

Machine Etruxure™

Preventa solutions for efficient machine safety

Catalogue
2014



Schneider
 Electric

How to find the “Automation and Control” products

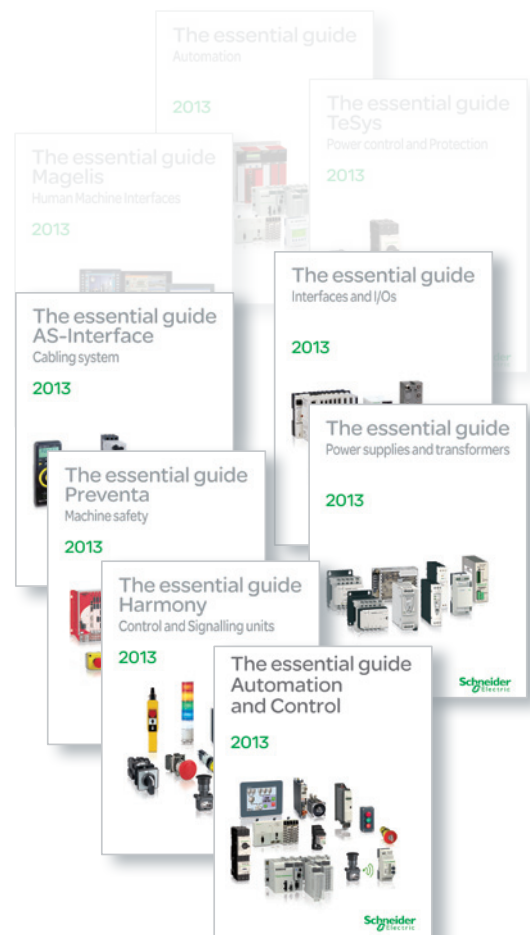
> Catalogs

Complete product ranges



> Essential guides

Selection of the top selling products



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Chapter 1

General presentation

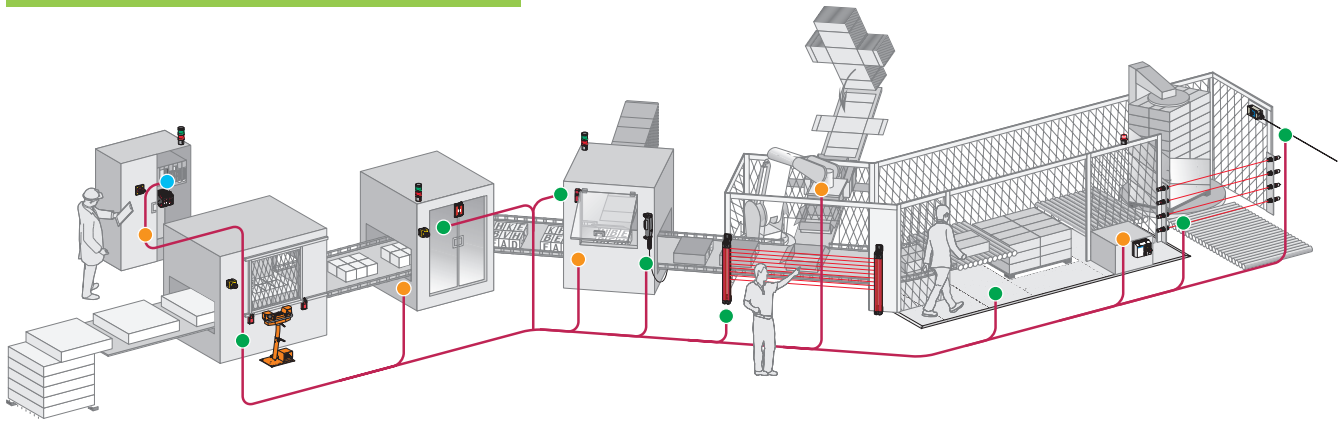


All technical information about products listed in this catalog
are available on: www.schneider-electric.com

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Product Approach

Schneider Electric Safety Approach



Schneider Electric is one provider of the complete safety chain.

In addition to moral obligation and economic consequences, the law requires that machinery operates safely in the interests of accident prevention. Preventa offers an extensive range of safety products, compliant with international standards, designed to provide the most comprehensive protection for personnel and equipment.

Acquire the information

- > Generic protective measures - Emergency stop
- > Two hand control stations and enabling switches for starting and enabling of dangerous movements
- > Protective guard devices used as part of safeguarding systems to control the access under specific conditions of reduced risk
- > Light curtains to detect approach to dangerous and limited areas

Monitor and processing

- > Safety modules manage one safety function, monitoring inputs from safety devices and managing the outputs to contactors and drives
- > Safety controllers: configurable safety device capable of managing multiple safety functions simultaneously
- > Safety PLCs: programmable electronic systems for complex distributed safety applications

Stop the machine

- > Contactors to cut-off the electrical power supply to the motors with mechanically linked mirror auxiliary contacts integrated for the feedback loop diagnosis used by the safety modules, controller and PLCs
- > Variable speed drives and servo drives provide controlled stopping of the machine by using embedded safety functions
- > Rotary switch disconnectors: for equipment isolation from the electrical supply and for emergency stop by direct interruption of the power supply

Solution Approach

Schneider Electric Safety Approach

One provider for the complete safety chain

- > Emergency stop
- > Perimeter guarding
- > Guard monitoring
- > Enabling movement
- > Speed monitoring
- > Position monitoring

The Safety Chain Solutions are TÜV certified safety architectures based upon the most common safety functions required on and around a machine. The safety chain solutions enable you to save time and costs when designing and manufacturing your machine in accordance with the European Machinery Directive.

Each solution comes with:

- > Bill of materials and the system description file
- > Wiring diagram
- > Layout of solution indicating performance level (PL) and safety integrity level (SIL)
- > Description of the Performance Level and Safety Integrity Level calculation for the safety function
- > Sistema Library file with corresponding solution
- > TÜV certification



1

Machine Solutions Services & Support

Service and support that are behind you all the way

Design



We find the best solution for your needs

- > Based on your needs, System and Architecture Experts and Application Design Experts (SAE/ADE) work out innovative technical solutions including
 - > Co-engineering
 - > Tests
 - > Validation

We understand your pain points

- > Consulting

We execute the solution with a full service agreement

- > Our solution design and project centers (Flex-Centres) are committed to quality and results and provide:
 - > Project and program management
 - > Software and hardware engineering
 - > Tests, validation, and commissioning

We improve your team's competencies

- > In class training and on site training

Build



We ensure the delivery of your solution

- > Availability of components through a large worldwide network of distributors
- > Collaboration, management, and delivery through local partners
- > With Schneider Electric as your turnkey solution partner we include in our solutions:
 - > Project management and responsibility
 - > Engineered systems
 - > Third-party components management

We provide on-site services and support

- > Qualified personnel to deliver on-site engineering and technical services

We improve your service team's competencies

- > Service and commissioning training

Operate



We provide international sales and after-sales services for you and your customers

- > Maintenance contracts
- > Spares parts
- > Repairs
- > Normal and express deliveries
- > Service expertise:
 - > Error diagnosis and repair
 - > Environmental measurements (EMC, field bus, thermography, power quality analyses, etc.)
- > Customer International Support (CIS) as a single point of contact:
 - > A network of 190 dedicated local country experts
 - > A web-based collaborative platform for efficient communication

Improve



Improve your machine ranges

- > Consulting

We improve your customer's machines in their production line

- > Audits
- > Retrofitting
- > Migration and upgrade
- > Training

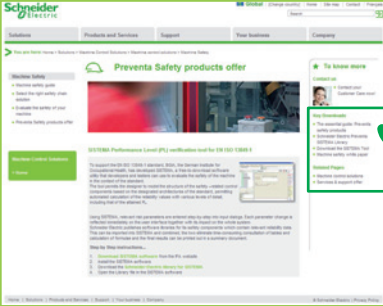
Schneider Electric Library for SISTEMA

To support the EN/ISO 13849-1 standard, IFA, the German Institute for Occupational Health, has developed SISTEMA, a free-to-download software utility that designers and verifiers can use to evaluate the safety of the machine in the context of the standard.

The tool permits the designer to model the structure of the safety-related control components based on the designated architectures of the standard, permitting automated calculation of the reliability values with various levels of detail, including that of the attained PL.

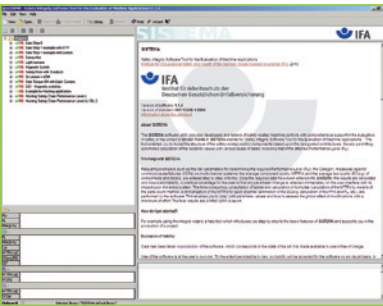
Using SISTEMA, relevant risk parameters are entered step-by-step into input dialogs. Each parameter change is reflected immediately on the user interface together with its impact on the whole system.

Schneider Electric publishes software libraries for its safety components which contain relevant reliability data. This can be imported into SISTEMA and combined, the two eliminate time-consuming consultation of tables and calculation of formulae and the final results can be printed out in a summary document.



Download

Schneider Electric library for SISTEMA



SISTEMA software

Industrial accidents

An industrial accident occurs through work or in the workplace and causes minor to serious injury to a person using a machine, feeding it or carrying out special work on it (fitter, operator, maintenance personnel, etc.).

Causes of accidents in the workplace

- > Human-related factors (designers, users):
 - > poor grasp of machine design
 - > over-familiarity with danger through habit and failure to take dangerous situations seriously
 - > underestimation of hazards, causing people to ignore safe working procedure
 - > loss of concentration on tasks to be performed (e.g. fatigue)
 - > failure to comply with procedures
 - > stressful working conditions (noise, work rates, etc.)
 - > uncertainty of employment which can lead to inadequate training
 - > inadequate or bad maintenance, generating unsuspected hazards
- > Machine-related factors:
 - > inadequate guards
 - > inherent machine hazards (e.g. reciprocal motion of a machine, unexpected starting or stopping)
 - > machines not suited to the application or environment (e.g. sound alarms deadened by the noise of surrounding machinery)
- > Plant-related factors:
 - > movement of personnel from machine to machine (automated production line)
 - > machinery from different manufacturers and using different technologies
 - > flow of materials or products between machines

Consequences

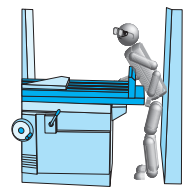
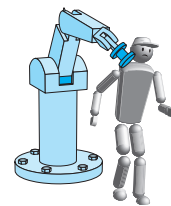
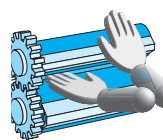
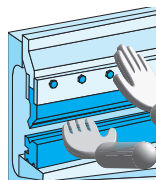
- > Risk of varying degrees of physical injury to the user
- > stoppage of the machine involved
- > stoppage of similar machine installations for inspection, for example by health and safety inspectors
- > if necessary, modifications to make machinery safe
- > change of personnel and training new personnel for the job
- > damage to the company brand image

Conclusion

Damages for physical injuries are equivalent to about 20 thousand million euro paid out each year in the European Union. Decisive action is required to reduce the number of accidents in the workplace. The first essentials are adequate company policies and efficient organisation. Reducing the number of industrial accidents and injuries depends on the safety of machines and equipment.

Types of potential hazard

The potential hazards of a machine can be classified into three main groups, as illustrated below:



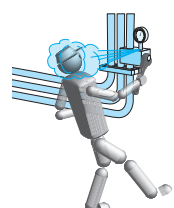
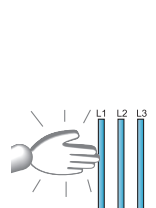
Mechanical hazards

Puncturing, cutting, shearing, fractures, severing

Catching, entanglement, drawing in, trapping

Impact

Crushing



Electrical hazards

Physical and chemical hazards

Electric shock, electrocution, burns

Discharge of dangerous substances

Burns

European legislation

Safety has become a key issue for businesses. Social developments in association with technological progress have had a profound impact on legislation and on regulations for the use of building electrical automation equipment.

Social issues

The safety-conscious nature of our western societies has led the legislature to increase the number of requirements and establish stricter rules, while the high cost of accidents has prompted companies to make efforts in the same direction.

Technological issues

Increasing levels of automation have led to new restrictions. In some cases it is difficult, if not dangerous, to stop a machine suddenly and it is necessary to perform a safe shut down sequence before allowing personnel to enter into a production cell. The increasingly widespread use of electronics and software has required a different approach to the solutions adopted; empirical rules are no longer enough. Selection includes a reliability calculation to determine the behavior of the system. In this context, the specification and design phase are crucial. Studies show that more than 2/3rds of incidents are due to bad design and inadequate specifications. At this stage it is therefore necessary to estimate potential risks and select the most appropriate solutions to reduce their consequences. Standards are available to assist and guide the designer.

Manufacturers of components and solutions help their customers by offering complete, ready-to-use functions which, when combined in accordance with the regulations, satisfy the customer's needs and meet legislative requirements. In this chapter, we will present a simplified process. To make a choice, the customer will then be able to refer to the safety functions chapter and to the safety products chapters.

European legislation requires that preventive action be taken to preserve and protect the quality of the environment and human health. To achieve these objectives, European Directives have been prepared which must be applied by plant operators and by manufacturers of equipment and machines. It also assigns responsibility for possible accidents.

- > Notwithstanding the constraints, machine safety has the following positive repercussions:
 - > prevention of industrial accidents
 - > protection of workers and personnel by means of suitable safety measures that take into account the machine's application and the local environment
- > This makes it possible to reduce direct and indirect related costs:
 - > by reducing physical harm
 - > by reducing insurance premiums
 - > by reducing production losses and possible delay penalties
 - > by limiting damages and costs for maintenance
- > Safe operation involves two principles: safety and reliability of the process:
 - > safety is the ability of a device to keep the risk incurred by persons within acceptable limits
 - > reliability of operation is the ability of a system or device to perform its function at any moment in time and for a specified duration
- > Safety must be taken into account right from the beginning of the design stage and kept in place throughout all stages of a machine's life cycle: transport, installation, commissioning, maintenance, dismantling

The main purpose of the Machinery Directive 2006/42/EC is to compel manufacturers to guarantee a minimum safety level for machinery and equipment sold within the European Union. This version has been replacing the 98/37/EC version since January 2010.

To allow free circulation of machinery within the European Union, the CE marking must be applied to the machine and an EC declaration of conformity is issued to the purchaser. This directive came into effect in January 1995 and has been enforced since January 1997 for all machines.

The user has obligations defined by the Use of Work Equipment directive 89/655/EEC which can in most cases be met by using machinery compliant with relevant standards.

These standards are complex. After a brief presentation of the structure of the standards system, we will provide the practical guide to the typical standards to be applied according to the selected control system design.

Certification and CE marking

Certification and CE marking

There are 6 stages in the process for certification and affixing of the CE marking on machines:

- 1 Apply all the relevant directives
- 2 Conform to the essential health and safety requirements
- 3 Draw up the technical documentation
- 4 If applicable proceed with the conformity examination
- 5 Draw up the Declaration of Conformity
- 6 Affix the CE marking

The Machinery Directive

The Machinery Directive is an example of the “New approach” for the harmonization of products in terms of technical specifications and standards.

It is based on:

- > Essential health and safety requirements which must be complied with before the machine is put on the market
- > A voluntary harmonization process of standards undertaken by the European Standards Committee (CEN) and the European committee for electro-technical standardization (CENELEC)
- > Conformity of evaluation procedures adapted to the types of risk and associated with machine types
- > The CE marking, affixed by the manufacturer to indicate that the machine conforms to the applicable directives; machines bearing this marking can circulate freely within the European Union

The directive has considerably simplified the multiple national legislations which were in force and has therefore removed many barriers which made trading difficult in the European Union. This has also made it possible to reduce the social cost of accidents. The directives do not apply to pre-existing machines within the EU unless they are substantially modified. A list of the machines requiring special attestation procedures can be found in the Machinery Directive Annex 4.

The essential requirements

Annexe I of the Machinery Directive groups together the essential health and safety requirements, for putting machines and safety components on the market and into service in Europe.

It follows that:

- > If all the requirements of the directive are complied with, no member state of the European Union can oppose circulation of this product
- > If the requirements of the directive are not complied with, putting the product on the market may be prohibited or withdrawal of the product from the market may be required

In the European Union, this concerns not only manufacturers or their distributors, but also importers and resellers who import these machines or put them into service. Second-hand machines within the EU are not covered, but used machines that have been modified or refurbished can be considered to be new machines.

The harmonized standards

The simplest way to demonstrate conformity with the directives is to conform to the European Harmonized Standards. When, for a product listed in Annex 4 of the Machinery Directive, there is no harmonized standard, or the existing standards are not relevant to cover the essential health and safety requirements, or if the manufacturer considers that these standards are not applicable to their product, they can apply for approval by an outside Notified Body.

These bodies are approved by the Member States after having shown that they have the recognized expertise to give such an opinion (TÜV, BGIA, INRS, BSI Product Services, etc.).

Although the Notified Body has a certain number of responsibilities under the Directive, it is always the manufacturer or their representative who remain responsible for conformity of the product.

Certification and CE marking (continued)

Declaration of conformity

In accordance with Article 1 of the Machinery Directive, the manufacturer or their authorized representative established in the European Union must draw up a European Declaration of Conformity for each machine (or safety component). This is in order to certify that the machine or safety component conforms to the Directive.

Before putting a product on the market, the manufacturer or their representative must prepare a technical file.

CE marking

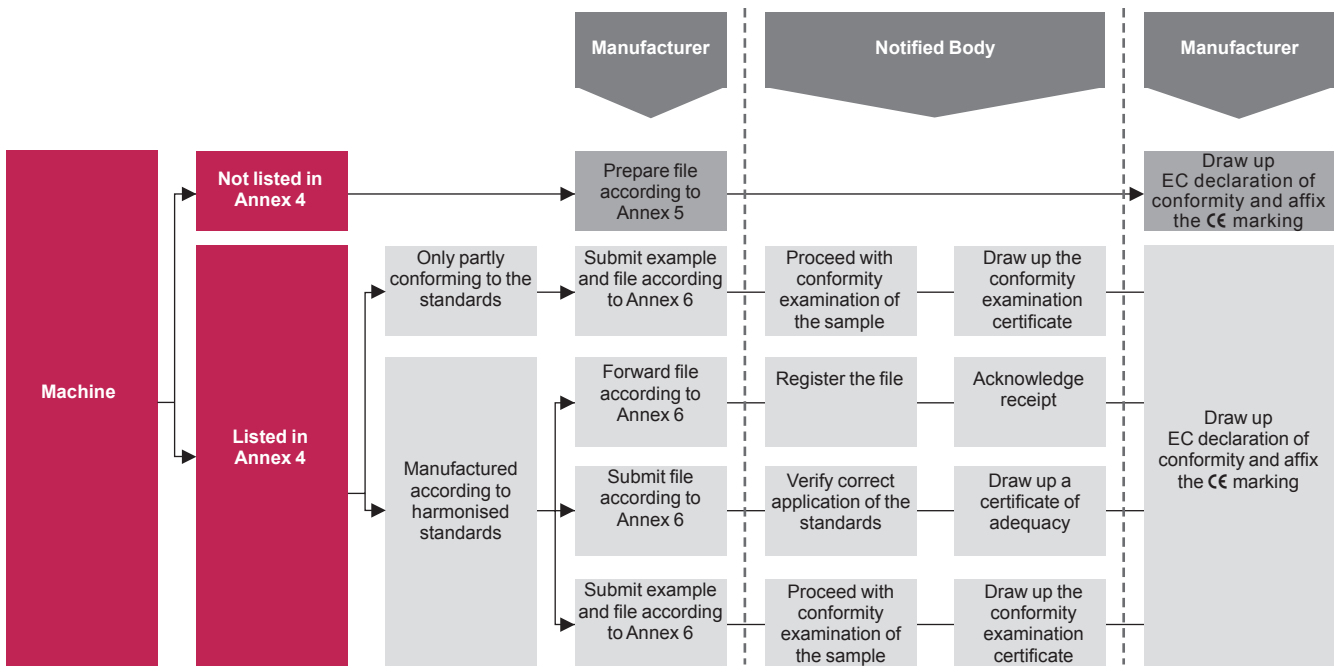
Finally, the CE mark must be affixed to the machine by the manufacturer or their authorized representative in the European Union. This marking has been obligatory since 1st January 1995 and can only be affixed if the machine conforms to all the applicable directives, such as:

- > The Machinery Directive 2006/42/ECC
- > The Electromagnetic Compatibility (EMC) directive 2004/108/EC
- > The Low Voltage Directive 2006/95/EC

There are other directives such as the protection of persons, lifts, medical equipment, etc., which may also be applicable.

The CE marking is the machine's passport in the European Union, which allows it to be marketed in all countries within the Union without taking into account regulations in each individual country.

CE marking procedure



Standards

Introduction

The harmonized European safety standards establish technical specifications which comply with the minimum safety requirements defined in the related directives. Compliance with all applicable harmonized European standards can be assumed to ensure compliance with the related directives. The main purpose is to guarantee a minimum safety level for machinery and equipment sold within the EU market and allow the free circulation of machinery within the European Union.

The 3 groups of European standards

- > **Type A** standards
Basic safety standards which specify the basic concepts, design principles and general aspects valid for all types of machine: e.g. EN/ISO 12100
- > **Type B** standards
Standards relating to specific aspects of safety or to a particular device that can be used on a wide range of machines
- > **Type B1** standards
Standards relating to specific safety aspects of machines: e.g. EN/IEC 60204-1 Electrical equipment of machines
- > **Type B2** standards
Standards relating to specific products such as two-hand control stations (EN 574), guard switches (EN 1088/ISO 14119), emergency stops (EN/ISO 13850), etc
- > **Type C** standards
Standards relating to various families or groups of machines (e.g.: hydraulic presses EN 693, robots, etc) and giving detailed applicable requirements

A selection of standards

Standards	Type	Subject
EN/ISO 12100	A	Machinery safety - General principles for design, risk assessment and risk reduction
EN 574	B	Two-hand control devices - Functional aspects and design principles
EN/ISO 13850	B	Emergency stop - Principles for design
EN/IEC 62061	B	Functional safety of safety-related electrical, electronic and electronic programmable control systems
EN/ISO 13849-1	B	Machinery safety - Safety-related parts of control systems - Part 1 General principles for design
EN/ISO 13849-2	B	Machinery safety - Safety-related parts of control systems - Part 2 Validation
EN 349	B	Minimum gaps to avoid crushing parts of the human body
EN 294	B	Safety distances to prevent hazardous zones being reached by upper limbs
EN 811	B	Safety distances to prevent hazardous zones being reached by lower limbs
EN/IEC 60204-1	B	Machinery safety - Electrical equipment of machines - Part 1: general requirements
EN 999/ISO 13855	B	Positioning of protective equipment in respect of approach speeds of body parts
EN 1088/ISO 14119	B	Interlocking devices associated with guards - Principles for design and selection
EN/IEC 61496-1	B	Electro-sensitive protective equipment
EN/IEC 60947-5-1	B	Electromechanical control circuit devices
EN 842	B	Visual danger signals - General requirements, design and testing
EN 1037	B	Prevention of unexpected start-up
EN 953	B	General requirements for the design and construction of fixed and movable guards
EN/IEC 61800-5-2	B	Adjustable speed electrical power drive systems. Part 5-2: Safety requirements – Functional
EN 201	C	Machinery for plastics and rubber - Injection moulding machines – Safety requirements
EN 692	C	Mechanical presses - Safety requirements
EN 693	C	Hydraulic presses - Safety requirements
EN 289	C	Machinery for plastics and rubber - Presses - Safety requirements
EN 422	C	Blow moulding machines for producing hollow parts - Design and construction requirements
EN/ISO 10218-1	C	Manipulating industrial robots - Safety requirements
EN 415-4	C	Safety of packaging machines - Part 4: palletisers and depalletisers
EN 619	C	Safety and EMC requirements for equipment for mechanical handling of unit loads
EN 620	C	Safety and EMC requirements for fixed belt conveyors for bulk material
EN 746-3	C	Industrial thermo processing equipment - Part 3: safety requirements for the generation and use of atmosphere gases

Standards to be applied

The process

European Machinery Directive 2006/42/EC
Compliance with the following standards ensure compliance with the Machinery Directive (this new version of the Machinery Directive 2006/42/EC has been replacing 98/37/EC since January 2010).

European Machinery Directive 2006/42/EC

EN/ISO 12100: 2010: General principles for design, risk assessment and risk reduction.
The purpose of this standard is to provide designers with an overall framework and guidance to enable them to produce machines that are safe for their intended use.

Machinery safety
General principles for design, risk assessment and risk reduction
EN/ISO 12100: 2010

Standards to be apply according to the design selected for the safety-related machine control system.

Remarks:
The use of either the EN/ISO 13849 or EN/IEC 62061 standards gives presumption of conformity to the new 2006/42/EC directive.

EN/ISO 13849-1
EN/ISO 13849-2

Machinery safety
Safety-related parts of control systems

EN/IEC 62061

Machinery safety
Functional safety of safety-related electrical, electronic and programmable electronic control systems

EN/IEC 60204-1: Electrical equipment of machines
Standard EN/IEC 60204-1 completes the safety standards by giving setting-up rules for each component of a machine's electrical functions.
It specifies, amongst other things:
> the type of connection terminals and disconnection and breaking devices
> the type of electric shock protection
> the type of control circuits
> the type of conductors and wiring rules
> the type of motor protection

Machinery safety
EN/IEC 60204-1
Electrical equipment of machines

Standard to be applied according to the design selected for the safety related machine control system

Safety standards to be applied according to type of architecture selected
Based on the generic definition of the risk, the standards classify necessary safety levels in different discrete levels corresponding for each one to a probability of dangerous failure per hour:
> PL (Performance Level) for standard EN/ISO 13849-1
> SIL (Safety Integrity Level) for standard EN/IEC 62061

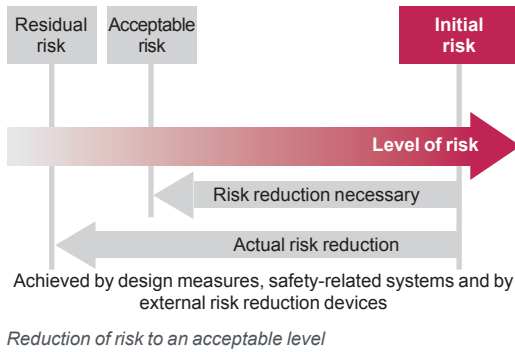
Certification and **CE** marking in accordance with the Machinery Directive

Standards to be applied for the design of machines

Risk and safety

Safety is the absence of risks which could cause injury to or damage the health of persons. Functional safety is a part of safety that depends on the correct operation of safety functions.

According to the requirements of standard EN/ISO 12100: 2010, the machine designer's job is to reduce all risks to a value lower than the acceptable risk. For more details concerning the sources of accidents and risk prevention, the reader is referred on page 1/6.



This standard recognizes two sources of hazardous phenomena:

- > Moving transmission parts
- > Moving parts contributing to the work

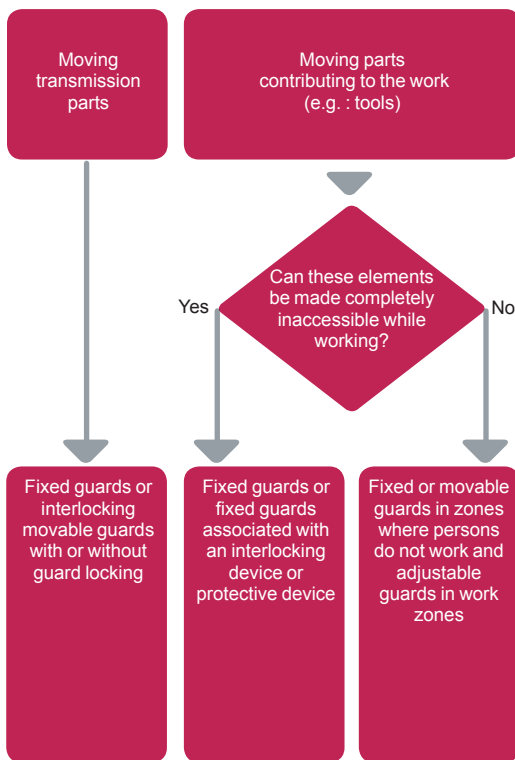
It gives guidelines for the selection and installation of devices which can be used to protect persons and identifies those measures that are implemented by the machine designer and those dependent on its user.

The measures taken by the machine designer may be:

- > Inherent in the design
- > Selection of guards and additional measures, including control systems
- > Information for the user

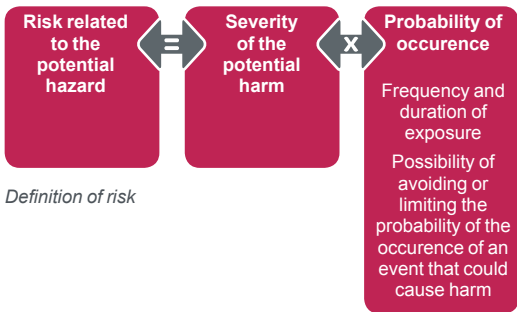
The measures taken by the user may be (non-exhaustive list):

- > Organization, procedures, etc.
- > Personal protective equipment
- > Training



Selection of the protection system
(EN/ISO 12100: 2010)

Risk Assessment



Definition of risk

Assessment of machinery related risk

European legislation

Machines are sources of potential risk and the Machinery Directive requires a risk assessment to ensure that any potential risk is reduced to less than the acceptable risk.

Standard EN/ISO 12100 defines risk as follows: risk is the severity multiplied by the possibility of occurrence. It defines an iterative process for achieving machine safety, which states that the risks for each potential hazard can be determined in four stages. This method provides the basis for the requisite risk reduction.

Risk assessment

- > Risk assessment consists of a series of logic steps which make it possible to systematically analyze and evaluate machinery-related risks
- > Risk assessment is followed, whenever necessary, by a reduction of the risk. This definition taken from standard EN/ISO 12100 is based on an iterative process represented in the diagram opposite

Determination of machine limits

Risk assessment starts by determining the limits of the machine at all stages of its life cycle:

- > Transport, assembly, installation
- > Commissioning
- > Use
- > De-commissioning, dismantling

The use limitations must then be specified:

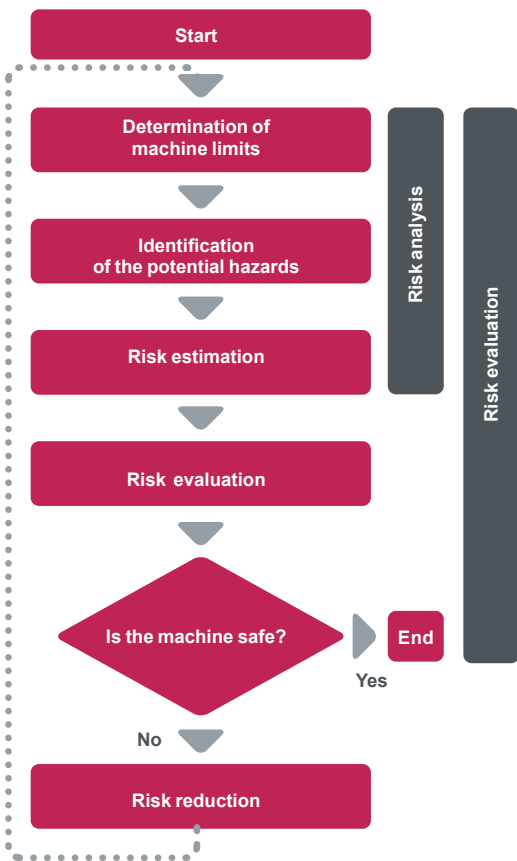
- > Operating modes
- > Level of training required
- > Space limits (amplitude, movement)
- > Time limits (life cycle, frequency of maintenance)

Identification of the potential hazard

If a potential hazard exists, a hazardous phenomenon will cause harm if measures are not taken.

All the tasks associated with the machine's life cycle must be identified, such as:

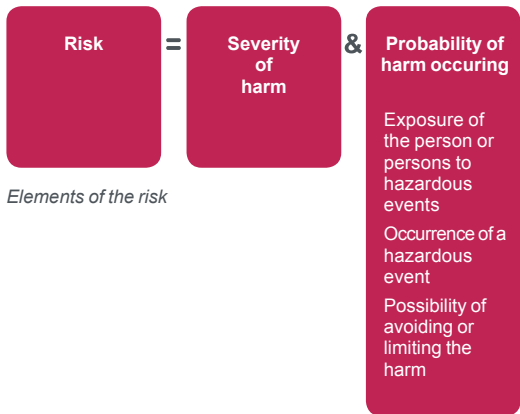
- > Assembly, transport and installation
- > Adjustment, testing
- > Learning, programming
- > Tool changing
- > Feeding, removal of product from the machine
- > Starting, stopping
- > Emergency Stops, restarting after an unexpected stop
- > Maintenance, cleaning, etc.



Logic steps for risk analysis

1

Risk Assessment



Risk estimation

The risk is a function of the severity of the harm and the probability that this harm will occur.

- > The severity of the harm takes into account:
 - > The severity of injuries (slight, serious, death)
 - > The extent of the harm (number of persons)
- > The probability of the harm occurring takes into account:
 - > Exposure to the hazard (nature of access, time spent in the hazardous zone, number of persons exposed, frequency of access, etc.)
 - > The occurrence of a hazardous event (accident history, comparison of risks, etc.)
 - > The possibility of avoiding or limiting the harm (experience, awareness of the risk, etc.)

Risk assessment

On the basis of the risk assessment, the designer has to define the safety related control system.

To achieve that, the designer will choose one of the two standards appropriate to the application:

- > either standard EN/ISO 13849-1, which defines performance levels (PL)
- > or standard EN/IEC 62061, which defines safety integrity level (SIL)



- λ rate of control system failures
- λ_D rate of dangerous failures
- λ_{DU} rate of undetected dangerous failures
- λ_{DD} rate of detected dangerous failures
- λ_S rate of safe failures
- λ_{SU} rate of undetected safe failures
- λ_{SD} rate of detected safe failures

Breakdown of the probability of failures

Risk reduction

The process of risk reduction for dangerous events starts by:

- > Intrinsic prevention (inherently safe design)
- > Definition of the appropriate protective means (guards, carters, fix fences, etc.)
- > Personal training

If the selected preventive measure depends on a safety related control system, the designer has to perform an iterative process for the design of the safety relative control system.

- > The first stage is to define the necessary safety-related control functions:
 - > either through the choice of components
 - > or by adapting the control system architecture. Redundancy (double circuit components), for example, significantly increases the reliability of the solution
- > Once the limits of available technologies have been reached, it will not be possible to further reduce the rate of dangerous failures. To achieve the required level of safety, it will be necessary to use a diagnostic system that allows dangerous failures to be detected

How to choose between EN/ISO 13849 and EN/IEC 62061

Select the applicable standard

Based on the generic definition of the risk, the standards classify necessary safety levels in different discrete levels corresponding for each one to a probability of dangerous failure per hour:

- > PL (Performance Level) for standard EN/ISO 13849-1
- > SIL (Safety Integrity Level) for standard EN/IEC 62061

The table below gives the relationship between the performance level (PL) and the Safety Integrity Level (SIL).

PL	ISL	Probability of dangerous failures per hour 1/h
a	No correspondance	$\geq 10^{-5} \dots < 10^{-4}$
b	1	$\geq 3 \times 10^{-6} \dots < 10^{-5}$
c	1	$\geq 10^{-6} \dots < 3 \times 10^{-6}$
d	2	$\geq 10^{-7} \dots < 10^{-6}$
e	3	$\geq 10^{-8} \dots < 10^{-7}$

Recommended application of IEC 62061 and ISO 13849-1

Annex	Technology implementing the safety related control fuction (S)	ISO 13849-1	IEC 62061
A	Non electrical, e.g. hydraulics	X	Not covered
B	Electromechanical, e.g. relays, or non-complex electronics	Restricted to designated architectures (see Note 1) and up to PL=e	All architectures and up to SIL 3
C	Complex electronics, e.g. programmable	Restricted to designated architectures (see Note 1) and up to PL=d	All architectures and up to SIL 3
D	A combined with B	Restricted to designated architectures (see Note 1) and up to PL=e	X see Note 3
E	C combined with B	Restricted to designated architectures (see Note 1) and up to PL=d	All architectures and up to SIL 3
F	C combined with A, or C combined with A and B	X see Note 2	X see Note 3

"X" indicates that this item is dealt with by the standard shown in the column heading.

Note 1 Designated architecture are defined in Annex B of EN/ISO 13849-1 to give a simplified approach for qualification of performance level

Note 2 For complex electronics: use of designated architecture according to EN/ISO 13849-1 up to PL=d or any architecture according to EN/IEC 62061

Note 3 For non-electrical technology use parts according to EN/ISO 13849-1 as subsystems.

For building specific complex sub-systems or for higher level requirements including software, standard EN/IEC 61508 relating to systems must be used.

1

Standard EN/ISO 13849-1
Standards to be applied according to the design selected for the safety-related machine control system

Introduction to Functional Safety of Machinery

The functional safety standards are intended to encourage designers to focus more on the functions that are necessary to reduce each individual risk, and on the performance required for each function, rather than simply relying on particular components. These standards make it possible to achieve greater levels of safety throughout the machine's life.

- > Under the previous standard, EN 954-1, categories (B, 1, 2, 3 and 4) dictated how a safety-related electrical control circuit must behave under fault conditions. Designers can follow either EN/ISO 13849-1 or EN/IEC 62061 to demonstrate conformity with the Machinery Directive. These two standards consider not only whether a fault will occur, but also how likely it is to occur
- > This means there is a quantifiable, probabilistic element in compliance: machine builders must be able to determine whether their safety circuit meets the required safety integrity level (SIL) or performance level (PL). Panel builders and designers should be aware that manufacturers of the components used in safety circuits (such as safety detection components, safety logic solvers and output devices like contactors) must provide detailed data on their products

Standard EN/ISO 13849-1 Machinery safety - Safety-related parts of control systems

Standard EN/ISO 13849-1 is an evolution of standard EN 954-1.

Field of application of the standard

This standard gives safety requirements and advice relating to principles for the design and integration of safety-related parts of control systems (SRP/CS), including software design. For these parts, it specifies the characteristics, including the performance level, needed to achieve these safety functions. It applies to the SRP/CS of all types of machine, regardless of the technology and type of energy used (electric, hydraulic, pneumatic, mechanical, etc.).

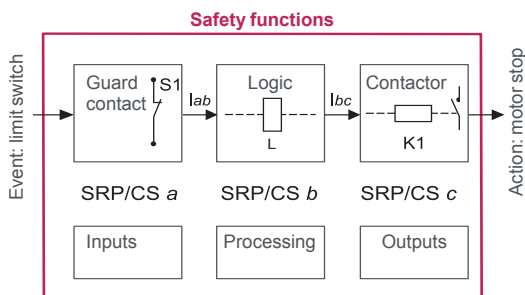
Process

Risk assessment as defined in standard EN/ISO 12100 leads to decisions on risk reduction measures.

If these measures depend on a control system, then EN/ISO 12100 can apply. It defines a **6-stage design process**:

- 1 - Selection of the essential safety functions that SRP/CS must perform. For each safety function, specify the required characteristics
- 2 - Determine the required performance level (PLr)
- 3 - Design and technical creation of safety functions: identify the parts that perform the safety function
- 4 - Evaluate the performance level PL for each safety-related part
- 5 - Check that the performance level PL achieved is greater than or equal to the required level (PLr)
- 6 - Check that all requirements are satisfied

We will now illustrate these stages, taking as an example a safety function where a severe injury can be caused by a trolley not stopping at the end of the Jib and thus causing the trolley to fall. A person can be exposed to this dangerous situation around the hoisting machine.



Representation of the safety function

Stage 1 - Selection of safety functions

The diagram opposite shows a safety function which consists of several parts:

- > The input actuated by opening of the guard (SRP/CSa)
- > The control logic, limited in this example to opening or closing of a contactor coil (SRP/CSb)
- > The power output that controls the motor (SRP/CSc)
- > The connections (lab, lbc)

Stage 2 - Estimation of required performance level (PLr)

Considering our example of the person coming into area where the dangerous hoisting machine is operating we now estimate the risk using the risk graph.

The parameters to be considered are:

- > **S** Severity of the injury
 - > **S1** Slight injury, normally reversible
 - > **S2** Serious, normally irreversible, including death
- > **F** Frequency and/or duration of exposure to the hazardous phenomenon
 - > **F1** Rare to fairly frequent and/or short duration of exposure
 - > **F2** Frequent to permanent and/or long duration of exposure
- > **P** Possibility of avoiding the hazardous phenomena or limiting the harm
 - > **P1** Possible under certain circumstances
 - > **P2** Virtually impossible

Risk related to the potential hazard

$$= \text{Severity of the potential harm} \times \text{Probability of occurrence:}$$

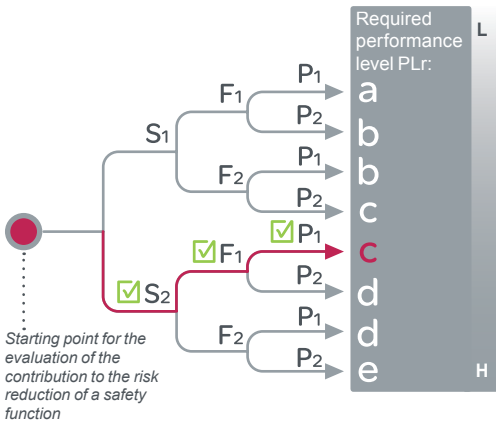
- Frequency and duration of exposure
- Possibility of avoiding or limiting the probability of the occurrence of an event that could cause the harm

Risk analysis

Standard EN/ISO 13849-1
Machinery safety - Safety-related parts of control systems (continued)
Process (continued)

Stage 2 - Estimation of required performance level (PLr) (continued)

For our example: a serious injury S1 can be caused by being exposed near the hoisting machine as if there is no safe guarding to ensure the trolley stops the load and trolley will fall. After considering the severity of the injury we investigate the frequency and/or duration of the possible entry to the dangerous area. Here we define the frequency of exposure to the hazard is low F1 (occasional presence) as there are restrictions to enter the area. The last step is based upon the possibility to avoid the hazard and limiting the harm as the visibility around the dangerous machine is monitored by the operator and in this case there is a possibility to avoid the harm under certain conditions so we define it as P1.
The result of the estimation gives a required performance level PLr = c.



- Estimation of required performance level**
- S = Severity of injury**
 - S1 = Slight (normally reversible injury)
 - ☑ S2 = Serious (normally irreversible) injury including death
 - F = Frequency and/or exposure time to the hazard**
 - ☑ F1 = Seldom to less often and/or the exposure time is short
 - F2 = Frequent to continuous and/or the exposure time is long
 - P = Possibility of avoiding the hazard or limiting the harm**
 - ☑ P1 = Possible under specific conditions
 - P2 = Scarcely possible
 - L = Low contribution to risk reduction
 - H = High contribution to risk reduction
 - ➔ Estimation

Stage 3 - Design and creation of the safety functions

At this point, we need to describe the PL calculation method. For a SRP/CS (or a combination of SRP/CS), PL could be estimated with the figure shown on page 1/19, after estimation of several factors such as :

- > Hardware and software system structure (categories)
- > Mechanism of failures, diagnostic coverage (DC)
- > Components reliability, Mean Time To dangerous Failure (MTTF_d)
- > Common Cause Failure (CCF)

> Categories (Cat.) and designated architectures

The table below summarises system behaviour in the event of a failure and the principles used to achieve the safety, for the 5 categories defined:

Cat.	System behaviour	Designated architectures
B	A fault can lead to loss of the safety function	
1	As for category B but the probability of this occurrence is lower than for the category B	
2	A fault can lead to loss of the safety function between two periodic inspections and loss of the safety function is detected by the control system at the next test.	
3	For a single fault, the safety function is always ensured. Only some faults will be detected. The accumulation of undetected faults can lead to loss of the safety function.	
4	When faults occur, the safety function is always ensured. Faults will be detected in time to prevent loss of the safety function	

- Key:**
- im: Interconnecting means
 - c: Cross monitoring
 - I, I1, I2: Input device, e.g. sensor
 - L, L1, L2: Logic
 - m: Monitoring
 - O, O1, O2: Output device, e.g. main contactor
 - TE: Test equipment
 - OTE: Output of TE

> MTTF_d (Mean Time To dangerous Failure)

The value of the MTTF_d of each channel is given in 3 levels (see table below) and shall be taken into account for each channel (e.g. single channel, each channel of a redundant system) individually.

Reliability levels of components	
Index	Range
Low	3 years ≤ MTTF _d < 10 years
Medium	10 years ≤ MTTF _d < 30 years
High	30 years ≤ MTTF _d < 100 years

A MTTF_d of less than 3 years should never be found, because this would mean that after one year in operation, 30% of all those components in use would have failed to a dangerous state. The maximum value is limited to 100 years because devices dealing with a significant risk should not depend on the reliability of a single component. Additional measures such as redundancy and tests are required.

Standard EN/ISO 13849-1
Standards to be applied according to the design selected for the safety-related machine control system

Standard EN/ISO 13849-1
Machinery safety - Safety-related parts of control systems (continued)

Process (continued)

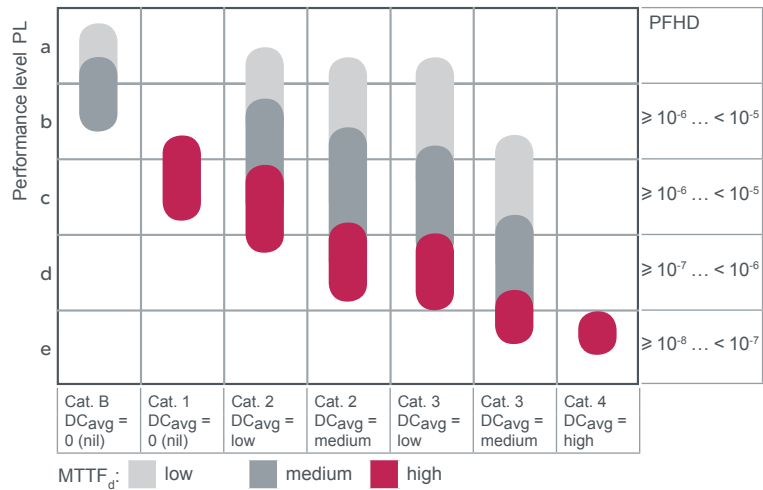
Stage 3- (continued)

> Diagnostic coverage (DC): this term is expressed as a percentage and quantifies the ability to diagnose a dangerous failure
For example, in the event of welding of a N/C contact in a relay, the state of the N/O contact could incorrectly indicate the opening of the circuit, unless the relay has mechanically linked N/O and N/C contacts, when the fault can be detected.
The standard recognises four levels:

Diagnostic coverage (DC)

Denotation	Range
Nil	DC < 60%
Low	60% ≤ DC < 90%
Medium	90% ≤ DC < 99%
High	99% ≤ DC

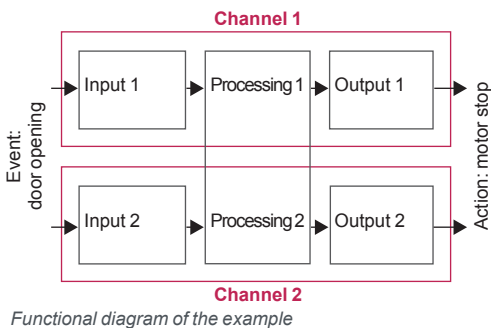
> Relationship between Categories, DC and MTTF_d of each channel and the PL



> Using the above chart we can now select the most appropriate architecture, the required Diagnostic coverage as well as ensure the products selected have the right MTTF_d values

> As we require PL= "c" the chart states as a minimum a category 1 architecture with a Diagnostic coverage of 0 (Nil) and a MTTF_d of High is required. It is possible to use architectures with higher categories to solve the safety function needs

> We start with determining the architecture required to solve the function. We use the following Category 1 architecture (see page 1/19)

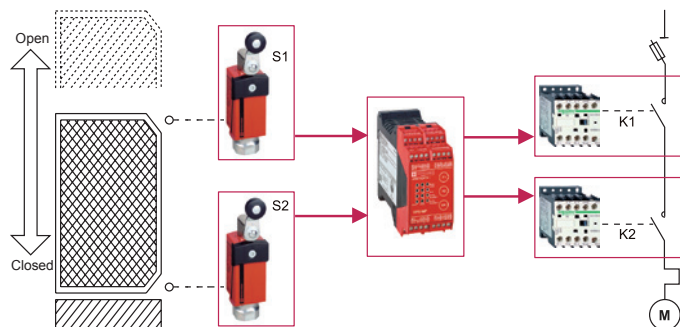


> In our example, to reach the PL = e, the solution will therefore have to correspond to category 4 with redundant circuit; the function scheme is shown opposite with two channels in parallel

> a high diagnostic capability

> a high MTTF_d

For our application, we could suggest a redundant relay scheme but it is nowadays easier to use safety function blocks. The solution is illustrated below.



The process suggested by the standard is iterative and a few estimations are therefore necessary in order to obtain the expected result. In view of the required performance level, we have chosen a solution with redundant circuit.

Standard EN/ISO 13849-1
Machinery safety - Safety-related parts of control systems (continued)
Process (continued)

Stage 4 - Evaluate the performance level PL for each safety-related part
 Based on the information in the supplier's catalogue and Annex E of the standard, we obtain the following values:

Example	B ₁₀ (number of operations) / % dangerous failure	MTTF _d	DC
SRP/CS _a : Safety limit switches	10.000.000 / 20% dangerous failure	7102	99%
SRP/CS _b : XPS AK safety module	-	154.5	99.99%
SRP/CS _c : LCK contactor	1.000.000 / 73% dangerous failure	194	99%

For electromechanical products, the MTTF_d is calculated on the basis of the total number of operations that the product can perform, using B_{10d} values:
 In our case, the machine operates for 220 days per year, 8 hours per day with a cycle of 90 s.

$$N = 220 \times 8 \times (3600 / 90) = 70\,400 \text{ operations/year}$$

$$MTTF_d = B_{10d} / (0.1 \times N) \text{ and } B_{10d} = B_{10} / \% \text{ dangerous failure.}$$

For the safety switches, the MTTF_d = (1 / 0.20 x 10 000 000) / (0.1) x 70 400 = 7102 years

For the contactors, the MTTF_d = (1 / 0.73 x 1 000 000) / (0.1) x 70 400 = 194 years

The MTTF_d for each channel will then be calculated using the formula:

$$\frac{1}{MTTF_d} = \frac{1}{MTTF_{da}} + \frac{1}{MTTF_{db}} + \frac{1}{MTTF_{dc}}$$

i.e. 85 years for each channel.

A similar formula is used to calculate the diagnostic capability

$$DC_{avg} = \frac{\frac{DC_a}{MTTF_{da}} + \frac{DC_b}{MTTF_{db}} + \frac{DC_c}{MTTF_{dc}}}{\frac{1}{MTTF_{da}} + \frac{1}{MTTF_{db}} + \frac{1}{MTTF_{dc}}}$$

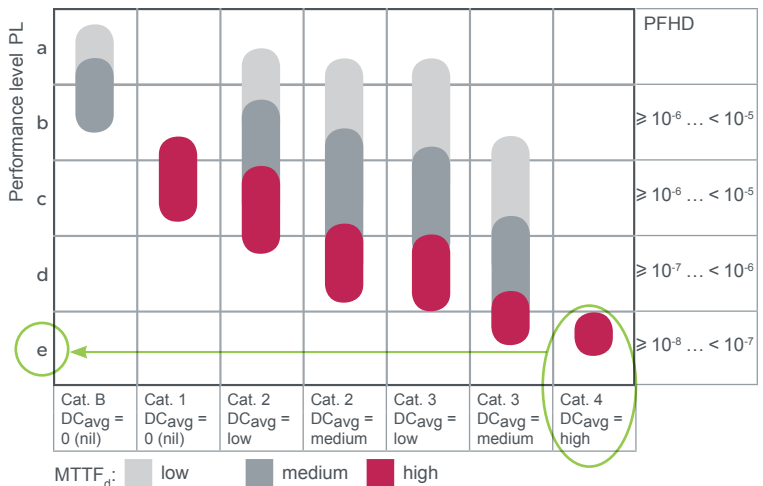
The result of the calculation in our example gives a value of 99%

Stage 5 - Checking that required performance level is achieved

The result of the above calculations is summarised below:

- > a redundant architecture: category 4
- > a mean time to failure > 30 years: high MTTF_d
- > a diagnostic capability of 99%: high DC

Looking at this table, we confirm that PL level e is achieved:



Checking the PL

Stage 6 - Validation of the required performance level

The design of SRP/CS must be validated and must show that the combination of SRP/CS performing each safety function satisfies all the applicable requirements of EN/ISO 13849.

Standard EN/IEC 62061
Standards to be applied according to the design selected for the safety-related machine control system

Standard EN/IEC 62061
Machinery safety - Safety-Related Electrical Control systems (SRECS)

Functional Safety of safety-related electrical, electronic and electronic programmable control systems

Field of application of the standard

Safety-related electrical control systems in machines (SRECS) are playing an increasing role in ensuring the overall safety of machines and are more and more frequently using complex electronic technology.

This standard is specific to the machine sector within the framework of EN/IEC 61508. It gives rules for the integration of sub-systems designed in accordance with EN/ISO 13849. It does not specify the operating requirements of non-electrical control components in machines (for example: hydraulic, pneumatic).

Functional approach to safety

As with EN/ISO 13849-1, the process using the EN/IEC 62061 starts with analysis of the risks (EN/ISO 12100) in order to be able to determine the safety requirements.

A particular feature of this standard is that it prompts the user to make a functional analysis of the architecture, then split it into sub-functions and analyse their interactions before deciding on a hardware solution for them (the SRECS).

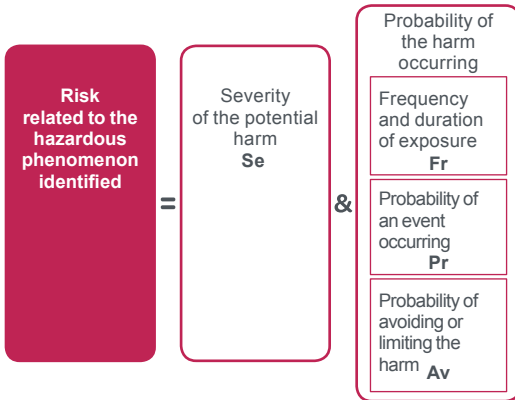
- > A functional safety plan must be drawn up and documented for each design project. It must include:
 - > A specification of the safety requirements for the safety functions (SRFC) that is in two parts:
 - > Description of the functions and interfaces, operating modes, function priorities, frequency of operation, etc.
 - > Specification of the safety integrity requirements for each function, expressed in terms of **SIL** (Safety Integrity Level)
 - > The structured and documented design process for electrical control systems (SRECS)
 - > The procedures and resources for recording and maintaining appropriate information
 - > The process for management and modification of the configuration, taking into account organisation and authorised personnel
 - > The verification and validation plan

> **Functional safety**

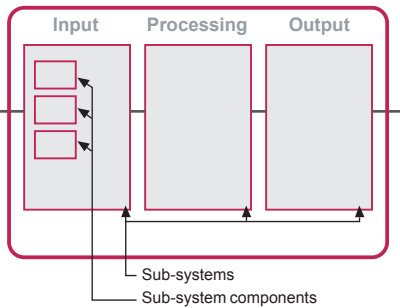
The decisive advantage of this approach is that of being able to offer a failure calculation method that incorporates all the parameters that can affect the reliability of electrical systems, whatever the technology used.

The method consists of assigning a SIL to each function, taking into account the following parameters:

- > The probability of a dangerous failure of the components (PFH_d)
- > The type of architecture; with or without redundancy, with or without diagnostic device making it possible to avoid some of the dangerous failures
- > Common cause failures (power cuts, overvoltage, loss of communication network, etc.) (CCF)
- > The probability of a dangerous transmission error where digital communication is used
- > Electromagnetic interference (EMC)



SRECS: Safety-related control system



Stage 1: Basic structure of the electrical control system

Standard EN/IEC 62061
Machinery safety - Safety-Related Electrical Control systems (SRECS) (continued)
Process

Designing a system is split into 5 stages after having drawn up the functional safety plan:

- 1 - Based on the safety requirements specification (SRS), assign a safety level (SIL) and identify the basic structure of the electrical control system (SRECS), describe each related function (SRCF)
- 2 - Break down each function into a function block structure (FB)
- 3 - List the safety requirements for each function block and assign the function blocks to the sub-systems within the architecture
- 4 - Select the components for each sub-system
- 5 - Design the diagnostic function and check that the specified safety level (SIL) is achieved.

Stage 1 - Assign a safety integrity level (SIL) and identify the structure of the SRECS

Based on the risk assessment performed in accordance with standard EN/ISO 12100, estimation of the required SIL is performed for each hazardous phenomenon and is broken down into parameters, see illustration opposite.

> Severity **Se**

The severity of injuries or damage to health can be estimated by taking into account reversible injuries, irreversible injuries and death.

The classification is shown in the table below:

Consequence	Severity Se
Irreversible: death, loss of an eye or an arm	4
Irreversible: shattered limb, loss of a finger	3
Reversible: requires the attention of a medical practitioner	2
Reversible: requires first aid	1

> Probability of the harm occurring

Each of the three parameters **Fr**, **Pr**, **Av** must be estimated separately using the most unfavourable case. It is strongly recommended that a task analysis model be used in order to ensure that estimation of the probability of the harm occurring is correctly taken into account.

> Frequency and duration of exposure **Fr**

The level of exposure is linked to the need to access the hazardous zone (normal operation, maintenance, ...) and the type of access (manual feeding, adjustment, ...). It must then be possible to estimate the average frequency of exposure and its duration.

The classification is shown in the table below:

Frequency of dangerous exposure	Fr
≤ 1 hour	5
>1 hour... ≤ 1 day	5
> 1 day... ≤ 2 weeks	4
2 weeks... ≤ 1 year	3
> 1 year	2

> Probability of occurrence of a hazardous event **Pr**.

Two basic concepts must be taken into account:

- > the predictability of the dangerous components in the various parts of the machine in its various operating modes (normal, maintenance, troubleshooting), paying particular attention to unexpected restarting
- > behaviour of the persons interacting with the machine, such as stress, fatigue, inexperience, etc.

Probability of occurrence of a dangerous event	Pr
Very high	5
Probable	4
Possible	3
Almost impossible	2
Negligible	1

Standard EN/IEC 62061
Standards to be applied according to the design selected for the safety-related machine control system

Standard EN/IEC 62061
Machinery safety - Safety-Related Electrical Control systems (SRECS) (continued)
Process (continued)

Stage 1 -(continued)

> Probability of avoiding or limiting the harm Av
 This parameter is linked to the design of the machine. It takes into account the suddenness of the occurrence of the hazardous event, the nature of the dangerous component (cutting, temperature, electrical) and the possibility for a person to identify a hazardous phenomenon.

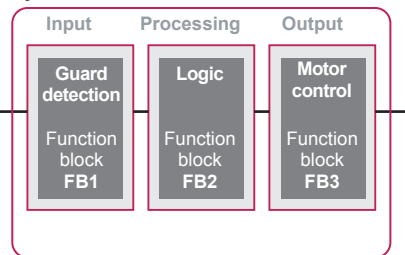
Probability of avoiding or limiting the harm	Av
Impossible	5
Almost impossible	3
Probable	1

> Assignment of the **SIL**

Estimation is made with the help of the table below.
 In our example, the degree of severity is 3 because there is a risk of a finger being amputated; this value is shown in the first column of the table.
 All the other parameters must be added together in order to select one of the classes (vertical columns in the table below), which gives us:
 > Fr = 5 accessed several times a day
 > Pr = 4 hazardous event probable
 > Av = 3 probability of avoiding almost impossible
 Therefore a class CI = 5 + 4 + 3 = 12
 A level of SIL 2 must be achieved by the safety-related electrical control system(s) (**SRECS**) on the machine.

Se	Class CI				
	3-4	5-7	8-10	11-13	14-15
4	SIL 2	SIL 2	SIL 2	SIL 3	SIL 3
3	-	-	SIL 1	SIL 2	SIL 3
2	-	-	-	SIL 1	SIL 2
1	-	-	-	-	SIL 1

SRECS
Objective SIL 2



Stage 2: Break down into function blocks

> Basic structure of the **SRECS**

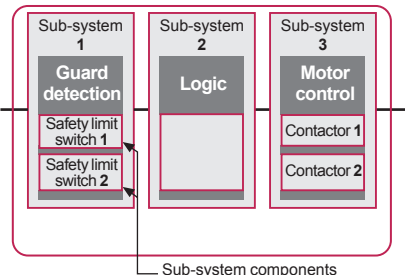
Without going into detail about the hardware components to be used, the system is broken down into sub-systems. In our case, we find the 3 sub-systems that will perform the input, processing and output functions. The figure opposite illustrates this stage, using the terminology given in the standard.

Stage 2 - Break down each function into a function block structure (FB)

A function block (FB) is the result of a detailed break down of a safety-related function.

The function block structure gives an initial concept of the SRECS architecture. The safety requirements of each block are deduced from the specification of the safety requirements of the system's function.

SRECS



Stage 3: Assignment of function blocks

Stage 3 - List the safety requirements for each function block and assign the function blocks to the sub-systems within the architecture

Each function block is assigned to a sub-system in the SRECS architecture. A failure of any sub-system will lead to the failure of the safety-related control function. More than one function block may be assigned to each sub-system. Each sub-system may include sub-system elements and, if necessary, diagnostic functions in order to ensure that anomalies can be detected and the appropriate action taken.

These diagnostic functions (D) are considered as separate functions; they may be performed within the sub-system, by another internal or external sub-system.

Standard EN/IEC 62061
Machinery safety - Safety-Related Electrical Control systems (SRECS) (continued)
Process (continued)

Stage 4 - Select the components for each sub-system

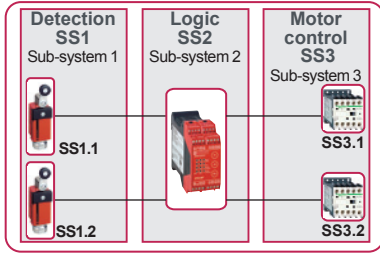
The products shown in the illustration opposite are selected. If the sensors and contactors are the same as in the previous example, a safety module XPS AK will be chosen. In this example, we take a cycle of 450s which means the duty cycle C is 8 operations per hour.

As the safety integrity level required for the entire system is SIL 2, each of the components must achieve this level.

The manufacturer's catalogue gives the following values:

Safety limit switches 1 and 2: $B_{10} = 10\,000\,000$ operations, the proportion of dangerous failures is 20%, lifetime is 10 years.

- > Safety module: $PFH_d = 7.389 \cdot 10^{-9}$
- > Contactors 1 and 2: $B_{10} = 1\,000\,000$ operations, the proportion of dangerous failures = 73%, lifetime is 20 years



Stage 4: Component selection

Stage 5 - Design the diagnostic function

The SIL of the sub-system depends not only on the components, but also on the architecture selected. For our example, we will choose architectures B and D of the standard.

In our architecture, the safety module performs diagnostics not only on itself, but also on the safety limit switches.

We have three sub-systems for which the safety levels must be determined:

- > SS1: two redundant safety limit switches in a sub-system with a type D architecture
- > SS2: a SIL 3 safety module (obtained on the basis of the PFH provided by the manufacturer)
- > SS3: two redundant contactors built in accordance with a type B architecture

The calculation method can be found in the machine safety guide, so we will only give the final result. This method takes into account the following parameters:

- > B_{10} : number of operations at which 10% of the population fail
- > C: Duty cycle (number of operations per hour)
- > λ_D : rate of dangerous failures ($\lambda_D = \lambda \times$ portion of dangerous failures in %)
- > β : common cause failure coefficient, which is 10% here and 10% is the worst case: see Annex F
- > T1: Proof Test Interval or life time whichever is smaller, as provided by the supplier
- > T2: diagnostic test interval
- > DC: Diagnostic coverage rate = λ_{DD}/λ_D , ratio between the rate of detected failures and the rate of dangerous failures

We obtain:

- > for SS1 $PFH_d = 1.6 \cdot 10^{-9}$
- > for SS3 $PFH_d = 1.06 \cdot 10^{-7}$

The total probability of dangerous failures per hour is:

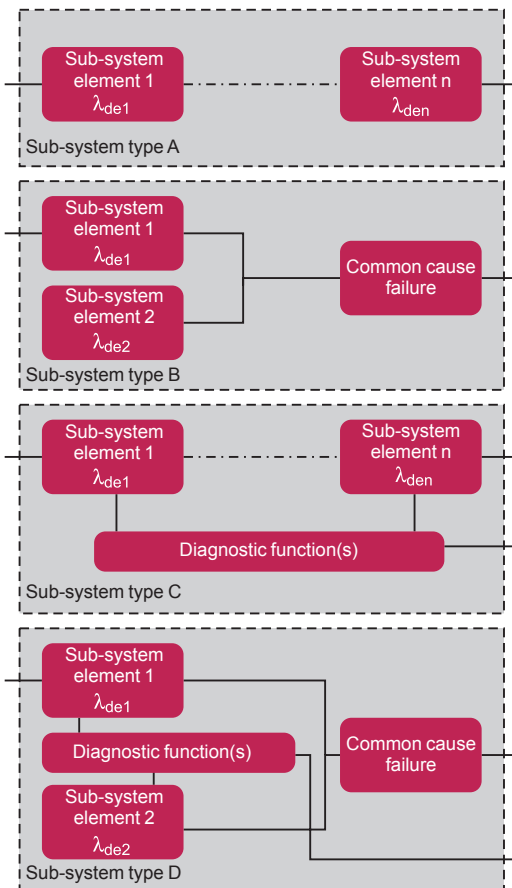
- > $PFH_{DSRECS} = PFH_{DSS1} + PFH_{DSS2} + PFH_{DSS3}$
- > $PFH_{DSRECS} = 1.6 \cdot 10^{-9} + 7,38 \cdot 10^{-9} + 1.06 \cdot 10^{-7} = 1.15 \cdot 10^{-7}$

Which corresponds to the expected result (table below) of a SIL = 2 .

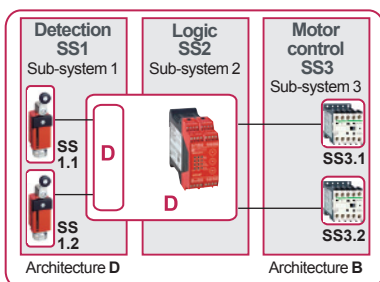
Comment: A level of SIL 3 could have been achieved by using mirror contacts to create a feedback loop on the contactors, i.e. a sub-system architecture type D.

Checking the required SIL

SIL	Probability of dangerous failures per hour (PFHd)
3	$\geq 10^{-8} \dots < 10^{-7}$
2	$\geq 10^{-7} \dots < 10^{-6}$
1	$\geq 10^{-6} \dots < 10^{-5}$



Types of sub-system architecture



Stage 5: Design of the diagnostic function

Chapter 2

Safety chain solution



All technical information about products listed in this catalog
are available on: www.schneider-electric.com





■ Safety chain solutions

- Selection guide..... page 2/2
- Functions page 2/3

■ Safety functions with detailed description

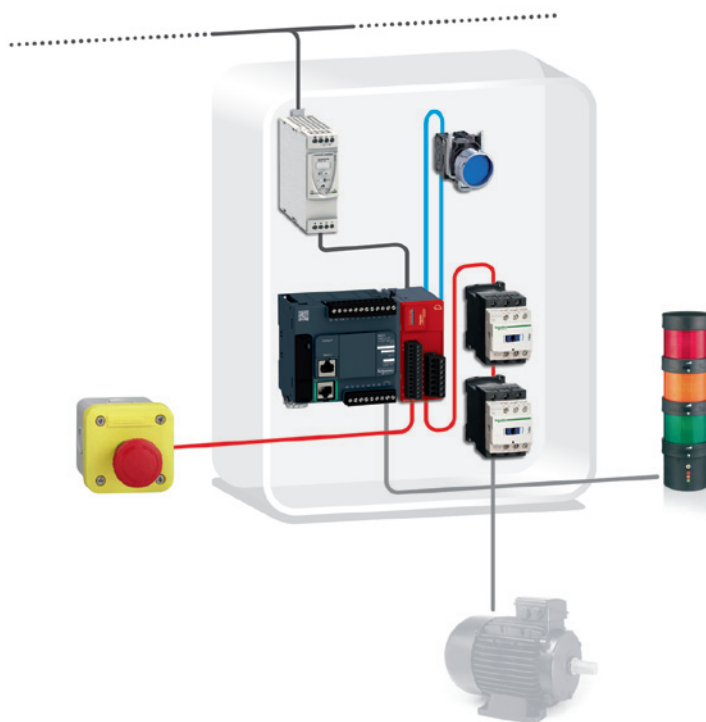
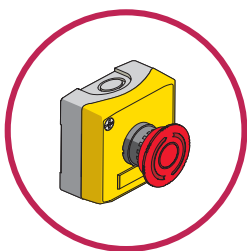
- Emergency stop
 - > Explanation of function..... page 2/26
 - > Typical architecture page 2/26
- Guard monitoring
 - > Explanation of function..... page 2/27
 - > Typical architecture page 2/28
- Perimeter guarding
 - > Explanation of function..... page 2/29
 - > Typical architecture page 2/29
- Enabling movement
 - > Explanation of function..... page 2/30
 - > Typical architecture page 2/30
- Speed monitoring
 - > Explanation of function..... page 2/31
 - > Typical architecture page 2/32
- Position monitoring
 - > Explanation of function..... page 2/33
 - > Typical architecture page 2/33



Function	Processing device	Input / Output	Cat. PL, SIL / Stop Cat. <i>see page</i>	
Emergency Stop 	with Embedded Safety Module	Emergency Stop Pushbutton / Contactor	Cat.3 PL d, SIL 2 / Stop Category 0 <i>see page 2/3</i>	
		Emergency Stop Pushbutton / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/4</i>	
	with Embedded Safety PLC	Emergency Stop Push Button / PacDrive 3 Drive	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/5</i>	
Guard Monitoring 	with Safety Module	Limit switch / Contactor	Cat.3 PL d, SIL 2 / Stop Category 0 <i>see page 2/6</i>	
		Coded Magnetic Switch / Variable Speed Drive	Cat.4 PL e, SIL 3 / Stop Category 1 <i>see page 2/7</i>	
		Guard switch with lock / Variable Speed Drive	Cat.3 PL d, SIL 2 / Stop Category 1 <i>see page 2/8</i>	
		Coded Magnetic Switch / Servo Drive	Cat.3 PL d, SIL 2 / Stop Category 1 <i>see page 2/9</i>	
		Guard switch with lock / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/10</i>	
		Coded Magnetic Switch / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/11</i>	
		with Embedded Safety Module	Guard switch with lock / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/12</i>
		with Safety Controller	Limit Switch / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/13</i>
		with Embedded Safety PLC	Guard Switch with lock/ PacDrive 3 Drive	Cat.4 PL e, SIL 3 / Stop Category 1 <i>see page 2/14</i>
		with Embedded Safety Servo Drive	Coded Magnetic Switch / Embedded Safety Servo Drive	Cat.4 PL e, SIL 3 / Stop Category 2 <i>see page 2/15</i>
	with Well Tried Components	Limit Switch / Motor Starter	Cat.3 PL c, SIL 1 / Stop Category 0 <i>see page 2/16</i>	
Enabling movement 	with Safety Controller	Two Hand Control Station / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/17</i>	
Speed Monitoring 	with Safety Module	Remanent Voltage detection and limit switch and Guard switch with lock / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/18</i>	
	with Embedded Safety PLC	Selector Switch / PacDrive 3 Drive	Cat.4 PL e, SIL 3 / Safe Limited Speed <i>see page 2/19</i>	
Position Monitoring 	with Embedded Safety PLC	Limit Switch / PacDrive 3 Drive	Cat.4 PL e, SIL 3 / Stop Category 2 <i>see page 2/20</i>	
Perimeter Guarding 	with Safety Module	Safety Mat / Contactor	Cat.3 PL d, SIL 2 / Stop Category 0 <i>see page 2/21</i>	
		Single Beam Light curtains / Contactor	Cat.3 PL c, SIL 1 / Stop Category 0 <i>see page 2/22</i>	
	with Embedded Safety Module	Light curtain / Contactor	Cat.4 PL e, SIL 3 / Stop Category 0 <i>see page 2/23</i>	
		Light curtain / Variable Speed Drive	Cat.3 PL d, SIL 2 / Stop Category 1 <i>see page 2/24</i>	

Emergency Stop with Embedded Safety Module

Emergency Stop Pushbutton / Contactor
Cat.3 PL d, SIL 2 / Stop Category 0



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Modicon TM3SAC5R(G)
- Safety switches - Preventa XCS
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

Function

Safety-related stop function initiated by Emergency stop push button to minimize the consequences of possibly harmful event.

The pushing of emergency stop push button is detected from opening contacts, which are checked by the safety module.

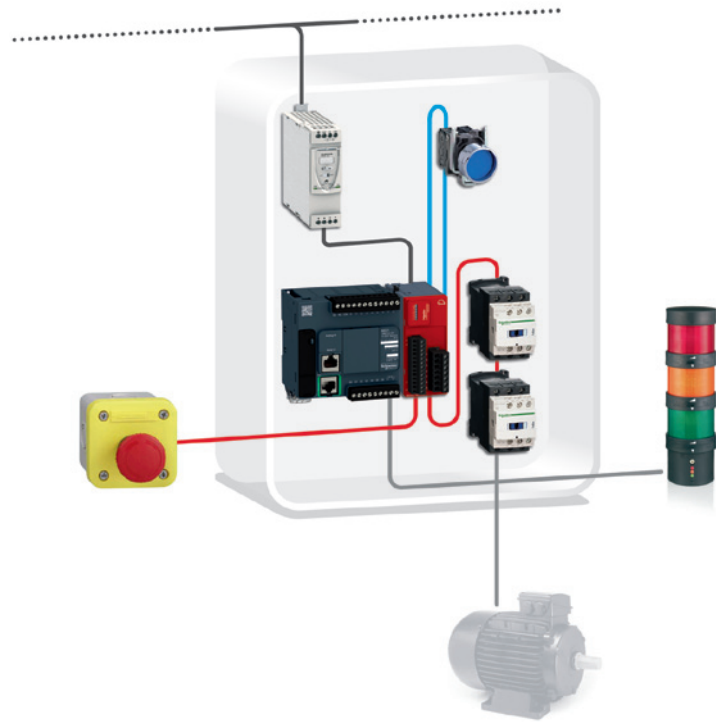
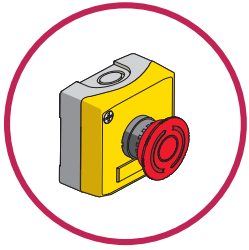
Opening these contacts causes the deactivation of the safety module outputs (stop category 0 according to EN/IEC 60204-1), which results in a switch-off of the motor power supply to minimize hazard in case of emergency by means of the contactors (K1 and K2).

Typical applications

- > Machine-tools or similar machines with low inertia (no rundown time), where the access to the hazardous area is limited to maintenance interventions

Emergency Stop with Embedded Safety Module
Emergency Stop Pushbutton / Contactor
Cat.4 PL e, SIL 3 / Stop Category 0

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Modicon TM3SAF5R(G)
- Safety switches - Preventa XCS
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

Function

Safety-related stop function initiated by Emergency stop push button to minimize the consequences of possibly harmful event.

The pushing of emergency stop push button is detected from opening contacts, which are checked by the safety module.

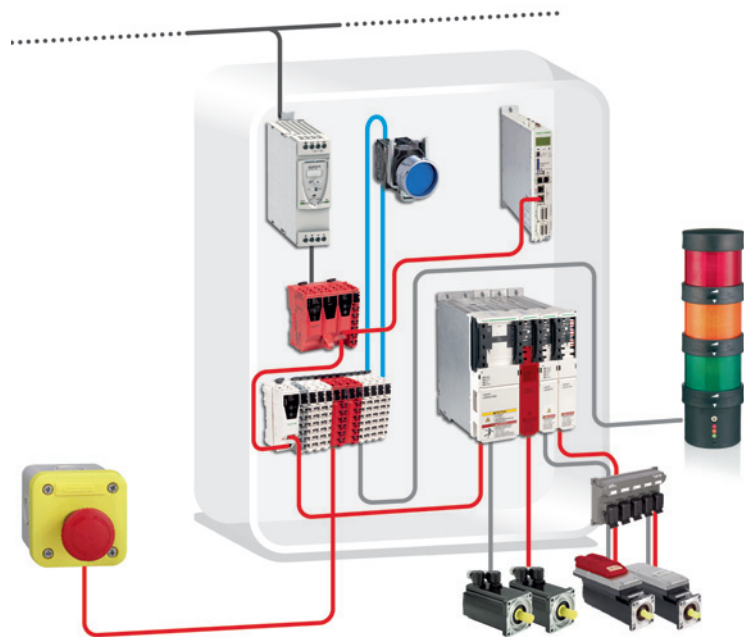
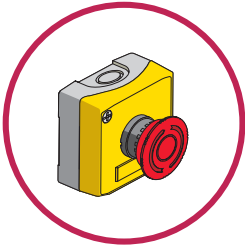
Opening these contacts causes the deactivation of the safety module outputs (stop category 0 according to EN/IEC 60204-1), which results in a switch-off of the motor power supply to minimize hazard in case of emergency by means of the contactors (K1 and K2).

The main contactors are monitored by the safety module to detect e.g. contact welding, by means of their mirror contacts.

Typical applications

- > Machine-tools or similar machines with low inertia (no rundown time), where the access to the hazardous area is limited to maintenance interventions

Emergency Stop with Embedded Safety
PLC
Emergency Stop Push Button / PacDrive 3
Drive
Cat.4 PL e, SIL 3 / Stop Category 0



2

Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Preventa Safety PLC TM5SLC●● (TM5SPS, SDIO, BC)
- Safety switches - Preventa XCS
- PacDrive 3
- Harmony XVB

Function

Safety-related stop function initiated by any stop or emergency stop command to halt the machine and to unlock the moveable guard that prevents the access to the hazardous area before the machine comes to a standstill.

Emergency stop command is detected by using an emergency stop push button in positive actuation mode, which are then checked by the safety PLC allowing detection of the opening contacts.

Actuation of the emergency stop or stop contacts initiates the functional stopping of the machine by cutting-off torque from the motor. As electric motors run down, a remanent voltage is produced in the windings of the motor due to residual magnetism. This voltage is measured so as to detect the stopped condition of the motor, providing the unlock signal for the electrically locked moveable guard and for engaging brakes after the motor has come to a standstill.

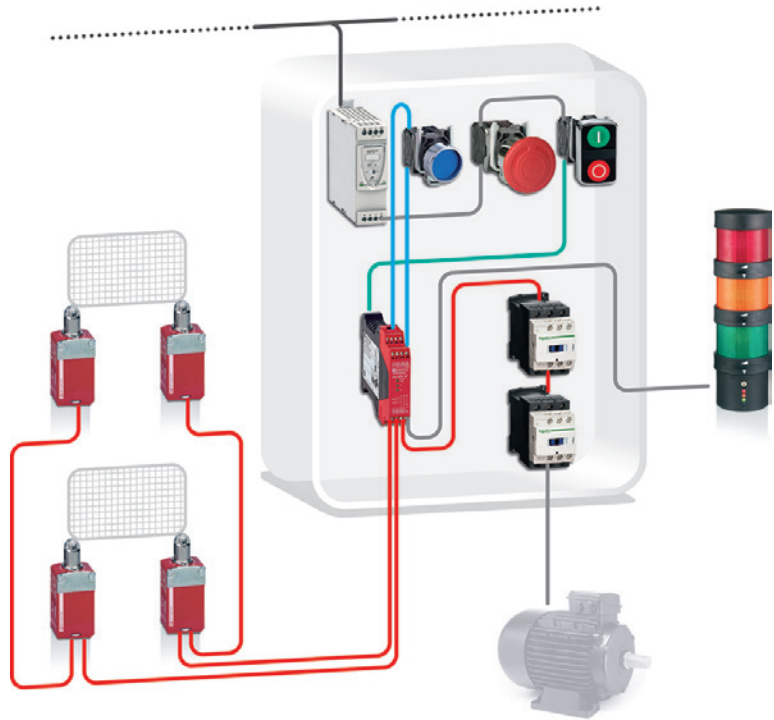
The continuity of the wiring between the motor windings and the inputs of the safety modules are also monitored to prevent a cable breakage or fault being seen as a stopped motor.

Typical applications

- > Machine tools, robots, production test equipment, test benches
- > Papermaking machines, textile production machines, calendars in the rubber industry
- > Process lines in plastics, chemicals or metal production, rolling-mills
- > Cement crushing machines, cement kilns, mixers, centrifuges, extrusion machines
- > Drilling machines
- > Conveyors, materials handling machines, hoisting equipment (cranes, gantries, etc.)
- > Pumps, fans, etc.

Guard Monitoring with Safety Module
Limit switch / Contactor
Cat.3 PL d, SIL 2 / Stop Category 0

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Preventa XPSAC
- Safety switches - Preventa XCS
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

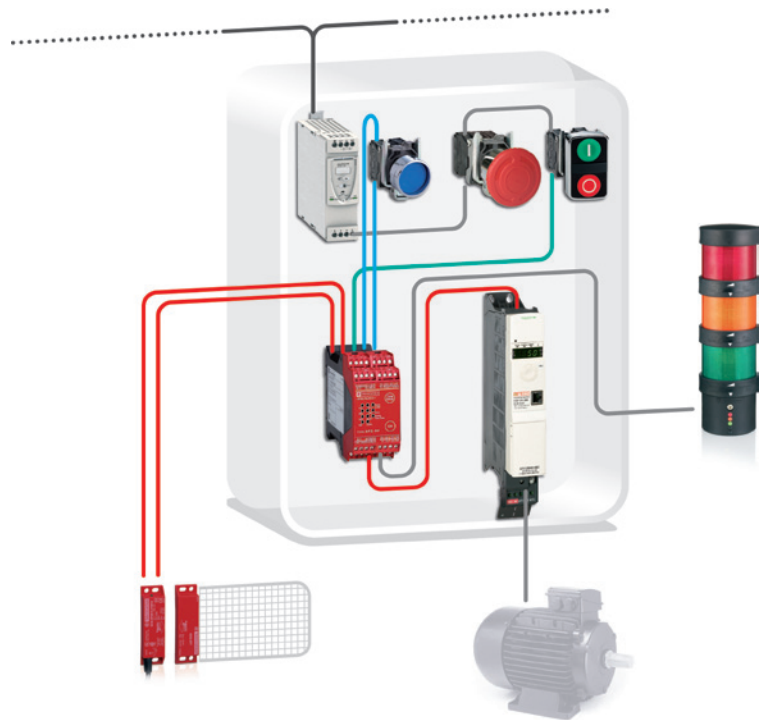
Function

Safety-related stop function initiated by the moveable guards designed to help protecting from the the access to a hazardous zone. The opening of each guard is detected by using two limit switches in combination mode (positive mode + negative mode), which are checked by the safety module allowing detection of the opening or the removal of the protective guard.
 Opening of any of these guards causes the deactivation of the safety module outputs (stop category 0 according to EN/IEC 60204-1), which results in a switch-off of the motor power supply to prevent possible hazardous movements or states by means of the contactors (K1 and K2).
 The main contactors are monitored by the safety module to detect e.g. contact welding, by means of their mirror contacts.

Typical applications

- > Assembling, textile, printing or similar machines where the access to the hazardous area is limited to maintenance interventions

Guard Monitoring with Safety Module
Coded Magnetic Switch -
Variable Speed Drive
Cat.4 PL e, SIL 3 / Stop Category 1



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Safety Module - Preventa XPSAV
- Coded magnetic switches - Preventa XCSDM
- Variable speed drive - Altivar 32
- Modular beacon and tower lights -Harmony XVB
- Switch mode Power supply - Phaseo ABL8

Function

Safety-related stop function initiated by a moveable guard that helps protecting from the access to the hazardous area.

Controlled stopping with power maintained to the actuator (drive) to achieve stopping (i.e. braking), then cut-off of power when standstill is reached (Safe Stop 1). The hazardous movement is interrupted either if the stop button (S2) or the emergency stop device (S3) is actuated.

Opening of this guard is detected by a magnetic switch, which initiates the functional stopping of the drive, i.e. by a braking ramp (stop category 1 in accordance with EN/IEC 60204-1).

After the delay time monitored by the safety module has elapsed, the safety delayed outputs are deactivated. The drive is then halted, by the "safe torque off" (STO) safety function integrated within it, which prevents the motor from restarting unintentionally.

The switching of the STO and LI3 input is monitored by the drive. The power stage is disabled if the time offset is exceeded. The motor can no longer generate torque and coasts down without braking.

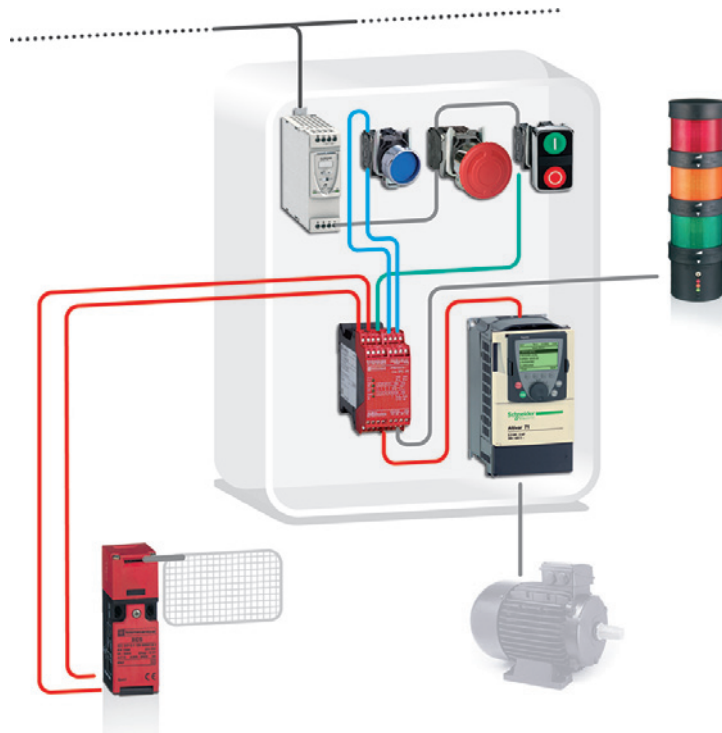
The safety module also monitors the consistent actuation of the redundant coded magnetic switch contacts to detect possible failure, before restart of the machine movement is permitted.

Typical applications

- > Machines that use drives in their movements due to high speed and precision needed (i.e. textile, wood-working or simple packaging machines), when the delayed initiation of the stopping in the event of a fault must not involve an unacceptably high residual risk

2

Guard Monitoring with Safety Module
Guard switch with lock / Variable Speed
Drive
Cat.3 PL d, SIL 2 / Stop Category 1



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Emergency stop function - Harmony XALK
- Switch mode Power supply - Phaseo ABL8
- Safety Guard switches - Preventa XCSB, XCS
- Safety module - Preventa XPSATE
- Variable speed drive - Altivar 71
- Modular beacon and tower lights - Harmony XVB

Function

Safety-related stop function initiated by a moveable guard that helps protecting from the access to the hazardous area.

Controlled stopping with power maintained to the actuator (drive) to achieve stopping (i.e. braking), then cut-off of power when standstill is reached (Safe Stop 1). The hazardous movement is interrupted either if the stop button (S2) or the emergency stop device (S3) is actuated. (*)

Opening of this guard is detected by a safety guard switch, which initiates the functional stopping of the drive, i.e. by a braking ramp (stop category 1 in accordance with EN/IEC 60204-1).

After the delay time monitored by the safety module has elapsed, the safety delayed outputs are deactivated. The drive is then halted, by the "safe torque off" (STO) safety function integrated within it, which prevents the motor from restarting unintentionally.

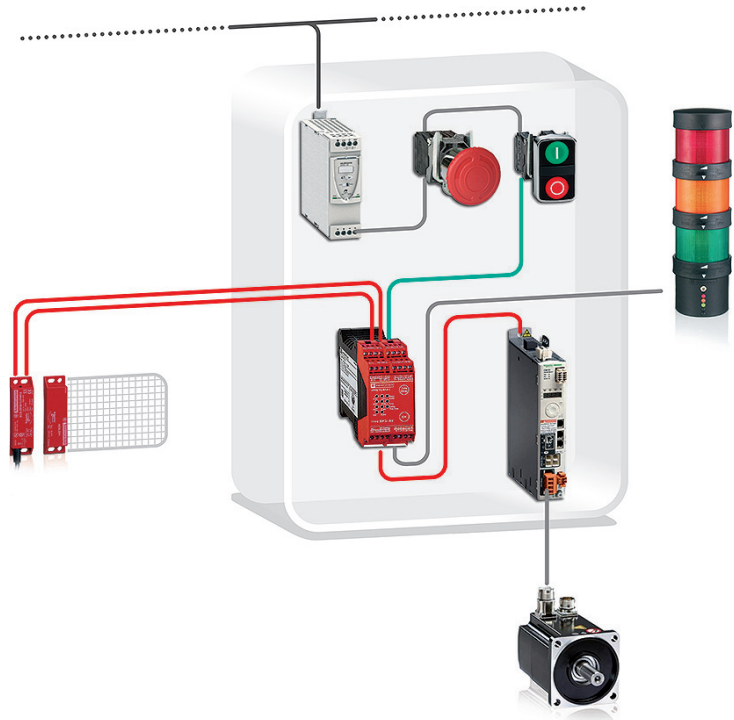
The safety module also monitors the consistent actuation of the redundant guard switch contacts to detect possible failure, before restart of the machine movement is permitted.

(*) The function for stopping in an emergency is a protective measure which complements the safety functions for the safeguarding of hazardous zones according to EN/ISO 12100-2.

Typical applications

- > Machines that use drives in their movements due to high speed and precision needed (i.e. stacker-cranes used on automatic storage and retrieval systems), when the delayed initiation of the stopping in the event of a fault must not involve an unacceptably high residual risk

Guard Monitoring with Safety Module
Coded Magnetic Switch / Servo Drive
Cat.3 PL d, SIL 2 / Stop Category 1



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Coded magnetic system - Preventa XCSDM
- Safety Module - Preventa XPSAV
- Servo Drive - Lexium 32
- Modular beacon and tower lights - Harmony XVB

Function

Safety-related stop function initiated by any of the moveable guards that helps protecting from the access to the hazardous area.

Controlled stop with power available to the actuators (servo-drive) to achieve the stop (i.e. by controlled braking). Power is not interrupted until the stop is achieved (Safe Stop 1).

After activating the function, the servo motor is braked in a controlled manner, maintaining the power on the actuators. The power is then cut after the machine has come to a halt.

Opening of a guard is detected by a coded magnetic switch system that activates via the safety module the "Halt" function on the servo-drive; any active movement is decelerated via the adjusted ramp.

After the delay time monitored by the safety module has elapsed, the safety delayed outputs (stop category 1 in accordance with EN/IEC 60204-1) are deactivated. The servo-drive power stage is then disabled, via the "safe torque off" (STO) safety function integrated within it, which prevents the servo-motor from restarting unintentionally.

The switching of the two redundant STO inputs is monitored by the servo-drive. The power stage is disabled and an error message is generated if the time offset (< 1 sec) is exceeded. The servo-motor can no longer generate torque and coasts down without braking.

The safety module also monitors the consistent actuation of the magnetic switch contacts to detect possible failure, before restart of the machine movement is permitted.

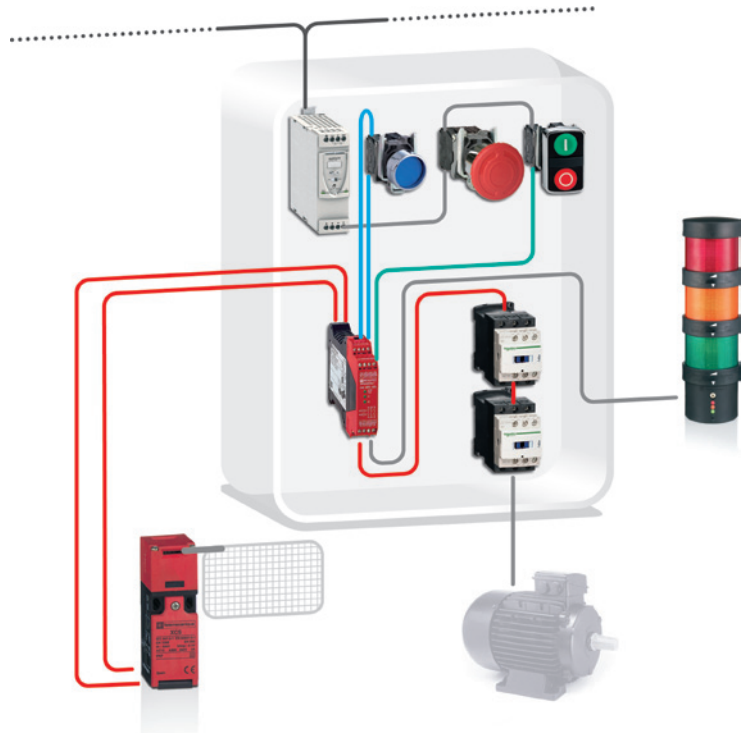
Opening or removal of the protective guard is detected by means of the coded magnetic switch system, which are particularly usable for guards without accurate guidance and for use in difficult environments (dust, liquids, etc.).

Typical applications

- > Packaging, printing, or similar machines that use servo-drives in their movements due to high speed and precision needed, on which non-braking stopping would result in a impermissibly long run-down of the hazardous tool movements

Guard Monitoring with Safety Module
Guard switch with lock / Contactor
Cat.4 PL e, SIL 3 / Stop Category 0

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Preventa XPSAF
- Safety Guard switches - Preventa XCSB, XCS
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

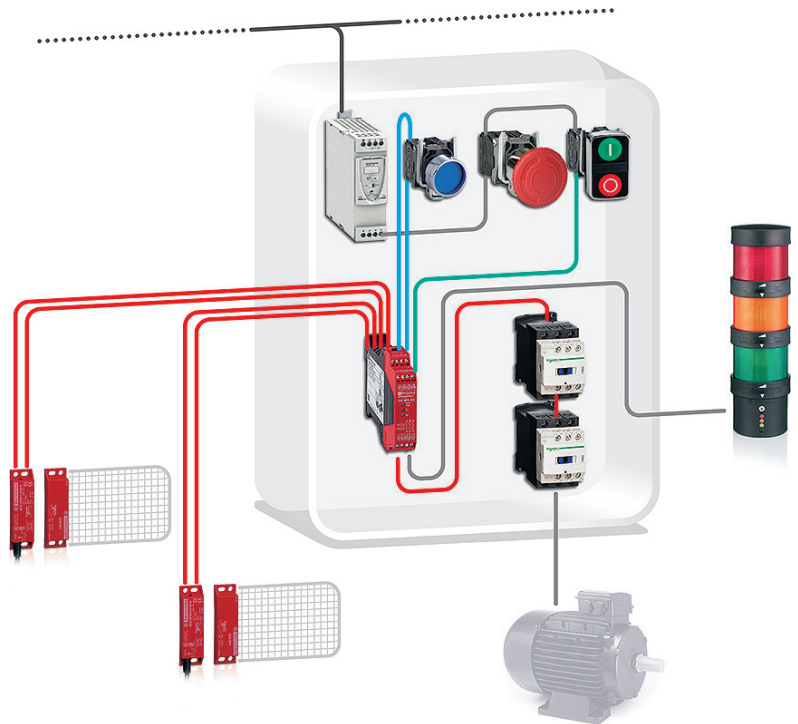
Function

Safety-related stop function initiated by a moveable guard designed to help protecting from the access to a hazardous zone.
 The opening of this guard is detected by using a guard switch, which is checked by the safety module allowing detection of the opening or the removal of the protective guard according to EN1088.
 Opening of this guard causes the deactivation of the safety module outputs (stop category 0 according to EN/IEC 60204-1), which results in a switch-off of the motor power supply to prevent possible hazardous movements or states by means of the contactors (K1 and K2).
 The main contactors are monitored by the safety module to detect e.g. contact welding, by means of their mirror contacts.

Typical applications

- > Assembling, machining centers or similar machines tools, where the access to the hazardous area is frequent or with long exposure time

Guard Monitoring with Safety Module
Coded Magnetic Switch / Contactor
Cat.4 PL e, SIL 3 / Stop Category 0



2

Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Preventa XPSDM
- Coded magnetic system - Preventa XCSDM
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

Function

Safety-related stop function initiated by any of the moveable guards that helps protecting from the access to the hazardous area.

The opening of each guard is detected by using magnetic switches, which are checked by the safety module by means of a combination of contacts (normally closed and normally open).

Opening of any of these guards causes the deactivation of the safety module outputs, which results in the switching-off of the motor power supply by means of the contactors K1 and K2 (stop category 0 according to EN/IEC 60204-1) to help prevent possible hazardous movements or states.

The main contactors are monitored by the safety module to detect contact welding by means of the mirror contacts.

The safety module also monitors the consistent actuation of the magnetic switch contacts to detect any failure, before restart of the machine movement is permitted. Opening or removal of the protective guard is detected by means of the coded magnetic switches, which are particularly useful for guards without accurate guidance and for use in difficult environments (dust, liquids, etc.).

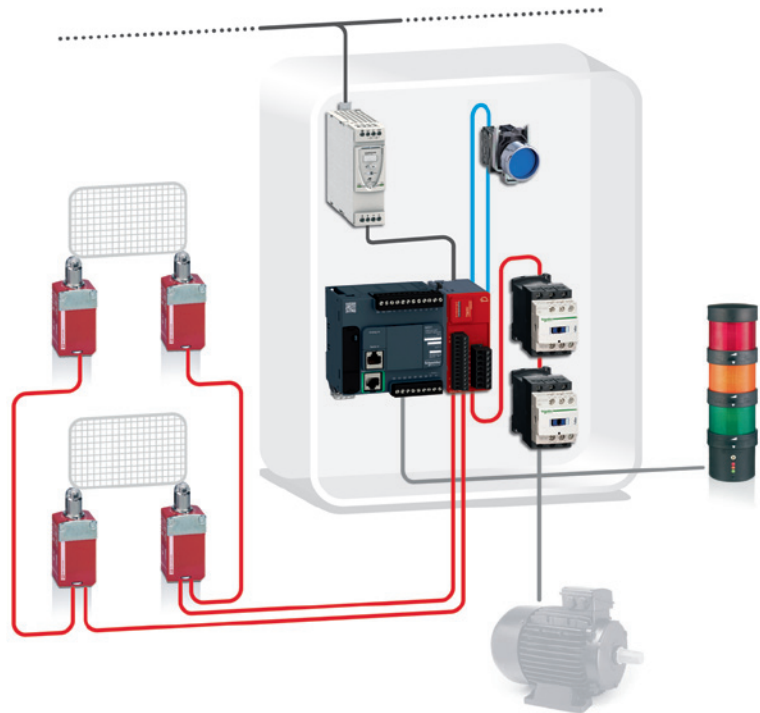
Typical applications

- > Assembling, packaging or similar compacted machines with a short rundown time and where the access to the hazardous area is very frequent

Guard Monitoring with Embedded Safety Module

Guard switch with lock / Contactor
Cat.4 PL e, SIL 3 / Stop Category 0

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Modicon TM3SAF5R(G)
- Safety switches - Preventa XCS
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

Function

Safety-related stop function initiated by a moveable guard designed to help protecting from the access to a hazardous zone.

The opening of this guard is detected by using a guard switch, which is checked by the safety module allowing detection of the opening or the removal of the protective guard according to EN1088.

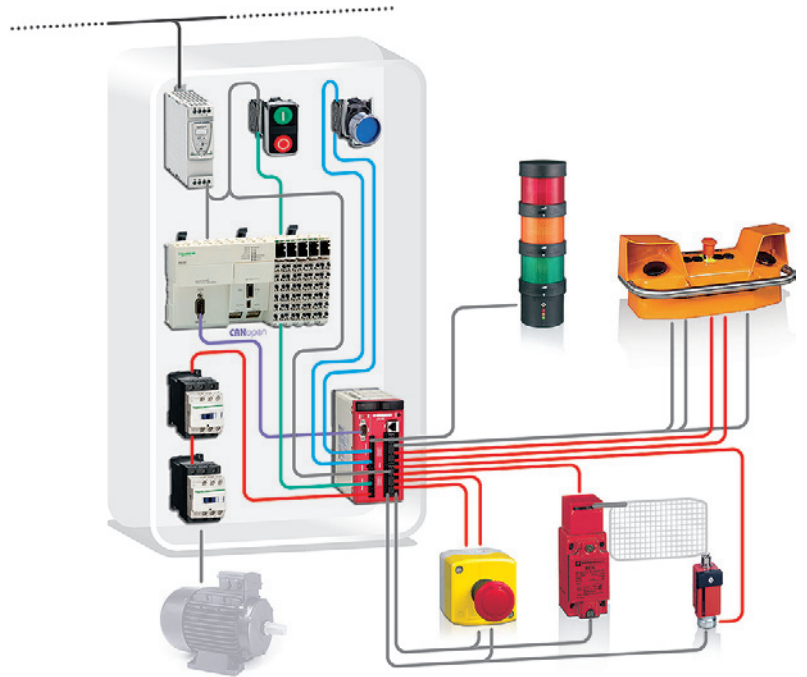
Opening of this guard causes the deactivation of the safety module outputs (stop category 0 according to EN/IEC 60204-1), which results in a switch-off of the motor power supply to prevent possible hazardous movements or states by means of the contactors (K1 and K2).

The main contactors are monitored by the safety module to detect e.g. contact welding, by means of their mirror contacts.

Typical applications

- > Assembling, machining centers or similar machines tools, where the access to the hazardous area is frequent or with long exposure time

Guard Monitoring with Safety Controller
Limit Switch / Contactor
Cat.4 PL e, SIL 3 / Stop Category 0



Related Products

- Switches, pushbuttons - Harmony XB4
- Emergency stop control station - Harmony XALK
- Two-Hand control station - Preventa XY2 SB
- Switch mode Power supply - Phaseo ABL8
- Logic controller - Modicon M258
- Guard interlock switch and safety
- switches - Preventa XCS
- Safety Controller - Preventa XPS MC
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

Function

Safety-related stop function initiated by a moveable guard that helps protecting from the access to a hazardous zone.

The guard opening is detected by using a solenoid locked switch in combination with a limit switch in positive operating mode, which are checked by the safety module allowing detection of the opening or removal of the protective guard.

Opening of the moveable guard causes the deactivation of the safety module outputs which results in switching-off the motor power supply by means of the contactors K1 and K2 to help prevent possible hazardous movements (stop category 0 according to EN/IEC 60204-1).

The motor can be also de-energized when the emergency stop device (S1) is actuated.*

The main contactors are monitored by the safety controller to detect for example contact welding, by means of the mirror contacts.

The safety controller also monitors the consistent actuation of the limit switch contacts to detect failure, before restart of the machine movement is permitted.*

(*) The function for stopping in an emergency is a protective measure which complements the safety functions for the safeguarding of hazardous zones according to EN/ISO 12100-2.

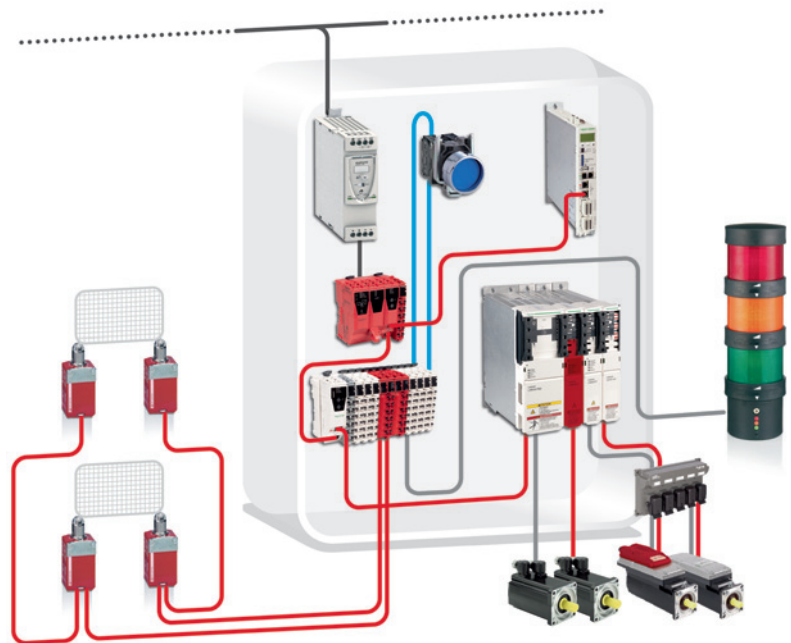
Typical applications

- > Plastic injection, eccentric press or similar complex machines with 4 or more safety functions included, where a centralized safety controller would be required

Guard Monitoring with Embedded Safety PLC

Guard Switch with lock/ PacDrive 3 Drive
Cat.4 PL e, SIL 3 / Stop Category 1

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Preventa Safety PLC TM5SLC●● (TM5 Slices > SPS, SDIO, BC)
- Safety switches - Preventa XCS
- PacDrive 3
- Harmony XVB

Function

Safety-related stop function initiated by a moveable guard that helps preventing access to the hazardous area.

Controlled stopping with power maintained to the actuator (drive) to achieve stopping (i.e. braking), then cut-off of power when standstill is reached (Safe Stop 1). The hazardous movement is interrupted either if the stop button or the emergency stop device is actuated. Opening of this guard is detected by limit switches, which initiates the functional stopping of the drive, i.e. by a braking ramp (stop category 1 in accordance with EN/IEC 60204-1).

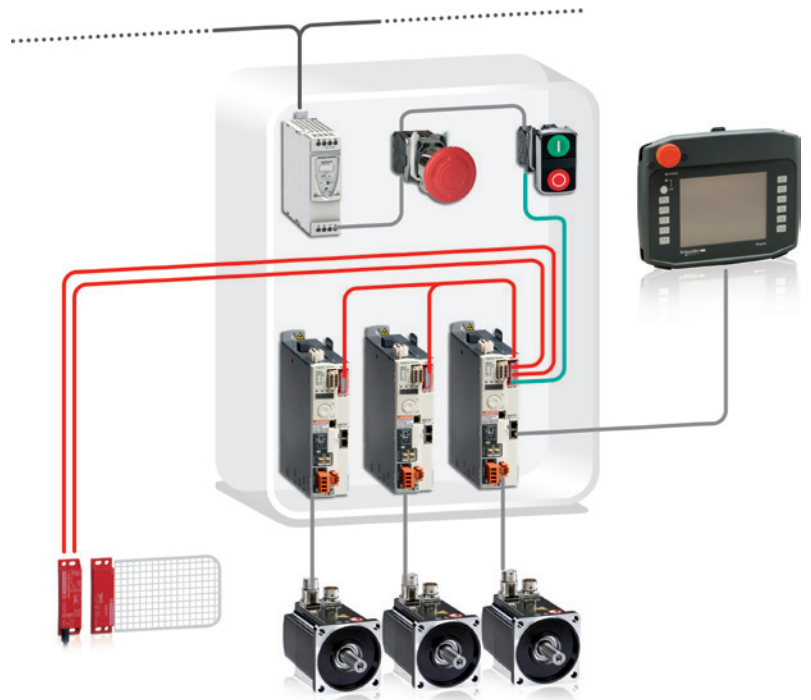
After the delay time monitored by the drive has elapsed, drive halts itself, by the "safe torque off" (STO) safety function integrated within it, which prevents the motor from restarting unintentionally. The switching of the STO and input is monitored by the drive. When the motor can no longer generate torque, the safety PLC is notified and it can provide the unlock signal for the electrically locked movable guard or engaging brakes.

The safety module also monitors the consistent actuation of the redundant limit switch contacts to detect possible failure, before restart of the machine movement is permitted.

Typical applications

- > Machine tools, robots, production test equipment, test benches
- > Papermaking machines, textile production machines, calendars in the rubber industry
- > Process lines in plastics, chemicals or metal production, rolling-mills
- > Cement crushing machines, cement kilns, mixers, centrifuges, extrusion machines
- > Drilling machines
- > Conveyors, materials handling machines, hoisting equipment (cranes, gantries, etc.)
- > Pumps, fans, etc.

Guard Monitoring with Embedded Safety
Servo Drive
Coded Magnetic Switch / Embedded Safety
Servo Drive
Cat.4 PL e, SIL 3 / Stop Category 2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Guard switches - Preventa XCSLE
- Enhanced Safety Module (eSM) - Lexium 32M
- Servo drive - Lexium 32M
- Human machine interface - Magelis XBT GH
- Modular beacon and tower lights - Harmony XVB
- Switch mode Power supply - Phaseo ABL8

Function

Safety-related stop function realized by a moveable guard that helps protecting from the access to the hazardous area.

The hazardous movement is interrupted either if the stop button (S2) or the emergency stop device (S3) is actuated, which initiates the functional stopping of the servo-drive, i.e. by a deceleration ramp.

The Safe Stop 2 safety function is used to achieve a category 2 safe stop in accordance with EN/IEC 61800-5-2, where the servo motor is braked in a controlled manner, maintaining the power on the actuators.

The safety function SS2 (Safe Stop 2), integrated in the enhanced safety module (eSM) card, monitors the deceleration and the standstill position.

When the SS2 function is triggered, a deceleration of movement is monitored with the specified monitoring ramp up to standstill. The motor is then immobilized by the "safe operating stop" (SOS) function, which is used to monitor any deviation from the standstill position.

If the monitored deceleration ramp is violated or the monitored standstill position is not maintained, the drive is halted by the "safe torque off" (STO) function, which prevents the motor from restarting unintentionally.

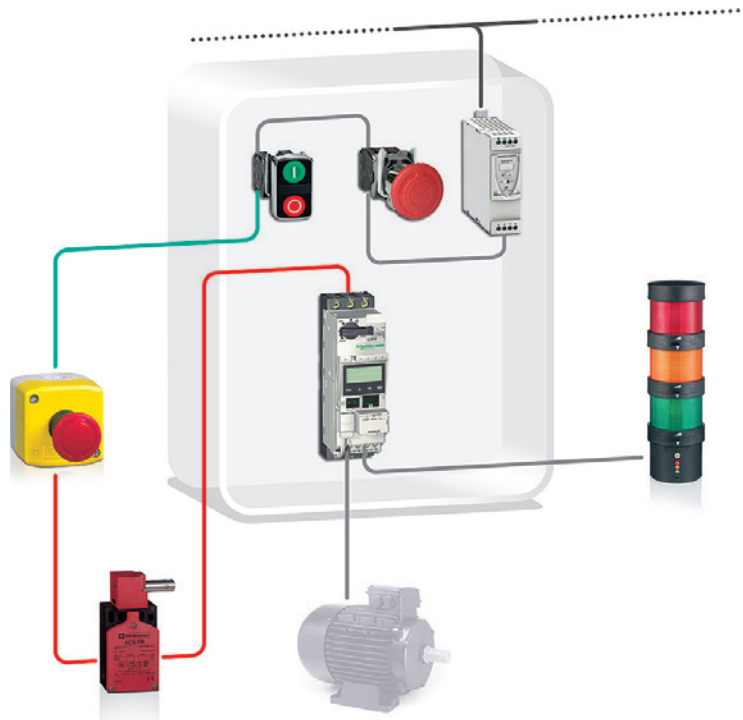
The eSM card also monitors the consistent actuation of the redundant switch contacts from the magnetic switch to detect possible failure, before restart of the machine movement is permitted.

Typical applications

- > Packaging, printing, or similar machines that use servo-drives in their movements due to high speed and precision needed, on which non-braking stopping would result in a impermissibly long run-down of the hazardous tool movements

2

Guard Monitoring with Well Tried Components
Limit Switch / Motor Starter
Cat.3 PL c, SIL 1 / Stop Category 0



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Emergency stop function - Harmony XALK
- Switch mode Power supply - Phaseo ABL8
- Motor starter - TeSys U
- Safety Guard switches - Preventa XCS
- Modular beacon and tower lights - Harmony XVB

Function

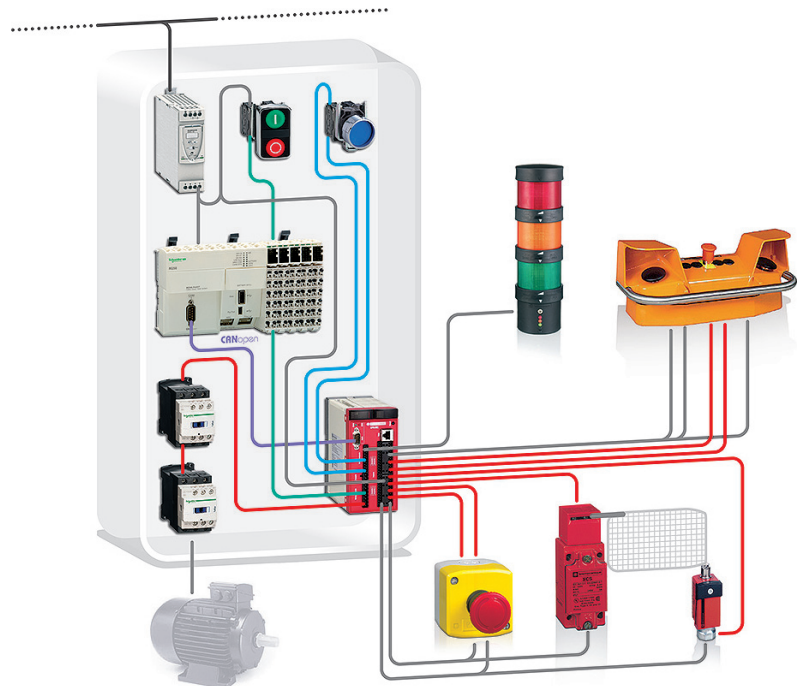
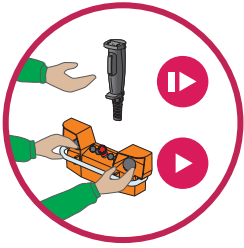
Stop function initiated by a moveable protective guard.
 Opening of this guard is detected by a guard switch, which interrupts the control voltage of the motor starter (stop category 0 according to EN/IEC 60204-1) to help preventing possible hazardous movements.
 The break contact of this guard switch interrupts the control circuit directly when the protective guard is not in the safe position.
 The motor is also de-energized when either of the emergency stop devices (S1 or S2) are actuated.(*)
 The safety function is fully dependent upon the reliability of the components.

(*) The function for stopping in an emergency is a protective measure which complements the safety functions for the safeguarding of hazardous zones according to EN/ISO 12100-2.

Typical applications

- > Machine-tools or similar machines with low inertia (no rundown time), where the access to the hazardous area is limited to maintenance interventions

Enabling movement with Safety Controller
Two Hand Control Station / Contactor
Cat.4 PL e, SIL 3 / Stop Category 0



2

Related Products

- Switches, pushbuttons - Harmony XB4
- Emergency stop control station - Harmony XALK
- Two-Hand control station - Preventa XY2SB
- Switch mode Power supply - Phaseo ABL8
- Logic controller - Modicon M258
- Guard interlock switch - Preventa XCS
- Safety Controller - Preventa XPS MC
- Contactor - TeSys D
- Modular beacon and tower light - Harmony XVB

Function

Safety-related function to help control the location of the operator's hands outside the hazardous area during a hazardous movement of the machine.

To initiate a movement, both actuators (two-hand control pushbuttons S3 and S4) must be activated synchronously (within an interval less than 0,5 sec.) to energize the contactors (K1 and K2). When at least one of the two pushbuttons is released, the energization is cancelled and remains blocked until both pushbuttons are released and pressed again synchronously.

The logic device (Safety Controller) monitors operation of the actuators (pushbuttons). Faults in the actuating mechanism as well as the cable wiring are detected in S3/S4 by the use of two contacts employing a normally open (NO) and normally closed (NC) combination.

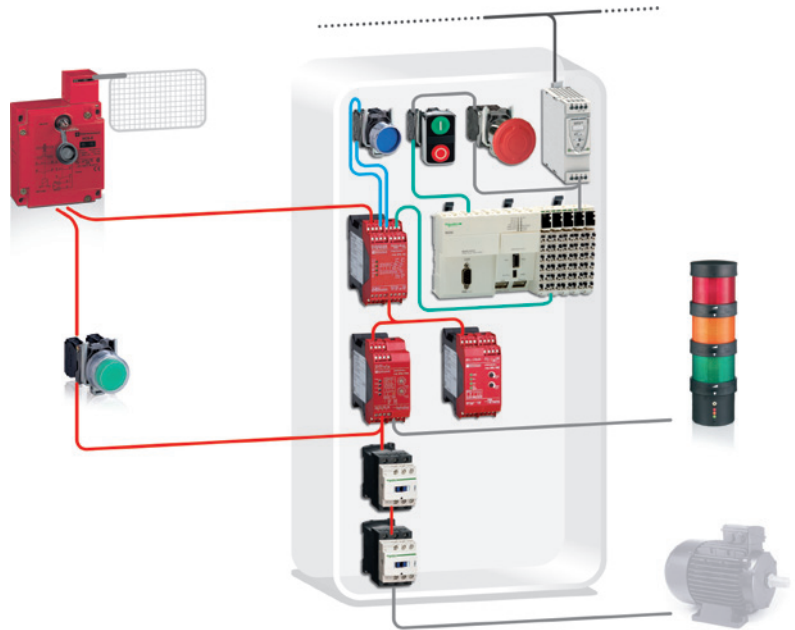
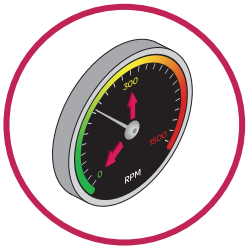
Faults in K1/K2 (with mirror contacts) are detected in the safety controller and lead to de-energization of the contactors (K1 and K2).

Typical applications

- > Hydraulic, eccentric press or similar complex machines with 4 or more safety functions included, where a centralized safety controller would be required

Speed Monitoring with Safety Module
 Remanent Voltage detection and limit
 switch and Guard switch with lock /
 Contactor
 Cat.4 PL e, SIL 3 / Stop Category 0

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Logic controller - Modicon M258
- Guard lock switch - Preventa XCSE
- Safety Module - Preventa XPS
- Contactor - TeSys D
- Modular beacon and tower lights - Harmony XVB

Function

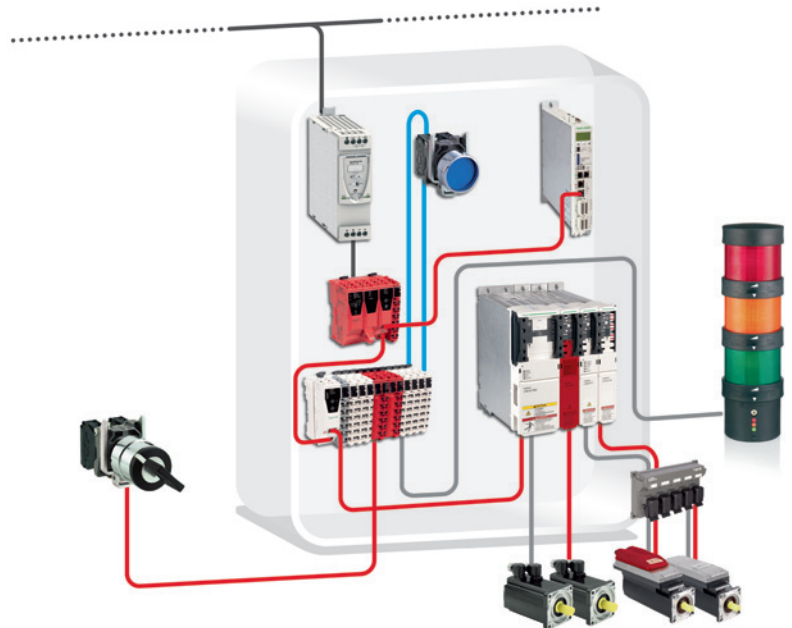
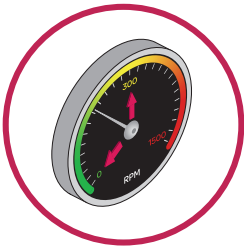
Safety-related stop function initiated by any stop or emergency stop command to halt the machine and to unlock the moveable guard that prevents the access to the hazardous area before the machine comes to a standstill. Guard opening is detected by using a solenoid locking guard switch in combination with a limit switch in positive actuation mode, which are then checked by the safety module allowing detection of the opening or removal of the protective guard. Actuation of the emergency stop or stop contacts initiates the functional stopping of the machine by switching-off the motor power supply. As electric motors run down, a remanent voltage is produced in the windings of the motor due to residual magnetism. This voltage is measured so as to detect the stopped condition of the motor, providing the unlock signal for the electrically locked movable guard and for engaging brakes after the motor has come to a standstill. The continuity of the wiring between the motor windings and the inputs of the safety module is also monitored to prevent a cable breakage or fault being seen as a stopped motor. The main contactors are monitored by the safety modules by means of the mirror contacts to detect e.g. contact welding. The safety modules also monitor the consistent actuation of the limit switch contacts to detect failure, before restart of the machine movement is permitted.

Typical applications

- > On metal, wood work or similar high inertia machines with a long run-down of the hazardous tool movements, and where an electronically interlock guard is used to protect the hazardous area

Speed Monitoring with Embedded Safety PLC

Selector Switch / PacDrive 3 Drive
Cat.4 PL e, SIL 3 / Safe Limited Speed



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Preventa Safety PLC TM5SLC●● (TM5 Slices> SPS, SDIO, BC)
- Safety switches - Preventa XCS
- PacDrive 3
- Harmony XVB

Function

Safety-related Speed monitoring function initiated by a safe command to control the machine and to unlock the moveable guard that prevents the access to the hazardous area before the machine comes to a safe speed.

Selector switch status change is detected by using a selector switch or standard PLC signal for change in operating mode, which are then checked by the safety PLC allowing detection of the change in operating mode of the machine.

Actuation of the selector switch or standard PLC signal initiates the control rampdown of the machine by drive controller. As electric motors run down, monitored by built in encoder, then speed will be continuously monitored. If at any time the speed of the motor exceeds the specified limit, SS1 or STO function is initiated for monitored stop or free whiling stop.

The continuity of the wiring between the motor windings and the inputs of the safety modules are also monitored to prevent a cable breakage or fault being seen as a stopped motor.

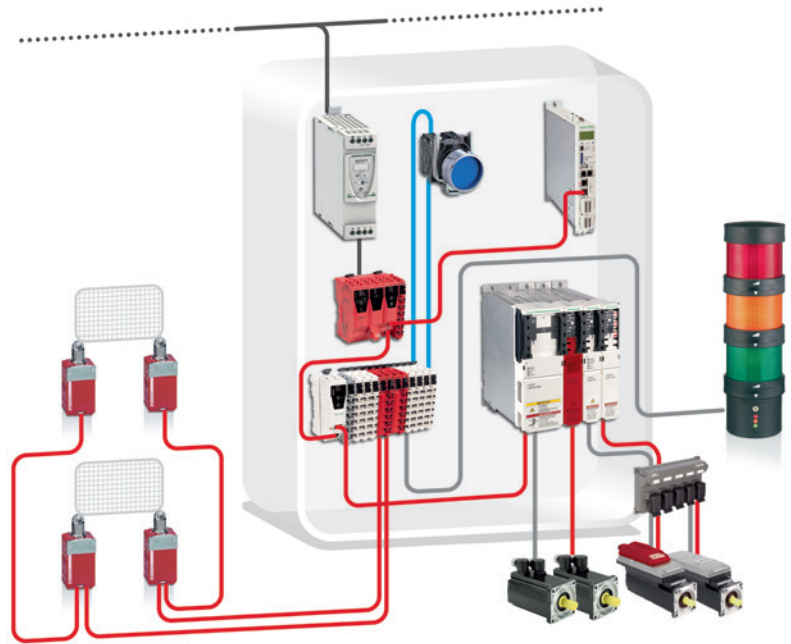
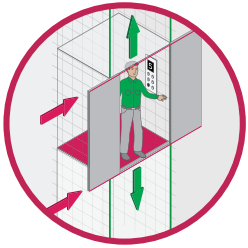
The safety modules also monitor the consistent actuation of the limit switch contacts to detect failure, before restart of the machine movement is permitted.

Typical applications

- > Machine tools, robots, production test equipment, test benches
- > Papermaking machines, textile production machines, calendars in the rubber industry
- > Process lines in plastics, chemicals or metal production, rolling-mills
- > Cement crushing machines, cement kilns, mixers, centrifuges, extrusion machines
- > Drilling machines
- > Conveyors, materials handling machines, hoisting equipment (cranes, gantries, etc.)
- > Pumps, fans, etc.

Position Monitoring with Embedded Safety PLC
Limit Switch / PacDrive 3 Drive
Cat.4 PL e, SIL 3 / Stop Category 2

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Preventa Safety PLC TM5SLC●● (TM5 Slices> SPS, SDIO, BC)
- Safety Switches - Preventa XCS
- PacDrive 3
- Harmony XVB

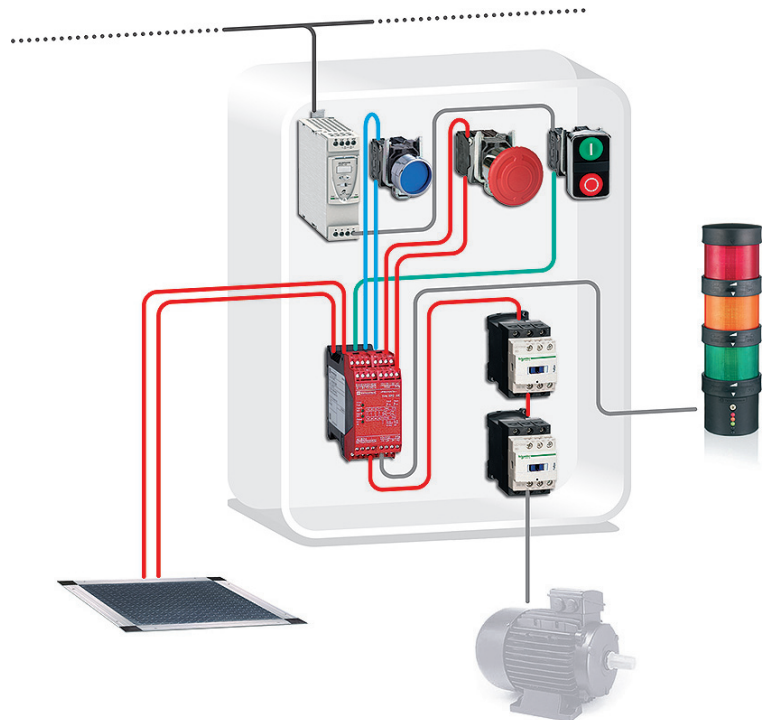
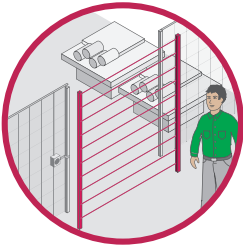
Function

Safety-related stop function initiated by any stop or emergency stop command to halt the machine and to unlock the moveable guard that prevents the access to the hazardous area before the machine comes to a standstill. Guard opening is detected by using a Coded magnetic switch, which are then checked by the safety PLC allowing detection of the opening or removal of the protective guard. Actuation of the stop contacts initiates the functional stopping of the machine by control ramp down of the motor then monitor the motor position, for the stand still. If the position of the motor is violated the SS1 or STO will be initiated. The continuity of the wiring between the motor windings and the inputs of the safety modules are also monitored to prevent a cable breakage or fault being seen as a stopped motor. The main contactors are monitored by the safety modules by means of the mirror contacts to detect e.g. contact welding. The safety modules also monitor the consistent actuation of the coded magnetic switch contacts to detect failure, before restart of the machine movement is permitted.

Typical applications

- > Machine tools, robots, production test equipment, test benches
- > Papermaking machines, textile production machines, calendars in the rubber industry
- > Process lines in plastics, chemicals or metal production, rolling-mills
- > Cement crushing machines, cement kilns, mixers, centrifuges, extrusion machines
- > Drilling machines
- > Conveyors, materials handling machines, hoisting equipment (cranes, gantries, etc.)
- > Pumps, fans, etc.

Perimeter Guarding with Safety Module
Safety Mat / Contactor
Cat.3 PL d, SIL 2 / Stop Category 0



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Preventa XPSAK
- Safety Mats - Preventa XY2TP
- Contactor - Tesys D
- Modular beacon and tower lights - Harmony XVB

Function

Safety-related stop function initiated by any of the safety mats installed around the different potentially hazardous zones defined by the dangerous movement of the machine.

The hazardous movement is interrupted either if the emergency stop device (S1) or any of the safety mats (SM1 or SM2) is actuated.

Stepping on the safety mat deactivates the safety module outputs, which results in the switching-off of the motor power supply by means of the contactors K1 and K2 (stop category 0 in accordance with EN/IEC 60204-1) in order to prevent possible hazardous movements or states.

The safety mat provides a protection zone between machine operator and any dangerous movements and enables free access for the loading and unloading of the machine.

The safety module monitors the consistent actuation of the redundant safety mat contacts to detect possible failures.

The main contactors are also monitored by the safety module by means of the mirror contacts, to detect contact welding.

The resetting of the function can be performed manually or automatically, depending on the configuration of the safety module, before renewed start-up of the machine movement. (*)

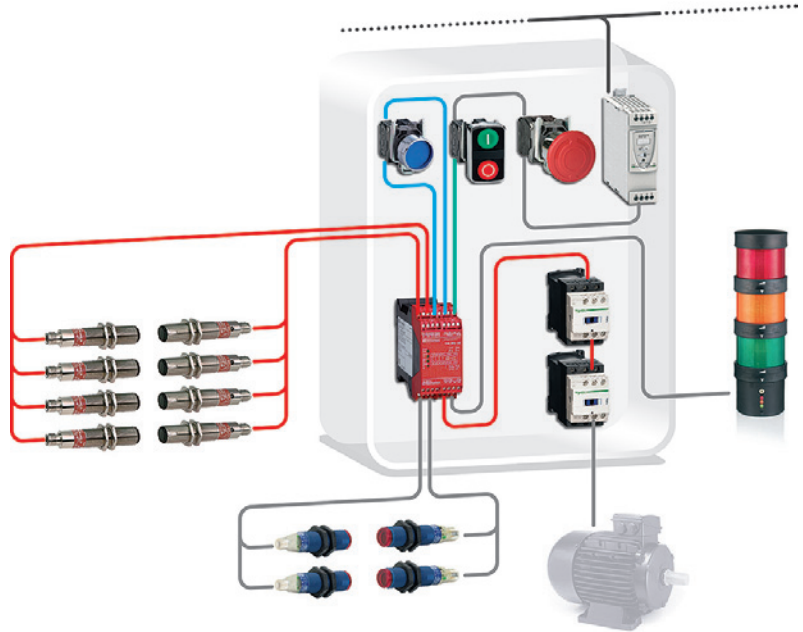
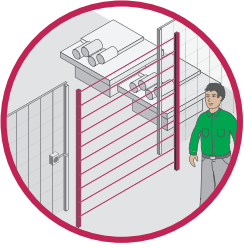
(*) The function for stopping in an emergency is a protective measure which complements the safety functions for the safeguarding of hazardous zones according to EN/ISO 12100-2.

Typical applications

- > Machines which use a free and very frequent access to the hazardous area, where a high number of interventions are needed

Perimeter Guarding with Safety Module
Single Beam Light curtains / Contactor
Cat.3 PL c, SIL 1 / Stop Category 0

2



Related Products

- Switches, pushbutton, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety light curtains, single-beam for body detections - Preventa XU2S
- Photo-electric sensors - OsiSense XU
- Safety Module - Preventa XPSCM
- Contactor - Tesys D
- Modular beacon and tower lights - Harmony XVB

Function

Safety-related stop function initiated by several single-beam photo-electric devices used as protective equipment (ESPE Type 2 according to EN/IEC 61496-1 and EN/IEC 61496-2).

An interruption of the detection field causes the safety outputs to open. The deactivation of the safety outputs results in the switching-off of the motor power supply by means of the contactor (K1) to help to prevent possible hazardous movements or states. The photo-electric devices (B1...B4) are cyclically tested and monitored by the safety module to detect possible failures.

A muting function can be enabled by means of photo-electric sensors (A1, A2). It allows the light curtain's detection function to be temporarily inhibited without triggering the stop function.

During the muting time interval, materials can be transported through the hazardous area and the muting indicator light (H1) indicates to the operator this temporary disabling of protection.

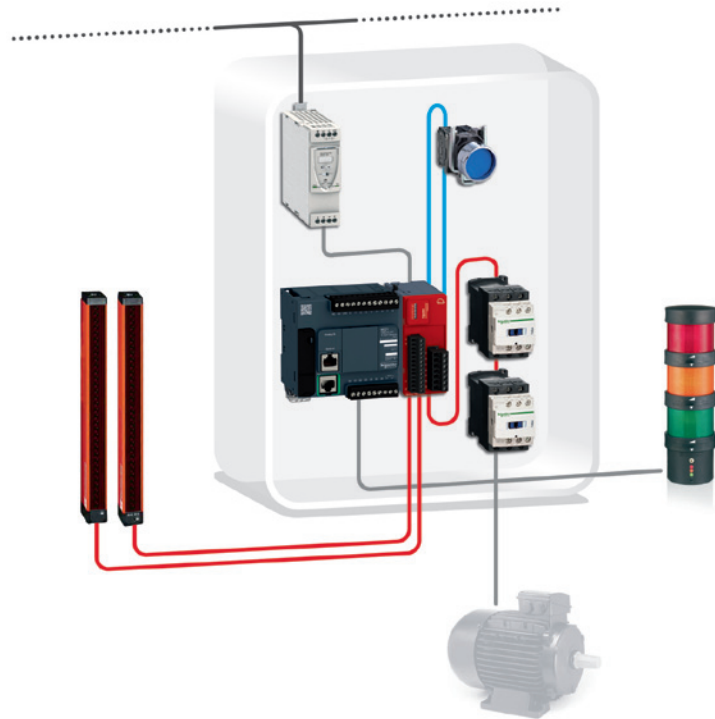
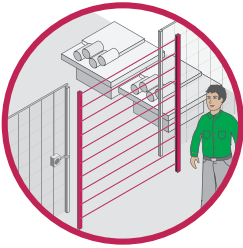
Typical applications

- > Palletizing stations with automatic control system where pallets would pass frequently through the hazardous area

Perimeter Guarding with Embedded Safety Module

Light curtain / Contactor

Cat.4 PL e, SIL 3 / Stop Category 0



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety light curtains, single-beam for body detections - Preventa XU2S
- Photo-electric sensors - OsiSense XU
- Safety Module - Modicon TM3SAFL5R(G)
- Contactor - Tesys D
- Modular beacon and tower lights - Harmony XVB

Function

Safety-related stop function initiated by safety light curtain (ESPE Type 4 according to EN/IEC 61496-1 and EN/IEC 61496-2).

An interruption of the detection field causes the safety outputs to open. The deactivation of the safety outputs results in the switching-off of the motor power supply by means of the contactor (K1) to help to prevent possible hazardous movements or states.

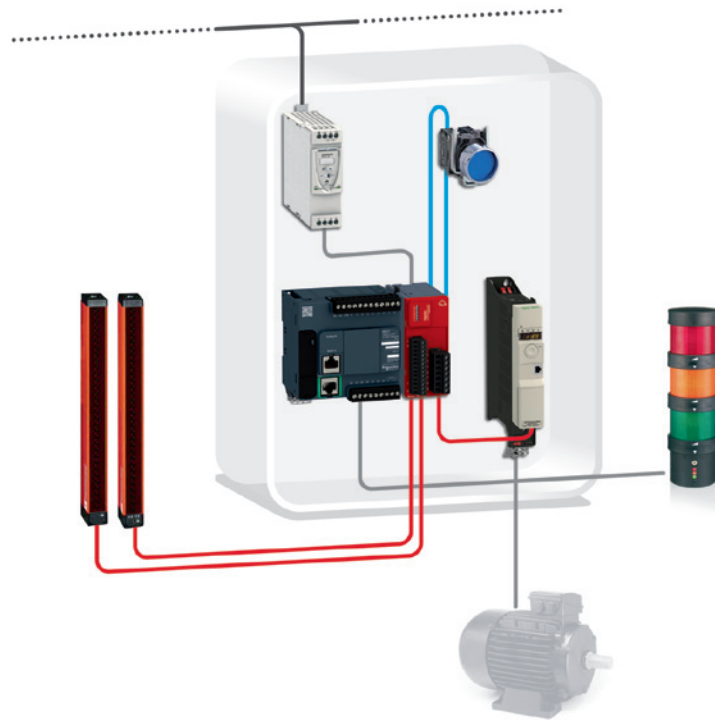
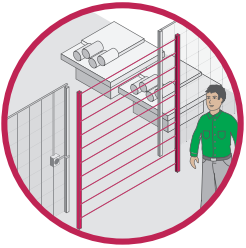
The safety light curtain receivers and outputs are cyclically tested and monitored by the safety light curtain to detect possible failures.

Typical applications

- > Palletizing stations with automatic control system where pallets would pass frequently through the hazardous area

Perimeter Guarding with Embedded Safety Module
 Light curtain / Variable Speed Drive
 Cat.3 PL d, SIL 2 / Stop Category 1

2



Related Products

- Switches, pushbuttons, emergency stop - Harmony XB4
- Switch mode Power supply - Phaseo ABL8
- Safety Module - Modicon TM3SAK5R(G)
- Safety light curtains
- Variable speed drive - Altivar 32
- Modular beacon and tower lights - Harmony XVB

Function

Safety-related stop function initiated by a safety light curtain (ESPE Type 4 according to EN/IEC 61496-1 and EN/IEC 61496-2). Controlled stopping with power maintained to the drive to achieve stopping (i.e. braking), then cut-off of power when standstill is reached (Safe Stop 1).

The hazardous movement is interrupted either if the stop button (S2) or the emergency stop device (S3) is actuated. An interruption of the detection field initiates the functional stopping of the drive, i.e. by a braking ramp (stop category 1 in accordance with EN/IEC 60204-1).

After the delay time monitored by the drive has elapsed, the drive is halted, by the "safe torque off" (STO) safety function integrated within it, which prevents the motor from restarting unintentionally.

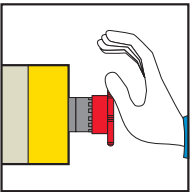
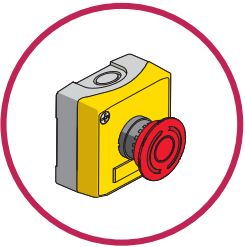
The switching of the LI3 input is monitored by the drive. The power stage is disabled when the time offset is exceeded.

Typical applications

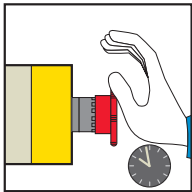
- > Machines that use drives in their movements due to high speed and precision needed (i.e. textile, wood-working or simple packaging machines), when the delayed initiation of the stopping in the event of a fault must not involve an unacceptably high residual risk

2

Emergency stop



Stop category 0:
Emergency stop function



Stop category 1

Explanation of function

International standard EN/ISO 13850 (replaces standard EN 418) specifies the functional requirements and design principles of emergency stop devices.

Stop types:
Stop category 0 and/or stop category 1 and/or stop category 2 stop functions shall be provided as indicated by the risk assessment and the functional requirements of the machine:

Stop Category 0:
Stopping by immediate removal of power to the machine actuators (i.e. an uncontrolled stop – stopping of machine motion by removing electrical power to the machine actuators)

Stop Category 1:
A controlled stop (stopping of machine motion with electrical power to the machine actuators maintained during the stopping process) with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved

Stop Category 2:
A controlled stop with power left available to the machine actuators

For the Emergency stop function either Stop Category 0 or Stop Category 1 is chosen according to the risk assessment results. It applies to all machines, whatever type of energy is used to control this function. When the emergency stop instruction ceases, the effect must be maintained until it is reset. Manual resetting must only be possible in the location where the instruction was given. Resetting must not start the machine, but simply enable the starting cycle. Restarting of the machine must not be possible until the emergency stop has been reset.

Where required, facilities to connect protective devices and interlocks shall be provided. If such a protective device or interlock causes a stop of the machine, it may be necessary for that condition to be signalled to the logic of the control system. The reset of the stop function shall not initiate any hazardous situation. Where more than one control station is provided, stop commands from any control station shall be effective when required by the risk assessment of the machine. In addition to the requirements for the emergency stop function has the following requirements:

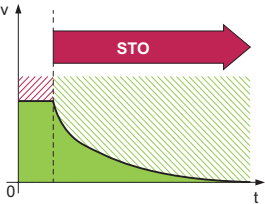
- It shall override all other functions and operations in all modes
- Power to the machine actuators that can cause a hazardous situation(s) shall be either removed immediately (stop category 0) or shall be controlled in such a way to stop the hazardous motion as quickly as possible (stop category 1) without creating other hazards
- Reset shall not initiate a restart

The choice between these two stopping methods is determined by an evaluation of the machine-related risks. This function includes several sub-functions either Safe Torque off (stop category 0), Safe Stop 1 (stop category 1) or Safe Stop 2 (stop category 2) and is represented by the drawings opposite.

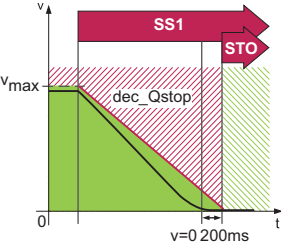
- The operator interface may be:
- Pushbutton equipped with a mushroom head
 - Cable actuated switch
 - Foot switch

Typical architecture

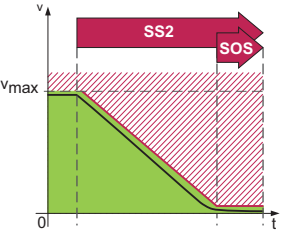
- Safety chain solution:**
- > Emergency Stop with Embedded Safety Module / Emergency Stop Pushbutton / Contactor / Cat.3 PL d, SIL2, Stop Category 0
 - > Emergency Stop with Embedded Safety Module / Emergency Stop Pushbutton / Contactor / Cat.4 PL e, SIL3, Stop Category 0
 - > Emergency Stop with Modular Safety Controller / Emergency Stop Pushbutton / Contactor / Cat.4 PL e, SIL3, Stop Category 0
 - > Emergency Stop with Embedded Safety PLC / Emergency Stop Pushbutton / PacDrive 3 drive STO / Cat.4 PL e, SIL3 / Stop Category 0



STO: Safe Torque Off



SS1: Safe Stop 1, STO: Safe Torque Off



SS2: Safe Stop 2, SOS: Safe Operating Stop

Guard monitoring

Explanation of function



Guards without guard locking device

On a large number of potentially dangerous machines, the operator must be kept at a distance during operation, but needs to take action when the machine is stopped to position a part, remove a product or adjust a tool.

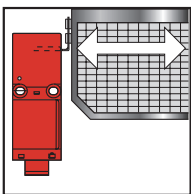
An effective means of protection is to install a guard which, according to the type of installation, will cut-off the power to the motor if an attempt is made to open it during the machine operating phase.

In all cases, it must not be possible to restart the machine until the guard is closed. Depending on the level of protection required, the system will comprise two conventional limit switches or a combination of protected, actuator operated guard switches to prevent tampering.

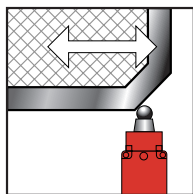
Guards with guard locking device

This type of guard is necessary for potentially dangerous machines with high inertia (long rundown time).

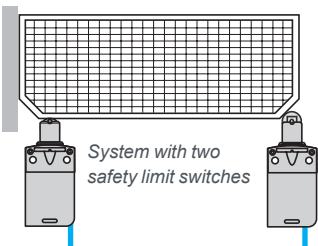
The guard is interlocked (by a solenoid for example); it cannot be opened until the machine has come to a complete standstill.



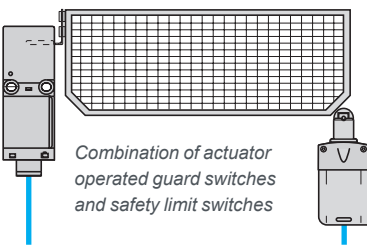
Guard without guard locking device



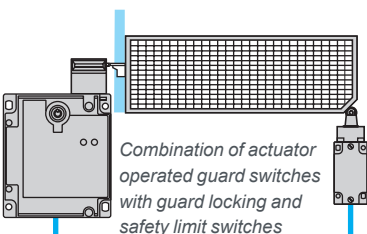
Guard with guard locking device



System with two safety limit switches



Combination of actuator operated guard switches and safety limit switches



Combination of actuator operated guard switches with guard locking and safety limit switches

Typical architecture

Safety chain solution:

- > Guard Monitoring with Well Tried Components / Limit switch / Motor Starter / Cat.3 PL c, SIL 1 / Stop Category 0
- > Guard Monitoring with Safety Module / Limit switch / Contactor / Cat.3 PL d, SIL 2 / Stop Category 0
- > Guard Monitoring with Safety Module / Guard switch with lock / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Guard Monitoring with Safety Module / Guard switch with lock / Variable speed drive / Cat.3 PL d, SIL 2 / Stop Category 1
- > Guard Monitoring with Embedded Safety Module / Guard switch with lock / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Guard Monitoring with Safety Controller / Limit switch / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Guard Monitoring with Modular Safety Controller / Guard switch with lock / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Guard Monitoring with Embedded Safety PLC / Guard switch with lock / PacDrive 3 Drive SS1 / Cat.4 PL e, SIL 3 / Stop Category 1

Guard Monitoring

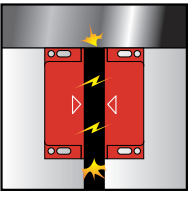
Explanation of function

2



Coded magnetic guard switch and system
 A non-contact solution is often used on industrial machines fitted with a door or guards with imprecise guiding.
 It is particularly suitable for machines subjected to frequent washing or splashing of liquids as well as small machines with a single guard for self-contained systems. Depending on the models used, the sensing distance will be between 5 and 10 mm. The reed contacts used for the coded magnetic switches cannot withstand short circuits and the switches always incorporate a resistor in series. Their operation can therefore only be guaranteed with the associated processing module. The Hall-effect self-contained systems with integral processing module do not require any further processing of the signal.

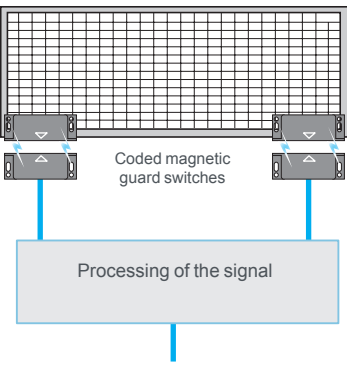
The illustrations opposite show the functions of coded magnetic guard switches and of a system.



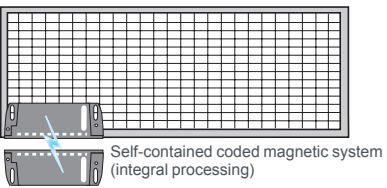
Coded magnetic guard switch

Typical architecture

- Safety chain solution:**
- > Guard Monitoring with Safety Module / Coded Magnetic switch / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
 - > Guard Monitoring with Safety Module / Coded Magnetic switch / Variable speed drive / Cat.4 PL e, SIL 3 / Stop Category 1
 - > Guard Monitoring with Safety Module / Coded Magnetic switch / Servos drive / Cat.4 PL e, SIL 3 / Stop Category 1
 - > Guard Monitoring with Embedded Safety Servo Drive / Coded Magnetic switch / Embedded Safety Servo drive / Cat.4 PL e, SIL 3 / Stop Category 2

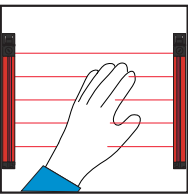
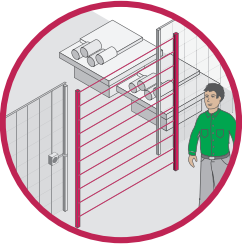


Functions of coded magnetic guard switches

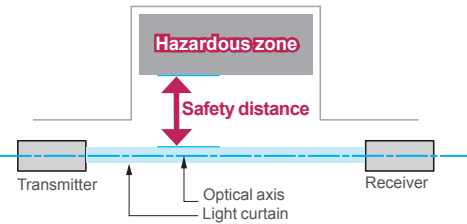


Functions of a coded magnetic guard switch system

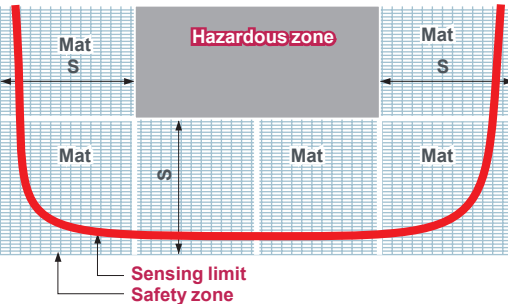
Perimeter guarding



Safety light curtain



Safety mat



Example of a safety mat application

Explanation of function

Safety light curtains

Safety light curtains are electro-sensitive systems (Electro-Sensitive Protective Equipment) designed to protect persons working in the vicinity of machinery, by stopping dangerous movements when a light beam is broken.

The absence of a door or guard reduces loading, inspection or tool changing times. This type of system, defined by standards EN/IEC 61496-1 and EN/IEC 61496-2, is frequently used with machines such as:

- presses
- machine tools
- assembly lines, etc.

The machine must be designed so that it is impossible to gain access to dangerous movements without breaking one or more of the light beams. In addition, the movement must be stopped whatever the entry speed of the operator into the hazardous zone.

The diagram opposite illustrates the operation of a light curtain.

Typical architecture

Safety chain solution:

- > Perimeter Guarding with Safety Module / Single beam Light Curtains / Contactor / Cat.3 PL c, SIL 1 / Stop Category 0
- > Perimeter Guarding with Embedded Safety Module / Light Curtain / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Perimeter Guarding with Embedded Safety Module / Light Curtain / Variable Speed Drive / Cat .3 PL d, SIL 2 / Stop Category 1
- > Perimeter Guarding with Modular Safety Controller / Light Curtain / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0

Explanation of function

Safety mats

Safety mats are used to detect persons walking across or standing on the mat or objects falling onto the mat. Standards EN 1760-1/ISO 13856 define their performance. Any detection of an object on the mat initiates stopping of any dangerous machine movement.

Restarting can be controlled manually or automatically, depending on the configuration of the associated processing unit.

When pressure is applied, the mat distorts locally and the integrated sensors are short-circuited.

The special design of these sensors requires that the mat and the detection module be matched.

In general, several mats are used to cover the safety zone.

The safety distance **S**, defined by the standard, takes into account the speed at which a person can cross the safety zone to reach the hazardous zone.

Typical architecture

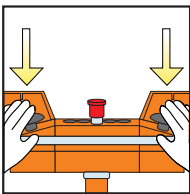
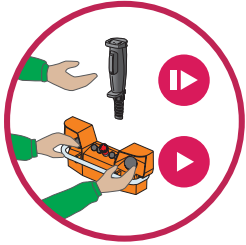
Safety chain solution:

- > Perimeter Guarding with Safety Module / Safety Mat / Contactor / Cat.3 PL d, SIL2 / Stop Category 0

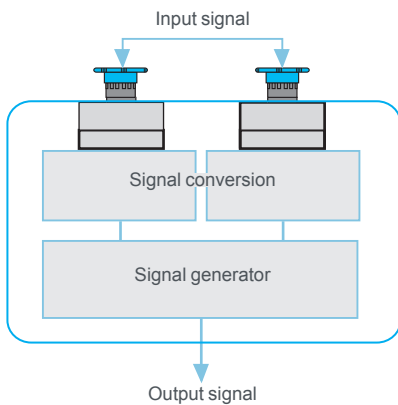
Enabling movement

Explanation of function

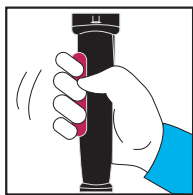
2



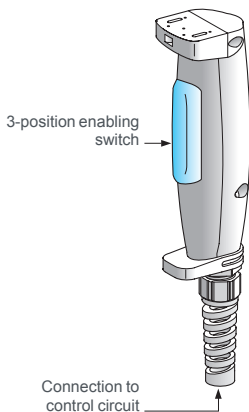
Two-hand control stations



Functions of a two-hand control station



Enabling Switch



Enabling switch XY2 AU1:
2 enabling functions, 3 positions + 1 N/C

Two-hand control stations

Standards ISO 13851 and EN 574 define this device. It requires simultaneous operation by both hands in order to start and maintain operation of a machine. It therefore provides protection exclusively for the person operating it.

A diagram representing the function is given opposite; it must meet the following requirements:

- > Concurrent, maintained operation of the two input controls for the same period of time
- > Synchronous operation; the delay between the two signals must not exceed 0.5 s
- > Prevention of accidental operation (mechanical guard)
- > Protection against tampering

Enabling switches, allow authorized personnel to carry out maintenance, adjustment or programming operations within hazardous zones of machines, provided certain conditions are met. These devices conform to standards EN/IEC 60947-5-8 and EN/IEC 60204-1. In effect, to gain access, these operations, often performed at reduced speed, must be selected by authorized personnel using selectors with key or equivalent.

Important note: the enabling switch alone must not lead to the actuation of any dangerous movements associated with the machine; a secondary, intentional, control action is required from the operator. All devices which conform to the standard must be identified by the marking scheme shown opposite.

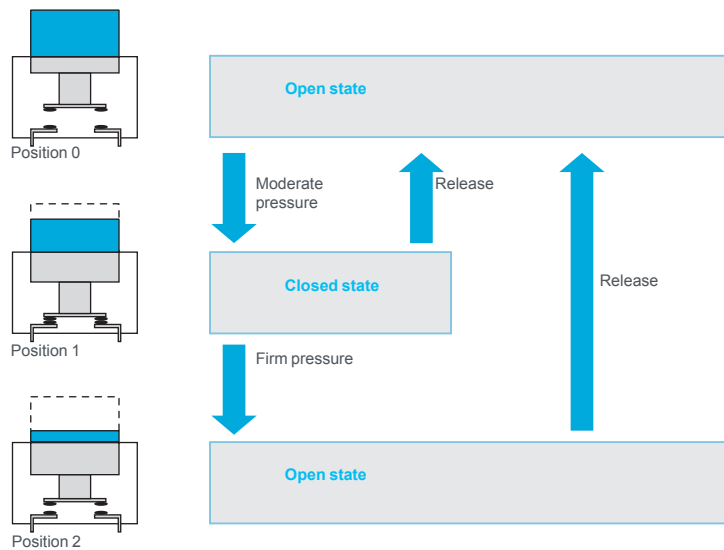
Enabling Switch

Operating principle

The three possible states are:

- > Position 0: contact open (control operator at rest)
- > Position 1: contact closed (control operator depressed to normal enabling position)
- > Position 2: contact open (control operator fully depressed)

When the switch is depressed in position 1, it must return to position 0 when released. The switch must change from position 1 to position 2 when pressed more firmly. When it is released from position 2 to position 0, the switching contact must not close.



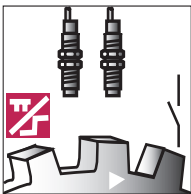
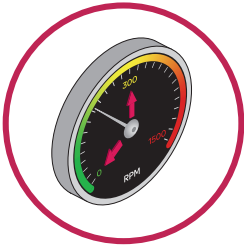
Operating principle of an enabling switch

Typical architecture

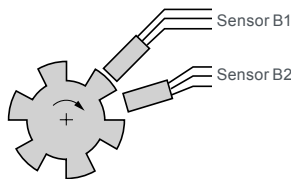
Safety chain solution:

- > Enable Machine Movement with Safety Controller / Two Hand Control Station / Contactor / Cat.4 PL e, SIL 3
- > Enable Machine Movement with Modular Safety Controller / Two Hand Control Station / Contactor / Cat.4 PL e, SIL 3

Speed monitoring



Speed monitoring

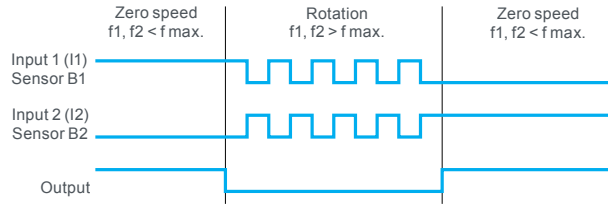


Sensor control

Explanation of function

Zero speed monitoring

Detection principle



The two sensors to be arranged that only one sensor is activated at any given time. If the inputs are in the low state, the zero speed signal will disappear after $t=1/f$ seconds and an open-circuit will be indicated. If the 2 inputs are in the high state, the zero speed signal will disappear after $t=1/f$ seconds and a short-circuit will be indicated. If the 2 inputs are in the high or low state after starting, no enabling will take place.

Sensor States and Behavior

Switch-on Sequence			
State of Sensor 1	0	0 (1)	1
State of Sensor 2	0	1 (1)	1
Behavior	Error Message	Zero Speed	Notification (2)
Output	0	1	0
Operation			
State of Sensor 1	0	0 (1)	1
State of Sensor 2	0	1 (1)	1
Behavior	Error Message	Zero Speed	Notification
Output	0	1	1

(1) If the state of the sensors is inverse (0/1, 1/0), the behavior is identical.
 (2) If the firmware version is earlier than 2.34 an error message (short circuit between inputs) appears instead of a notification. This error message must be acknowledged with the reset button.

Detection principle 2

Preventa safety modules XPSVNE for zero speed detection are used to detect the stop condition of electric motors. Their most common applications include: providing the unlock signal for electrically interlocked sliding or removable machine guards, controlling rotation direction signals for reversing motors and engaging locking brakes after a motor has come to a standstill.

As electric motors run down, a remanent voltage is produced in the windings of the motor due to residual magnetism. This voltage is proportional to the speed of the motor and, therefore, decreases as the motor comes to a standstill.

This remanent voltage is measured in a redundant manner so as to detect the stop condition of the motor. The cabling between the motor windings and the inputs of the XPSVNE module is also monitored to prevent a cabling breakage or fault being seen as a stopped motor.

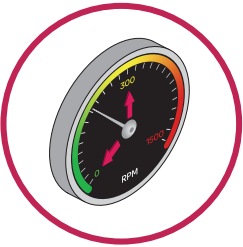
A transformer should not be used to connect the motor to terminals Z1, Z2 and Z3 since there is no monitoring of the connection with the motor winding via the resistance monitoring.

Modules XPSVNE are suitable for detecting the stop condition of all types of AC or DC motor driven machines which, when the motor runs down, produce a remanent voltage in the windings due to residual magnetism. These machines can be controlled by electronic devices, such as variable speed drives or DC injection brakes. The input lters for standard XPSVNE modules are designed for a frequency of up to 60 Hz.

For motors operating at a frequency higher than 60 Hz, which therefore produce a high frequency remanent voltage, special modules XPSVNE●●●●HS should be used. Modules XPSVNE have t2 potentiometers mounted on the front face of the module which allow independent adjustment of the switching threshold for each input circuit. This allows adjustment for different types of motors and application requirements. To aid diagnostics, modules XPSVNE have 4 LEDs and 2 solid-state outputs to provide information on the status of the zero speed detection circuit.

2

Speed monitoring



Explanation of function

Motion safety functions

Safety-limited speed

The SLS function prevents the motor from exceeding the specified speed limit.

When this function is initiated the machine starts to decelerate to the specified safe speed v_2 with in the specified time t_2 . Once the machine reaches the safe speed v_2 then the function will monitor the speed stays below safe speed v_2 .

In case of speed exceeding specified speed during time t_2 and further, safety function will initiate either SS1 or STO to stop the machine in minimum time.

Safe maximum speed

The SMS function provides a safe output signal to indicate whether the motor speed is below a specified limit.

This safety function is an optional function to set an upper limit parameter for continuous monitoring. If the speed of the machine exceeds the specified value then specified safe output will change its state.

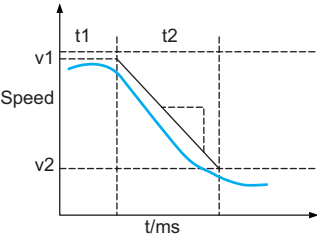
Safe direction

The SDI function prevents the motor shaft from moving in the unintended direction.

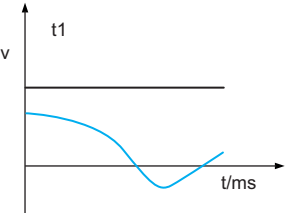
Typical architecture

Safety chain solution:

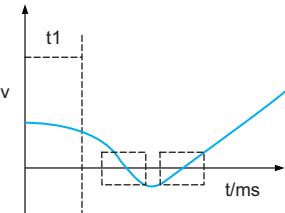
- > Speed Monitoring with Safety Module / Remanent Voltage detection and limit switch and Guard switch with lock / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Speed Monitoring with Modular Safety Controller / Safety Encoder / Contactor / Cat.4 PL e, SIL 3 / Stop Category 0
- > Speed Monitoring with Embedded Safety PLC / Selector Switch / PacDrive 3 Drive SLS / Cat.4 PL e, SIL 3 / Safe Limited Speed



Safety-limited speed

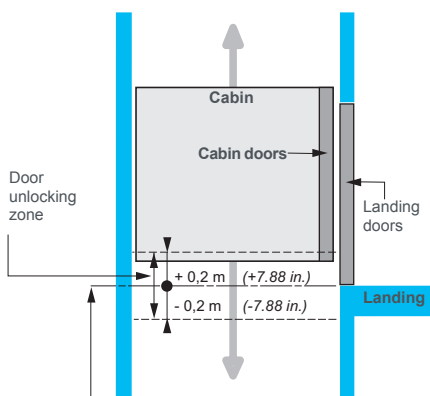
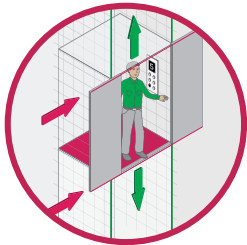


Safe maximum speed



Safe direction

Position monitoring



Landing indicator (stop reference point)
Vertical position monitoring



Safe operating stop (SOS)

Explanation of function

Vertical position monitoring

When the cabin is parked at a landing, with the doors open, some lifts automatically correct their level (isolevelling) in relation to the landing in order to compensate for any differences generated by modification of the load in the cabin.

During this operation, European standard EN-81 recommends that the presence of the cabin be checked within a zone of +/- 0.2 m around the landing (door unlocking zone), by means of a safety circuit which will cause the cabin to stop if it moves out of the specified zone.

The use of the safety module XPS EDA, which checks the presence of the cabin in the specified zone at two points, meets this requirement.

The module incorporates two safety outputs and two solid-state outputs for signaling functions. Four LEDs on the front face of the module provide visual indication of the status of the safety circuit.

The position of the cabin in relation to the landing is detected by two limit switches in the lift shaft. It is also possible to use non-contact sensors (magnetic sensors with reed contact).

When the cabin reaches the preset position and when it is within the permissible tolerances in relation to the landing, the two safety circuits in safety module XPS EDA close and allow isolevelling of the cabin with the doors open. Any change in one of the input signals (cabin outside the specified zone) or detection of a fault (break in the wiring, short-circuit, etc.) causes immediate opening of the safety outputs in the XPS EDA module and subsequent stopping of the cabin.

Motion safety function:

Safe operating stop (SOS)

The SOS function prevents the motor from deviating more than a defined amount from the stopped position. The drive provides energy to the motor to enable it to resist external forces. The Safe Operating Stop function is most commonly used in conjunction with the Safe Stop 2 function where the machine movement enters into zero speed the Safe Operating Stop is enabled.

Typical architecture

Safety chain solution:

- > Position Monitoring with Embedded Safety PLC / Coded Magnetic Switch / PacDrive 3 Drive SS2 / Cat.4 PL e, SIL 3 / Stop Category 2

Chapter 3

Preventa

safety product

offer



All technical information about products listed in this catalog
are available on: www.schneider-electric.com

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 - Harmony® XB5, plastic Pushbuttons, switches and pilot lights page 3/16 to 3/27
 - Body/contact assemblies page 3/28
 - **Control units for safety application** page 3/30
 - Control station page 3/32
 - Enabling grip page 3/54
 - Two hand control station page 3/56
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 - Mini-VARIO and VARIO switch disconnectors. page 3/158
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 - **TeSys contactors 5, from 6 to 16 A** page 3/168
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 - **Motion control Lexium 32, Lexium 28** page 3/174



Description of range		<ul style="list-style-type: none"> LED pilot lights 	<ul style="list-style-type: none"> Pushbuttons Multiple-headed pushbuttons Emergency Stop pushbuttons Selector switches and key switches Illuminated pushbuttons Pilot lights 			<ul style="list-style-type: none"> Fingerprint readers 24V $\overline{\text{---}}$ Stand-alone biometric switches Stand-alone USB biometric switches USB biometric switches dedicated to Schneider HMI (1)
Features	Products	Monolithic, compact, low consumption	Complete units or sub-assemblies (body + head)			Monolithic
	Bezel	Double insulated	Double insulated (3)	Metal, chromium plated or black	Double insulated	Double insulated, dark grey
	Shape of head	Circular	Circular, square or rectangular	Circular	Circular or square	–
Drilling or cut-out for fixing		\varnothing 8 mm and \varnothing 12 mm/0.315 in. and 0.472 in.	\varnothing 16 mm/0.630 in.	\varnothing 22 mm/0.866 in.		
Degree of protection	Conforming to IEC 60529	IP 40 IP 65 with seal	IP 65	IP 66 IP 69K (Selector switches and key switches, multiple-headed pushbuttons and Emergency Stop pushbuttons with bellows)		IP 65 (control button)
	Conforming to UL 508 and CSA C22-2 N° 14	–	Enclosure type 4, 4X and 13			Enclosure type 12
Cabling		Tags for 2.8 x 0.5 mm/0.110 x 0.020 in. connectors or threaded connector	Faston connectors Solder pins for printed circuit boards (3) Fast connector socket (4)	Spring clamp terminal connections Screw clamp terminal connections Faston connectors Connector With adaptor for printed circuit board		Cable or connectors
Mounting	Panel thickness	1...8 mm/ 0.039...0.315 in.	1...6 mm/0.039...0.236 in.			
Type references		XVLA	XB6, XB6E	XB4	XB5	XB5S

(1) Compatible with Magelis iPC, STU, OT, GXO, GT (except GT1000 series), GK, GH, and GTO models.
 (2) Wireless and batteryless pushbutton and receiver ready-paired at the factory.

Wireless and batteryless pushbuttons	Pushbuttons, selector switches and pilot lights	Joystick controllers			Pushbuttons, selector switches and pilot lights	Cam switches
						
<ul style="list-style-type: none"> ■ Wireless and batteryless pushbuttons and rope pull switch ■ Configurable receivers ■ Access point ■ Relay-antenna ■ Mobile handy box or plastic boxes for wall mounting 	<ul style="list-style-type: none"> ■ Pushbuttons ■ Emergency Stop and Emergency switching off pushbuttons ■ Selector switches and key switches ■ Illuminated pushbuttons ■ Pilot lights 	<ul style="list-style-type: none"> ■ 2 or 4 direction ■ Stay put or spring return 			<ul style="list-style-type: none"> ■ Pushbuttons ■ Emergency Stop buttons ■ Selector switches and key switches ■ Illuminated pushbuttons ■ Pilot lights 	<ul style="list-style-type: none"> ■ Switches ■ Stepping switches ■ Reversing and changeover switches ■ Ammeter switches ■ Voltmeter switches ■ Reversing switches ■ Star-delta and reversing star-delta switches ■ Pole change switches
Ready-to-use packs (2) and "components" range	Monolithic	Complete units or sub-assemblies (body + head with lever)			Complete units or sub-assemblies (body + head)	Complete units or sub-assemblies (body + front panel + head)
Metal, chromium plated or double insulated, black	Double insulated, dark grey (or white for pilot lights)	Metal, chromium plated	Double insulated, black		Metal, chromium plated or double insulated, black	
Transmitter with circular head	Circular	Circular			Hexagonal	Square
Ø 22 mm/0.866 in.					Ø 30 mm/1.181 in.	Ø 16 or Ø 22 mm/0.630 or 0.866 in.: series K10 Ø 22 mm/0.866 in. and multifixing: series K1/K2 4 holes, 48 or 68 centres: series K30...K150
IP 65	IP 65 (control buttons and pilot lights) IP 54 (Emergency switching off pushbuttons)	IP 65	IP 66	IP 65	IP 66	IP 65: series K10 IP 40, IP 65 with seal: series K1/K2 IP 40: series K30...K150
Enclosure type 12	Enclosure type 3 (pushbuttons and Emergency stop) and 4 (pilot lights)	Enclosure type 4, 4X and 13			Enclosure type 4 and 13 (9001K) Enclosure type 4, 4X, 13 (9001SK)	-
Wireless (transmitter) Through cable (receiver)	Screw and captive clamp terminal connections Faston clip connections (pilot lights)	Screw and captive clamp terminal connections				
1...6 mm/0.039...0.236 in.						0.5...6 mm/0.020...0.236 in. (depending on model)
XB5R, XB4R	XB7	XD4PA	XD2GA	XD5PA	9001K, 9001SK	K10, K1, K2, K30, K50, K63, K115, K150

(3) For Harmony® XB6 only.
(4) For Harmony® XB6E only.

Acquire the information

Control and signaling units Ø 22

Harmony® XB4, metal

Pushbuttons, switches and pilot lights

Presentation

The Harmony® XB4 range of metal control and signaling units combines simplicity of installation, flexibility and robustness. It meets the requirements of the majority of industrial applications.

■ This range includes:

- Pushbuttons and switches designed for Start/Stop control of machines and installations, adjustment and parametering (contact functions): Pushbuttons, selector/key switches, Emergency stop or Emergency switching off pushbuttons, multiple-headed pushbuttons
- Pilot lights designed for visual signaling (signaling functions)
- Illuminated pushbuttons designed for control and signaling (contact functions + signaling functions)

■ These products are shown on the following pages in two forms:

- Complete units with chromium plated metal bezel
- Sub-assemblies for user assembly (body sub-assemblies and head sub-assemblies with chromium plated or black metal bezel)

■ The pushbutton and switch control offer (illuminated and non-illuminated) is both broad and comprehensive:

- Flush, projecting, recessed, booted, spring return, push-pull, marked or unmarked pushbuttons
- Emergency stop trigger action and mechanically latching pushbuttons (conforming to standards EN/IEC 60204-1 and EN/ISO 13850)
- Emergency switching off mechanically latching pushbuttons (conforming to standard IEC 60364-5-53)
- Selector switches with standard, long handle or knurled knob, key switches
- Controllers
- Wide choice of legends and legend holders
- Wide choice of head colors
- Wide choice of accessories and spare parts

■ The pilot light signaling offer includes pilot lights with integral LED and pilot lights for BA 9s base fitting bulbs. The two types of pilot lights are for direct supply or via integral transformer.

■ Innovative complementary offers are also available:

- Multiple-headed pushbuttons
- Control and signaling units for severe applications
- Wireless and batteryless pushbuttons
- Biometric switches (see the Harmony® XB5 offer)

Installation

■ Harmony® XB4 products are both simple and quick to install:

- Mounting by single installer (self-maintaining of the head in its cut-out)
- Clip-together component system (head, body, contact blocks and LED)
- Fixing by a single locking screw
- Anti-loosening system for screw clamp terminals of contact blocks.

■ Various types of connection are available: Screw clamp, connector, Faston connector, spring terminal or for printed circuit board.

Environment

■ The performance features of the Harmony® XB4 range meet the most demanding international standards and approvals:

- EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4 and EN/IEC 60947-5-5
- UL 508, CSA C22-2 n° 14, GB 14048.5
- International certifications: UL, CSA, CCC, GOST
- Marine certifications: BV, RINA, LRCS, DNV, GL

■ The range includes products for use in difficult industrial environments, due to:

- Their high degree of protection for harsh environments (IP 66 / IP 69K)
- Their resistance to high pressure cleaning
- Their "all climates" TH compatibility
- A wide choice of contact blocks with various breaking capacities (low, standard or high power switching)

For more technical information, please refer to our website www.schneider-electric.com.

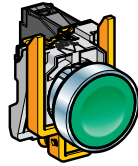
Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Pushbuttons, switches and pilot lights

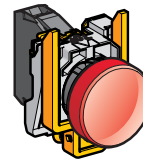
Description

The Ø 22 mm/0.866 in. range of metal control and signaling units comprises:

Complete units XB4B, with chromium plated metal bezel

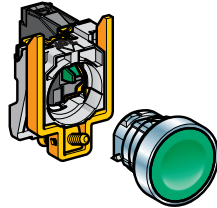


Pushbuttons and switches

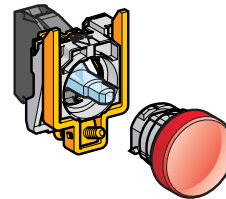


Pilot lights

Sub-assemblies ZB4B, with chromium plated or black metal bezel

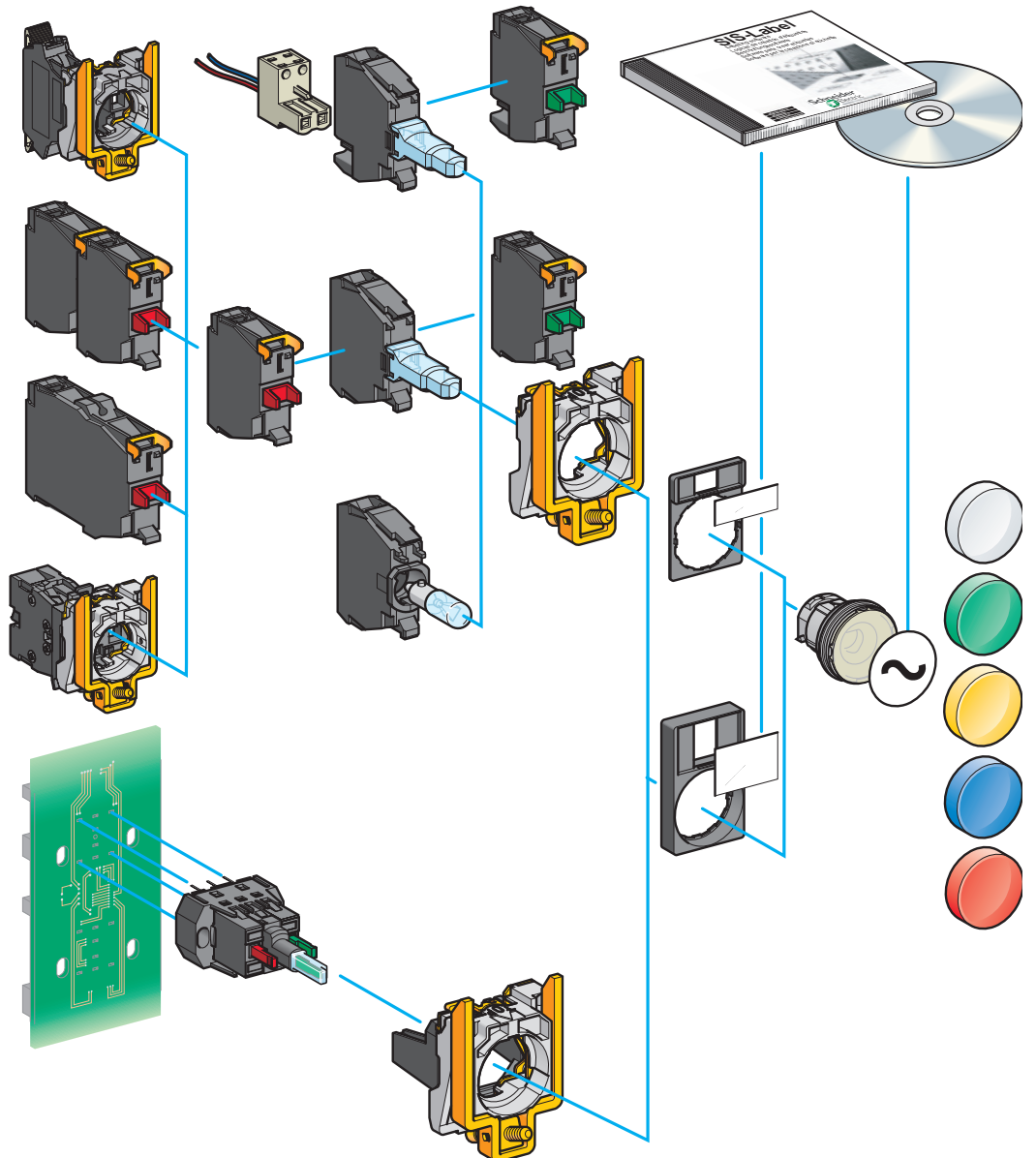


Pushbuttons and switches:
body + head
sub-assemblies



Pilot lights:
body + head
sub-assemblies

Component parts and accessories, ZB



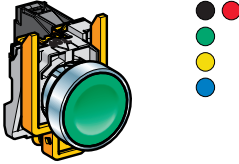
Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Pushbuttons, switches and pilot lights:
complete units, XB4B

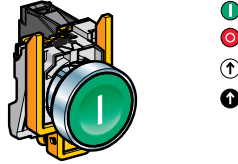
Complete units

Contact functions

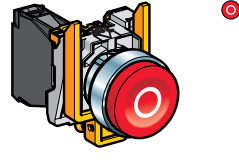
Pushbuttons, spring return, with chromium plated metal bezel



Flush push, unmarked
XB4BA●1/BA42
(1)

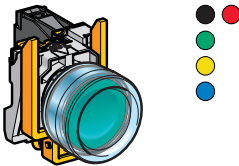


Flush push, with marking
XB4BA3311
(1)

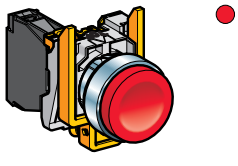


Projecting push, with marking
XB4BL4322
(1)

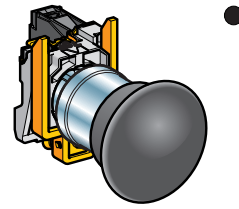
3



Booted flush push
XB4BP●1/BP42
(1)



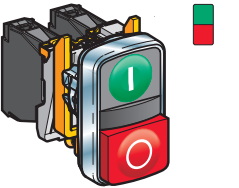
Projecting push, unmarked
XB4BL42
(1)



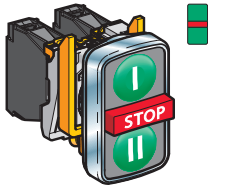
Mushroom head
XB4BC21
see page 3/12

Ø 40 mm/
1.57 in.

Multiple-headed pushbuttons, spring return, with chromium plated metal bezel

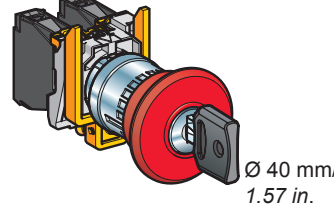
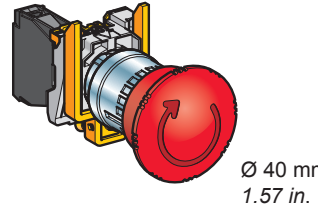
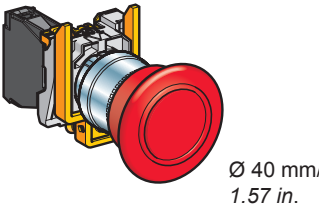


Double-headed
XB4BL73415
(1)



Triple-headed
XB4BA731327/XB4BA711237
(1)

Emergency Stop or Emergency switching off mushroom head pushbuttons, Ø 40 mm/1.57 in., with chromium plated metal bezel



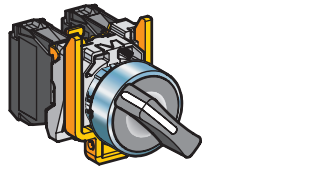
Emergency stop trigger action and mechanical latching

Push-pull (EN/ISO 13850)
XB4BT845
see page 3/14

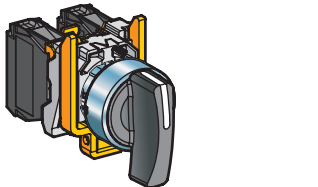
Turn to release (EN/ISO 13850)
XB4BS844●
see page 3/14

Key release (EN/ISO 13850)
XB4BS9445
see page 3/14

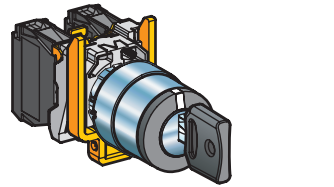
Selector switches and key switches, with chromium plated metal bezel



Standard handle, black
XB4BD●●
(1)



Long handle, black
XB4BJ●●
(1)



Key switch
XB4BG●●
(1)

(1) Please refer to our website www.schneider-electric.com

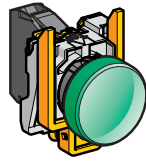
Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Pushbuttons, switches and pilot lights:
complete units, XB4B

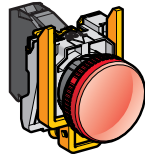
Complete units

Signaling functions

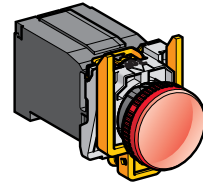
Pilot lights



Integral LED
XB4BVB●/BVG●/BVM●
(1)



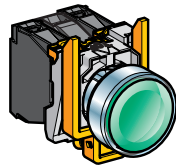
For bulb with BA 9s base fitting
Direct supply
XB4BV6●
(1)



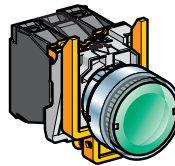
Via integral transformer with secondary
XB4BV3●/BV4●
(1)

Combined functions (contact and signaling)

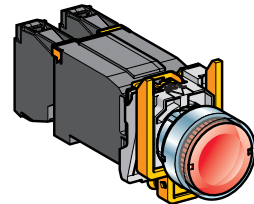
Illuminated pushbuttons, spring return, flush push, chromium plated metal bezel



Integral LED
XB4BW3●B5/BW3●G5/BW3●M5
(1)

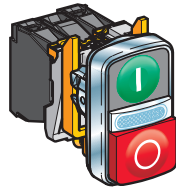


For bulb with BA 9s base fitting
Direct supply
XB4BW3●65
(1)



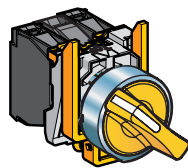
Via integral transformer
XB4BW3●35/BW3●45
(1)

Double-headed pushbuttons + pilot light block, spring return, chromium plated metal bezel



Integral LED
XB4BW73731●5
(1)

Illuminated selector switches with standard handle, chromium plated metal bezel



Integral LED
XB4BK12●●5, XB4BK13●●5
(1)

3

(1) Please refer to our website www.schneider-electric.com

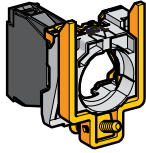
Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB4B

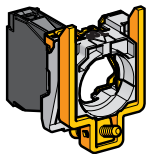
Non illuminated units for user assembly

For pushbuttons, spring return, unmarked

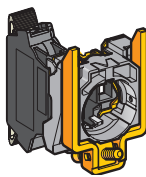
Body sub-assemblies



Screw clamp terminals
ZB4BZ10●/BZ141
see page 3/28



Faston
ZB4BZ10●3
(1)



Spring clamp terminals
ZBE10●5
ZB4BZ10●5
(1)

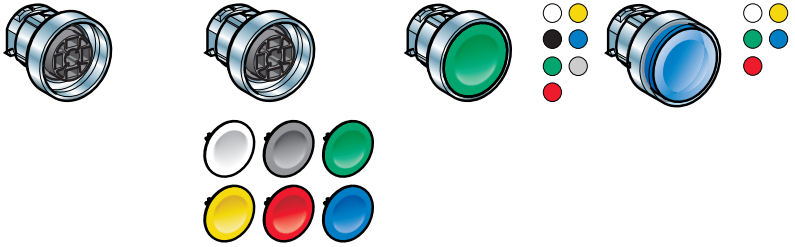
For pushbuttons, spring return, with marking

For multiple-headed pushbuttons, spring return

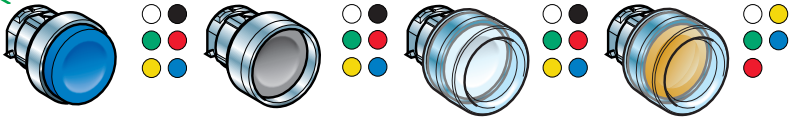
For "push-push to release" pushbuttons

Contact functions

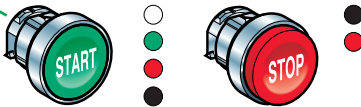
Head sub-assemblies, chromium plated or black metal bezel



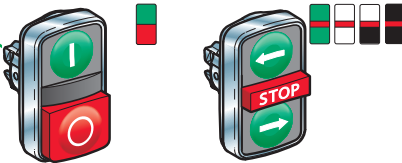
Flush push without cap ZB4BA0 (1)	Flush push with set of 6 caps ZB4BA9 (1)	Flush push ZB4BA● (1)	Flush push for insertion of legend ZB4BA●8 (1)
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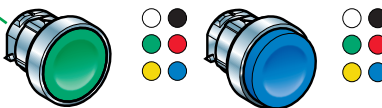
Projecting push ZB4BL● (1)	Recessed push ZB4BA●6 (1)	Booted flush/ projecting push ZB4BP●/BP●S (1)	Booted flush push for insertion of legend ZB4BP●8 (1)
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Flush push ZB4BA●3●/BA●4● ZB4BA334/335 (1)	Projecting push ZB4BL●3● (1)
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Double-headed pushbuttons ZB4BA7●●● ZB4BA79 ZB4BL734● (1)	Triple-headed pushbuttons ZB4BA7313● ZB4BA711●● ZB4BA72124 ZB4BA791 (1)
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Flush push ZB4BH0● (1)	Projecting push ZB4BH● (1)
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(1) Please refer to our website www.schneider-electric.com

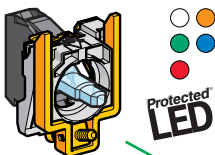
Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB4B

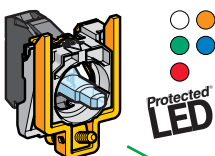
**Pilot lights
for user assembly**

Signaling functions

**Body sub-assemblies
with integral LED**

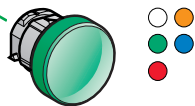


Connection: screw
clamp terminals
**ZB4BVJ●/BVB●/BVG●/
BVM●**
(1)

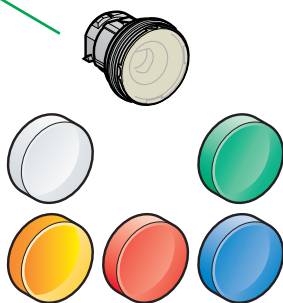


Connection: plug-in
connector
**ZB4VB●4/BVG●4/
BVM●4**
please consult our
Customer Care Centre

Head sub-assemblies



With lens fitted
ZB4BV0●3
(1)

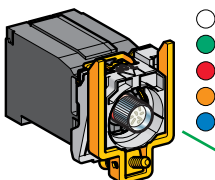


With 5 separate lenses, not fitted
ZB4BV003
(1)

**Body sub-assemblies
for BA 9s bulb**

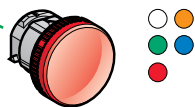


Direct supply
Connection: screw
clamp terminals
ZB4BV6
(1)



Via integral transformer
Connection: screw clamp
terminals
ZB4BV●D●
(1)

Head sub-assemblies



With lens fitted
ZB4BV0●, ZB4BV0●S
(1)

3

(1) Please refer to our website www.schneider-electric.com

Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB4B

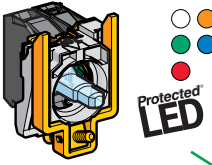
3

Illuminated pushbuttons for user assembly

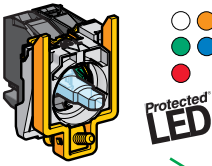
For illuminated pushbuttons, spring return

Combined functions (contact and signaling)

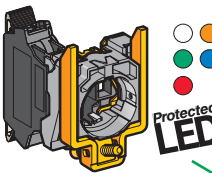
Body sub-assemblies with integral LED



Screw clamp terminals
ZB4BW0B●●/BW0G●●/BW0M●●
(1)



Plug-in connector
ZB4BW0B●●4
please consult our Customer Care Centre



Spring clamp terminals
ZBV●●●
(1)

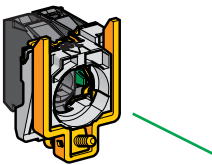
For illuminated double-headed pushbuttons, spring return

For illuminated "push-push to release" pushbuttons and illuminated selector switches with standard handle

For illuminated mushroom head pushbuttons

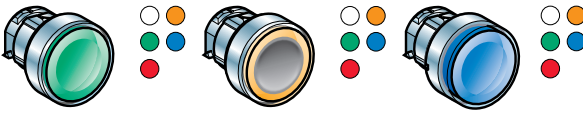
For illuminated pushbuttons, spring return

Body sub-assemblies for BA 9s bulb

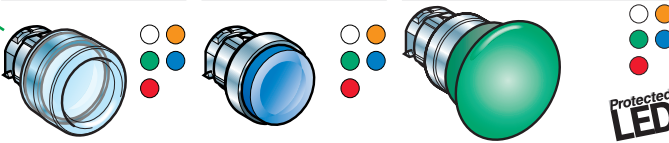


Direct supply or via integral transformer
Screw clamp terminals
ZB4BW0●●●
(1)

Head sub-assemblies, chromium plated or black metal bezel



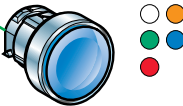
Flush push ZB4BW3●3 (1)	Flush push with illuminated ring ZB4BW9●3 (1)	Flush push for insertion of legend ZB4BA●8 (1)
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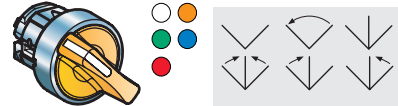
Booted flush push ZB4BW5●3 (1)	Projecting push ZB4BW1●3, ZB4BW1●3S (1)	Mushroom head, spring return ZB4BW4●3 (1)
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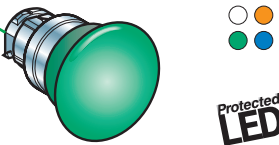
Double-headed (flush/flush push) + central pilot light
Double-headed (flush/projecting push) + central pilot light
ZB4BW7A17●● / ZB4BW7A374● / ZB4BW7A9, (1)
ZB4BW7L374●, (1)



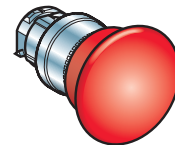
Flush or projecting "push-push to release"
ZB4BH0●3/BH●3
(1)



Selector switches with standard handle
ZB4BK1●●3
(1)

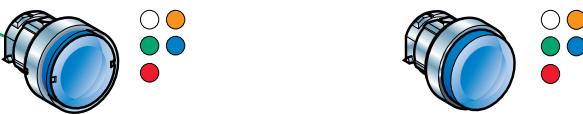


Mushroom head, latching
ZB4BW6●3
(1)



Emergency switching off, mechanical latching, push-pull
ZB4BW643
see page 3/14

Head sub-assemblies, chromium plated or black metal bezel



Flush push ZB4BW3●, ZB4BW3●S (1)	Projecting push ZB4BW1●, ZB4BW1●S (1)
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(1) Please refer to our website www.schneider-electric.com

Acquire the information

Control and signaling units Ø 22
Harmony® XB4, metal
Mushroom head pushbuttons, spring return



814088
XB4BC21



814166
ZB4BC24



814167
ZB4BC2



814168
ZB4BR2



103543
ZB4BR216



103544
ZB4BW443

Mushroom head pushbuttons (1) (2)

Screw clamp terminal connections (Schneider Electric anti-loosening system)

Shape of head	Type of push	Type of contact		Push Ø (mm/in.)	Color	Reference	Weight kg/lb
		N/O	N/C				

Complete units

	Mushroom head	1	–	40/1.575	Black	XB4BC21 (ZB4BZ101 + ZB4BC2)	0.122/0.269
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Heads only

	Mushroom head			30/1.181	Black	ZB4BC24	0.075/0.165
					Green	ZB4BC34	0.075/0.165
					Red	ZB4BC44	0.075/0.165
					Yellow	ZB4BC54	0.075/0.165
					Blue	ZB4BC64	0.075/0.165
				40/1.575	Black	ZB4BC2	0.074/0.163
					Green	ZB4BC3	0.074/0.163
					Red	ZB4BC4	0.074/0.163
					Yellow	ZB4BC5	0.074/0.163
					Blue	ZB4BC6	0.074/0.163
				60/2.362	Black	ZB4BR2	0.093/0.205
					Green	ZB4BR3	0.093/0.205
					Red	ZB4BR4	0.093/0.205
					Yellow	ZB4BR5	0.093/0.205
					Blue	ZB4BR6	0.093/0.205
				60/2.362 (3)	Black	ZB4BR216	0.054/0.119
				Hemispherical	Green	ZB4BR316	0.054/0.119
					Red	ZB4BR416	0.054/0.119
					Yellow	ZB4BR516	0.054/0.119
					Blue	ZB4BR616	0.054/0.119

Illuminated mushroom head pushbuttons (1) (2)

Integral LED

Shape of head	Type of push	Push Ø (mm/in.)	Color	Reference	Weight kg/lb
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Heads only (4)

	Mushroom head	40/1.575	White	ZB4BW413	0.051/0.112
			Green	ZB4BW433	0.051/0.112
			Red	ZB4BW443	0.051/0.112
			Orange	ZB4BW453	0.051/0.112
			Blue	ZB4BW463	0.051/0.112



Heads with black metal bezel

To order, add a figure 7 to the references selected above.
Example: **ZB4BC24** becomes **ZB4BC247**.

- (1) These pushbuttons and heads cannot be used for an Emergency Stop function. Therefore, it is recommended that a legend with a black or white background is used.
- (2) Recommended maximum number of contacts constituting the body (fixing collar + contact) associated with the head, "Please refer to our website www.schneider-electric.com"
- (3) Ergonomic product used in two-handed control applications. Recommended maximum number of contacts constituting the body (fixing collar + contact) associated with the head: 6.
- (4) Only for use with bodies comprising a light block with integral LED.





Acquire the information

Control and signaling units Ø 22

Harmony® XB4, metal

Mushroom head pushbuttons, latching

Mushroom head pushbuttons (1) (2)

Shape of head	Type of reset	Push		Reference	Weight kg/lb
		Ø (mm/in.)	Color		
Heads only					
	Push-pull	40/1.575	Black	ZB4BT2	0.077/0.170
		60/2.362	Black	ZB4BX2	0.095/0.209
	Turn to release	30/1.181	Black	ZB4BS42	0.066/0.146
		40/1.575	Black	ZB4BS52	0.070/0.154
		40/1.575	Yellow	ZB4BS55	0.070/0.154
		60/2.362	Black	ZB4BS62	0.090/0.198
	Key release (key n° 455) (2 keys included with head) (3)  (5)	30/1.181	Black	ZB4BS72	0.066/0.146
		40/1.575	Black	ZB4BS12 (4)	0.070/0.154
		60/2.362	Black	ZB4BS22	0.090/0.198

110130



ZB4BT2

523765



ZB4BS62


523766



ZB4BS72


Illuminated mushroom head pushbuttons (1) (2)

Integral LED

Shape of head	Type of reset	Push		Reference	Weight kg/lb
		Ø (mm/in.)	Color		
Heads only					
	Mushroom head	40/1.575	White	ZB4BW613	0.051/0.112
			Green	ZB4BW633	0.051/0.112
			Orange	ZB4BW653	0.051/0.112
			Blue	ZB4BW663	0.051/0.112

Heads with black metal bezel

To order, add a figure 7 to the references selected above.
Example: **ZB4BT2** becomes **ZB4BT27**.

- (1) These pushbuttons and heads cannot be used for an Emergency Stop function.
Therefore, it is recommended that a legend with a black or white background is used.
- (2) Recommended maximum number of contacts constituting the body (fixing collar + contact) associated with the head,
"Please refer to our website www.schneider-electric.com"
- (3) For specific keys with other numbers, please consult our Customer Care Centre.
- (4) Other key numbers:
 - key n° 421E: add suffix **12** to the reference.
 - key n° 458A: add suffix **10** to the reference.
 - key n° 520E: add suffix **14** to the reference.
 - key n° 3131A: add suffix **20** to the reference.
 Example: To order a Ø 40 black mushroom head for a latching pushbutton, with release by key n° 421E, the reference becomes: **ZB4BS1212**.
- (5) The symbol  indicates key withdrawal position(s).

Acquire the information

Control and signaling units Ø 22

Harmony® XB4, metal

Emergency stop and Emergency switching off functions
 Conforming to EN/IEC 60204-1, 60364-5-53,
 EN/ISO 13850 and Machinery Directive 2006/42/EC






Emergency stop function: Mushroom head Emergency stop trigger action and mechanical latching pushbuttons conform to standards EN/IEC 60204-1 and EN/ISO 13850, to Machinery Directive 2006/42/EC and to standard EN/IEC 60947-5-5.

Emergency switching off function: Mushroom head switching off mechanical latching pushbuttons conform to standards IEC 60364-5-53 and EN/IEC 60947-5-5.




Please consult our Customer Care Centre for a full explanation of these standards and directives.

Emergency stop and switching off pushbuttons with trigger action and mechanical latching (1) (2)

Screw clamp terminal connections (Schneider Electric anti-loosening system)


Shape of head	Type of reset	Type of contact		Push		Reference	Weight kg/lb
				Ø (mm)/in.	Color		
Complete units							
	Push-pull	-	1	40/1.575	Red	XB4BT842 (ZB4BZ105 + ZB4BT84)	0.125/0.276
		1	1	40/1.575	Red	XB4BT845 (ZB4BZ105 + ZB4BT84)	0.136/0.300
	Turn to release	-	1	40/1.575	Red	XB4BS8442 (ZB4BZ102 + ZB4BS844)	0.118/0.260
		1	1	40/1.575	Red	XB4BS8445 (ZB4BZ105 + ZB4BS844)	0.130/0.287
		-	2	40/1.575	Red	XB4BS8444 (ZB4BZ104 + ZB4BS844)	0.130/0.287
		1	2	40/1.575	Red	XB4BS84441 (ZB4BZ141 + ZB4BS844)	0.140/0.309
	Key release (key n° 455) (3)	1	1	40/1.575	Red	XB4BS9445 (ZB4BZ105 + ZB4BS944)	0.170/0.375

Heads only

Shape of head	Type of reset	Push		Reference	Weight kg/lb
		Ø (mm)/in.	Color		
	Push-pull	30/1.181	Red	ZB4BT844	0.078/0.172
		40/1.575	Red	ZB4BT84	0.078/0.172
		60/2.362	Red	ZB4BX84	0.098/0.216
	Turn to release	30/1.181	Red	ZB4BS834	0.068/0.150
		40/1.575	Red	ZB4BS844	0.073/0.161
		60/2.362	Red	ZB4BS864	0.093/0.205
	Key release (key n° 455) 2 keys included with head (5) (3)	30/1.181	Red	ZB4BS934	0.094/0.207
		40/1.575	Red	ZB4BS944 (4)	0.098/0.216
		60/2.362	Red	ZB4BS964	0.118/0.260


Illuminated Emergency switching off function only, mechanical latching pushbuttons (1)

Screw clamp terminal connections (Schneider Electric anti-loosening system)

Shape of head	Type of reset	Push		Reference	Weight kg/lb
		Ø (mm)/in.	Color		
	Push-pull	40/1.575	Red	ZB4BW643	0.051/0.112

(1) Recommended maximum number of contacts constituting the body (fixing collar + contact) associated with the head, "Please refer to our website www.schneider-electric.com"

(2) It is recommended that a legend or yellow background is used.

(3) The symbol  indicates key withdrawal position(s).

(4) Other key numbers:

- key n° 421E: add suffix **12** to the reference.
- key n° 458A: add suffix **10** to the reference.
- key n° 520E: add suffix **14** to the reference.
- key n° 3131A: add suffix **20** to the reference.
- key n° 4A185: add suffix **D** to the reference.

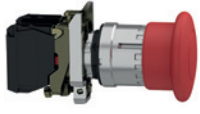
Example: To order a Ø 40 red mushroom head for a trigger action and mechanical latching Emergency stop pushbutton, with release by key n° 421E, the reference becomes: **ZB4BS94412**.

(5) For specific keys with other numbers, please consult our Customer Care Centre.

(6) Only for use with bodies comprising a light source with integral LED.

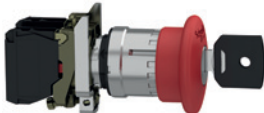
3

PF512504



XB4BT845

PF512505



XB4BS9445

PF512506



ZB4BT844

PF512507



ZB4BS834

PF512508



ZB4BS964

Acquire the information

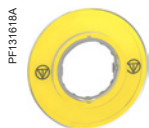
Control and signaling units Ø 22

Harmony® XB4, metal

Emergency stop and Emergency switching off functions

Conforming to EN/IEC 60204-1, 60364-5-53,

EN/ISO 13850 and Machinery Directive 2006/42/EC



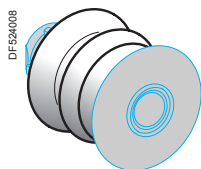
PF131618A

ZBY9121



PF131622A

ZBY9420



DF524008

ZBZ•8

Circular yellow legends for Emergency stop (1)

Description	Marking	Color	Reference	Weight kg/lb
Ø 60 mm/2.362 in. legend for Emergency stop function	-	Yellow	ZBY9121	0.007/0.015
	EMERGENCY STOP	Yellow	ZBY9320	0.007/0.015
	ARRET D'URGENCE	Yellow	ZBY9120	0.007/0.015
	NOT HALT	Yellow	ZBY9220	0.007/0.015
	PARADA DE EMERGENCIA	Yellow	ZBY9420	0.007/0.015
	ARRESTO DI EMERGENZA	Yellow	ZBY9620	0.007/0.015

Bellows for harsh environments (IP 69K) (2)

For use in	Material	For use with	Color	Sold in lots of	Unit reference	Weight kg/lb
Environments subject to humidity, dust, high pressure cleaning, etc.	Silicone	Emergency stop / Switching off function	Yellow	2	ZBZ28	0.009/0.020
		Other functions	Black	2	ZBZ58	0.009/0.020

Heads with black metal bezel

To order, add a figure 7 to the references selected above.

Example: ZB4BT844 becomes ZB4BT8447.

(1) Other legend models for Emergency stop and Emergency switching off function "Please refer to our website www.schneider-electric.com"

(2) Not compatible with Ø 30 pushbutton.

Acquire the information

Control and signaling units Ø 22

Harmony® XB5, plastic

Pushbuttons, switches and pilot lights

Presentation

The Harmony® XB5 range of plastic control and signaling units combines simplicity of installation and flexibility. It provides a solution for industrial applications demanding a high resistance to chemical agents and also provides double electrical insulation.

- This range includes:
 - Pushbuttons and switches designed for Start/Stop control of machines and installations, adjustment and parametering (contact functions): Pushbuttons, selector/key switches, Emergency stop or Emergency switching off pushbuttons, multiple-headed pushbuttons
 - Pilot lights designed for visual signaling (signaling functions)
 - Illuminated pushbuttons designed for control and signaling (contact functions + signaling functions)
- These products are shown on the following pages in two forms:
 - Complete units with black plastic bezel
 - Sub-assemblies for user assembly (body sub-assemblies and head sub-assemblies with black plastic bezel)
- The pushbutton and switch control offer (illuminated and non-illuminated) is both broad and comprehensive:
 - Flush, projecting, recessed, booted, spring return, push-pull, marked or unmarked pushbuttons
 - Emergency stop trigger action and mechanically latching pushbuttons (conforming to standards EN/IEC 60204-1 and EN/ISO 13850)
 - Emergency switching off mechanically latching pushbuttons (conforming to standard IEC 60364-5-53)
 - Selector switches with standard handle, long handle or knurled knob, key switches
 - Controllers
 - Wide choice of legends and legend holders
 - Wide choice of head colors
 - Wide choice of accessories and spare parts
- The pilot light signaling offer includes pilot lights with integral LED and pilot lights for BA 9s base fitting bulbs. The two types of pilot light are for direct supply or via integral transformer.
- The XB5 range also includes innovative complementary offers:
 - Multiple-headed pushbuttons
 - Control and signaling units for harsh applications
 - Wireless and batteryless pushbuttons
 - Biometric switches

Installation

- Harmony® XB5 products are both simple and quick to install:
 - Mounting by single installer (self-maintaining of the head in its cut-out)
 - Clip-together component system (head, body, contact blocks and LED)
 - Fixing by a single nut (anti-rotation plate)
 - Anti-loosening system for screw clamp terminals of contact blocks (thus avoiding frequent checking/retightening).
- Various types of connection are available: Screw clamp, connector, Faston connector, spring terminal or for printed circuit board.

Environment

- The performance features of the Harmony® XB5 range meet the most demanding international standards and approvals:
 - EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4 and EN/IEC 60947-5-5
 - UL 508, CSA C22-2 n° 14, GB 14048.5
 - International certifications: UL, CSA, CCC, GOST
 - Marine certifications: BV, RINA, LROS, DNV, GL
- The range includes products for use in difficult industrial environments, due to:
 - Their high degree of protection for severe environments (IP 66/IP 69K)
 - Their resistance to high pressure cleaning
 - Their "all climates" TH compatibility
 - A wide choice of contact blocks with various breaking capacities (low, standard or high power switching)

For more technical information, please refer to our website www.schneider-electric.com.

Acquire the information

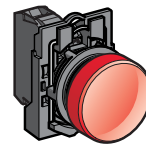
Control and signaling units Ø 22
Harmony® XB5, plastic
Pushbuttons, switches and pilot lights

Description The Ø 22 range of plastic (double insulated) control and signaling units comprises:

Complete units, XB5A

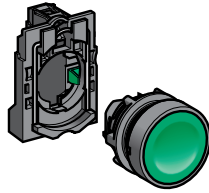


Pushbuttons and switches

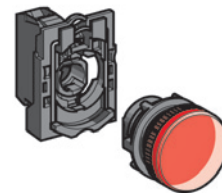


Pilot lights

Sub-assemblies, ZB5A

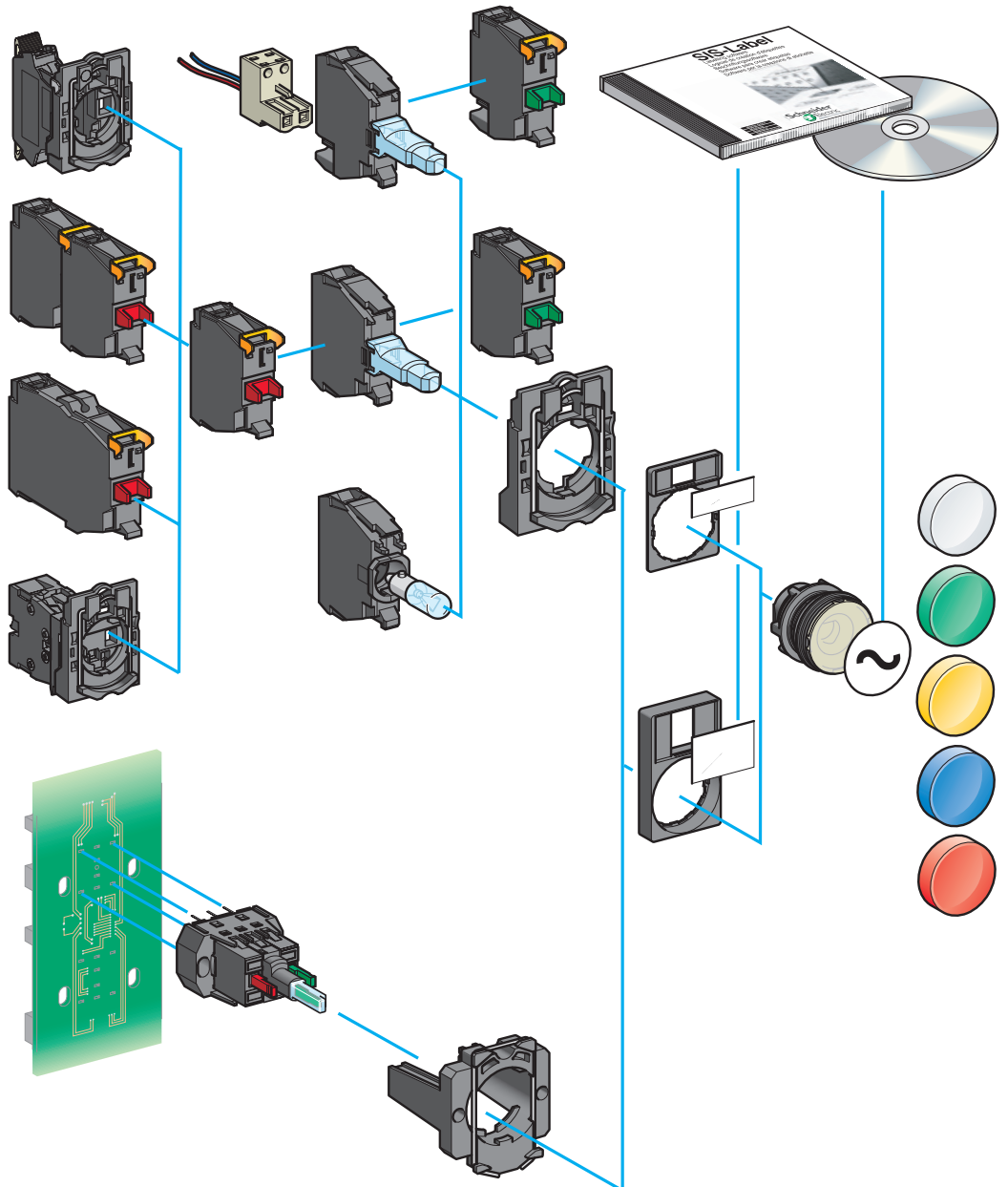


Pushbuttons and switches:
body + head
sub-assemblies



Pilot lights:
body + head
sub-assemblies

Component parts and accessories, ZB



3

Acquire the information

Control and signaling units Ø 22
 Harmony® XB5, plastic
 Pushbuttons, switches and pilot lights:
 complete units, XB5A

Complete units

Contact functions

Pushbuttons, spring return



Flush push, unmarked
XB5AA●1/AA42
 (1)



Flush push, marked
XB5AA3311/AA33●1
 (1)



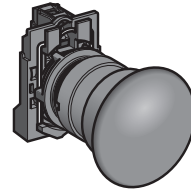
Projecting push, marked
XB5AL4322
 (1)



Booted flush push
XB5AP●1/AP42
 (1)



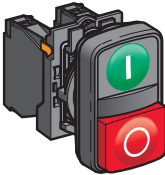
Projecting push, unmarked
XB5AL42
 (1)



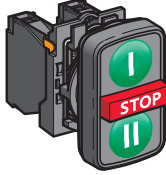
Ø 40
 /1.575 in.

Mushroom head
XB5AC21
 (1)

Multiple-headed pushbuttons, spring return

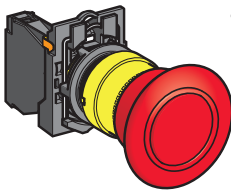


Double-headed
XB5AL73415
 (1)



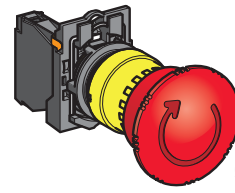
Triple-headed
XB5AA731327/XB5AA711237
 (1)

Emergency Stop or Emergency switching off mushroom head pushbuttons, Ø 40/1.575 in.



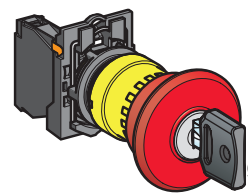
Ø 40
 /1.575 in.

Push-pull (EN/ISO 13850)
XB5AT845
 see page 3/26



Ø 40
 /1.575 in.

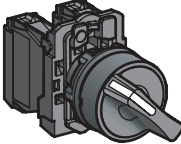
Turn to release (EN/ISO 850)
XB5AS8●4
 see page 3/26



Ø 40
 /1.575 in.

Key release (EN/ISO 13850)
XB5AS9445
 see page 3/26

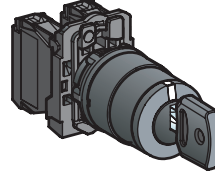
Selector switches and key switches



Standard handle, black
XB5AD●●
 (1)



Long handle, black
XB5AJ●●
 (1)



Key switch
XB5AG●●
 (1)

(1) Please refer to our website www.schneider-electric.com

Acquire the information

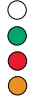
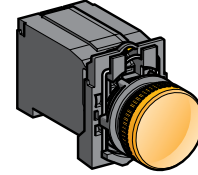
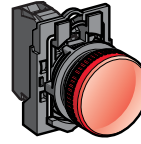
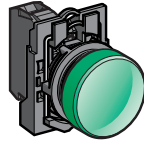
Control and signaling units Ø 22
Harmony® XB5, plastic
Pushbuttons, switches and pilot lights:
complete units, XB5A

Complete units

(continued)

Pilot lights

Signaling functions



Integral LED

XB5AVB●/AVG●/AVM●
(1)

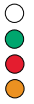
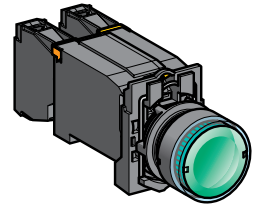
For bulb with BA 9s base fitting

Direct supply
XB5AV6●
(1)

Via integral transformer
XB5AV3●/AV4●
(1)

Combined functions (contact and signaling)

Illuminated pushbuttons, spring return, flush push



Integral LED

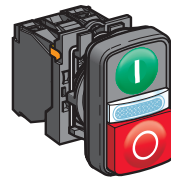
XB5AW3●B5/AW3●G5/AW3●M5
(1)

For bulb with BA 9s base fitting

Direct supply
XB5AW3●65
(1)

Via integral transformer
XB5AW3●35/AW3●45
(1)

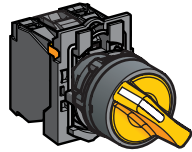
Double-headed pushbuttons, spring return, and pilot light block



Integral LED

XB5AW73731●5
(1)

Illuminated selector switches, standard handle



Integral LED

XB5AK12●●5, XB5AK13●●5
(1)

(1) Please refer to our website www.schneider-electric.com

Acquire the information

Control and signaling units Ø 22
Harmony® XB5, plastic
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB5A

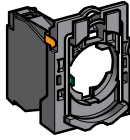
Non illuminated units for user assembly

Contact functions

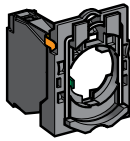
Body sub-assemblies

Head sub-assemblies

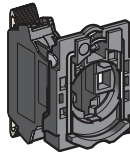
For pushbuttons, spring return, unmarked



Screw clamp terminals
ZB5AZ10●/AZ141
see page 3/28



Faston
ZB5AZ10●3
(1)



Spring clamp terminals
ZBE10●5
ZB5AZ10●5
(1)

For pushbuttons, spring return, marked

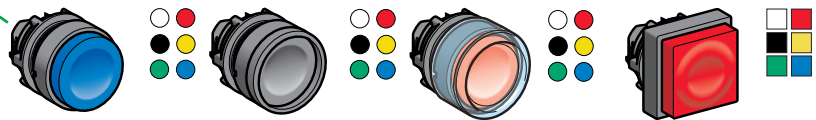
For multiple-headed pushbuttons, spring return

For "push-push to release" pushbuttons

For "push-turn to release" pushbuttons



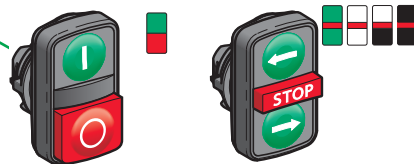
Flush push without cap/with set of 6 caps ZB5AA0/AA9 (1)	Flush push ZB5AA● (1)	Flush push for insertion of legend ZB5AA●8 (1)	Flush push, cap mounted/not mounted ZB5CA0/CA● (1)
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Projecting ZB5AL● (1)	Recessed push ZB5AA● (1)	Booted flush push, for insertion of legend ZB5AP●●/AP●S (1)	Projecting or recessed push ZB5CA●/CL● (1)
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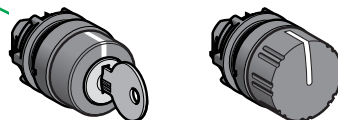
Flush push ZB5AA●3●/AA●4● (1)	Projecting push ZB5AL● (1)	Flush push ZB5CA●3●/CA●9● (1)
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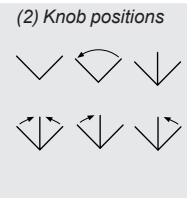
Double-headed ZB5AA7●●/AA79 ZB5AL734● (1)	Triple-headed ZB5AA7313●, ZB5AA711●● ZB5AA72124, ZB5AA791 (1)
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Flush push (caps mounted/not mounted) ZB5AH●●/CH●● (1)	Projecting push ZB5AH● (1)	Flush push (caps mounted/not mounted) ZB5CH0/CH0● (1)
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Key switches ZB5AFD● (1)	Knurled knob (2) ZB5AF (1)
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(1) Please refer to our website www.schneider-electric.com

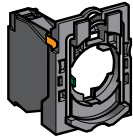
Acquire the information

Control and signaling units Ø 22
Harmony® XB5, plastic
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB5A

Non illuminated units for user assembly
(continued)

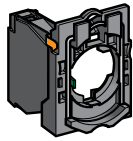
For mushroom head pushbuttons

Body sub-assemblies



Screw clamp terminals
ZB5AZ10●/AZ141
see page 3/28

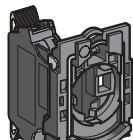
For Emergency Stop or Emergency switching off mushroom head pushbuttons



Faston
ZB5AZ10●3
(1)

Emergency stop trigger action and mechanical latching

Emergency switching off mechanical latching



Spring clamp terminals
ZBE10●5
ZB5AZ10●5
(1)

Emergency stop trigger action and mechanical latching

For selector switches and key switches

For toggle switches

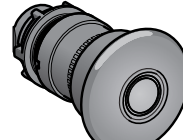
Contact functions (continued)

Head sub-assemblies



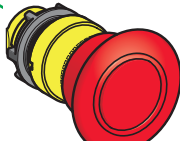
- ●
 - ●
 - ●
 - ●
- Ø 30
Ø 40
Ø 60

Spring
ZB5AC●/AR●
see page 3/24



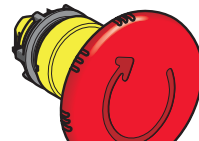
- -
- Ø 30
Ø 40
Ø 60

Latching
ZB5A●2/AS●2/AS55
see page 3/25



-
- Ø 30
Ø 40
Ø 60

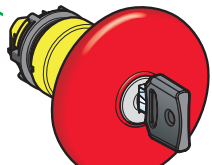
Push-pull (EN/ISO 13850)
ZB5AT84
see page 3/26



-
- Ø 30
Ø 40
Ø 60

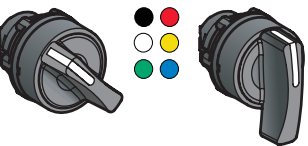
Turn to release (EN/ISO 13850)
ZB5AS8●4
see page 3/26

Push-pull (IEC 60364-5-53)
ZB5AT●/AX●
see page 3/27



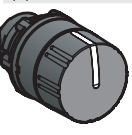
-
- Ø 30
Ø 40
Ø 60

Key release (EN/ISO 13850)
ZB5AS9●4/AS944D, see page 3/26



Standard handle (2)
ZB5AD●
(1)

Long black handle (2)
ZB5AJ●
(1)

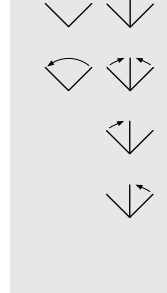


Knurled black knob (2)
ZB5AD●9
(1)

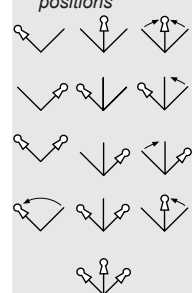


Key switch (3)
ZB5AG●●
(1)

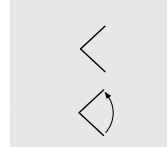
(2) Switch handle and knob positions



(3) Key switch positions
Key withdrawal positions



(4) Lever positions



2-position lever (4)
ZB5AD●8
(1)

(1) Please refer to our website www.schneider-electric.com

Acquire the information

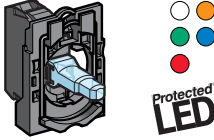
Control and signaling units Ø 22
Harmony® XB5, plastic
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB5A

3

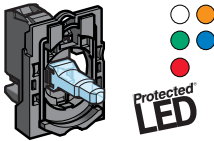
Pilot lights for user assembly

Signaling functions

Body sub-assemblies with integral LED



Connection: screw clamp terminals
ZB5AVB●/AVG●/AVM●
(1)



Connection: plug-in connector
Please consult our Customer Care Centre

Head sub-assemblies



With lens fitted (insertion of legend)
ZB5AV0●3/AV0●3E, (1)



With lens fitted
ZB5CV0●3, (1)

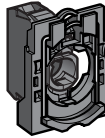


With 5 lens caps (not fitted) for insertion of legend
ZB5AV003/AV0●3●, (1)

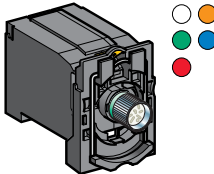


With 5 separate lens caps, not fitted
ZB5CV003, (1)

Body sub-assemblies for BA 9s bulb



Direct supply
Connection: screw clamp terminals
ZB5AV6, (1)



Via integral transformer
Connection: screw clamp terminals
ZB5AV●/AV3D●/AV5D●
(1)

Head sub-assemblies



With lens fitted
ZB5AV0●, (1)

Illuminated pushbuttons for user assembly

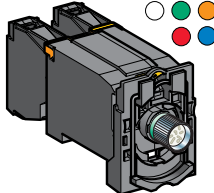
Combined functions (contact and signaling)

For illuminated pushbuttons, spring return

Body sub-assemblies for BA 9s bulb

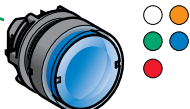


Direct supply
Connection: screw clamp terminals
ZB5AW06●, (1)

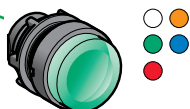


Via integral transformer
Connection: screw clamp terminals
ZB5AW03●/ AW04●/AW05●
(1)

Head sub-assemblies



Flush
ZB5AW3●/AW3●S, (1)



Projecting
ZB5AW1●/AW1●S, (1)

(1) Please refer to our website www.schneider-electric.com

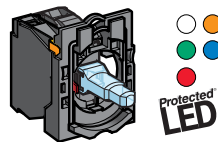
Acquire the information

Control and signaling units Ø 22
Harmony® XB5, plastic
Pushbuttons, switches and pilot lights:
sub-assemblies, ZB5A

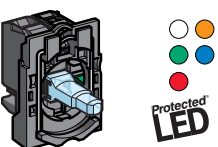
Illuminated pushbuttons for user assembly

For illuminated pushbuttons, spring return

Body sub-assemblies with integral LED

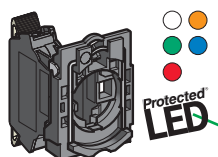


Connection: screw clamp terminals
ZB5AW0B●●/AW0G●●/AW0M●●
(1)



Connection: plug-in connector

Please consult our Customer Care Centre



For double-headed pushbuttons, spring return, with pilot light

For illuminated, mushroom head pushbuttons, latching

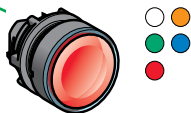
Connection: spring clamp terminals
ZBV●●5
(1)

For illuminated mushroom head pushbuttons
■ Emergency Stop with trigger action and mechanical latching
or
■ Emergency switching off with mechanical latching only

For illuminated "push-push to release" pushbuttons
For illuminated selector switches, standard handle

Combined functions (contact and signaling) (continued)

Head sub-assemblies



Flush push
Flush push with illuminated ring
ZB5AW3●3/AW3●3S/AW9●3
(1)



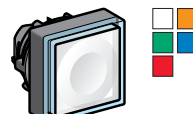
Flush push
for insertion of legend
ZB5AA●8
(1)



Booted flush push
ZB5AW5●3
(1)



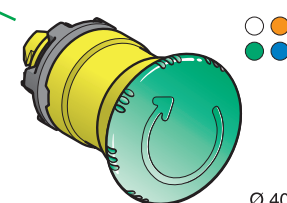
Projecting push
ZB5AW1●3/AW1●3S
(1)



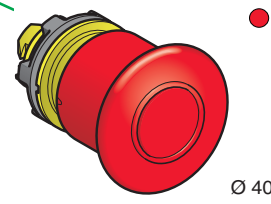
Flush or projecting push
Flush or projecting push for insertion of legend
ZB5CW3●3/CW1●3
(1)



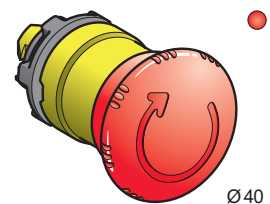
Double-headed (flush/flush push) + central pilot light
Double-headed (flush/projecting push) + central pilot light
ZB5AW7A17●●, ZB5AW7A374●, ZB5AW7A9, (1)
ZB5AW7L374●, (1)



Turn to release
ZB5AW7●3, see page 3/25



Push-pull with mechanical state indicator (EN/ISO 13850)
ZB5AT8643M
see page 3/26



Turn to release (IEC 60364-5-53)
ZB5AW743
see page 3/27



Flush or projecting "push-push to release"
ZB5AH0●3/AH●3
(1)
(2) Handle positions



Flush "Push-push to release"
ZB5CH3●3
(1)



Standard handle (2)
ZB5AK1●●3
(1)



(1) Please refer to our website www.schneider-electric.com

Acquire the information

Control and signaling units Ø 22
Harmony® XB5, plastic
Mushroom head pushbuttons, spring return

3



XB5AC21



ZB5AC24



ZB5AC2



ZB5AR4



ZB5AR216




Mushroom head pushbuttons (1) (2)							
Screw clamp terminal connections (Schneider Electric anti-loosening system)							
Shape of head	Type of push	Type of contact		Push Ø (mm)/in.	Color	Reference	
		N/O	N/C				
Complete units							
	Mushroom head	1	–	40/1.575	Black	ZB5AC21 (ZB5AZ101 + ZB5AC2)	0.062/0.137
Heads only							
	Mushroom head			30/1.181	Black	ZB5AC24	0.027/0.060
					Green	ZB5AC34	0.027/0.060
					Red	ZB5AC44	0.027/0.060
					Yellow	ZB5AC54	0.027/0.060
					Blue	ZB5AC64	0.027/0.060
				40/1.575	Black	ZB5AC2	0.046/0.101
					Green	ZB5AC3	0.046/0.101
					Red	ZB5AC4	0.046/0.101
					Yellow	ZB5AC5	0.046/0.101
					Blue	ZB5AC6	0.046/0.101
				60/2.362	Black	ZB5AR2	0.065/0.143
					Green	ZB5AR3	0.065/0.143
					Red	ZB5AR4	0.065/0.143
					Yellow	ZB5AR5	0.065/0.143
					Blue	ZB5AR6	0.065/0.143
				60/2.362 (3)	Black	ZB5AR216	0.048/0.106
				Hemispherical	Green	ZB5AR316	0.048/0.106
					Red	ZB5AR416	0.048/0.106
					Yellow	ZB5AR516	0.048/0.106
					Blue	ZB5AR616	0.048/0.106

(1) These pushbuttons and heads cannot be used for an Emergency Stop function. Therefore, it is recommended that a legend with a Black or White background is used.
 (2) Recommended maximum number of contacts constituting the body (fixing collar and contact) associated with the head, "Please refer to our website www.schneider-electric.com"
 (3) Ergonomic product used in two-handed control applications. Recommended maximum number of contacts constituting the body (fixing collar and contact) associated with the head: 6.

Acquire the information

Control and signaling units Ø 22
Harmony® XB5, plastic
Mushroom head pushbuttons, latching

Mushroom head pushbuttons (1) (2)

Shape of head	Type of reset	Push Ø (mm)/in.	Color	Reference	Weight kg/lb
Heads only					
	Push-pull	30/1.181	Black	ZB5AT24	0.044/0.097
		40/1.575	Black	ZB5AT2	0.049/0.108
		60/2.362	Black	ZB5AX2	0.067/0.148
	Turn to release	30/1.181	Black	ZB5AS42	0.040/0.088
		40/1.575	Black	ZB5AS52	0.044/0.097
		40/1.575	Yellow	ZB5AS55	0.044/0.097
		60/2.362	Black	ZB5AS62	0.064/0.141
	Key release (key n° 455) (2 keys included with head) (3) (5)	30/1.181	Black	ZB5AS72	0.040/0.088
		40/1.575	Black	ZB5AS12 (4)	0.044/0.097
		60/2.362	Black	ZB5AS22	0.064/0.141



ZB5AT2




ZB5AS62




ZB5AS72

Illuminated mushroom head pushbuttons (2)

Shape of head	Type of reset	Push Ø (mm)/in.	Color	Reference	Weight kg/lb
Heads only (6)					
	Turn to release	40/1.575	White	ZB5AW713	0.022/0.049
			Green	ZB5AW733	0.022/0.049
			Orange	ZB5AW753	0.022/0.049
			Blue	ZB5AW763	0.022/0.049



ZB5AW733

- (1) These pushbuttons and heads cannot be used for an Emergency Stop function. Therefore, it is recommended that a legend with a Black or White background is used.
- (2) Recommended maximum number of contacts constituting the body (fixing collar and contact) associated with the head, "Please refer to our website www.schneider-electric.com"
- (3) For specific keys with other numbers, please consult our Customer Care Centre.
- (4) Other key numbers:
 - key n° 421E: add suffix **12** to the reference.
 - key n° 458A: add suffix **10** to the reference.
 - key n° 520E: add suffix **14** to the reference.
 - key n° 3131A: add suffix **20** to the reference.
 Example: To order a Ø 40mm/1.575 in. Black mushroom head for a latching pushbutton, with release by key n° 421E, the reference becomes:
ZB5AS1212.
- (5) The symbol  indicates key withdrawal position(s).
- (6) Only for use with bodies comprising a light source with integral LED.

Aquire the information

Control and signaling units Ø 22



Harmony® XB5, plastic: Emergency stop devices

Conforming to EN/IEC 60204-1 and EN/ISO 13850 and Machinery Directive 2006/42/EC





Mushroom head Emergency stop trigger action and mechanical latching pushbuttons conform to standards EN/IEC 60204-1 and EN/ISO 13850, to Machinery Directive 2006/42/EC and to standard EN/IEC 60947-5-5. Please consult our Customer Care Centre for a full explanation of these standards and directives.

Emergency stop trigger action and mechanical latching pushbuttons (1) (2)





Screw clamp terminal connections (Schneider Electric anti-loosening system)

Shape of head	Type of reset	Type of contact	Push Ø (mm)	Color	Reference	Weight kg
		 N/O				
		 N/C				

Complete units

	Push-pull	1	1	40	Red	XB5AT845 (ZB5AZ105 + ZB5AT84)	0.076
	Turn to release	1	1	40	Red	XB5AS8445 (ZB5AZ105 + ZB5AS844)	0.072
		–	2	40	Red	XB5AS8444 (ZB5AZ104 + ZB5AS844)	0.072
	Key release (key n° 455)  (3)	1	1	40	Red	XB5AS9445 (ZB5AZ105 + ZB5AS944)	0.112

Heads only

Shape of head	Type of reset	Push Ø (mm)	Color	Reference	Weight kg
	Push-pull	30	Red	ZB5AT844	0.050
		40	Red	ZB5AT84	0.050
		60	Red	ZB5AX84	0.050
	Turn to release	30	Red	ZB5AS834	0.042
		40	Red	ZB5AS844	0.046
	Key release (key n° 455) 2 keys included with head (5)  (3)	30	Red	ZB5AS934	0.068
		40	Red	ZB5AS944 (4)	0.071
		60	Red	ZB5AS964	0.092
		40	Red	ZB5AS944D	0.071


Bellows for harsh environments (IP 69K) (6)

For use in	Material	Color	Sold in lots of	Unit reference	Weight kg
Environments subject to humidity, dust, high pressure cleaning, etc.	Silicone	Red	2	ZBZ48	0.009
	EPDM	Black	2	ZBZ28	0.009
		Yellow	2	ZBZ58	0.009

Illuminated Emergency stop trigger action and mechanical latching pushbuttons with mechanical state indicator (1)


For elevator inspection box applications

Heads only (7)

Shape of head	Type of reset	Push Ø (mm)	Color	Reference	Weight kg
	Push-pull (8)	40	Red	ZB5AT8643M	0.034

(1) Recommended maximum number of contacts constituting the body (fixing collar + contact) associated with the head, "Please refer to our website www.schneider-electric.com"

(2) It is recommended that a legend or yellow background is used.

(3) The symbol  indicates key withdrawal position(s).

(4) Other key numbers:

- key n° 421E: add suffix **12** to the reference.
- key n° 458A: add suffix **10** to the reference.
- key n° 520E: add suffix **14** to the reference.
- key n° 3131A: add suffix **20** to the reference.
- key n° 4A185: add suffix **D** to the reference.

Example: To order a Ø 40 red mushroom head for a trigger action and mechanical latching Emergency stop pushbutton, with release by key n° 421E, the reference becomes: **ZB5AS94412**.

(5) For specific keys with other numbers, please consult our Customer Care Centre.

(6) Not compatible with Ø 30 pushbuttons.

(7) Only for use with bodies comprising a light source with integral LED.

(8) Cannot be used with metal guards ZBZ160•.



XB5AT845



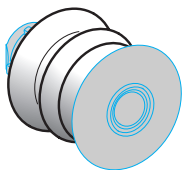
XB5AS8445



XB5AS9445



ZB5AS844



ZBZ•8



ZB5AT8643M



Acquire the information

Control and signaling units Ø 22





Harmony® XB5, plastic: Emergency switching off devices

Conforming to IEC 60364-5-53





Mushroom head switching off mechanical latching pushbuttons conform to standards IEC 60364-5-53 and EN/IEC 60947-5-5. Please consult our Customer Care Centre for a full explanation of these standards and directives.

Emergency switching off, mechanical latching pushbuttons ^{(1) (2)}							
Screw clamp terminal connections (Schneider Electric anti-loosening system)							
Shape of head	Type of reset	Type of contact		Push Ø mm	Color	Reference	Weight kg
							

Complete units

	Push-pull	–	1	40	Red	XB5AT42 (ZB5AZ102 + ZB5AT4)	0.065
	Turn to release	–	1	40	Red	XB5AS542 (ZB5AZ102 + ZB5AS54)	0.060
	Key release (key n° 455)  (3)	–	1	40	Red	XB5AS142 (ZB5AZ102 + ZB5AS14)	0.075


Heads only

	Push-pull			30	Red	ZB5AT44	0.049
				40	Red	ZB5AT4	0.049
				60	Red	ZB5AX4	0.067
	Turn to release			30	Red	ZB5AS44	0.040
				40	Red	ZB5AS54	0.044
				60	Red	ZB5AS64	0.064
	Key release (key n° 455) 2 keys included with head (5)  (3)			30	Red	ZB5AS74	0.040
				40	Red	ZB5AS14 (4)	0.044
				60	Red	ZB5AS24	0.060
	Key release (key n° 4A185)			40	Red	ZB5AS14D	0.044

Illuminated Emergency switching off, mechanical latching pushbuttons ⁽¹⁾

Screw clamp terminal connections (Schneider Electric anti-loosening system)						
Shape of head	Type of reset	Push Ø (mm)	Color	Reference	Weight kg	


Heads only ⁽⁶⁾

	Turn to release	40	Red	ZB5AW743	0.022
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(1) Recommended maximum number of contacts constituting the body (fixing collar + contact) associated with the head, "Please refer to our website www.schneider-electric.com"

(2) It is recommended that a legend or yellow background is used.

(3) The symbol  indicates key withdrawal position(s).

(4) Other key numbers:

- key n° 421E: add suffix **12** to the reference.

- key n° 458A: add suffix **10** to the reference.

- key n° 520E: add suffix **14** to the reference.

- key n° 3131A: add suffix **20** to the reference.

Example: To order a Ø 40 red mushroom head for a mechanical latching Emergency switching off pushbutton, with release by key n° 421E, the reference becomes: **ZB5AS1412**.

(5) For specific keys with other numbers, please consult our Customer Care Centre.

(6) Only for use with bodies comprising a light source with integral LED.



XB5AS542



ZB5AT4



ZB5AS64

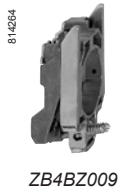


ZB5AS24

Acquire the information

Control and signaling units Ø 22
 Harmony® XB4, metal and Harmony® XB5, plastic
 Body/contact assemblies - Screw clamp terminal connections

3



Body/fixing collar for XB4			
For use with	Sold in lots of	Unit reference	Weight kg/lb
Electrical block (contact or light)	10	ZB4BZ009	0.038/0.084



Body/fixing collar for XB5			
For use with	Sold in lots of	Unit reference	Weight kg/lb
Electrical block (contact or light)	10	ZB5AZ009	0.006/0.013



Contact functions (1)

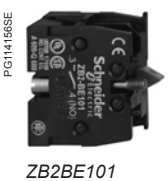
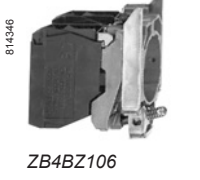
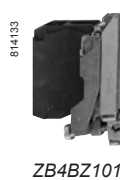
Screw clamp terminal connections (Schneider Electric anti-loosening system)

Contacts for standard applications						
Description	Type of contact	Terminal connection		Sold in lots of	Unit reference	Weight kg/lb
		N/O	N/C			
Contact blocks	Single	1	–	5	ZBE101	0.011/0.024
		–	1	5	ZBE102	0.011/0.024
	Double	2	–	5	ZBE203	0.020/0.044
		–	2	5	ZBE204	0.020/0.044
		1	1	5	ZBE205	0.020/0.044
Single with body/fixing collar	1	–	1	ZB4BZ101	0.053/0.117	
	–	1	1	ZB4BZ102	0.053/0.117	
	2	–	1	ZB4BZ103	0.062/0.137	
	–	2	1	ZB4BZ104	0.062/0.137	
	1	1	1	ZB4BZ105	0.062/0.137	
	1	2	1	ZB4BZ141	0.072/0.159	



Contacts for specific applications

Application	Type of contact	Description	Terminal connection		Sold in lots of	Unit reference	Weight kg/lb
			N/O	N/C			
Low power switching	Single	Standard	1	–	5	ZBE1016	0.012/0.026
			–	1	5	ZBE1026	0.012/0.026
	Dusty environment (2) (IP5X, 50 µm dust)	1	–	5	ZBE1016P	0.012/0.026	
		–	1	5	ZBE1026P	0.012/0.026	
Staggered contacts	Single	Early make N/O	1	–	5	ZBE201	0.011/0.024
			–	1	5	ZBE202	0.011/0.024
	Single with body/fixing collar	Overlapping N/O+N/C	1	1	5	ZB4BZ106	0.062/0.137
			2	–	5	ZB4BZ107	0.062/0.137
			–	–	–	–	–
High power switching	Single	Standard (3)	1	–	1	ZBE501	0.020/0.044
			–	1	1	ZBE502	0.020/0.044
			2	–	1	ZBE503	0.032/0.071
			–	2	1	ZBE504	0.032/0.071
			1	1	1	ZBE505	0.032/0.071
			–	–	–	–	–
Additional contact blocks for high power switching	Single	Standard (4)	1	–	1	ZB2BE101	0.020/0.044
			–	1	1	ZB2BE102	0.020/0.044



(1) The contact blocks enable variable composition of body/contact assemblies. Maximum number of rows possible: 3. Either 3 rows of 3 single contacts or 1 row of 3 double contacts + 1 row of 3 single contacts (double contacts occupy the first 2 rows)
 (2) It is not possible to fit an additional contact block on the back of these contact blocks.
 (3) It is not possible to use these contacts with light blocks.
 (4) To be fitted on the back of ZBE50● contacts.

Acquire the information

Control and signaling units Ø 22

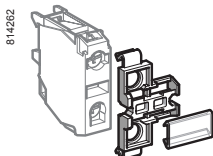
Harmony® XB4, metal and Harmony® XB5, plastic

Body/contact assemblies - Screw clamp terminal connections

Clip-on legend holder, sheet of blank legends and labelling software

Description	Sold in lots of	Unit reference	Weight kg/lb
Clip-on legend-holder for electrical blocks with screw clamp terminal connections (1). For identification of an XB4B control or signaling unit	10	ZBZ001	0.001/0.002
Sheet of 50 blank legends for legend holder ZBZ001	10	ZBY001	0.023/0.051
«SIS Label» labelling software for legend design (ZBY001 legends) (for design of legends in English, French, German, Italian, Spanish)	1	XBY2U	0.100/0.220

(1) This legend holder is not compatible with high power switching contacts.



ZBZ001

Applications

Control stations for:

- assembly and packaging machines,
- paper, cardboard and woodworking machines,
- food/beverage processing, chemical and automobile industries, mechanical presses

3



Features
Conformity to standards
Protective treatment
Ambient temperature For operation
For storage
Electric shock protection conforming to IEC 61140
Degree of protection conforming to IEC 60529, UL 508 and CSA C22-2 n° 14
Positive operation conf. to EN/IEC 60947-5-1 Appendix K
Rated insulation voltage
Rated impulse withstand voltage conforming to EN/IEC 60947-1
Type references
Pages

Plastic enclosure
EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4, EN/IEC 60947-5-5, EN/ISO 13850 and EN/IEC 60204-1 (Emergency Stop trigger action and mechanical latching mushroom head pushbuttons), IEC 60364-5-53 (Emergency switching off mechanical latching mushroom head pushbuttons) CSA C22-2 n° 14, UL 508 and GB 14048.5
Standard version, "TH"
- 25...+ 70 °C
- 40...+ 70 °C
Class II
IP 66 Enclosure type 4, 4X and 13
N/C contacts with positive opening operation
Standard single and double blocks with screw clamp terminals: Ui = 600 V, degree of pollution 3 Blocks for plug-in connector or Faston connectors, standard blocks for printed circuit board connection, contact blocks for high power switching: Ui = 250 V, degree of pollution 3 conforming to EN/IEC 60947-1
Standard single and double blocks with screw clamp terminals: Uimp = 6 kV Blocks for plug-in connector: Uimp = 4 kV Standard blocks for printed circuit board connection: Uimp = 4 kV Contact blocks for high power switching: Uimp = 4 kV
XALK
3/32

Enabling grip switch for:

- robots,
- machine tools,
- labellers

Ergonomic two-hand control stations for machine tool control



Plastic enclosure	2 control pushbuttons and 1 Emergency stop pushbutton
EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60204-1, cUL us 508, CSA C22-2 n° 14	EN/IEC 60947-5-1, EN 574/ISO 13851
Standard version, "TC"	Standard version, "TC"
- 10...+ 60 °C	- 25...+ 70 °C
- 40...+ 70 °C	- 40...+ 70 °C
Class II	Class I
IP 66 IP 65 with pushbutton	IP 65
2-contact, 3-position with positive opening operation \rightarrow	N/C contacts with positive opening operation \rightarrow
U _i = 250 V U _i = 125 V for pushbutton conforming to EN/IEC 60947-1	U _i = 600 V, degree of pollution 3 conforming to EN/IEC 60947-1
U _{imp} = 2.5 kV	U _{imp} = 6 kV
XY2AU	XY2SB
3/54	3/56





Acquire the information

Control stations and enclosures
 Plastic control stations XALD and XALK
 For Harmony® Ø 22 control and signalling units XB5
 Complete stations (screw clamp terminal connections)

Start or Stop function

■ Light grey "RAL 7035" base, dark grey "RAL 7016" lid

Description	Type of push	Dimensions (1) w x h x d mm	Type of contact		Marking	Reference	Weight kg
							
Marking on pushbutton							
1 spring return pushbutton	Flush, green	68 x 68 x 62	1	-	I	XALD102	0.135
					Marche	XALD104	0.156
					Start	XALD103	0.156
	Flush, red	68 x 68 x 62	-	1	O	XALD112	0.156
					Arrêt	XALD117	0.156
					Stop	XALD114	0.165
Projecting, red	68 x 68 x 66.5	-	1	O	XALD112E	0.165	
				Stop	XALD114E	0.165	
				Arrêt	XALD115	0.157	
Projecting, red	68 x 68 x 66.5	-	1	O	XALD118	0.157	
				Arrêt	XALD118	0.157	
				Stop	XALD116	0.157	
Marking on legend holder and legend below head							
1 spring return pushbutton	Flush, green	68 x 68 x 62	1	-	Marche	XALD101	0.157
					Start	XALD101H29	0.157
1 spring return pushbutton	Flush, red	68 x 68 x 62	-	1	Arrêt	XALD111	0.157
					Stop	XALD111H29	0.157
1 mushroom head pushbutton, Ø 40 mm, spring return	Red	68 x 68 x 86	-	1	Arrêt	XALD164	0.182

(1) Please consult our site www.schneider-electric.com for more precise information about dimensions of components.



XALD102



XALD115



XALD101



XALD111



XALD164

Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

Complete stations (screw clamp terminal connections)

Emergency stop function, with trigger action and mechanical latching

- Light grey "RAL 7035" base, yellow "RAL 1021" lid
- Conformity to standards EN/IEC 60204-1, EN/ISO 13850 (1), EN/IEC 60947-5-5 and to Machinery directive 2006/42/CE (2)

Description	Dimensions (3) w x h x d mm	Type of contact		Reference	Weight kg
		"F"	"O"		
Unmarked					
1 mushroom head pushbutton, Ø 40 mm, red Turn to release	68 x 68 x 92.5	–	1	XALK178	0.194
		–	2	XALK178F	0.194
		1	1	XALK178E	0.194
		1	2	XALK178G	0.194
1 mushroom head pushbutton, Ø 40 mm, red Key release (key n° 455)	68 x 68 x 114.5	–	1	XALK188	0.188
		–	2	XALK188F	0.188
		1	1	XALK188E	0.188
		1	2	XALK188G	0.188
1 mushroom head pushbutton, Ø 40 mm, red Push-pull	68 x 68 x 91.5	–	1	XALK198	0.193

Emergency switching off function, with mechanical latching

- Light grey "RAL 7035" base, yellow "RAL 1021" lid
- Conformity to standards IEC 60364-5-53 and EN/IEC 60947-5-5 (2)

Description	Dimensions (3) w x h x d mm	Type of contact		Reference	Weight kg
		"F"	"O"		
Unmarked					
1 mushroom head pushbutton, Ø 40 mm, red Key release (key n° 455)	68 x 68 x 87.5	–	1	XALK174	0.178
		–	2	XALK174F	0.188
		1	1	XALK174E	0.188
		1	2	XALK174G	0.197
	68 x 68 x 109.5	–	1	XALK184	0.178
		–	2	XALK184F	0.188
		1	1	XALK184E	0.188
		1	2	XALK184G	0.197
1 mushroom head pushbutton, Ø 40 mm, red Push-pull	68 x 68 x 91.5	–	1	XALK194	0.183

(1) Your Customer Care Centre may provide a control station type XALK1●8 with marking of the Emergency stop function and of the symbol in conformity with the requirements of EN/ISO 13850 standard.

(2) Please consult your Customer Care Centre for full details of these standards and directives.

(3) Please consult our site www.schneider-electric.com for more precised information about dimensions of components.



XALK178●



XALK188●



XALK198

Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

Complete stations (screw clamp terminal connections)

Start-Stop function

■ Light grey "RAL 7035" base, Dark grey "RAL 7016" lid

Description	Dimensions (3) w x h x d mm	Type of contact		Marking	Reference	Weight kg
		N/O	N/C			

Marking on pushbutton (2)

2 spring return pushbuttons: - 1 flush, green - 1 flush, red	68 X 106 X 62	1	–	I	XALD213	0.233
		–	1	O		
				Marche		
				Arrêt		
		1	1	Start	XALD215	0.233
		1	1	Stop		
2 spring return pushbuttons: - 1 flush, green - 1 projecting, red	68 X 106 X 66,5	1	–	I	XALD214	0.234
		–	1	O		
				Start		
				Stop		
		1	1	Start	XALD225	0.234
		1	1	Stop		

Marking on legend holder and legend below head

2 spring return pushbuttons: - 1 flush, green - 1 projecting, red	68 X 106 X 62	1	–	Marche	XALD211	0.233
		–	1	Arrêt		
				Start		
				Stop		
2 spring return pushbuttons, flush type, green	68 X 106 X 62	1	–	Ouverture	XALD241	0.233
		1	–	Fermeture		
1 selector switch with standard handle 2-position stay put	68 X 106 X 80	1	–	O-I	XALD134	0.163
		1	–	Arrêt-Marche		
1 key switch (key n° 455), key withdrawal from left-hand position	68 X 106 X 105.5	1	–	O-I	XALD144	0.187
				Arrêt-Marche		
		1	1	O-I		
		1	1	O-I	XALD144E	0.196

Description	Dimensions (3) w x h x d mm	Type of contact		Marking	Pilot light supply V	Reference	Weight kg
		N/O	N/C				

With pilot light and marking on pushbutton (2)

2 spring return pushbuttons and 1 pilot light with integral red LED Protected LED	68 X 136 X 64.5	1	–	I	~ 24	XALD363B	0.261
		–	1	O	~ 120		
					~ 230		

With pilot light and marking on legend holder and legend below head

2 spring return pushbuttons and 1 pilot light with integral red LED Protected LED	68 X 136 X 64.5	1	–	Marche	~ 24	XALD361B	0.261
		–	1	Arrêt	~ 230		

(1) Please consult our site www.schneider-electric.com for more precised information about dimensions of components.

(2) Push supplied with cap not clipped-in, allowing orientation through 90° in 360° steps.



XALD224



XALD211H29



XALD134



XALD144



XALD363B

Acquire the information

Control stations and enclosures



Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

Complete stations (screw clamp terminal connections)

Two function

■ Light grey "RAL 7035" base, Dark grey "RAL 7016" lid

Description	Dimensions (1) w x h x d mm	Type of contact		Marking	Reference	Weight kg
						
		N/O	N/C			

Marking on pushbutton (2)

2 spring return pushbuttons:



- 1 flush, white	68 X 106 X 62	1	–	↑	XALD222	0.233
- 1 flush, black		1	–	↓		
				→	XALD223	0.233
				↔		
		1	1	↑	XALD222E	0.233
		1	1	↓		



XALD222

Three function

■ Light grey "RAL 7035" base, Dark grey "RAL 7016" lid

Description	Dimensions (1) w x h x d mm	Type of contact		Marking	Reference	Weight kg
						
		N/O	N/C			

Marking on pushbutton (2)

3 spring return pushbuttons:

- 1 flush, green	68 X 136 X 62	1	–	I	XALD339	0.298
- 1 flush, red		–	1	O		
- 1 flush, green		1	–	II		

3 spring return pushbuttons:

- 1 flush, white	68 X 136 X 62	1	–	↑	XALD324	0.298
- 1 flush, red		–	1	O		
- 1 flush, black		1	–	↓		

3 spring return pushbuttons:

				↑	XALD326	0.298
				Stop		
				↓		

3 spring return pushbuttons:

				→	XALD334	0.298
				O		
				↔		

3 spring return pushbuttons:

		1	1	↑	XALD324E	0.317
		1	1	O		
		1	1	↓		

3 spring return pushbuttons:

- 1 flush, white	68 X 136 X 62	1	–	↑	XALD325	0.299
- 1 projecting, red		–	1	O		
- 1 flush, black		1	–	↓		

2 spring return + 1 mushroom

head pushbuttons:	68 X 136 X 87.5	1	–	↑	XALD328	0.317
- 1 flush, white		–	1	O		
- 1 mushroom head, red (3)		1	–	↓		

- 1 flush, black

Marking on legend holder and legend below head

3 spring return pushbuttons:

- 1 flush, green	68 X 136 X 62	1	–	Avant	XALD311	0.299
- 1 flush, red		–	1	Arrêt		
- 1 flush, green		–	–	Arrière		

3 spring return pushbuttons:

				Montée	XALD321	0.299
				Arrêt		
				Descente		



XALD339



XALD334



XALD321

(1) Please consult our site www.schneider-electric.com for more precised information about dimensions of components.

(2) Push supplied with cap not clipped-in, allowing orientation through 90° in 360° steps.

(3) Standard turn to release, latching, Ø 30 mm.

Aquire the information

Control stations and enclosures
 Plastic control stations XALD and XALK
 For Harmony® Ø 22 control and signalling units XB5
 Stations for customer assembly: empty enclosures




XALD02

3



XALK01H29

Empty control stations (lid fixing screws and nut material: stainless steel type A4, AISI 316)					
Description	Text and symbol	Dimensions (1) w x h x d mm	Number of cut-outs	Reference	Weight kg
Light grey "RAL 7035" base Dark grey "RAL 7016" lid	Without	68 x 68 x 53	1	XALD01	0.136
		68 x 106 x 53	2	XALD02	0.193
		68 x 136 x 53	3	XALD03	0.238
		68 x 166 x 53	4	XALD04	0.278
		68 x 196 x 53	5	XALD05	0.322
Light grey "RAL 7035" base Yellow "RAL 1021" lid For Emergency stop function	Without	68 x 68 x 53	1	XALK01	0.136
		68 x 106 x 53	2	XALK02	0.193
		68 x 136 x 53	3	XALK03	0.238
		68 x 166 x 53	4	XALK04	0.278
		68 x 196 x 53	5	XALK05	0.322
	With text «ARRET D'URGENCE» (2) and symbol (3)	68 x 68 x 53	1	XALK01HFR	0.136
	With text «EMERGENCY STOP» (2) and symbol (3)	68 x 68 x 53	1	XALK01H29	0.136
	With text «NOT HALT» (2) and symbol (3)	68 x 68 x 53	1	XALK01H44	0.136
CSA + UL certified (4)					
Light grey "RAL 7035" base Dark grey "RAL 7016" lid	Without	68 x 68 x 53	1	XALD01H7	0.136
		68 x 106 x 53	2	XALD02H7	0.205
		68 x 136 x 53	3	XALD03H7	0.238

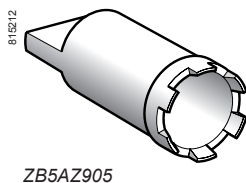
(1) Please consult our site www.schneider-electric.com for more precise information about dimensions of components.
 (2) For supply of the text in an other language, please consult your customer care centre.
 (3) For conformity with ISO 13850 standard, Emergency Stop function symbol  has been added.
 (4) Volt-free commoning/earth terminal included.

Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: electrical blocks



Electrical blocks and accessories for mounting in back of enclosure

Description	Description	Colour	Sold in lots of	Unit reference	Weight kg
Electrical blocks with screw clamp terminal connections					
Standard contact blocks (1)	N/O contact	–	5	ZENL1111	0.015
	N/C contact	–	5	ZENL1121	0.015
Light blocks with integral LED (1)	≈ 24 V	White	5	ZALVB1	0.015
		Green	5	ZALVB3	0.015
		Red	5	ZALVB4	0.015
		Yellow	5	ZALVB5	0.015
		Blue	5	ZALVB6	0.015
		~ 110...120 V	White	5	ZALVG1
	Green	5	ZALVG3	0.015	
	Red	5	ZALVG4	0.015	
	Yellow	5	ZALVG5	0.015	
	Blue	5	ZALVG6	0.015	
	~ 230...240 V	White	5	ZALVM1	0.015
		Green	5	ZALVM3	0.015
		Red	5	ZALVM4	0.015
		Yellow	5	ZALVM5	0.015
		Blue	5	ZALVM6	0.015

Description	For use with	Sold in lots of	Unit reference	Weight kg
Accessories for electrical blocks				
Blanking plug	Ø 22 mm units	10	ZB5SZ3	0.008
Nut	Head fixing	10	ZB5AZ901	0.002
Volt-free terminal	Commoning/earth	10	XALZ09	0.003
Bezel tool	For tightening nut ZB5AZ901	1	ZB5AZ905	0.016

Electrical blocks and accessories for mounting beneath heads

Description	Description	Colour	Sold in lots of	Unit reference	Weight kg
Electrical blocks with screw clamp terminal connections (2) (for use with body/fixing collar ZB5AZ009)					
Standard contact blocks	N/O contact	–	5	ZBE101	0.016
	N/C contact	–	5	ZBE102	0.016
Light blocks with integral LED	≈ 24 V	White	5	ZBVB1	0.016
		Green	5	ZBVB3	0.016
		Red	5	ZBVB4	0.016
		Yellow	5	ZBVB5	0.016
		Blue	5	ZBVB6	0.016
		~ 110...120 V	White	5	ZBVG1
	Green	5	ZBVG3	0.016	
	Red	5	ZBVG4	0.016	
	Yellow	5	ZBVG5	0.016	
	Blue	5	ZBVG6	0.016	
	~ 230...240 V	White	5	ZBVM1	0.016
		Green	5	ZBVM3	0.016
		Red	5	ZBVM4	0.016
		Yellow	5	ZBVM5	0.016
		Blue	5	ZBVM6	0.016

Description	For use with	Voltage	Level of protection	Unit reference	Weight kg
Accessories for electrical blocks					
LED suppressors for high powers (≥ 30 VA)	Electrical light blocks with integral LED	~ 120 V	25...120 VA	ZBZVG	0.010
		~ 230 V	30...230 VA	ZBZVM	0.010
Body/fixing collar Sold in lots of 10	Electrical blocks (contact or light)	–	–	ZB5AZ009	0.006

(1) A maximum of 3 electrical blocks can be fitted per associated head.

(2) For electrical blocks for printed circuit board connection: please consult your customer care centre.

Aquire the information











Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

Stations for customer assembly: heads

Heads for spring return pushbuttons - unmarked

Shape of head	Type of push	Colour of cap	Reference	Weight kg
	Without cap (1)	–	ZB5AA0	0.022
	Flush, with set of 6 coloured caps	6 colours (2)	ZB5AA9	0.027
	Flush	White	ZB5AA1	0.018
		Black	ZB5AA2	0.018
		Green	ZB5AA3	0.018
		Red	ZB5AA4	0.018
		Yellow	ZB5AA5	0.018
		Blue	ZB5AA6	0.018
		Grey	ZB5AA8	0.018
	Flush with transparent cap, for insertion of legend (3)	White	ZB5AA18	0.018
		Green	ZB5AA38	0.018
		Red	ZB5AA48	0.018
		Yellow	ZB5AA58	0.018
		Blue	ZB5AA68	0.018
	Boot (coloured silicone) can be replaced without dismantling the head	White	ZB5AP1S	0.014
		Black	ZB5AP2S	0.014
		Green	ZB5AP3S	0.014
		Red	ZB5AP4S	0.014
		Yellow	ZB5AP5S	0.014
		Blue	ZB5AP6S	0.014
	Projecting	White	ZB5AL1	0.019
		Black	ZB5AL2	0.019
		Green	ZB5AL3	0.019
		Red	ZB5AL4	0.019
		Yellow	ZB5AL5	0.019
		Blue	ZB5AL6	0.019
	Flush (high guard)	White	ZB5AA14	0.020
		Black	ZB5AA24	0.020
		Green	ZB5AA34	0.020
		Red	ZB5AA44	0.020
		Yellow	ZB5AA54	0.020
		Blue	ZB5AA64	0.020
	Recessed (high guard)	White	ZB5AA16	0.019
		Black	ZB5AA26	0.019
		Green	ZB5AA36	0.019
		Red	ZB5AA46	0.019
		Yellow	ZB5AA56	0.019
		Blue	ZB5AA66	0.019
	Flush	White	ZB5CA1	0.019
		Black	ZB5CA2	0.019
		Green	ZB5CA3	0.019
		Red	ZB5CA4	0.019
		Yellow	ZB5CA5	0.019
		Blue	ZB5CA6	0.019
	Projecting	White	ZB5CL1	0.021
		Black	ZB5CL2	0.021
		Green	ZB5CL3	0.021
		Red	ZB5CL4	0.021
		Yellow	ZB5CL5	0.021
		Blue	ZB5CL6	0.021

(1) Cap to be ordered separately, Please consult our website www.schneider-electric.com.

(2) Head supplied with 6 different coloured caps (white, black, green, red, yellow, blue).

(3) For legend ordering information, Please consult our website www.schneider-electric.com.

ZB5AA0



ZB5AA5



ZB5AP2S



ZB5AL3



ZB5CA2



ZB5CA5

Acquire the information

Control stations and enclosures
Plastic control stations XALD and XALK
For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: heads



ZB5AA331



ZB5AA432



ZB5AL232



ZB5AC24



ZB5AC2

Heads for spring return pushbuttons - marked

Shape of head	Type of push	Marking Text	Colour	Colour of cap	Reference	Weight kg		
	Flush (1)	I	White	Green	ZB5AA331	0.018		
			Black	White	ZB5AA131	0.018		
		II	White	Green	ZB5AA336	0.018		
			Black	White	ZB5AA136	0.018		
		START	White	Green	ZB5AA333	0.018		
			Black	White	ZB5AA133	0.018		
		ON	White	Green	ZB5AA341	0.018		
			Black	White	ZB5AA141	0.018		
		MARCHE	White	Green	ZB5AA342	0.018		
			Black	White	ZB5AA142	0.018		
			Projecting (1)	O	White	Red	ZB5AL432	0.019
					Black	Black	ZB5AL232	0.019
		ARRET		White	Red	ZB5AL433	0.019	
				Black	Black	ZB5AL233	0.019	
		STOP		White	Red	ZB5AL434	0.019	
				Black	Black	ZB5AL234	0.019	
		OFF		White	Red	ZB5AL435	0.019	
				Black	Black	ZB5AL235	0.019	
		UP		Black	White	ZB5AA343	0.018	
				White	Black	ZB5AA344	0.018	
DOWN	White	Black		ZB5AA335	0.018			
	Black	White		ZB5AA334	0.018			
	Flush (1)	I		White	Green	ZB5CA331	0.019	
		O		White	Red	ZB5CA432	0.019	
		+		White	Black	ZB5CA2934	0.019	
		↑		White	Black	ZB5CA2912	0.019	
		R		White	Blue	ZB5CA6939	0.019	

Mushroom heads for spring return pushbuttons

Shape of head	Diameter of pushbutton mm	Colour of pushbutton	Reference	Weight kg
	30	Black	ZB5AC24	0.027
		Green	ZB5AC34	0.027
		Red	ZB5AC44	0.027
		Yellow	ZB5AC54	0.027
		Blue	ZB5AC64	0.027
	40	Black	ZB5AC2	0.046
		Green	ZB5AC3	0.046
		Red	ZB5AC4	0.046
		Yellow	ZB5AC5	0.046
		Blue	ZB5AC6	0.046

(1) Push supplied with cap not clipped-in, allowing orientation through 90° in 360° steps.

Aquire the information

Control stations and enclosures
Plastic control stations XALD and XALK
For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: heads

3



ZB5AS844



ZB5AS934



ZB5AT44



ZB5AS54

Emergency stop trigger action and mechanical latching red mushroom heads

Shape of head	Type of pushbutton	Diameter of pushbutton mm	Colour of pushbutton	Reference	Weight kg
	Trigger action Push-pull	30	Red	ZB5AT844 (1)	0.050
		40	Red	ZB5AT84 (1)	0.050
	Trigger action Turn to release	30	Red	ZB5AS834 (1)	0.042
		40	Red	ZB5AS844 (1)	0.046
	Trigger action Key release (key n° 4A185)	30	Red	ZB5AS934 (1) (4)	0.068
		40	Red	ZB5AS944 (1)	0.071
		60	Red	ZB5AS964 (1)	0.092
	Trigger action Key release (key n° 4A185)	40	Red	ZB5AS944D (1)	0.071

Emergency switching off mushroom heads, with mechanical latching

Shape of head	Type of pushbutton	Diameter of pushbutton mm	Colour of pushbutton	Reference	Weight kg
	Push-pull	30	Black	ZB5AT24 (2)	0.044
			Red	ZB5AT44 (2)	0.044
		40	Black	ZB5AT2 (2)	0.049
			Red	ZB5AT4 (2)	0.049
	Turn to release	30	Black	ZB5AS42 (2)	0.040
			Red	ZB5AS44 (2)	0.040
		40	Black	ZB5AS52 (2)	0.044
			Red	ZB5AS54 (2)	0.044
		40	Red	ZB5AS55 (2)	0.044
				Key release (key n° 4A185) (3)	30
Red	ZB5AS74 (2)	0.040			
40	Black	ZB5AS12 (2)			0.044
	Red	ZB5AS14 (2) (3)			0.044
	Trigger action Key release (key n° 4A185)	40	Red	ZB5AS14D (2)	0.044

(1) Mushroom head Emergency stop trigger action and mechanical latching pushbuttons conform to standards EN/IEC 60204-1 and EN/ISO 13850, to Machinery Directive 2006/42/EC and to standard EN/IEC 60947-5-5.
 (2) Mushroom head switching off mechanical latching pushbuttons conform to standards IEC 60364-5-53 and EN/IEC 60947-5-5. Please consult your customer care centre for full details of these standards and directives.
 (3) For specific keys with other numbers, please consult your customer care centre.
 (4) Other key numbers:
 - key n° 421E: add suffix **12** to the reference.
 - key n° 458A: add suffix **10** to the reference.
 - key n° 520E: add suffix **14** to the reference.
 - key n° 3131A: add suffix **20** to the reference.
 Example: The reference for a Ø 40 mushroom head for a trigger action latching pushbutton with release by key n° 421E becomes: **ZB5AS94412**.

Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

Stations for customer assembly: heads



ZB5AD2

Heads for selector switches (1)					
Shape of head	Type of operator	Number and type of positions		Reference	Weight kg
	Standard handle, black	2 - stay put		ZB5AD2	0.017
		2 - spring return from right to left		ZB5AD4	0.020
		3 - stay put		ZB5AD3	0.017
		3 - spring return to centre		ZB5AD5	0.017
		3 - spring return from left to centre		ZB5AD7	0.017
		3 - spring return from right to centre		ZB5AD8	0.017
	Standard handle, white	2 - stay put		ZB5AD201	0.017
		2 - spring return from right to left		ZB5AD401	0.020
		3 - stay put		ZB5AD301	0.017
		3 - spring return to centre		ZB5AD501	0.017
		3 - spring return from left to centre		ZB5AD701	0.017
		3 - spring return from right to centre		ZB5AD801	0.017
	Standard handle, green	2 - stay put		ZB5AD203	0.017
		2 - spring return from right to left		ZB5AD403	0.020
		3 - stay put		ZB5AD303	0.017
		3 - spring return to centre		ZB5AD503	0.017
		3 - spring return from left to centre		ZB5AD703	0.017
		3 - spring return from right to centre		ZB5AD803	0.017

(1) Can only be used for actuation of end of row (side) mounted contacts.

Acquire the information

Control stations and enclosures
 Plastic control stations XALD and XALK
 For Harmony® Ø 22 control and signalling units XB5
 Stations for customer assembly: heads



Heads for selector switches (1) (continued)				
Shape of head	Type of operator	Number and type of positions	Reference	Weight kg
	Standard handle, red	2 - stay put	ZB5AD204	0.017
		2 - spring return from right to left	ZB5AD404	0.020
		3 - stay put	ZB5AD304	0.017
		3 - spring return to centre	ZB5AD504	0.017
		3 - spring return from left to centre	ZB5AD704	0.017
		3 - spring return from right to centre	ZB5AD804	0.017
	Standard handle, yellow	2 - stay put	ZB5AD205	0.017
		2 - spring return from right to left	ZB5AD405	0.020
		3 - stay put	ZB5AD305	0.017
		3 - spring return to centre	ZB5AD505	0.017
		3 - spring return from left to centre	ZB5AD705	0.017
		3 - spring return from right to centre	ZB5AD805	0.017
	Standard handle, blue	2 - stay put	ZB5AD206	0.017
		2 - spring return from right to left	ZB5AD406	0.020
		3 - stay put	ZB5AD306	0.017
		3 - spring return to centre	ZB5AD506	0.017
		3 - spring return from left to centre	ZB5AD706	0.017
		3 - spring return from right to centre	ZB5AD806	0.017
	Long handle, black	2 - stay put	ZB5AJ2	0.017
		2 - spring return from right to left	ZB5AJ4	0.020
		3 - stay put	ZB5AJ3	0.017
		3 - spring return to centre	ZB5AJ5	0.017
		3 - spring return from left to centre	ZB5AJ7	0.017
		3 - spring return from right to centre	ZB5AJ8	0.017

(1) Can only be used for actuation of end of row (side) mounted contacts.



Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: heads

Heads for selector switches (1) (continued)



ZB5AD39



Knurled knob,
black

2 - stay put



ZB5AD29

0.020

2 - spring return from right
to left



ZB5AD49

0.024

3 - stay put



ZB5AD39

0.020

3 - spring return to centre



ZB5AD59

0.020

3 - spring return from left
to centre



ZB5AD79

0.020

3 - spring return from right
to centre



ZB5AD89

0.020



ZB5AG2



Key switch with
key n° 455 (3) (4)

2 - stay put



ZB5AG2

0.057



ZB5AG02

0.057



ZB5AG4

0.057

2 - spring return from right
to left



ZB5AG6

0.061

3 - stay put



ZB5AG0

0.057



ZB5AG3

0.057



ZB5AG5

0.057



ZB5AG9

0.057



ZB5AG09

0.057

3 - spring return from left
to centre



ZB5AG1

0.057

3 - spring return to centre



ZB5AG7

0.057

3 - spring return from right
to centre



ZB5AG8

0.057



ZB5AG05

0.057



ZB5AG08

0.057

(1) Can only be used for actuation of end of row (side) mounted contacts.

(2) The symbol "Q" indicates key withdrawal position(s).

(3) Other key numbers:

- key n° 421E: add suffix **12** to the reference,
- key n° 458A: add suffix **10** to the reference,
- key n° 520E: add suffix **14** to the reference,
- key n° 3131A: add suffix **20** to the reference.

Example:

For a key switch head with key n° 421E, 2-position stay put with key withdrawal from the left-hand position, the reference becomes: **ZB5AG212**.

(4) For specific keys with other numbers, please consult your customer care centre.

Aquire the information















Control stations and enclosures

Plastic control stations XALD and XALK


For Harmony® Ø 22 control and signalling units XB5

Stations for customer assembly: heads

Heads for selector switches (1) (continued)

Shape of head	Type of operator	Number and type of positions (2)		Reference	Weight kg		
 108224 ZB5AG●●		Key switch with key n° 8D1	2 - stay put		ZB5AG2D	0.057	
					ZB5AG02D	0.057	
					ZB5AG4D	0.057	
				2 - spring return from right to left		ZB5AG6D	0.061
				3 - stay put		ZB5AG0D	0.057
					ZB5AG3D	0.057	
					ZB5AG5D	0.057	
						ZB5AG9D	0.057
						ZB5AG09D	0.057
						ZB5AG03D	0.057
						ZB5AG04D	0.057
				3 - spring return from left to centre		ZB5AG06D	0.057
						ZB5AG1D	0.057
						ZB5AG07D	0.057
				3 - spring return from right to centre		ZB5AG8D	0.057
						ZB5AG08D	0.057
						ZB5AG05D	0.057
				3 - spring return to centre		ZB5AG7D	0.057

Heads for toggle switches

Shape of head	Description	Lever	Type of position	Reference	Weight kg	
 815307 ZB5AD28	2-position	Black	Stay put	ZB5AD28	0.023	
			Spring return	ZB5AD48	0.023	
			White	Stay put	ZB5AD2801	0.023
			Red	Stay put	ZB5AD2804	0.023
			Blue	Stay put	ZB5AD2806	0.023

(1) Can only be used for actuation of end of row (side) mounted contacts.

(2) The symbol "A" indicates key withdrawal position(s).

Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

Stations for customer assembly: heads



Heads for pilot lights				
Shape of head	For use with body comprising light source type	Colour of lens	Reference	Weight kg
With plain lens				
	With integral LED Protected LED	White	ZB5AV013	0.017
		Green	ZB5AV033	0.017
		Red	ZB5AV043	0.017
		Yellow	ZB5AV053	0.017
		Blue	ZB5AV063	0.017
	With integral LED Protected LED	White	ZB5CV013	0.020
		Green	ZB5CV033	0.020
		Red	ZB5CV043	0.020
		Yellow	ZB5CV053	0.020
		Blue	ZB5CV063	0.020
		5 colours (1)	ZB5CV003	0.028
With plain lens, for insertion of legend (2)				
	With integral LED Protected LED	White	ZB5AV013E	0.017
		Green	ZB5AV033E	0.017
		Red	ZB5AV043E	0.017
		Yellow	ZB5AV053E	0.017
		Blue	ZB5AV063E	0.017
With grooved lens (3)				
	With integral LED Protected LED	White	ZB5AV013S	0.017
		Green	ZB5AV033S	0.017
		Red	ZB5AV043S	0.017
		Yellow	ZB5AV053S	0.017
		Blue	ZB5AV063S	0.017



Heads for spring return illuminated pushbuttons				
Shape of head	Type of push	Colour	Reference	Weight kg
Only for use with bodies comprising a light source with integral LED				
	Flush, plain lens	White	ZB5AW313	0.017
		Green	ZB5AW333	0.017
		Red	ZB5AW343	0.017
		Yellow	ZB5AW353	0.017
		Blue	ZB5AW363	0.017
	Flush, grooved lens (3)	White	ZB5AW313S	0.016
		Green	ZB5AW333S	0.016
		Red	ZB5AW343S	0.016
		Yellow	ZB5AW353S	0.016
		Blue	ZB5AW363S	0.016
	Flush for insertion of legend (1)	White	ZB5AA18	0.018
		Green	ZB5AA38	0.018
		Red	ZB5AA48	0.018
		Yellow	ZB5AA58	0.018
		Blue	ZB5AA68	0.018
	Projecting	White	ZB5AW113	0.018
		Green	ZB5AW133	0.018
		Red	ZB5AW143	0.018
		Yellow	ZB5AW153	0.018
		Blue	ZB5AW163	0.018
	Flush for insertion of legend (1)	White	ZB5CW313	0.023
		Green	ZB5CW333	0.023
		Red	ZB5CW343	0.023
		Yellow	ZB5CW353	0.023
		Blue	ZB5CW363	0.023
Other versions	Heads for flush pushbuttons with illuminated ring. Please consult your customer care centre.			

(1) Head supplied with 5 different coloured lenses (white, green, red, yellow, blue) for insertion of legend. For legend ordering information: Please consult our website www.schneider-electric.com.

(2) For legend ordering information: Please consult our website www.schneider-electric.com.

(3) For use in bright ambient light conditions (outdoors in sunlight, for example).

Acquire the information






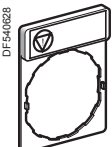




Control stations and enclosures

Plastic control stations XALD and XALK



For Harmony® Ø 22 control and signalling units XB5

Stations for customer assembly: heads

Heads for illuminated selector switches with standard handle

Shape of head	Number and type of positions	Colour of handle	Reference	Weight kg	
Only for use with bodies comprising a light source with integral LED					
 ZB5AK1263	 2 - stay put		White	ZB5AK1213	0.021
			Green	ZB5AK1233	0.021
			Red	ZB5AK1243	0.021
			Yellow	ZB5AK1253	0.021
			Blue	ZB5AK1263	0.021
 ZB5AK1463	2 - spring return from right to left		White	ZB5AK1413	0.021
			Green	ZB5AK1433	0.021
			Red	ZB5AK1443	0.021
			Yellow	ZB5AK1453	0.021
			Blue	ZB5AK1463	0.021
 ZBY4140	3 - stay put		White	ZB5AK1313	0.021
			Green	ZB5AK1333	0.021
			Red	ZB5AK1343	0.021
			Yellow	ZB5AK1353	0.021
			Blue	ZB5AK1363	0.021
	3 - spring return to centre		White	ZB5AK1513	0.021
			Green	ZB5AK1533	0.021
			Red	ZB5AK1543	0.021
			Yellow	ZB5AK1553	0.021
			Blue	ZB5AK1563	0.021
	3 - spring return from right to centre		White	ZB5AK1813	0.021
			Green	ZB5AK1833	0.021
			Red	ZB5AK1843	0.021
			Yellow	ZB5AK1853	0.021
			Blue	ZB5AK1863	0.021
	3 - spring return from left to centre		White	ZB5AK1713	0.021
			Green	ZB5AK1733	0.021
			Red	ZB5AK1743	0.021
			Yellow	ZB5AK1753	0.021
			Blue	ZB5AK1763	0.021

Heads for Ø 40 illuminated, latching, mushroom head pushbuttons (1)

Shape of head	Type of push	Colour of push	Reference	Weight kg	
Only for use with bodies comprising a light source with integral LED					
 ZB5AW743	 Turn to release		White	ZB5AW713	0.022
			Green	ZB5AW733	0.022
			Red	ZB5AW743	0.022
			Yellow	ZB5AW753	0.022
			Blue	ZB5AW763	0.022

(1) Use electrical blocks type ZBE10●, specifically designed for "mounting beneath heads", Please consult our website www.schneider-electric.com.

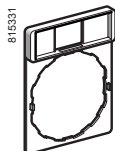
Acquire the information

Control stations and enclosures

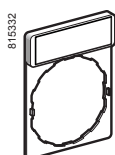
Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

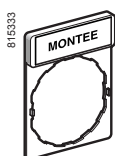
Stations for customer assembly: accessories



ZBZ32



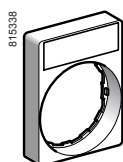
ZBY101



ZBY2107



ZBZ34



ZBYH101

Standard (30 x 40 mm) legend holders for 8 x 27 mm legends ⁽¹⁾

Description	Legend Colour	Marking	Sold in lots of	Unit reference	Weight kg		
Without legend	–	–	10	ZBZ32	0.001		
With blank legend (for engraving)	Black or red background	–	10	ZBY2101	0.002		
	White or yellow background	–	10	ZBY4101	0.002		
With 8 x 27 mm legend (with international marking)	Black or red background	O (black background)	1	ZBY2146	0.002		
		O (red background)	1	ZBY2931	0.002		
		I	1	ZBY2147	0.002		
		II	1	ZBY2148	0.002		
		O-I	1	ZBY2178	0.002		
		I-II	1	ZBY2179	0.002		
		I-O-II	1	ZBY2186	0.002		
		AUTO	1	ZBY2115	0.002		
		STOP	1	ZBY2304	0.002		
			Yellow background	⊕	1	ZBY4140 ⁽²⁾	0.002
		With 8 x 27 mm legend (with French language marking)	Black or red background ⁽³⁾	ARRET (red background)	1	ZBY2104	0.002
				ARRET (black background)	1	ZBY0104	0.002
				ARRET GENERAL	1	ZBY2129	0.002
				ARRET REARMEMENT	1	ZBY2133	0.002
ARRET MARCHÉ	1			ZBY2166	0.002		
ARRIERE	1			ZBY2106	0.002		
AUTO CYCLE-CYCLE	1			ZBY2198	0.002		
AUTO CYCLE-MAIN	1			ZBY2199	0.002		
AUTO-MAIN	1			ZBY2164	0.002		
AUTO-O-MAIN	1			ZBY2185	0.002		
AVANT	1			ZBY2105	0.002		
AVANT-O-ARRIERE	1			ZBY2184	0.002		
C-P-C NORMAL	1			ZBY2165	0.002		
CYCLE-MAIN	1			ZBY2197	0.002		
DECLENCHEMENT	1			ZBY2132	0.002		
DEFAUT (black background)	1			ZBY2134	0.002		
DEFAUT (red background)	1			ZBY2135	0.002		
DEPART CYCLE	1			ZBY2195	0.002		
DESCENTE	1			ZBY2108	0.002		
DROITE	1			ZBY2109	0.002		
ENCLENCHEMENT	1			ZBY2131	0.002		
EN SERVICE	1			ZBY2111	0.002		
FERMETURE	1			ZBY2114	0.002		
GAUCHE	1			ZBY2110	0.002		
HORS SERVICE	1			ZBY2112	0.002		
HORS-EN	1			ZBY2167	0.002		
LENT	1			ZBY2127	0.002		
MAIN	1			ZBY2116	0.002		
MARCHÉ	1			ZBY2103	0.002		
MONTEE	1			ZBY2107	0.002		
OUVERTURE	1			ZBY2113	0.002		
PHASE / PHASE	1			ZBY2196	0.002		
REARMEMENT (red bckgrnd.)	1	ZBY2123	0.002				
REARMEMENT (black bckgrnd.)	1	ZBY0123	0.002				
SOUS TENSION	1	ZBY2126	0.002				
VITE	1	ZBY2128	0.002				
Red background		ARRET D'URGENCE	1	ZBY2130 ⁽²⁾	0.002		

30 x 40 mm legend holders (flush mounting with bezel) for 8 x 27 mm legends

Description	For use with	Colour	Sold in lots of	Unit reference	Weight kg
Without legend	Circular heads	–	10	ZBZ34	0.003
	Square heads	–	10	ZBCZ34	0.002
With blank legend	Circular heads	Black or red background	10	ZBY2H101	0.004
		White or yellow background	10	ZBY4H101	0.004
	Square heads	Black or red background	10	ZBCY2H101	0.002
		White or yellow background	10	ZBCY4H101	0.002

(1) Legends: Please consult our website www.schneider-electric.com

(2) For complying with ISO 13850 standard, Emergency Stop function symbol ⊕ has been added.

(3) "Start" functions: white characters on black background. "Stop" functions: white characters on red background (unless otherwise stated above).

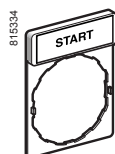
Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5

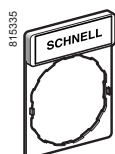
Stations for customer assembly: accessories



ZBY2303



ZBY0140



ZBY2228

Standard (30 x 40 mm) legend holders with 8 x 27 mm legend (continued)

Description	Legend Colour	Marking	Reference	Weight kg		
With 8 x 27 mm legend (with English marking)	Black or red background (1)	AUTO-HAND	ZBY2364	0.002		
		AUTO-O-HAND	ZBY2385	0.002		
		CLOSE	ZBY2314	0.002		
		DOWN	ZBY2308	0.002		
		FAST	ZBY2328	0.002		
		FORWARD	ZBY2305	0.002		
		HAND	ZBY2316	0.002		
		HAND-OFF-AUTO	ZBY2387	0.002		
		INCH	ZBY2321	0.002		
		LEFT	ZBY2310	0.002		
		OFF	ZBY2312	0.002		
		OFF-ON	ZBY2367	0.002		
		ON	ZBY2311	0.002		
		OPEN	ZBY2313	0.002		
		POWER ON	ZBY2326	0.002		
		RESET (red background)	ZBY2323	0.002		
		RESET (black background)	ZBY2322	0.002		
		REVERSE	ZBY2306	0.002		
		RIGHT	ZBY2309	0.002		
		RUN	ZBY2334	0.002		
		SLOW	ZBY2327	0.002		
		START	ZBY2303	0.002		
		STOP-START	ZBY2366	0.002		
		UP	ZBY2307	0.002		
			Red background	EMERGENCY STOP	ZBY2330 (2)	0.002
		With 8 x 27 mm legend (with German marking)	Black or red background (1)	AB	ZBY2208	0.002
				AUF	ZBY2207	0.002
AUS	ZBY2204			0.002		
AUS-EIN	ZBY2266			0.002		
AUS-IN BETRIEB	ZBY2267			0.002		
AUS-RUCKSTELLUNG	ZBY2233			0.002		
AUSSCHALTEN	ZBY2232			0.002		
AUTO-HAND	ZBY2364			0.002		
AUTO-O-HAND	ZBY2385			0.002		
AUTOZYKL-HAND	ZBY2299			0.002		
AUTOZYKL-1 ZYKL	ZBY2298			0.002		
C-P-C-NORMAL	ZBY2265			0.002		
EIN	ZBY2203			0.002		
EINSCHALTEN	ZBY2231			0.002		
HAND	ZBY2316			0.002		
LANGSAM	ZBY2227			0.002		
LINKS	ZBY2210			0.002		
NOT-AUS (red background)	ZBY2230			0.002		
ÖFFNEN	ZBY2213			0.002		
RECHTS	ZBY2209			0.002		
RUCKSTELLUNG	ZBY2223			0.002		
SCHLIESSEN	ZBY2214			0.002		
SCHNELL	ZBY2228			0.002		
SPANNUNG EIN	ZBY2226			0.002		
STEUERUNG AUS	ZBY2212			0.002		
STEUERUNG EIN	ZBY2211			0.002		
STORUNG (black background)	ZBY2234			0.002		
STORUNG (red background)	ZBY2235			0.002		
VOR	ZBY2205			0.002		
VOR-O-ZURUCK	ZBY2284			0.002		
ZURUCK	ZBY2206			0.002		
ZYKLUS-HAND	ZBY2297			0.002		
ZYKLUS-START	ZBY2295			0.002		
	Red background			NOT-HALT	ZBY2229 (2)	0.002
	Yellow background			NOT-HALT	ZBY22420001 (2)	0.002

(1) "Start" functions: white characters on black background. "Stop" functions: white characters on red background (unless otherwise stated above).

(2) For complying with ISO 13850 standard, Emergency Stop function symbol  has been added.

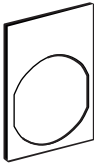
Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: accessories

522035



ZALY4

Legends (30 x 42 mm) for engraving

Description	Colour of background	Sold in lots of	Unit reference	Weight kg
Legends for engraving 2 lines of text	Black or red	10	ZALY2	0.001
	White or yellow	10	ZALY4	0.001

Legends (8 x 27 mm) for engraving

For use with	Colour of background	Sold in lots of	Unit reference	Weight kg
30 x 40 mm legend holder	Black or red	10	ZBY0101	0.001
	White or yellow	10	ZBY0102	0.001
	Yellow	10	ZBY0140 (1)	0.001

Sheets of 76 (8 x 27 mm) peel-off legends

For use with	Supplied with	Sold in lots of	Unit reference	Weight kg
30 x 40 mm legend holders ZBZ32 and ZBZ34	Backing board and protective transparent lid	10	ZBY4100	0.043

8 x 27 mm marked legends (for 30 x 40 mm legend holders ZBZ32 and ZBZ34)

Language	Colour of background	Marking	Reference	Weight kg	
International	Black or red (2)	O (black background)	ZBY02146	0.001	
		O (red background)	ZBY02931	0.001	
		I	ZBY02147	0.001	
		II	ZBY02148	0.001	
		O-I	ZBY02178	0.001	
		I-II	ZBY02179	0.001	
		I-O-II	ZBY02186	0.001	
		AUTO	ZBY02115	0.001	
		STOP	ZBY02304	0.001	
		French	Black or red (2)	ARRET (red background)	ZBY02104
ARRET (black background)	ZBY00104			0.001	
ARRET GENERAL	ZBY02129			0.001	
ARRET REARMEMENT	ZBY02133			0.001	
ARRET-MARCHE	ZBY02166			0.001	
ARRIERE	ZBY02106			0.001	
AUTO CYCLE-CYCLE	ZBY02198			0.001	
AUTO CYCLE-MAIN	ZBY02199			0.001	
AUTO-MAIN	ZBY02164			0.001	
AUTO-O-MAIN	ZBY02185			0.001	
AVANT	ZBY02105			0.001	
AVANT-O-ARRIERE	ZBY02184			0.001	
C-P-C-NORMAL	ZBY02165			0.001	
CYCLE-MAIN	ZBY02197			0.001	
DECLenchement	ZBY02132			0.001	
DEFAULT (black background)	ZBY02134			0.001	
DEFAULT (red background)	ZBY02135			0.001	
DEPART CYCLE	ZBY02195			0.001	
DESCENTE	ZBY02108			0.001	
DROITE	ZBY02109			0.001	
ENCLenchement	ZBY02131			0.001	
EN SERVICE	ZBY02111			0.001	
FERMETURE	ZBY02114			0.001	
GAUCHE	ZBY02110			0.001	
HORS SERVICE	ZBY02112			0.001	
HORS-EN	ZBY02167			0.001	
LENT	ZBY02127			0.001	
MAIN	ZBY02116			0.001	
MARCHE	ZBY02103			0.001	
MONTEE	ZBY02107			0.001	
OUVERTURE	ZBY02113			0.001	
PHASE / PHASE	ZBY02196			0.001	
REARMEMENT (red background)	ZBY02123			0.001	
REARMEMENT (black background)	ZBY00123			0.001	
SOUS TENSION	ZBY02126			0.001	
VITE	ZBY02128			0.001	
Red	ARRET D'URGENCE			ZBY02130 (1)	0.001

815339



ZBY02178

815340



ZBY0104

(1) For complying with ISO 13850 standard, Emergency Stop function symbol  has been added.

(2) "Start" functions: white characters on black background. "Stop" functions: white characters on red background (unless otherwise stated above).

Aquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: accessories

8 x 27 mm marked legends (for 30 x 40 mm legend holders ZBZ32 and ZBZ34) (continued)

Language	Colour of background	Marking	Reference	Weight kg
English	Black or red (1)	AUTO-HAND	ZBY02364	0.001
		AUTO-O-HAND	ZBY02385	0.001
		CLOSE	ZBY02314	0.001
		DOWN	ZBY02308	0.001
		FAST	ZBY02328	0.001
		FORWARD	ZBY02305	0.001
		HAND	ZBY02316	0.001
		HAND-OFF-AUTO	ZBY02387	0.001
		INCH	ZBY02321	0.001
		LEFT	ZBY02310	0.001
		OFF	ZBY02312	0.001
		OFF-ON	ZBY02367	0.001
		ON	ZBY02311	0.001
		OPEN	ZBY02313	0.001
		POWER ON	ZBY02326	0.001
		RESET (red background)	ZBY02323	0.001
		RESET (black background)	ZBY02322	0.001
		REVERSE	ZBY02306	0.001
		RIGHT	ZBY02309	0.001
		RUN	ZBY02334	0.001
		SLOW	ZBY02327	0.001
		START	ZBY02303	0.001
		STOP-START	ZBY02366	0.001
UP	ZBY02307	0.001		
	Red	EMERGENCY STOP	ZBY02330 (2)	0.001
German	Black or red (1)	AB	ZBY02208	0.001
		AUF	ZBY02207	0.001
		AUS	ZBY02204	0.001
		AUS-EIN	ZBY02266	0.001
		AUS-IN BETRIEB	ZBY02267	0.001
		AUS-RUCKSTELLUNG	ZBY02233	0.001
		AUSSCHALLEN	ZBY02232	0.001
		AUTO-HAND	ZBY02364	0.001
		AUTO-O-HAND	ZBY02385	0.001
		AUTOZYKL-HAND	ZBY02299	0.001
		AUTOZYKL- 1 ZYKL	ZBY02298	0.001
		C-P-C-NORMAL	ZBY02265	0.001
		EIN	ZBY02203	0.001
		EINSCHALTEN	ZBY02231	0.001
		HAND	ZBY02316	0.001
		LANGSAM	ZBY02227	0.001
		LINKS	ZBY02210	0.001
		NOT-AUS (red background)	ZBY02230	0.001
		ÖFFNEN	ZBY02213	0.001
		RECHTS	ZBY02209	0.001
		RUCKSTELLUNG	ZBY02223	0.001
		SCHLIESSEN	ZBY02214	0.001
		SCHNELL	ZBY02228	0.001
		SPANNUNG EIN	ZBY02226	0.001
		STEUERUNG AUS	ZBY02212	0.001
		STEUERUNG EIN	ZBY02211	0.001
		STORUNG (black background)	ZBY02234	0.001
		STORUNG (red background)	ZBY02235	0.001
		VOR	ZBY02205	0.001
		VOR-O-ZURUCK	ZBY02284	0.001
		ZURUCK	ZBY02206	0.001
		ZYKLUS-HAND	ZBY02297	0.001
		ZYKLUS-START	ZBY02295	0.001
	Red	NOT-HALT	ZBY02229 (2)	0.001
	Yellow	NOT-HALT	ZBY022420001 (2)	0.001

(1) "Start" functions: white characters on black background. "Stop" functions: white characters on red background (unless otherwise stated above).

(2) For complying with ISO 13850 standard, Emergency Stop function symbol  has been added.

815341

START

ZBY02303

3

815342

SCHNELL

ZBY02228

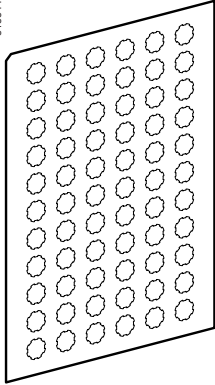
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Control stations and enclosures

Plastic control stations XALD and XALK

For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: accessories

816344



ZBY1●●●

Legends for pushbuttons, switches and pilot lights XB5A

Description	Marking	Sold in lots of	Unit reference	Weight kg	
Sheets of 66 circular peel-off transparent self-adhesive legends	Without	10	ZBY1101	0.017	
	International	O	10	ZBY1146	0.017
		I	10	ZBY1147	0.017
		II	10	ZBY1148	0.017
		III	10	ZBY1149	0.017
		AUTO	10	ZBY1115	0.017
		STOP	10	ZBY1304	0.017
		↑	10	ZBY1912	0.017
	French	ARRET	10	ZBY1104	0.017
		ARRIERE	10	ZBY1106	0.017
		AVANT	10	ZBY1105	0.017
		AUTO	10	ZBY1115	0.017
		DESCENTE	10	ZBY1108	0.017
		MAIN	10	ZBY1116	0.017
		MARCHE	10	ZBY1103	0.017
	MONTEE	10	ZBY1107	0.017	
	English	HAND	10	ZBY1316	0.017
		OFF	10	ZBY1312	0.017
		ON	10	ZBY1311	0.017
		START	10	ZBY1303	0.017
German	AB	10	ZBY1208	0.017	
	AUF	10	ZBY1207	0.017	
	AUS	10	ZBY1204	0.017	
	EIN	10	ZBY1203	0.017	
	ZU	10	ZBY1214	0.017	

DF540548



XBY2U

Strip of 66 square peel-off transparent self-adhesive legends	Without	10	ZBCY1101	0.017
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“SIS Label” labelling software (for legend sheets ZBY1101, ZBY4100 and ZBCY1101)

Application	Reference	Weight kg
Legend design for English, French, German, Italian and Spanish	ZBY001, ZBY0101, ZBY0102, ZBY1101, ZBY4100, ZBY5100, ZBY5101 AND ZBY5102	XBY2U 0.100

Circular yellow legends for mushroom head pushbuttons

Used for “Emergency stop” function

Diameter mm	Conforming to standards	Marking on yellow background	Reference (1)	Weight kg
60	EN/IEC 60204-1 and EN/ISO 13850	–	ZBY9140	0.004
		ARRET D'URGENCE	ZBY9130	0.004
		EMERGENCY STOP	ZBY9330	0.004
		NOT-HALT	ZBY9230	0.004
		PARADA DE EMERGENCIA	ZBY9430	0.004
		ARRESTO DE EMERGENZA	ZBY9630	0.004
90	EN/IEC 60204-1 and EN/ISO 13850	–	ZBY8140	0.008
		ARRET D'URGENCE	ZBY8130	0.008
		EMERGENCY STOP	ZBY8330	0.008
		NOT-HALT	ZBY8230	0.008
		PARADA DE EMERGENCIA	ZBY8430	0.008
		ARRESTO DE EMERGENZA	ZBY8630	0.008

Used for “Emergency switching off” function

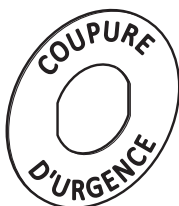
60	EN/IEC 60204-1	–	ZBY9101	0.004
		COUPURE D'URGENCE	ZBY9160	0.004
		EMERGENCY SWITCHING OFF	ZBY9360	0.004
		NOT-AUS	ZBY9260	0.004
		DESCONEXION DE EMERGENCIA	ZBY9460	0.004
		INTERRUZIONE DI EMERGENZA	ZBY9660	0.004
90	EN/IEC 60204-1	–	ZBY8101	0.008
		COUPURE D'URGENCE	ZBY8160	0.008
		EMERGENCY SWITCHING OFF	ZBY8360	0.008
		NOT-AUS	ZBY8260	0.008
		DESCONEXION DE EMERGENCIA	ZBY8460	0.008
		INTERRUZIONE DI EMERGENZA	ZBY8660	0.008

DF539640



ZBY9130

DF539642



ZBY9160

(1) For complying with ISO 13850 standard, Emergency Stop function symbol has been added.

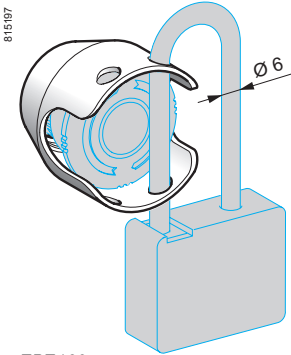
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Control stations and enclosures

Plastic control stations XALD and XALK

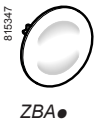
For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: accessories

Metal guards (1)				
Description	For use with	Colour	Reference	Weight kg
Metal guards Padlockable	Emergency stop function only with the following Ø 40 trigger action pushbuttons: XB5AT8●, XB5AS8●, XB5AS9●, ZB5AT8●, ZB5AS8●, ZB5AS9●.	Chromium plated	ZBZ1600	0.046
		Black	ZBZ1602	0.046
		Red	ZBZ1604	0.046
		Blue	ZBZ1605	0.046

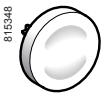


Pushbutton caps - unmarked						
For use with	Cap Type	Colour	Sold in lots of	Unit reference	Weight kg	
Circular pushbutton heads ZB5AA supplied without cap	Flush	White	10	ZBA1	0.001	
		Black	10	ZBA2	0.001	
		Green	10	ZBA3	0.001	
		Red	10	ZBA4	0.001	
		Yellow	10	ZBA5	0.001	
		Blue	10	ZBA6	0.001	
		6 colours (2)	1	ZBA9	0.006	
		Projecting	White	10	ZBL1	0.001
			Black	10	ZBL2	0.001
	Green		10	ZBL3	0.001	
	Red		10	ZBL4	0.001	
	Yellow		10	ZBL5	0.001	
	Blue		10	ZBL6	0.001	
	6 colours (2)		1	ZBL9	0.006	

ZBZ160●



ZBA●



ZBL●

Pushbutton caps - marked (3) (sold in lots of 10)						
For use with	Type of push	Marking		Colour of cap	Unit reference	Weight kg
		Text	Colour			
Circular pushbutton heads ZB5AA supplied without cap	Flush	I	White	Green	ZBA331	0.001
			Black	White	ZBA131	0.001
		II	White	Green	ZBA336	0.001
			Black	White	ZBA136	0.001
		III	White	Green	ZBA337	0.001
			Black	White	ZBA137	0.001
		IV	White	Green	ZBA338	0.001
			Black	White	ZBA138	0.001
		START	White	Green	ZBA333	0.001
			Black	White	ZBA133	0.001
		ON	White	Green	ZBA341	0.001
			Black	White	ZBA141	0.001
		MARCHE	White	Green	ZBA342	0.001
			Black	White	ZBA142	0.001
		⊕	White	Black	ZBA245	0.001
			Black	White	ZBA145	0.001
		UP	Black	White	ZBA343	0.001
		DOWN	White	Black	ZBA344	0.001
		↑	White	Black	ZBA335	0.001
			Black	White	ZBA334	0.001
		O	White	Red	ZBA432	0.001
				Black	ZBA232	0.001
		ARRET	White	Red	ZBA433	0.001
				Black	ZBA233	0.001
		STOP	White	Red	ZBA434	0.001
				Black	ZBA234	0.001
		OFF	White	Red	ZBA435	0.001
				Black	ZBA235	0.001
		⚠	White	Green	ZBA346	0.001
		R	White	Blue	ZBA639	0.001
		+	White	Black	ZBA2934	0.001
		-	White	Black	ZBA2935	0.001



ZBA333

(1) These guards can be used in conjunction with a legend holder, but only those for mounting directly beneath the head. Please consult our website www.schneider-electric.com.

(2) Set of 6 different coloured caps: white, black, green, red, yellow, blue.

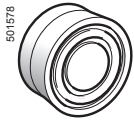
(3) Can be clipped-in at 90° steps through 360°.

Acquire the information

Control stations and enclosures

Plastic control stations XALD and XALK

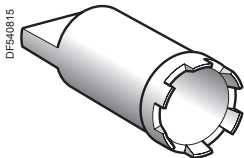
For Harmony® Ø 22 control and signalling units XB5
Stations for customer assembly: accessories



ZB2BP01●



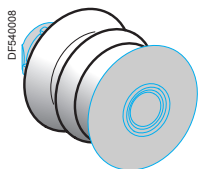
ZBV01●3



ZB5AZ905



ZB5SZ3



ZBZ●8



ZBG455

Coloured boots

Description	Colour	Sold in lots of	Unit reference	Weight kg
Coloured boots (can be replaced without dismantling the head)	Black	10	ZB2BP012	0.003
	Green	10	ZB2BP013	0.003
	Red	10	ZB2BP014	0.003
	Yellow	10	ZB2BP015	0.003
	Blue	10	ZB2BP016	0.003

Lens caps

Circular lens caps for light sources with integral LED

Pilot lights	White	10	ZBV0113	0.002
	Green	10	ZBV0133	0.002
	Red	10	ZBV0143	0.002
	Yellow	10	ZBV0153	0.002
	Blue	10	ZBV0163	0.002
	5 different coloured grooved lenses (1)	1	ZBV0103S	0.010
Illuminated pushbuttons, with flush pushbutton	White	10	ZBW9113	0.002
	Green	10	ZBW9133	0.002
	Red	10	ZBW9143	0.002
	Yellow	10	ZBW9153	0.002
	Blue	10	ZBW9163	0.002
Illuminated pushbuttons, with projecting pushbutton	White	10	ZBW9313	0.002
	Green	10	ZBW9333	0.002
	Red	10	ZBW9343	0.002
	Yellow	10	ZBW9353	0.002
	Blue	10	ZBW9363	0.002

Square lens caps for light sources with integral LED

Pilot lights	White	10	ZBCV0113	0.002
	Green	10	ZBCV0133	0.002
	Red	10	ZBCV0143	0.002
	Yellow	10	ZBCV0153	0.002
	Blue	10	ZBCV0163	0.002
Illuminated pushbuttons, with flush pushbutton	White	10	ZBCW9113	0.002
	Green	10	ZBCW9133	0.002
	Red	10	ZBCW9143	0.002
	Yellow	10	ZBCW9153	0.002
	Blue	10	ZBCW9163	0.002
Illuminated pushbuttons, with projecting pushbutton	White	10	ZBCW9313	0.002
	Green	10	ZBCW9333	0.002
	Red	10	ZBCW9343	0.002
	Yellow	10	ZBCW9353	0.002
	Blue	10	ZBCW9363	0.002

Miscellaneous accessories

Description	For use with	Sold in lots of	Colour	Unit reference	Weight kg
Bezel tool	ZB5AZ901 head	10	–	ZB5AZ905	0.016
Plastic blanking plugs (with fixing nut)	Square shape for Ø 22 units (2)	10	Black	ZB5SZ5	0.009
	Circular shape for Ø 22 units	10	Black	ZB5SZ3	0.009
Terminal branch	XALD and XALK control stations	10		XALZ09	0.003
Bellow seals (IP 69K) (3)	Control station with 1 cut-out, installed in harsh environment + Emergency Stop pushbutton type ZB5	2	Red	ZBZ48	0.009
			Black	ZBZ28	0.009
			Yellow	ZBZ58	0.009

Replacement keys for Emergency stop key release heads and key switches

Description	Key number	Reference	Weight kg
Set of 2 keys	455	ZBG455	0.013
	421E	ZBG421E	0.014
	458A	ZBG458A	0.014
	520E	ZBG520E	0.014
	3131A	ZBG3131A	0.014

- (1) Set of 5 different coloured lenses: white, green, red, yellow and blue.
 (2) Body/fixing collar ZB5AZ009 necessary for fixation, to be ordered separately.
 (3) Not compatible with Ø 30 mm Emergency Stop heads.

Operating principle

Enabling switches, comprising an XY2AU grip and an XPSVC monitoring module, allow authorised personnel to undertake adjustment, programming or maintenance operations near machine equipment hazardous zones, providing certain conditions are met.

To gain access, these operations, often performed at reduced speed, must be selected by authorised personnel using selectors, with or without keys. Once selection is made, the enabling switch temporarily assumes control of the hazardous zone's usual protection measures. Important note: the enabling switch alone must not lead to the actuation of any dangerous movements associated with the machine; a secondary, intentional control action is required from the operator. In addition, each person in the hazardous zone must be provided with an enabling switch to ensure their own safety.

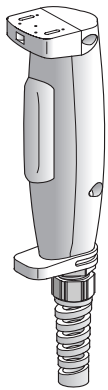
Environment

Conforming to standards	Products		IEC/EN 60947-1 , IEC/EN 60947-5-1, cUL us 508 and CSA C22-2 n° 14 , IEC/EN 60947-5-8
	Machine assemblies		IEC/EN 60204-1
Maximum safety level (1)			PL e, category 4 conforming to EN/ISO 13849-1 and SIL 3 conforming to EN/IEC 61508
Reliability data B10d			5,000,000 (data value for a service life of 10 years: can be limited by contact and mechanical wear)
Protective treatment			Standard version: "TC"
Ambient air temperature	Operation	°C	- 10...+ 60
	Storage	°C	- 40...+70
Vibration resistance			6 gn (5...55 Hz) conforming to IEC 60068-2-6
Shock resistance			10 gn (11 ms) conforming to IEC 60068-2-27
Electric shock protection			Class II conforming to IEC/EN 61140
Degree of protection			IP 66 conforming to IEC 60529, IP 65 with a pushbutton, IK 06 conforming to EN 50102
Mechanical durability		Op. cycles	1 million
Enclosure			Double insulated enclosure made of PA66
Cable diameter		mm	7...13

Contact block characteristics

Rated operational characteristics			~ AC-15 : C300 or Ue = 250 V, Ie = 1.5 A or Ue = 125 V, Ie = 0.75 A --- DC-13 : R300 or Ue = 250 V, Ie = 0.1 A or Ue = 125 V, Ie = 0.22 A conforming to IEC 60947-5-1 Appendix A
Thermal current (Ithe)	A		5
Rated insulation voltage (Ui)	V		250, degree of pollution III (II inside) conforming to IEC 60947-1 125, contact 7-8
Rated impulse withstand voltage (Uimp)	kV		2.5 conforming to EN 60947-1
Positive operation			2 3-position contacts with positive opening operation conforming to IEC 60947-5-1
Contact operation			Slow break
Resistance across terminals	mΩ		≤ 50
Actuation force			1...2: 12 N 2...3: 50 N
Terminal referencing			Numbered conforming to CENELEC EN 50013
Short-circuit protection			4 A cartridge fuse type gG (gl)
Connection	mm ²		Terminal block, 1 x 0.34...1 x 1.5

(1) Using an appropriate and correctly connected control system.



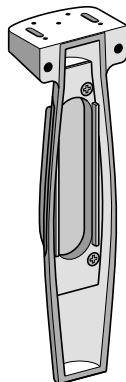
XY2AU●



XY2AZ1



XY2AZ2



XY2AZ3

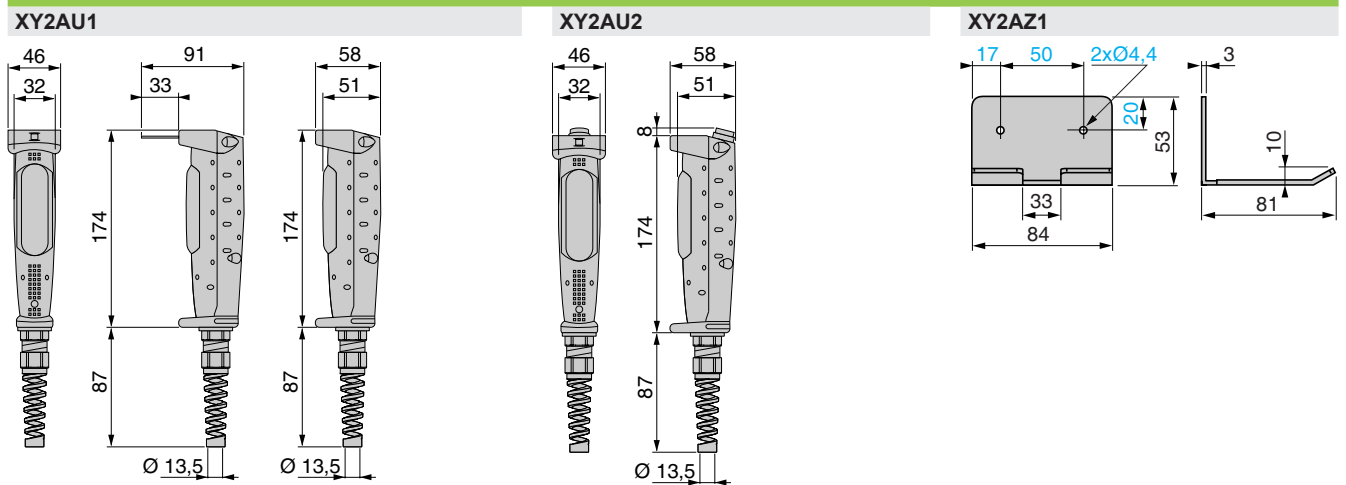
References

Number of contacts	Contact type	Contact blocks and scheme	Reference	Weight kg
3	2 enabling 3 positions + 1 N/C		XY2AU1	0.310
	2 enabling 3 positions + 1 N/C + 1 N/O supplementary contact		XY2AU2	0.320

Separate components and spare parts

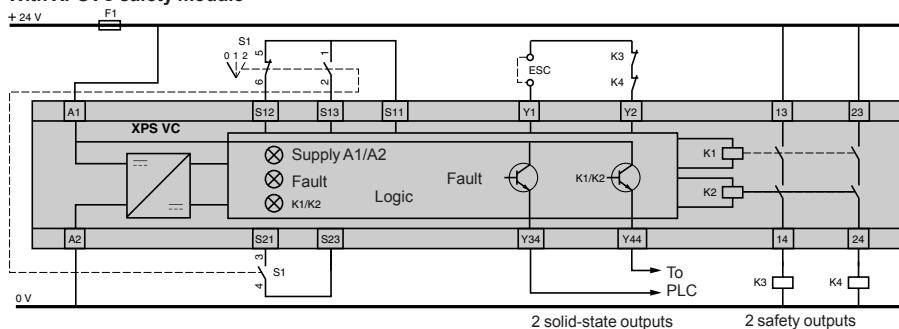
Description	Reference	Weight kg
Grip support	XY2AZ1	0.215
Cover kit for key actuator XCSZ01 or XCSZ11 only applicable to XY2AU1	XY2AZ2	0.015
Cover	XY2AZ3	0.060

Dimensions



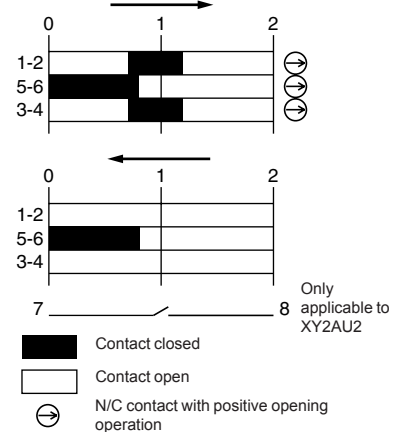
Connection example

With XPSVC safety module



ESC : external start conditions

State of XY2AU● contacts

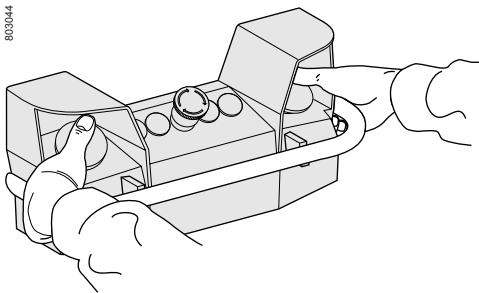
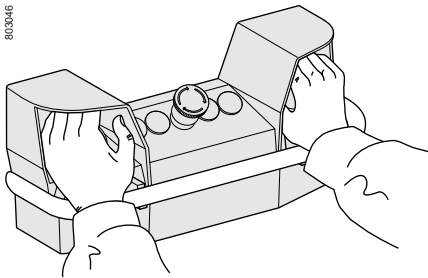
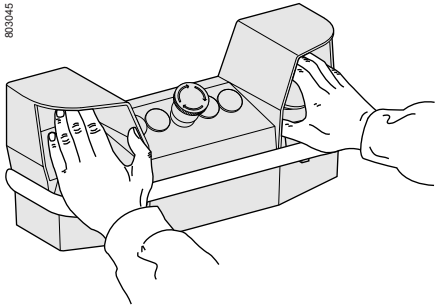
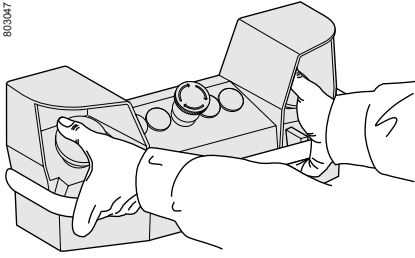


Aquire the information

Two-hand ergonomic control stations

With Harmony XB4B control units

3



Presentation

The design of the control station incorporates features to significantly reduce occupational illnesses associated with repetitive movements of the hands, particularly “carpal tunnel syndrome”.

The health and comfort of the machine operator is assured by:

- the numerous alternative hand positions for operating the 2 pushbutton actuators, see diagrams to left,
- a hand rail,
- simple and fast adjustments of control station position.

This two-hand control station protects machine operators against both industrial accidents and illnesses related to their occupation.

It conforms to the following European safety standards:

- EN 574/ISO 13851 (two-hand control),
- EN 999 (approach speeds of parts of the human body and positioning of safety devices).

The control station can be mounted:

- directly on the machine housing,
- on a pedestal, enabling 3 directional adjustment:
 - height,
 - rake,
 - skew.

The use of a two-hand control station in conjunction with a safety module type XPSBCE or XPSBF provides type IIIC two-hand control conforming to EN 574/ISO 13851 and PLe / Category 4 according to EN/ISO 13859-1.

The range comprises:

- two-hand control stations with or without pre-wired terminal blocks,
- kits (control station + pedestal), with or without pre-wired terminal blocks.

The products are supplied with an installation manual, which is also available as a separate item.

Acquire the information

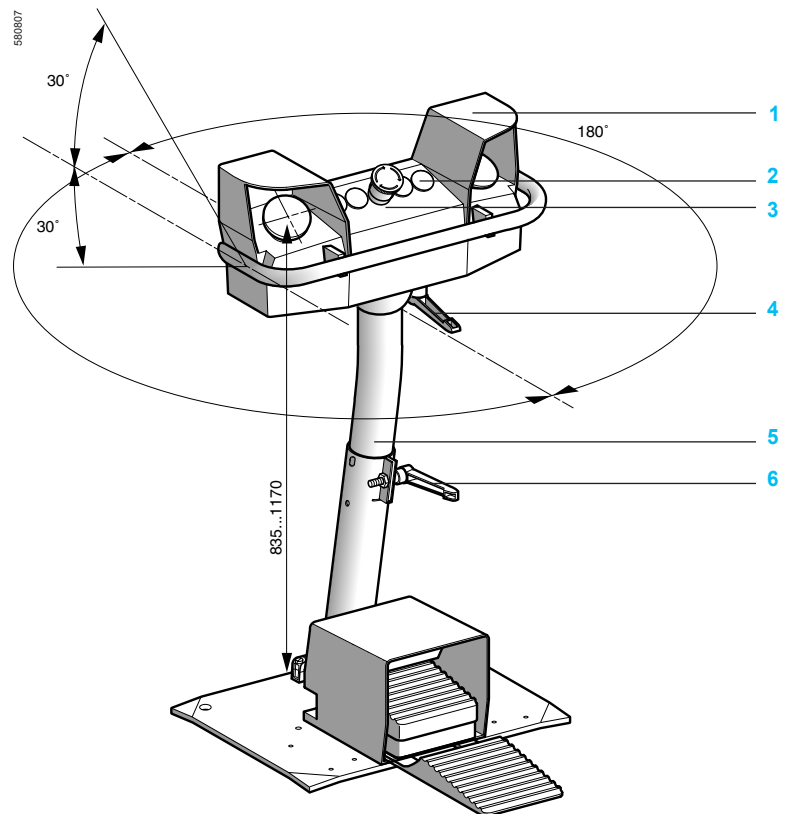
Two-hand ergonomic control stations With Harmony XB4B control units

Description

The control station **1** has five cut-outs ($\varnothing 22$ mm) **2** as standard. Five additional cut-outs are possible **3**.

Its pedestal **5** enables the following quick and simple adjustments:

- Control station rake ($\pm 30^\circ$) using handle **4**.
- Control station skew ($\pm 180^\circ$) using handle **6**.
- Control station height (835 to 1170 mm) using handle **6**.



Characteristics

Environment

Conformity to standards		EN/IEC 60947-5-1, EN 574/ISO 13851
Maximum safety level (1)		PL e, category 4 conforming to EN/ISO 13849-1 and SIL 3 conforming to EN/IEC 61508
Reliability data B10d	Contact block Harmony XB4B	25,000,000 (data value for a service life of 10 years: can be limited by contact and mechanical wear)
Colour		Orange RAL 2008
Protective treatment	Standard version	"TC"
Ambient air temperature	For operation	°C - 25...+ 70
	For storage	°C - 40...+ 70
Vibration resistance	Conforming to EN/IEC 60068-2-6	5 gn (2...500 Hz)
Shock resistance	Conforming to EN/IEC 60068-2-27	10 gn (duration 11 ms)
Electric shock protection	Conforming to EN/IEC 61140	Class I
Degree of protection	Conforming to EN/IEC 60529	IP 65
Mechanical life	Number of operating cycles	1 million
Cable entries		See dimensions, page 3/61

Contact block characteristics

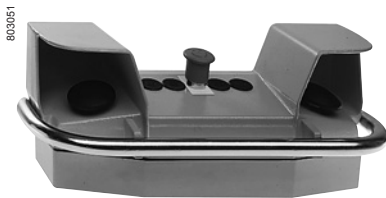
Rated operational characteristics	~ AC-15		A600 or Ue = 240 V and Ie = 3 A		
	--- DC-13		Q600 or Ue = 250 V and Ie = 0.27 A conforming to EN/IEC 60947-5-1 Appendix A		
Rated insulation voltage	Conforming to EN/IEC 60947-1	V	Ui = 600, degree of pollution 3		
	Conforming to UL 508 and CSA C22-2 n° 14	V	Ui = 600		
Rated impulse withstand voltage	Conforming to EN/IEC 60947-1	kV	Uimp = 6		
Contact operation	Slow break, with positive opening operation		N/C + N/O break before make on each black actuator pushbutton N/C + N/C simultaneous on Emergency stop pushbutton N/C + N/O break before make on Lock out pushbutton		
Positive operation	Conforming to EN/IEC 60947-5-1 Appendix K		N/C contact with positive opening operation		
Terminal referencing			Conforming to CENELEC EN 50013		
Short-circuit protection	Conforming to EN/IEC 269		10 A cartridge fuse type gG (gl)		
Connection	Screw clamp terminals	mm²	Minimum clamping capacity: 1 x 0.22 or 1 x 0.22 + 1 x 0.34 Maximum clamping capacity: 1 x 2.5 or 2 x 1.5		
Electrical durability Conforming to EN/IEC 60947-5-1 Appendix C Operating rate: 3600 operating cycles/hour. Load factor: 0.5	a.c. supply for 1 million operating cycles utilisation category AC-15	V	24	120	230
		A	4	3	2
	d.c. supply for 1 million operating cycles utilisation category DC-13	V	24	110	
		A	0.5	0.2	
Electrical reliability	Failure rate According to EN/IEC 60947-5-4		At 17 V and 5 mA, $\lambda < 10^{-8}$ At 5 V and 1 mA, $\lambda < 10^{-6}$		

(1) Using an appropriate and correctly connected control system.

Acquire the information

Two-hand ergonomic control stations

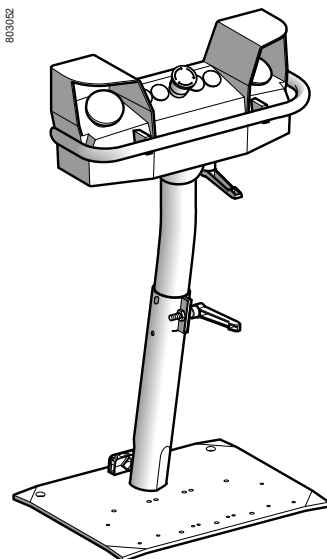
With Harmony XB4B control units



XY2SB7●

Two-hand control stations - painted

Description	Mushroom head		Reference	Weight kg
	Function and colour	Contacts		
2 control pushbuttons with N/C + N/O break before make contacts and 1 mushroom head pushbutton	Emergency stop Red	N/C + N/C slow break	XY2SB71	4.000
	Lock out (Schalt Sperre) Yellow	N/C + N/O break before make		
2 control pushbuttons with N/C + N/O break before make contacts and 1 mushroom head pushbutton, with pre-wired terminal block	Emergency stop Red	N/C + N/C slow break	XY2SB72	4.000
	Lock out (Schalt Sperre) Yellow	N/C + N/O break before make		



XY2SB7●4

Kits (control station + pedestal)

Description	Mushroom head		Reference	Weight kg
	Function and colour	Contacts		
2 control pushbuttons and 1 mushroom head Emergency stop pushbutton + pedestal XY2SB90	Emergency stop Red	N/C + N/C slow break	XY2SB714	17.000
	Emergency stop Red	N/C + N/C slow break		
2 control pushbuttons and 1 mushroom head Emergency stop pushbutton, with pre-wired terminal block + pedestal XY2SB90	Emergency stop Red	N/C + N/C slow break	XY2SB724	17.000
	Emergency stop Red	N/C + N/C slow break		

Documentation

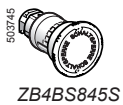
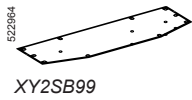
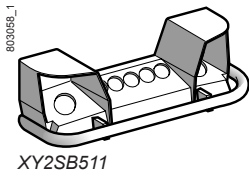
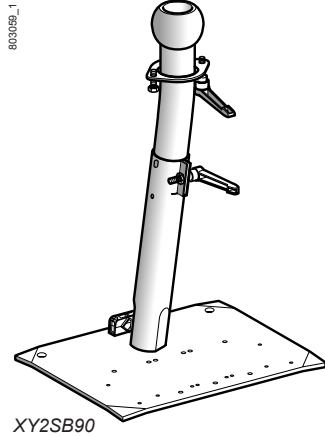
Description	For use with	Reference	Weight kg
Installation manual	All control stations XY2SB7●●	XCOM2514	0.200

Acquire the information

Two-hand ergonomic control stations

With Harmony XB4B control units

3



Separate components and spare parts

Various accessories

Description	For use with	Colour	Unit reference	Weight kg
Metal pedestal adjustable height	XY2SB●●	Orange	XY2SB90	13.000
Collar for guard rail (welded fixing)	XY2SB90	Orange	XY2SB98	0.800
Control station top without control devices	–	Orange	XY2SB511	2.500
Control station base	–	Orange	XY2SB531	1.200
Double protective metal cover	Metal pedestal XY2SB90 and foot switches type XPER	Orange	XY2SB96	4.370
Replacement handle (sold in lots of 5)	Metal pedestal XY2SB90	Black	XY2SB93	0.155
Replacement seals	–	–	XY2SB99	0.300
Adaptor (sold in lots of 5)	ISO M25	–	DE9RA2125	0.010
Fixing nut (sold in lots of 5)	Adaptor	–	DE9EC21	0.005

Control units (1)

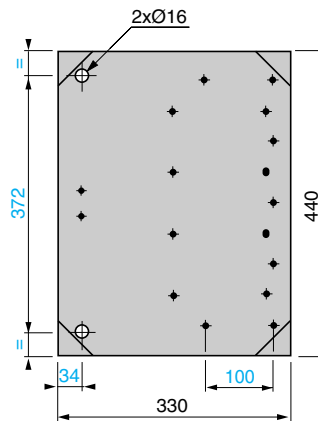
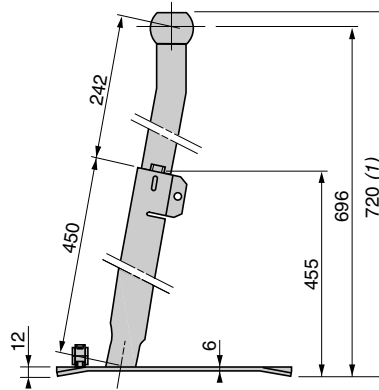
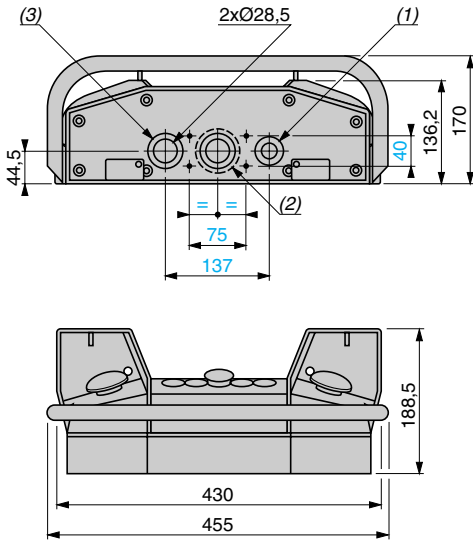
Description	Component part	Colour	Reference	Weight kg
Pushbutton actuator	Ø 60 mm mushroom head	Black	ZB4BR216	0.095
	N/C + N/O body/contact assembly	–	ZB4BZ105	0.055
Emergency stop pushbutton	Ø 40 mm mushroom head	Red	ZB4BS844	0.060
	N/C + N/C body/contact assembly	–	ZB4BZ104	0.055
Lock out pushbutton	Ø 40 mm mushroom head	Yellow, marked "Schaltsperr"	ZB4BS845S	0.060
	N/C + N/O body/contact assembly	–	ZB4BZ105	0.055

(1) Other XB4B control and signalling units are suitable for use on the control stations. Please refer to our "Human Machine Interface catalogue".

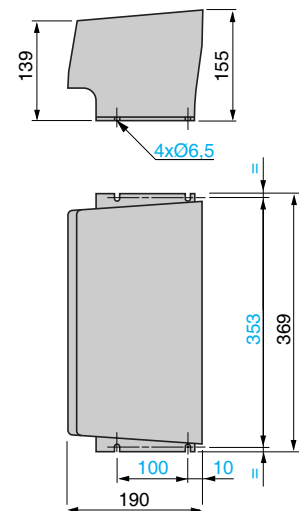
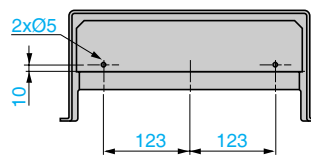
Dimensions

Control station
XY2SB7●

Pedestal
XY2SB90



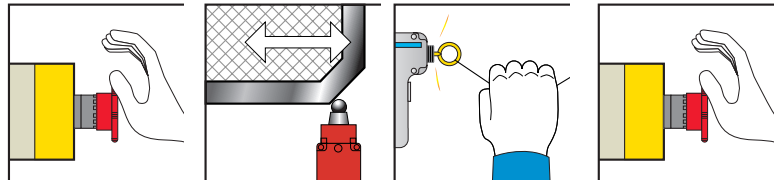
Double protective cover
XY2SB96



(1) 2 plain holes for n° 13 (PG13.5) or ISO M20 cable gland.
(2) Ø 56 mm knock-out specifically for mounting on pedestal.
(3) 1 plain hole for n° 21 (PG21) cable gland. For ISO M25, use adaptator DE9RA2125 and fixing nut DE9EC21.

(1) Adjustable height of pedestal 720 to 1060 mm.

Applications



Modules

For Emergency stop and switch monitoring

For Emergency stop and protective guard applications



3

Maximum achievable safety level

PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061

PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061

PLe/Category 4 (instantaneous safety outputs) and PL/Category 3 (time delay safety outputs) conforming to EN/ISO 13849-1, SILCL3 (instantaneous safety outputs) and SILCL2 (time delay safety outputs) conforming to EN/IEC 61508 and EN/IEC 62061

PLe/Category 4 conforming to EN ISO 13849-1, SILCL3 conforming to EN/IEC 62061

Conformity to standards

EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1

EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1

EN/IEC 60204-1, EN/ISO 13850, EN 1088/ISO 14119, EN/IEC 60947-1, EN/IEC 60947-5-1

EN 62061, EN ISO 13849-1, EN 50156-1, EN 60204-1, EN/IEC 61496-1, EN/IEC 60947-5-1

Product certifications

UL, CSA, TÜV

UL, CSA, BG

UL, CSA, TÜV

UL, CSA, TÜV

Number of circuits

Safety

3 NO

3 NO

2 NO instantaneous + 3 NO time delay

3 NO instantaneous + 3 NO time delay

Additional

1 solid-state output for signalling to PLC

1 relay output for signalling to PLC

4 solid-state outputs for signalling to PLC

1 NC

Display

2 LEDs

2 LEDs

4 LEDs

5 LEDs

Supply voltage

~ and 24 V ---
48 V ~
115 V ~
230 V ~

~ and 24 V ---

~ and 24 V ---
115 V ~
230 V ~

--- 24 V
~ 115...230 V

Synchronisation time between inputs

Unlimited

Unlimited

75 ms (automatic start)

1

Input channel voltage

24 V/48 V version

~ and 24 V ---/48 V ~

24 V ---

24 V ---/-

24 V ---/-

24 V/48 V or 110 V/120 V/230 V version

115 V ~/230 V -

-

48 V ~/48 V -

24 V ---/-

Module type

XPSAC

XPSAXE

XPSATE

XPSATR

Pages

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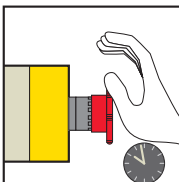
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3/69

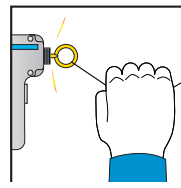
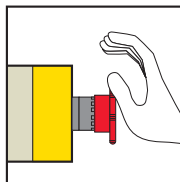
3/70



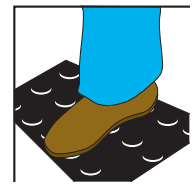
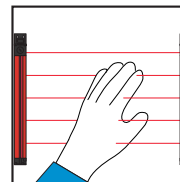
More technical information on www.schneider-electric.com



For Emergency stop and switch monitoring



For Emergency stop, switch or solid-state output safety light curtain monitoring



For Emergency stop, switch, sensing mat/edges or solid-state output safety light curtain monitoring



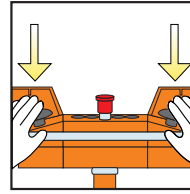
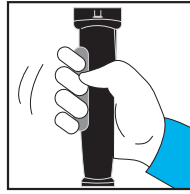
PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 (instantaneous safety outputs) and PLd/Category 3 (time delay safety outputs) conforming to EN/ISO 13849-1, SILCL3 (instantaneous safety outputs) and SILCL2 (time delay safety outputs) conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061
EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/ISO 13850, EN 1088/ISO 14119	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 61496-1 (type 4)	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/ISO 13850, EN/IEC 60947-1, EN/IEC 60947-5-1
UL, CSA, TÜV	UL, CSA, BG	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV

3 NO instantaneous + 3 NO time delay	2 NO instantaneous + 1 NO time delay	3 NO		7 NO	3 NO instantaneous
3 solid-state outputs for signalling to PLC	–	–		2 NC + 4 solid-state outputs for signalling to PLC	1 NC + 4 solid-state outputs for signalling to PLC
11 LEDs	3 LEDs	3 LEDs		4 LEDs	4 LEDs
24 V $\overline{\text{---}}$	24 V $\overline{\text{---}}$	\sim and 24 V $\overline{\text{---}}$		\sim and 24 V $\overline{\text{---}}$ 115 V \sim and 24 V $\overline{\text{---}}$ 230 V \sim and 24 V $\overline{\text{---}}$	\sim and 24 V $\overline{\text{---}}$ 48 V \sim 110 V \sim and 24 V $\overline{\text{---}}$ 120 V \sim and 24 V $\overline{\text{---}}$ 230 V \sim and 24 V $\overline{\text{---}}$

Unlimited or 1.5 s (depending on wiring)	Unlimited	Unlimited			Unlimited or 2 s, 4 s (depending on wiring)
24 V $\overline{\text{---}}$ /–	24 V $\overline{\text{---}}$ /–	$\overline{\text{---}}$ 24 V/–		24 V $\overline{\text{---}}$ /–	24 V $\overline{\text{---}}$ /–
–	–	–		24 V \sim /24 V –	– 24 V $\overline{\text{---}}$ /24 V/24 V

XPSAV	XPSABV	XPSAF	XPSAFL	XPSAR	XPSAK
3/69	3/69	3/71	3/72	3/73	3/74

Applications



Modules

For enabling switch monitoring

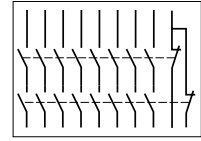
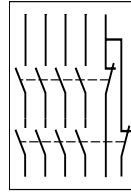
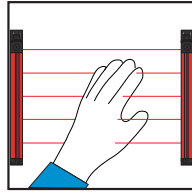
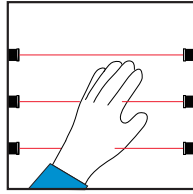
For electrical monitoring of two-hand control stations



3

Maximum achievable safety level	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	PLc/Category 1 conforming to EN/ISO 13849-1 SILCL1 conforming to EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061
Conformity to standards	EN/IEC 60204-1, EN 61326, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 574 type III A, EN/IEC 60204-1, EN/IEC 60947-5-1, EN 62061	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851
Product certifications	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, BG
Number of circuits			
Safety	2 NO	1 NO	2 NO
Additional	2 solid-state outputs for signalling to PLC	1 NC	1 NC
Display	3 LEDs	2 LEDs	3 LEDs
Supply voltage	24 V $\overline{\text{DC}}$	\sim and 24 V $\overline{\text{DC}}$ 115/230 V \sim	\sim and 24 V $\overline{\text{DC}}$ 115/120 V \sim 230 V \sim
Synchronisation time between inputs	–	500 ms	500 ms
Input channel voltage			
24 V/48 V version	24 V $\overline{\text{DC}}$	24 V $\overline{\text{DC}}$ /–	24 V $\overline{\text{DC}}$
115 V/230 V version	–	24 V \sim /24 V	–
Module type	XPSVC	XPSBAE	XPSBCE
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For control of 1 to 4 single-beam photo-electric sensors XU2 S (transmitter-receiver pair)

For monitoring type 2 and type 4 light curtains Compact and slim ranges

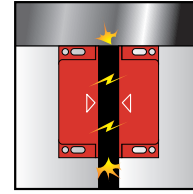
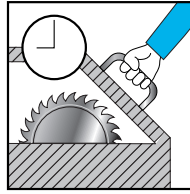
For extending the number of safety contacts



3

<p>PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061</p>	<p>PLc/Category 2 conforming to EN/ISO 13849-1, SILCL1 conforming to EN/IEC 61508 and EN/IEC 62061</p>	<p>PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061</p>	<p>PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061 (when connected to the appropriate module)</p>	<p>PLe/Category 4 conforming to EN/ISO 13849-1, SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061 (when connected to the appropriate module)</p>
<p>EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1, EN 574 type III C/ISO 13851</p>	<p>EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1</p>	<p>EN/IEC 61496-1, EN/IEC 61496-2, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1</p>	<p>EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1</p>	<p>EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1</p>
<p>UL, CSA, TÜV</p>	<p>UL, CSA, IFA</p>	<p>UL, CSA, TÜV</p>	<p>UL, CSA, BG</p>	<p>UL, CSA, TÜV</p>
<p>2 NO</p>	<p>2 NO</p>	<p>2 solid-state</p>	<p>4 NO</p>	<p>8 NO</p>
<p>2 solid-state outputs for signalling to PLC</p>	<p>4 solid-state PNP NO outputs for signalling to PLC</p>	<p>1 PNP + 1 NPN output for signalling to PLC</p>	<p>2 NC</p>	<p>1 NC</p>
<p>3 LEDs</p>	<p>4 LEDs</p>	<p>14 LEDs + 2-digit display</p>	<p>2 LEDs</p>	<p>3 LEDs</p>
<p>24 V $\overline{\text{---}}$</p>	<p>24 V $\overline{\text{---}}$</p>	<p>24 V $\overline{\text{---}}$</p>	<p>\sim and 24 V $\overline{\text{---}}$</p>	<p>\sim and 24 V $\overline{\text{---}}$ 115 V \sim 230 V \sim</p>
<p>500 ms</p>	<p>–</p>	<p>3 s or infinite</p>	<p>–</p>	<p>–</p>
<p>24 V $\overline{\text{---}}$/–</p>	<p>–</p>	<p>–</p>	<p>–</p>	<p>–</p>
<p>–</p>	<p>–</p>	<p>–</p>	<p>–</p>	<p>–</p>
<p>XPSBF</p>	<p>XPSCM</p>	<p>XPSLCM</p>	<p>XPSECME</p>	<p>XPSECPE</p>
<p>3/76</p>	<p>3/77</p>	<p>3/78</p>	<p>3/79</p>	<p>3/79</p>

Applications



Modules

For the monitoring of applications requiring safety time delays

For coded magnetic switch monitoring

For 2 max.

For 6 max.



3

Maximum achievable safety level
Conformity to standards
Product certifications

PL d/Category 3 conforming to EN/ISO 13849-1, SILCL 2 conforming to EN/IEC 62061	PL d/Category 3 conforming to EN/ISO 13849-1, SILCL 2 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1 SILCL 3 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1 SILCL 3 conforming to EN/IEC 62061
EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-3	EN/IEC 60204-1, EN 1088/ISO 14119, EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-3
UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV

Number of circuits	Safety	1 NO time delayed	1 NO pulse type	2 NO
	Additional	2 NC + 2 solid-state outputs for signalling to PLC		2 solid-state outputs for signalling to PLC
Display	4 LEDs		3 LEDs	15 LEDs
Supply voltage	~ and 24 V $\overline{\text{---}}$ 115 V \sim 230 V \sim		$\overline{\text{---}}$ 24 V	

Synchronisation time between inputs

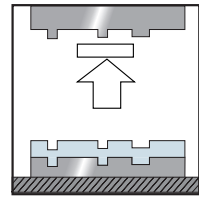
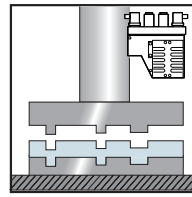
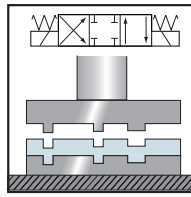
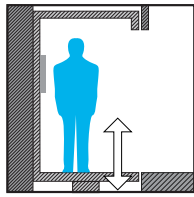
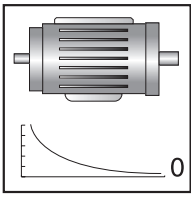
-	-	500 ms
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Module type

XPSTSA	XPSTSW	XPSDME	XPSDME
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Pages

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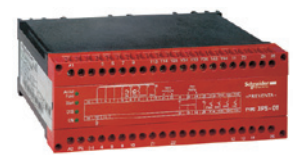
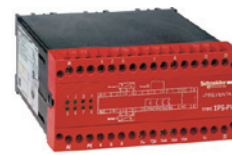
For zero speed detection of AC or DC motors which produce a remanent voltage in their windings due to residual magnetism

For lift control

For dynamic monitoring of hydraulic valves on linear presses

For dynamic monitoring of double-bodied solenoid valves

For safety stop at top dead centre with automatic overtravel monitoring and control



3

PL d/Category 3 conforming to EN/ISO 13849-1, SILCL 2 conforming to EN/IEC 62061,	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061	PL e/Category 4 conforming to EN/ISO 13849-1, SILCL 3 conforming to EN/IEC 62061
EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 81-1, EN 81-2, EN/IEC 60947-5-1, EN 12015, EN 12016	EN 693, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 692, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1	EN 692, EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1
UL, CSA, TÜV	TÜV	UL, CSA, TÜV	UL, CSA, TÜV	UL, CSA, TÜV

1 NO + 1 NC	2 NO	2 NO + 1 NC	1 NO + 1 NC	3 NO
2 solid-state outputs for signalling to PLC		–	4 solid-state outputs for signalling to PLC	
4 LEDs	4 LEDs	8 LEDs		
24 V $\overline{\text{DC}}$ 115 V \sim 230 V \sim	\sim and 24 V $\overline{\text{DC}}$	24 V $\overline{\text{DC}}$	24 V $\overline{\text{DC}}$ 115 V \sim 230 V \sim	– 115 V \sim 230 V \sim
–	Infinite	–	–	–

XPSVNE	XPSEDA	XPSPVT	XPSPVK	XPSOT
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Monitor and Processing

Preventa safety modules types XPSAC, XPSAXE

For Emergency stop and switch monitoring

Operating principle

Safety modules **XPSAC** and **XPSAXE** are used for monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1 and also meet the safety requirements for the electrical monitoring of switches in protective devices conforming to standard EN/ISO 14119. They provide protection for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of a fault in the safety circuit itself.

To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status.

- The **XPSAC** module has 3 safety outputs and a solid-state output for signalling to the PLC.
- The **XPSAXE** module has 3 safety outputs and a relay output for signalling to the PLC

3

Description	Connection	Number of instantaneous opening safety circuits	Additional outputs	Supply	Reference	Weight kg/lb
Safety modules for Emergency stop and switch monitoring	Captive screw clamp terminals Terminal block integrated in module	3	1 solid-state	~ and ≡ 24 V	XPSAC5121	0.160/ 0.353
				~ 48 V	XPSAC1321	0.210/ 0.463
				~ 115 V	XPSAC3421	0.210/ 0.463
				~ 230 V	XPSAC3721	0.210/ 0.463
	Captive screw clamp 3 terminals Terminal block removable from module	3	1 solid-state	~ and ≡ 24 V	XPSAC5121P	0.160/ 0.353
				~ 48 V	XPSAC1321P	0.210/ 0.463
				~ 115 V	XPSAC3421P	0.210/ 0.463
				~ 230 V	XPSAC3721P	0.210/ 0.463
			1 relay	~ and ≡ 24 V	XPSAXE5120P	0.229/ 0.505
	Spring terminals Terminal block removable from module	3	1 relay	~ and ≡ 24 V	XPSAXE5120C	0.229/ 0.505



XPSAC●●●●



XPSAC●●●●P



XPSAXE5120P



XPSAXE5120C

Operating principle

Safety modules **XPSAV**, **XPSABV** and **XPSATE** are used for monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1 and also meet the safety requirements for the electrical monitoring

of switches in protection devices conforming to standard EN/ISO 14119.

They provide protective for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of a fault in the safety circuit itself.

In addition to the stop category 0 instantaneous opening safety outputs (3 for **XPSAV**, 2 for **XPSABV** and 2 for **XPSATE**), the modules incorporate stop category 1 time delay outputs (3 for **XPSAV**, 1 for **XPSABV** and 3 for **XPSATE**) which allow for controlled deceleration of the motor components until a complete stop is achieved (for example, motor braking by variable speed drive).

At the end of the preset delay, the supply is disconnected by opening the time delay output circuits.

- For module **XPSAV**, the time delay of the 3 output circuits is adjustable, in 15 preset values, between 0 and 300 seconds using selector buttons.

- For module **XPSABV**, the time delay of the 3 output circuits is adjustable between 0.15 and 3 seconds or 1.5 and 30 seconds, depending on the model, using a selector switch.

- For module **XPSATE**, the time delay of the 3 output circuits is adjustable between 0 and 30 seconds using a 12-position selector switch.

Module **XPSAV** also incorporates 3 solid-state signalling outputs for signalling to the process PLC.

Module **XPSATE** incorporates 4 solid-state signalling outputs for signalling to the process PLC.

To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

References

Description	Connection	Number of safety circuits	Additional outputs	Setting range of time delay	Supply	Reference	Weight kg/lb
Safety modules for Emergency stop and switch monitoring	Captive screw clamp terminals Terminal block integrated in module	6 NO (3 NO time delay)	3 solid-state	0...300 s	~ 24 V	XPSAV11113	0.320/ 0.705
	Captive screw clamp terminals Terminal block removable from module	6 NO (3 NO time delay)	3 solid-state	0...300 s	~ 24 V	XPSAV11113P	0.320/ 0.705
	Captive screw clamp terminals Terminal block integrated in module	6 NO (3 NO time delay)	3 solid-state	0...300 s (Start delay 0,5 s)	~ 24 V	XPSAV11113T050	0.320/ 0.705
	Captive screw clamp terminals Terminal block integrated in module	6 NO (3 NO time delay)	3 solid-state	0.1 ...2 s	~ 24 V	XPSAV11113Z002	0.320/ 0.705
	Captive screw clamp terminals Terminal block removable from module	3 NO (1 NO time delay)	–	0,15...3 s	~ 24 V	XPSABV1133P	0.280/ 0.617
	Spring terminals Terminal block removable from module	3 NO (1 NO time delay)	–	0,15...3 s	~ 24 V	XPSABV1133C	0.275/ 0.606
	Captive screw clamp terminals Terminal block removable from module	3 NO (1 NO time delay)	–	1,5...30 s	~ 24 V	XPSABV11330P	0.280/ 0.617
	Spring terminals Terminal block removable from module	3 NO (1 NO time delay)	–	1,5...30 s	~ 24 V	XPSABV11330C	0.275/ 0.606
	Captive screw clamp terminals Terminal block integrated in module	5 NO (3 NO time delay)	4 solid-state	0...30 s	~ and ~ 24 V	XPSATE5110	0.280/ 0.617
	Captive screw clamp terminals Terminal block removable from module	5 NO (3 NO time delay)	4 solid-state	0...30 s	~ and ~ 24 V	XPSATE5110P	0.280/ 0.617
	Captive screw clamp terminals Terminal block integrated in module	5 NO (3 NO time delay)	4 solid-state	0...30 s	~ 115 V	XPSATE3410	0.380/ 0.838
	Captive screw clamp terminals Terminal block removable from module	5 NO (3 NO time delay)	4 solid-state	0...30 s	~ 115 V	XPSATE3410P	0.380/ 0.838
Captive screw clamp terminals Terminal block integrated in module	5 NO (3 NO time delay)	4 solid-state	0...30 s	~ 230 V	XPSATE3710	0.380/ 0.838	
Captive screw clamp terminals Terminal block removable from module	5 NO (3 NO time delay)	4 solid-state	0...30 s	~ 230 V	XPSATE3710P	0.380/ 0.838	



XPSAV11113



XPSAV11113P



XPSABV1133P



XPSABV11330C



XPSATE5110

Operating principle

Safety modules **XPSATR** meet the requirements of Performance Level PL e/Category 4 conforming to standard EN ISO 13849-1.

Safety modules **XPSATR** are electronic, redundant and self-monitoring devices with positively driven relays.

They are used for monitoring Emergency stop circuits (single or two-channel) and protective guard applications.

The modules are conforming to standards EN/ISO 13850 and EN 60204-1.

They provide protection for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of a fault in the safety circuit itself.

XPSATR incorporate 3 NO and 1 NC not delayed contacts and 3 delayed NO contacts.

To aid diagnostics, the modules have 5 LEDs on the front face which provide information on the monitoring circuit status.

References

Description	Connection	Number of safety circuits	Additional outputs	Time setting range	Supply	Reference	Weight kg/lb
Safety modules for emergency stop and safety guards monitoring	Captive screw clamp terminals Terminal block removable from module	3 NO + 3 NO time delay	1 NC	0.1...3 s	≡ 24 V	XPSATR1153P	0.330/ 0.728
				0.1...3 s	~ 115...230 V	XPSATR3953P	0.350/ 0.772
				0...30 s	≡ 24 V	XPSATR11530P	0.330/ 0.728
				0...30 s	~ 115...230 V	XPSATR39530P	0.350/ 0.772
	Cage clamp terminals Terminal block removable from module	3 NO + 3 NO time delay	1 NC	0.1...3 s	≡ 24 V	XPSATR1153C	0.330/ 0.728
				0.1...3 s	~ 115...230 V	XPSATR3953C	0.350/ 0.772
				0...30 s	≡ 24 V	XPSATR11530C	0.330/ 0.728
				0...30 s	~ 115...230 V	XPSATR39530C	0.350/ 0.772



XPSATR●●●●P



XPSATR●●●●C

Monitor and Processing

Preventa safety modules type XPSAF

For Emergency stop and switch monitoring

Operating principle

Safety modules **XPSAF** meet the requirements of Performance Level PL e/Category 4 conforming to standard EN/ISO 13849-1.

They are used for:

- Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices conforming to standard EN/ISO 14119.

Housed in a compact enclosure, the modules have 3 safety outputs.

Preventa safety modules **XPSAF●●●●P** incorporate removable terminal blocks, thus optimising machine maintenance.

To aid diagnostics, the modules have 3 LEDs on the front face which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

3

References

Description	Connection	Number of safety circuits	Supply	Reference	Weight kg/ lb
Safety modules for Emergency stop and switch monitoring	Captive screw clamp terminals Terminal block integrated in module	3	~ and 24 V	XPSAF5130	0.250/ 0.551
	Captive screw clamp terminals Terminal block removable from module	3	~ and 24 V	XPSAF5130P	0.250/ 0.551



XPSAF5130

Monitor and Processing

Preventa safety modules type XPSAFL

For Emergency stop, switch and safety light curtain monitoring

Operating principle

Safety modules **XPSAFL** meet the requirements of Performance Level PL e/Category 4 conforming to standard EN/ISO 13849-1.

They are used for:

- Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices conforming to standard EN/ISO 14119.

They can also be used for monitoring type 4 light curtains conforming to EN 61496-1 that have solid-state safety outputs (for example, light curtains type XUSL). This system conforms to Performance Level PL e/Category 4 in accordance with EN/ISO 13849-1.

Housed in a compact enclosure, the modules have 3 safety outputs. Preventa safety modules **XPSAFL●●●●P** incorporate removable terminal blocks, thus optimising machine maintenance. To aid diagnostics, the modules have 3 LEDs on the front face which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

3

References

Description	Connection	Number of safety circuits	Supply	Reference	Weight kg/lb
Safety modules for Emergency stop, switch and safety light curtain monitoring	Captive screw clamp terminals Terminal block integrated in module	3	~ and = 24 V	XPSAFL5130	0.250/ 0.551
	Captive screw clamp terminals Terminal block removable from module	3	~ and = 24 V	XPSAFL5130P	0.250/ 0.551



XPSAFL5130

Monitor and Processing

Preventa safety modules type XPSAR

For Emergency stop, switch or safety light curtain monitoring

Operating principle

Safety modules **XPSAR** meet the requirements of Performance Level PL e/ Category 4 conforming to standard EN/ISO 13849-1 and are designed for the following safety applications:

- Monitoring Emergency stop circuits conforming to EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices conforming to standard EN/ISO 14119.
- Monitoring type 4 light curtains conforming to EN/IEC 61496-1 that have solid-state safety outputs with test function (light curtains XUS L).

In addition to 7 safety outputs, modules **XPSAR** incorporate 2 relay signalling outputs and 4 solid-state signalling outputs for signalling to the process PLC.

Safety modules **XPSAR●●●●●P** incorporate removable terminal blocks, thus optimising machine maintenance.

To aid diagnostics, the modules have 4 LEDs on the front face which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

References

Description	Connection	Number of safety circuits	Additional outputs/ solid-state outputs to PLC	Supply	Reference	Weight kg/ lb	
Safety modules for Emergency stop, switch or safety light curtain monitoring	Captive screw clamp terminals, Terminal block integrated in module	7	2 / 4	~ and ☐ 24 V	XPSAR311144	0.300/ 0.661	
				~ 115 V ☐ 24 V	XPSAR351144	0.400/ 0.882	
				~ 230 V ☐ 24 V	XPSAR371144	0.400/ 0.882	
	Captive screw clamp terminals, Terminal block removable from module	7	2 / 4		~ and ☐ 24 V	XPSAR311144P	0.300/ 0.661
					~ 115 V ☐ 24 V	XPSAR351144P	0.400/ 0.882
					~ 230 V ☐ 24 V	XPSAR371144P	0.400/ 0.882



XPSAR3●1144

Monitor and Processing

Preventa safety modules type XPSAK
For Emergency stop, switch, sensing mat/edges
or safety light curtain monitoring

Operating principle

Safety modules **XPSAK** meet the requirements of Performance Level PL e/Category 4 conforming to standard EN/ISO 13849-1.

They are used for:

- Monitoring Emergency stop circuits conforming to standards EN/ISO 13850 and EN/IEC 60204-1.
- Electrical monitoring of switches activated by protection devices, with optional selection of synchronisation time between signals.
- Monitoring 4-wire sensing mats or edges.
- Monitoring type 4 light curtains conforming to EN/IEC 61496-1 which have solid-state safety outputs with test function (light curtains XUSL).

Housed in a compact enclosure, the modules have 3 safety outputs, a relay signalling output and 4 solid-state signalling outputs for signalling to the process PLC.

Preventa safety modules **XPSAK●●●●P** incorporate removable terminal blocks, thus optimising machine maintenance.

To aid diagnostics, the modules have 4 LEDs on the front face which provide information on the monitoring circuit status.

The Start button monitoring function is configurable depending on the wiring.

3

References

Description	Connection	Number of safety circuits	Additional outputs / Solid-state outputs for PLC	Supply	Reference	Weight kg/ lb
Safety modules for Emergency stop, switch, sensing mat/edges or safety light curtain monitoring	Captive screw clamp terminals Terminal block integrated in module	3	1 / 4	~ and = 24 V	XPSAK311144	0.300/ 0.661
				~ 110 V = 24 V	XPSAK361144	0.400/ 0.882
				~ 120 V = 24 V	XPSAK351144	0.400/ 0.882
				~ 230 V = 24 V	XPSAK371144	0.400/ 0.882
	Captive screw clamp terminals Terminal block removable from module	3	1 / 4	~ and = 24 V	XPSAK311144P	0.300/ 0.661
				~ 48 V	XPSAK331144P	0.300/ 0.661
				~ 110 V = 24 V	XPSAK361144P	0.400/ 0.882
				~ 120 V = 24 V	XPSAK351144P	0.400/ 0.882
				~ 230 V = 24 V	XPSAK371144P	0.400/ 0.882



XPSAK3●1144

Operating principle

The enabling grip switch system, comprising an enabling switch XY2AU and a monitoring module **XPSVC**, enables authorised personnel to carry out adjustment, programming or maintenance operations within hazardous zones of machines providing certain conditions are met.

To be accessible, such operations are often carried out at reduced speed, and must be intentionally selected by authorised persons by means of a selector switch or key switch. Once the selection is made, the enabling switch system temporarily takes over from the hazardous zone's usual protection measures.

Caution: The enabling switch system alone must not cause dangerous movements of the machine to be activated; a second intentional control action on the part of the operator is required. In addition, each person remaining in the hazardous zone must be provided with an individual enabling switch to ensure their own safety.



XPSVC1132

References						
Description	Connection	Number of safety circuits	Solid-state outputs for PLC	Supply	Reference	Weight kg/lb
Safety modules for enabling switch monitoring	Captive screw clamp terminals Terminal block integrated in module	2 NO	2	☰ 24	XPSVC1132	0.250/ 0.551
	Captive screw clamp terminals Terminal block removable from module	2 NO	2	☰ 24	XPSVC1132P	0.250/ 0.551

Operating principle

Two-hand control stations are designed to provide protection against hand injury. They require machine operators to keep their hands clear of the dangerous movement zone. The use of two-hand control is an individual protective measure, which can safely protect only one operator. Separate two-hand control stations must be provided for each operator in a multiple-worker environment.

Safety modules **XPSBAE**, **BCE** and **BF** for two-hand control stations comply with the requirements of European standard EN 574/ISO 13851 for two-hand control systems.

The control stations must be designed and installed such that they cannot be activated involuntarily or easily rendered inoperative. Depending on the application, the requirements of type C standards specific to the machinery involved must be met (additional personal protection methods may have to be considered).

To initiate a dangerous movement, both operators (two-hand control pushbuttons) must be activated within an interval ≤ 0.5 s (synchronous activation). If one of the two pushbuttons is released during a dangerous operation, the control sequence is cancelled. Resumption of the dangerous operation is possible only if both pushbuttons are returned to their initial position and reactivated within the required time interval.

The safety distance between the control units and the hazardous zone must be sufficient to ensure that when only one operator is released, the hazardous zone cannot be reached before the dangerous movement has been completed or stopped.

3



XPSBAE●●●●P



XPSBAE●●●●C



XPSBCE●●●●P



XPSBCE●●●●C



XPSBF1132

Selection

Requirements of standard EN 574/ISO 13851

Standard EN 574/ISO 13851 defines the selection of two-hand controls according to its behavior. The following table details the 3 types of two-hand control conforming to EN 574/ISO 13851. For each type, it lists the operating characteristics and minimum requirements.

	Type I	Type II	Type III		
			A	B	C
Use of both hands (simultaneous action)					
Link between input and output signals					
Output signal inhibited					
Prevention of accidental operation					
Tamper-proof					
Output signal reinitialised					
Synchronous action (specified time limit)					
Use of proven components (Category 1 conforming to EN/ISO 13849-1)			XPSBAE		
Redundancy with partial error detection (Category 3 conforming to EN/ISO 13849-1)				XPSBCE XPSBF	
Redundancy + Self-monitoring (Category 4 conforming to EN/ISO 13849-1)					XPSBCE XPSBF
Two-hand control station	XY2SB●●				

Conforming to standard EN/ISO 13849-1

Meets the requirements of standard EN 574/ISO 13851

References

Description	Type conforming to standard EN 574	Connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight kg/ lb	
Safety modules for electrical monitoring of two-hand control stations	III A	Captive screw clamp terminals	1 NO	1 NC	~ and 24 V ~	XPSBAE5120P	0.100/ 0.220	
		Terminal block removable from module			~ 115/230V	XPSBAE3920P	0.100/ 0.220	
		Spring terminals	1 NO	1 NC	~ and 24 V ~	XPSBAE5120C	0.100/ 0.220	
		III C	Terminal block removable from module			~ 115/230V	XPSBAE3920C	0.100/ 0.220
	Captive screw clamp terminals		2 NO	1 NC relay	~ and 24 V ~	XPSBCE3110P	0.272/ 0.600	
	Terminal block removable from module				~ 115/120 V	XPSBCE3410P	0.322/ 0.710	
				~ 230 V	XPSBCE3710P	0.322/ 0.710		
		Spring terminals	2 NO	1 NC relay	~ and 24 V ~	XPSBCE3110C	0.272/ 0.600	
		Terminal block removable from module			~ 115 /120 V	XPSBCE3410C	0.322/ 0.710	
					~ 230 V	XPSBCE3710C	0.322/ 0.710	
		Captive screw clamp terminals	2 NO	2 solid-state	~ 24 V	XPSBF1132	0.150/ 0.331	
		Terminal block removable from module	2 NO	2 solid-state	~ 24 V	XPSBF1132P	0.150/ 0.331	

Monitor and Processing

Preventa safety modules and single-beam photo-electric sensors

With a test input associated with a built-in “muting” function

Operating principle

XPSCM safety modules used in conjunction with XU2S single-beam photo-electric sensors (periodically tested), establish a category 2 light curtain conforming to IEC/EN 61496 parts 1 and 2.

The connection of 1 to 4 pairs of XU2S photo-electric sensors makes it possible to create a protected zone up to 1200 mm high conforming to EN 999/ISO 13855 and 8 m long.

The built-in “muting” function allows the automatic passage of parts to be machined, or loaded pallets, without interrupting the transportation movement.

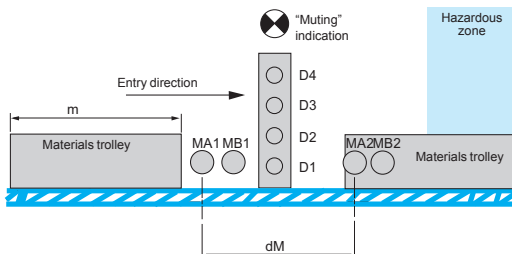
When the system is switched on by the start command (in series with the main circuit feedback loop) and the light protection is not interrupted, the main circuit is closed by the two safety relays of the XPSCM module.

An interruption of the protective field causes the safety outputs to open instantaneously, and the process PLC receives a stop command. The LED on the XPSCM front panel changes from green to red. The “open” state is maintained until the module is restarted using the start button.

The “muting” function allows the light curtain protection to be inhibited. This can be used to authorise the passage of a materials trolley through the light curtain without tripping the main circuit. The “muting” function cannot be activated by supplying the inhibition sensors unless the safety outputs have been switched on beforehand.

To trigger the “muting” function, the inhibition devices must be activated within the 3 second time interval. This synchronisation time for the two inhibition inputs can be deactivated by connecting two configuration terminals. The “muting” cycle has a maximum duration of 60 seconds. During this period, materials can be transported through the protection field without deactivating the safety outputs. The 60 second limit value of the “muting” cycle may be made infinite by connecting two configuration terminals.

During the “muting” process, a light indicating the “muting” status is controlled by the XPSCM module. An fault at indicator light level (short-circuit, open circuit) will be immediately recognised and deactivate the “muting” function. The indicator light comes on when a “muting” signal is generated and indicates the inhibition of the protection function.



D1, D2, D3, D4: monitoring photo-electric sensors.
MA1, MB1, MA2, MB2: “muting” photo-electric sensors.
m = trolley length (including material)
dM = distance between MA1, MB1 and MA2, MB2.

Conditions to be observed for the “muting” function

- The “muting” sensors must either be:
 - Thru-beam type, sensing distance 8 m: XU2S18PP340L5 (or XU2S18PP340D).
 - Thru-beam type, sensing distance 15 m: XUB2BKSNL2T (or XUB2BKSNM12T) + XUB2BPANL2R (or XUB2BPANM12R).
 - Polarised reflex type, sensing distance 2 m: XUB9BPNAL2 (or XUB9BPNAM12) + XUZC50.
 - Polarised reflex type, sensing distance 5 m: XUM9APCNL2 (or XUM9APCNM8) or XUM9BPANL2 + XUZC50.
 - Limit switches.
- $dM \leq m$ to obtain continuous validation of the “muting” function.
- Avoid the intrusion of persons during the “muting” phase. This phase is indicated by the indicator light connected to the “muting” indicator output of the XPSCM module.
- A materials trolley must provide the “muting” signal before entering the protection field and cease it once it has cleared all the sensors of the protection field on exiting.

References

Description	Type of terminal block connection	Number of safety circuits	Additional safety outputs	Supply	Reference	Weight kg/ lb
Safety modules for monitoring single-beam photo-electric sensors, with a built-in “muting” function	Integrated in module	2	4	24 V $\overline{\text{---}}$	XPSCM1144	0.350/ 0.772
	Removable from module	2	4	24 V $\overline{\text{---}}$	XPSCM1144P	0.350/ 0.772



XPSCM1144●

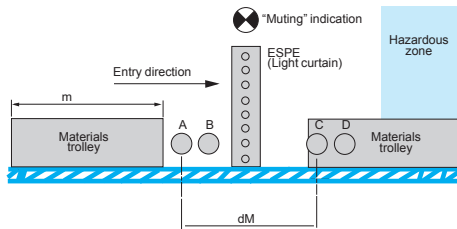
Monitor and Processing

Safety monitoring module

Preventa XPSLCM

for the “muting” function of type 2 and type 4 safety light curtains

3



ESPE: electro-sensitive protection equipment (light curtain).
A, B, D, C: “muting” sensors.
m: trolley length and dM = distance between A, B and D, C.

Operating principle

XPSLCM safety modules are used with type 4 light curtains conforming to EN/IEC 61496-1 to provide a system inhibiting the light curtain protection, i.e. “muting”. This function enables the automatic passage of parts for machining or loaded pallets, without interrupting the transportation movement within the zone protected by the electro-sensitive protection equipment (ESPE) system. In addition to the electro-sensitive protection and XPSLCM safety modules, the system comprises 4 to 8 inhibition sensors, 2 indicator lights and a key switch to reset the system to the initial state in the event of a sequence error.

When the system is switched on by the start command and the light curtain protection not interrupted, the main circuit is closed by the safety outputs of the XPSLCM modules (solid-state safety outputs). In addition to safety outputs, the modules incorporate signalling outputs for sending system status information to the PLC. Either 5 or 14 LEDs and a 2-digit display, mounted on the front face of the module, provide information on the safety circuit status.

An interruption of the protection field monitored by the electro-sensitive protection equipment causes instantaneous opening of the safety outputs; the process PLC receives a stop command and the LED display mounted on the front face indicates the change of state of the safety circuits. The “open” state is maintained until the module is restarted using the Start button.

The “muting” function cannot be activated by supplying the inhibition sensors unless the safety outputs have been switched on beforehand. To trigger the “muting” function, the inhibition devices must be activated within the 3 second time interval. During the activated “muting” phase, materials can be transported through the protection field without deactivating the safety outputs. In the event of intrusion into the hazardous zone, a person cannot activate the inhibition sensors in the same way and the system stops.

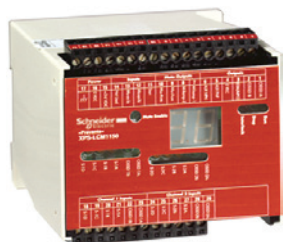
Whilst the “muting” function is activated, a “muting” status indicator light is controlled by the XPSLCM module. A fault at indicator light level (short-circuit, open circuit) is immediately recognised and deactivates the “muting” function. The indicator light only illuminates when a “muting” signal is generated and indicates the inhibition of the protection function.

Conditions to be observed for the “muting” function

- The “muting” sensors must either be:
 - Thru-beam type, sensing distance 15 m: XUM2APCNL2 (or XUM2APCNM8) or XUM2BPANL2 or XUM2BPNL2.
 - Polarised reflex type, sensing distance 5 m: XUM9APCNL2 (or XUM9APCNM8) or XUM9BPANL2 or XUM9BPNL2 + XUZC50.
 - Polarised reflex type, sensing distance 11 m: XUX9APANT16 (or XUX9APANM12) or XUX9APBNT16 (or XUX9APBNM12) + XUZC50.
 - Limit switches
- $dM \leq m$ to obtain continuous validation of the “muting” function.
- Avoid the intrusion of persons during the “muting” phase. This phase is indicated by the indicator light connected to the “muting” indicator output of the XPSLCM module.
- A materials trolley must provide the “muting” signal before entering the protection field and cease it once it has cleared all the sensors of the protection field on exiting.

References

Description	Type of terminal block connection	Number of safety circuits	Auxiliary outputs	Supply	Reference	Weight kg/ lb
Safety module for “muting” function	Removable from module	2 PNP	1 PNP + 1 NPN	24 V $\overline{\text{DC}}$	XPSLCM1150	0.660/ 1.455



XPSLCM1150

Monitor and Processing

Preventa safety modules types XPSECME, XPSECPE

For extending the number of safety contacts

Operating principle

Safety modules **XPSECME** and **XPSECPE**, for extending the number of safety contacts, are available as additions to Preventa XPSbase modules (Emergency stop, limit switch, two-hand control, etc.). They are used to extend the number of safety output contacts of the base modules.

References

Description	Connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight kg/lb
Safety modules for extending the number of safety contacts, for use with XPSbase modules	Captive screw clamp terminals Terminal block removable from module	4	2	~ and ⋮ 24 V	XPSECME5131P	0.270/ 0.595
	Spring terminals Terminal block removable from module	4	2	~ and ⋮ 24 V	XPSECME5131C	0.270/ 0.595
	Captive screw clamp terminals Terminal block removable from module	8	1	~ and ⋮ 24 V	XPSECPE5131P	0.550/ 1.213
	Spring terminals Terminal block removable from module	8	1	~ and ⋮ 24 V	XPSECPE5131C	0.650/ 1.433
	Captive screw clamp terminals Terminal block removable from module	8	1	~ 115...230 V	XPSECPE3910P	0.650/ 1.433
	Spring terminals Terminal block removable from module	8	1	~ 115...230 V	XPSECPE3910C	0.650/ 1.433



XPSECME5131P



XPSECME5131C



XPSECPE5131P



XPSECPE5131C

Monitor and Processing

Preventa safety modules types XPSTSA, XPSTSW

For safety time delays

Operating principle

Safety modules **XPSTSA** and **XPSTSW** are used in applications requiring safety time delays:

- modules **XPSTSA** in applications with interlocking on high inertia machines with long rundown time (guards unlocked after safety time delay has elapsed),
- modules **XPSTSW** in applications with a safety switchover contact (shunting contact in association with XPSVN modules for zero speed detection, solenoid valve monitoring, etc.).

The time delay of safety circuits can be set to 16 preset values, using 2 selectors located on the front face of the modules.

To aid diagnostics, the modules have LEDs which provide information on the monitoring circuit status and 2 solid-state outputs for signalling to the process PLC. In addition, their removable terminal blocks optimise machine maintenance.

3

References

Description	Connection	Number of safety circuits	Additional outputs / Solid-state outputs to PLC	Supply	Reference	Weight kg/ lb
Safety modules for applications with interlocking on high inertia machines	Captive screw clamp terminals Terminal block removable from module	1 delayed	2 NC / 2	~ and ~ 24 V	XPSTSA5142P	0.250/ 0.551
				~ 115 V	XPSTSA3442P	0.360/ 0.774
				~ 230 V	XPSTSA3742P	0.360/ 0.774
Safety modules for applications with safety switchover contact	Captive screw clamp terminals Terminal block removable from module	1 pulse type	2 NC / 2	~ and ~ 24 V	XPSTSW5142P	0.250/ 0.551
				~ 115 V	XPSTSW3442P	0.360/ 0.774
				~ 230 V	XPSTSW3742P	0.360/ 0.774



XPSTSA●●●●P



XPSTSW●●●●P

Monitor and Processing

Preventa safety modules types XPSDMB, XPSDME

For coded magnetic switch monitoring

Operating principle

Safety modules **XPSDMB** and **XPSDME** are specifically designed for monitoring coded magnetic safety switches. They incorporate two safety outputs and two solid-state outputs for signalling to the process PLC. Conforming to Performance Level PL e/Category 4 conforming to EN/ISO 13849-1, modules **XPSDMB** can monitor two independent sensors and modules **XPSDME** can monitor up to six independent sensors.

To monitor a higher number of magnetic switches using these safety modules, the magnetic switches can be connected in series parallel, while meeting the requirements of Performance Level PL d/Category 3 conforming to standard EN/ISO 13849-1.

Safety modules **XPSDM●●●●P** incorporate removable terminal blocks, thus optimising machine maintenance. To aid diagnostics, the modules have LEDs on the front face which provide information on the monitoring circuit status.



XPSDMB1132



XPSDME1132

References							
Description	Connection	Number of safety circuits	Synchro time between inputs	Solid-state outputs for PLC	Supply	Reference	Weight kg/lb
Safety module for monitoring 2 coded magnetic switches	Captive screw clamp terminals Terminal block integrated in module	2 NO	< 0.5 s	2	≡ 24 V	XPSDMB1132	0.250/ 0.551
Safety module for monitoring 6 coded magnetic switches	Captive screw clamp terminals Terminal block integrated in module	2 NO	< 0.5 s	2	≡ 24 V	XPSDME1132	0.300/ 0.661
Safety module for monitoring 2 coded magnetic switches	Captive screw clamp terminals Terminal block removable from module	2 NO	< 0.5 s	2	≡ 24 V	XPSDMB1132P	0.250/ 0.551
Safety module for monitoring 6 coded magnetic switches	Captive screw clamp terminals Terminal block removable from module	2 NO	< 0.5 s	2	≡ 24 V	XPSDME1132P	0.300/ 0.661
Safety module for monitoring 6 coded magnetic switches	Captive screw clamp terminals Terminal block integrated in module	2 NO	< 2.2 s	2	≡ 24 V	XPSDME1132TS220	0.300/ 0.661

Monitor and Processing

Preventa safety modules type XPSVNE

For zero speed detection

3

Operating principle

Preventa safety modules **XPSVNE** for zero speed detection are used to detect the stop condition of electric motors. Their most common applications include: providing the unlock signal for electrically interlocked sliding or removable machine guards, controlling rotation direction signals for reversing motors and engaging locking brakes after a motor has come to a standstill.

As electric motors run down, a remanent voltage is produced in the windings of the motor due to residual magnetism. This voltage is proportional to the speed of the motor and, therefore, decreases as the motor comes to a standstill.

This remanent voltage is measured in a redundant manner so as to detect the stop condition of the motor. The cabling between the motor windings and the inputs of the **XPSVNE** module is also monitored to prevent a cabling breakage or fault being seen as a stopped motor.

A transformer should not be used to connect the motor to terminals Z1, Z2 and Z3 since there is no monitoring of the connection with the motor winding via the resistance monitoring.

Modules **XPSVNE** are suitable for detecting the stop condition of all types of AC or DC motor driven machines which, when the motor runs down, produce a remanent voltage in the windings due to residual magnetism. These machines can be controlled by electronic devices, such as variable speed drives or DC injection brakes. The input filters for standard **XPSVNE** modules are designed for a frequency of up to 60 Hz.

For motors operating at a frequency higher than 60 Hz, which therefore produce a high frequency remanent voltage, special modules **XPSVNE●●●●HS** should be used.

Modules **XPSVNE** have 2 potentiometers mounted on the front face of the module which allow independent adjustment of the switching threshold for each input circuit. This allows adjustment for different types of motors and application requirements.

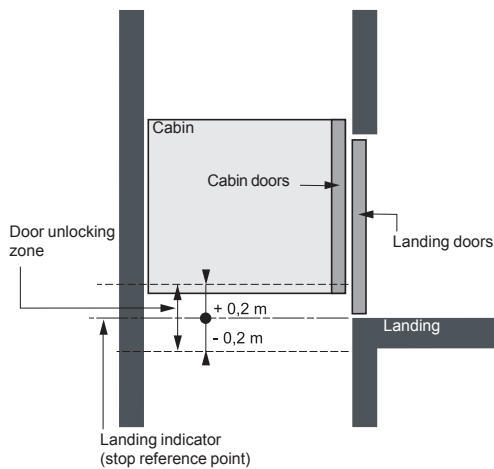
To aid diagnostics, modules **XPSVNE** have 4 LEDs and 2 solid-state outputs to provide information on the status of the zero speed detection circuit.

References

Description	Connection	Number of safety circuits/ Solid-state outputs for PLC	Supply	Frequency of motor power supply	Reference	Weight kg/ lb
Safety modules for zero speed detection	Captive screw clamp terminals	2/ 2	∩ 24 V	≤ 60 Hz	XPSVNE1142P	0.500/ 1.102
				> 60 Hz	XPSVNE1142HSP	0.500/ 1.102
	Terminal block removable from module		∩ 115 V	≤ 60 Hz	XPSVNE3442P	0.600/ 1.333
				> 60 Hz	XPSVNE3442HSP	0.600/ 1.323
			∩ 230 V	≤ 60 Hz	XPSVNE3742P	0.600/ 1.323
				> 60 Hz	XPSVNE3742HSP	0.600/ 1.323



XPSVNE●●●●●●



Operating principle

When the cabin is parked at a landing, with the doors open, some lifts automatically correct their level (isolevelling) in relation to the landing in order to compensate for any differences generated by modification of the load in the cabin. During this operation, European standard EN/IEC 81 recommends that the presence of the cabin be checked within a zone of ± 0.2 m around the landing (door unlocking zone), by means of a safety circuit which will cause the cabin to stop if it moves out of the specified zone.

The use of the safety module **XPSEDA**, which checks the presence of the cabin in the specified zone at two points, meets this requirement. The module incorporates two safety outputs and two solid-state outputs for signalling functions. Four LEDs on the front face of the module provide visual indication of the status of the safety circuit.

The position of the cabin in relation to the landing is detected by two limit switches in the lift shaft. It is also possible to use non-contact sensors (magnetic sensors with reed contact).

When the cabin reaches the preset position and when it is within the permissible tolerances in relation to the landing, the two safety circuits in safety module **XPSEDA** close and allow isolevelling of the cabin with the doors open. Any change in one of the input signals (cabin outside the specified zone) or detection of a fault (break in the wiring, short-circuit, etc.) causes immediate opening of the safety outputs in the **XPSEDA** module and subsequent stopping of the cabin.

3

References

Description	Connection	Number of safety circuits	Solid-state outputs for PLC	Supply	Reference	Weight kg/lb
Safety module for lift control	Captive screw clamp terminals Terminal block integrated in module	2	2	~ and = 24 V	XPSEDA5142	0.180/ 0.397



XPSEDA5142

Monitor and Processing

Preventa safety module type XPSPVT

For dynamic monitoring of hydraulic valves on linear presses

3

Operating principle

Safety module **XPSPVT** is specifically designed for monitoring hydraulic safety system valves which control the movements of potentially dangerous machines. The operating principle of this module is explained in the circuit diagram of a hydraulic safety system for linear presses (see below).

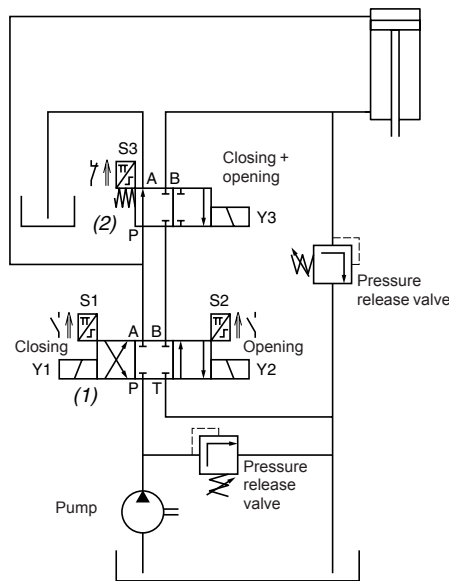
This hydraulic safety system features a 3 position piston which controls the up and down stroke of the operating cylinder. The circuit is equipped with a safety valve to complete the redundant system. This circuit must be activated to enable the up and down stroke of the cylinder.

If either of the 2 pistons becomes defective (for example, due to a broken spring or to oil contamination), and the valve piston shifts from its normal position towards the open position, the **XPSPVT** module will detect it and prevent resumption of the piston stroke.

Proximity sensors integrated in the valve to detect the piston positions and connected to the **XPSPVT** module must be damped when the valve coils are in the de-energised state (zero position).

The sensor circuits of the **XPSPVT** module are designed to allow connection of NPN and PNP proximity sensors or sensing components. Either 2-wire or 3-wire types can be used.

Hydraulic safety system circuit operating on a linear press.
Monitoring of valves in position 0.



(1) 3 position hydraulic valve.
(2) 2 position hydraulic valve.



XPSPVT1180

Reference				
Description	Display	Supply	Reference	Weight kg/ lb
Safety module for dynamic monitoring of hydraulic valves on linear presses	8 LEDs	24 V ~	XPSPVT1180	0.540/ 1.190

Monitor and Processing

Preventa safety modules type XPSPVK

For dynamic monitoring of double-bodied solenoid valves

Operating principle

Safety module **XPSPVK** is specially designed for dynamic monitoring of the safety valves in eccentric presses, conforming to European standard EN 692.

This standard establishes the specifications related to safety control systems for presses equipped with friction clutches.

To meet the requirements of this standard, the clutch/brake control must be monitored dynamically.

This function is provided by a double-bodied solenoid valve (safety valve for presses) which performs the functions of two valves mounted in one body.

The position of the two valve pistons can be monitored by proximity sensors, mechanical limit switches or pressure switches.

Module **XPSPVK** checks for the correct operation of the double-bodied safety valves at 3 points in the cycle.

- Start at top dead centre: checks the rest position of the two valves.
- Take-on point (transfer function): checks that the two valves are in the “activated” (energised) position.

- Press stop trigger point: checks that the two valves return to the rest position.

Return must be simultaneous for both valves within a defined time period.

To set up an automatic disconnect of the **XPSPVK** module at the first machine stroke, a NC auxiliary contact mounted on the main control contactor or on another contactor/relay, activated at the same time, can be wired to terminals 7 and 8 in parallel with the RESET button.

If a fault is detected during the cycle, the **XPSPVK** module will stop the slide stroke and will also inhibit the start of another cycle.

3

References

Description	Display	Supply	Reference	Weight kg/ lb
Safety modules for dynamic monitoring of double-bodied solenoid valves	8 LEDs	24 V $\overline{\text{---}}$	XPSPVK1184	0.700/ 1.543
		115 V \sim	XPSPVK3484	0.900/ 1.984
		230 V \sim	XPSPVK3784	0.900/ 1.984



XPSPVK

Monitor and Processing

Preventa safety modules type XPSOT

For safety stop with automatic overtravel monitoring and control

Operating principle

Safety module **XPSOT** is used on eccentric presses to monitor overtravel and ensure that the press slide stops in a non-dangerous position, i.e. top dead centre (TDC), during normal (non-emergency) operation.

Use of this module, designed in accordance with standard EN 692 relating to mechanical press safety, makes it possible to create a redundant, self-monitoring control system.

The two essential functions of this safety module are to:

- **Trigger the end of cycle stop sequences slightly before top dead centre (at point A) so as to come to a complete stop at TDC.**

After TDC, the permissible overtravel is approximately 10°. The safety module immediately detects any overtravel. Overtravel is indicative of braking device deterioration and, in this case, jog mode must be used to move the slide back to TDC. The next cycle will be inhibited to allow maintenance to be performed on the braking device (cam 1).

- Take over control monitoring during the dangerous part of the cycle (slide downstroke). Any stop instruction issued between TDC (0°) and point C (approximately 150° after TDC) causes an immediate stop of the press. **This approximate value of 150° corresponds to the 8 mm tool closure dimension (safety point).**

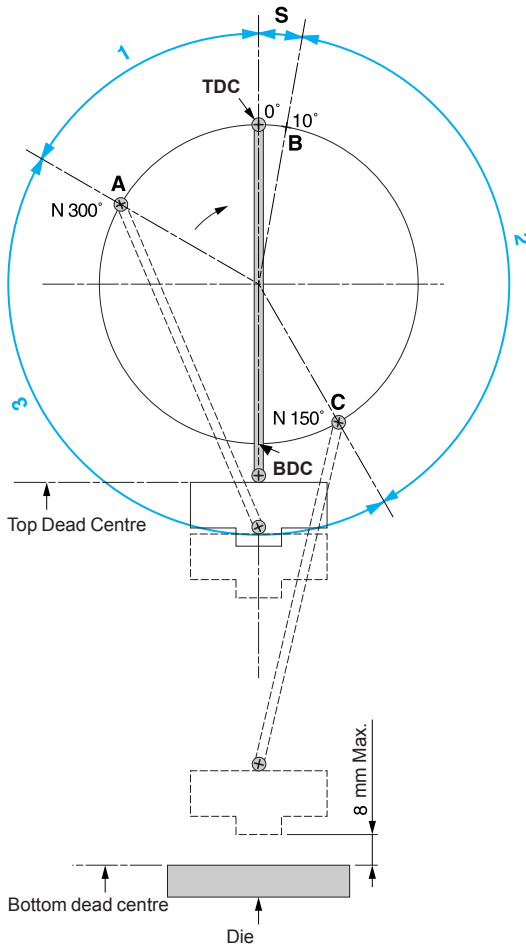
When a stop instruction is issued after this safety point, the press completes the cycle and comes to a complete stop at TDC (cam 2).

Control of the dangerous part of the cycle (generally the slide downstroke) is usually activated from a two-hand control station associated with a safety module (type **XPSBCE**).

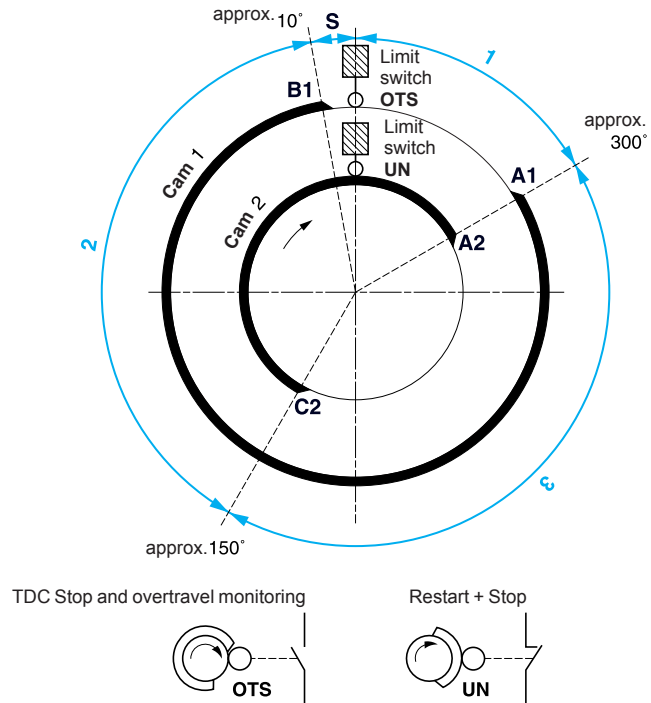
Overtravel monitoring is performed **on each cycle** by safety module **XPSOT**.

Operating principle (continued)

Press diagram



Control cams diagram



- 1 Permissible overtravel zone.
 - 2 Dangerous zone (usually slide downstroke).
 - 3 Non-dangerous zone (usually slide upstroke).
- S Permissible overtravel.
 - A Press stop trigger point.
 - B Point at which permissible overtravel is exceeded (a stop instruction issued after point B will lock up the press).
 - C Takeover point, beyond which the press will complete its cycle up to TDC.
 - TDC Top dead centre, actual stopping zone of the press.
 - BDC Bottom dead centre.

Cam operation

Cam 1 is associated with the **OTS**, limit switch (LS), cam 2 with the **UN** limit switch (the limit switches must be located on different cams for safety reasons).

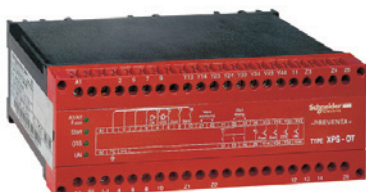
The **OTS** limit switch is deactivated at TDC, at which point the **UN** limit switch is activated.

Point A1 of **cam 1** is located approximately 300° after TDC and, when reached, the press stops and comes to a standstill: **A1 is the press stop trigger point**. Point B1, located approximately 10° after TDC, constitutes the end of cam 1: **If B1 is exceeded during stopping**, the overtravel is abnormally long, **the press locks up** and the next cycle is inhibited.

Point A2 of cam 2 functions like point A1 on cam 1 (contact state of the **UN** limit switch reversed in relation to the state of the **OTS** limit switch).

Point C2, located approximately 150° after TDC, corresponds to the 8 mm tool closing dimension. Stop instructions issued after C2 is reached are not executed until point A2 is reached.

References



XPSOT

Description	Display	Supply	Reference	Weight kg/ lb
Safety modules for safety stop with automatic overtravel monitoring and control	4 LEDs	115 V ~	XPSOT3444	1.100/ 2.425
		230 V ~	XPSOT3744	1.100/ 2.425

Compatibility of offers

Modicon TM3 expansion modules

- > Modicon M221 logic controllers
- > Modicon M221 Book logic controllers
- > Modicon M241 logic controllers
- > Modicon M251 logic controllers
- > SoMachine Basic software
- > SoMachine software
- > Modicon TM2 expansion modules

3



Digital I/O modules



Analog I/O modules



Expert I/O modules



Functional Safety modules



Bus expansion modules

Presentation

The Modicon TM3 expansion module offer provides an opportunity to enhance the capabilities of Modicon M221, M241 and M251 logic controllers:

- Digital I/O modules which can be used to create configurations with up to 264 digital I/O (according to the controller). These modules are available with the same connections as the controllers.
- Analog I/O modules which can be used to create configurations with up to 114 analog I/O (according to the controller) and are designed to receive, amongst other things, position, temperature or speed sensor signals. They are also capable of controlling variable speed drives or any device equipped with a current or voltage input.
- Expert modules for control of TeSys motor starters which simplify wiring up the control section due to connection with RJ45 cables.
- Functional Safety modules which simplify wiring and can be configured in the SoMachine Basic software.

In addition, the TM3 expansion system is flexible due to the possibility of remotely locating some of the TM3 modules in the enclosure or another cabinet (up to 5 meters (16.404 ft.) away, using a bus expansion system.

The Modicon TM3 expansion system is common to the whole range of Modicon M221, M241 and M251 logic controllers, meaning that the model of controller can be revised without changing expansion module.

Modicon TM3 range

- Digital I/O modules**
- modules with 8 to 32 inputs/outputs:
 - 24 V or 120 V $\overline{\text{V}}$ 50/60 Hz inputs
 - relay or transistor outputs

- Analog I/O modules**
- modules with 2 to 8 inputs/outputs:
 - current/voltage or temperature inputs
 - current/voltage outputs

- Expert module**
- module for control of between one and four TeSys motor starters

- Functional Safety modules**
- modules designed using **Preventa** technology for integral machine safety:
 - control of emergency stops
 - control of switches
 - control of light curtains
 - control of pressure-sensitive mats or edges

- Bus expansion system**
- transmitter module
 - receiver module
 - bus expansion cable

Specific features

Modicon TM3 expansion modules have been designed with a simple interlocking assembly mechanism. A bus expansion connector is used to distribute data and the power supply when assembling the Modicon TM3 expansion modules with logic controllers.

Connections

A wide choice of connections is available depending on the model of Modicon TM3 module:

- removable screw terminal blocks (1)
- removable spring terminal blocks (1)
- HE 10 connector, to be used with HE 10 cables/bare wires or HE 10/HE 10 and Telefast sub-bases (2)

The connectors (screw terminal blocks, spring terminal blocks, HE 10 connector, RJ 45) are located on the front of the TM3 expansion modules and are therefore accessible.

(1) The terminal blocks are supplied with Modicon TM3 expansion modules.

(2) Telefast Modicon ABE7 pre-wired system to be ordered separately.

Monitor and Processing

Modicon TM3 expansion modules

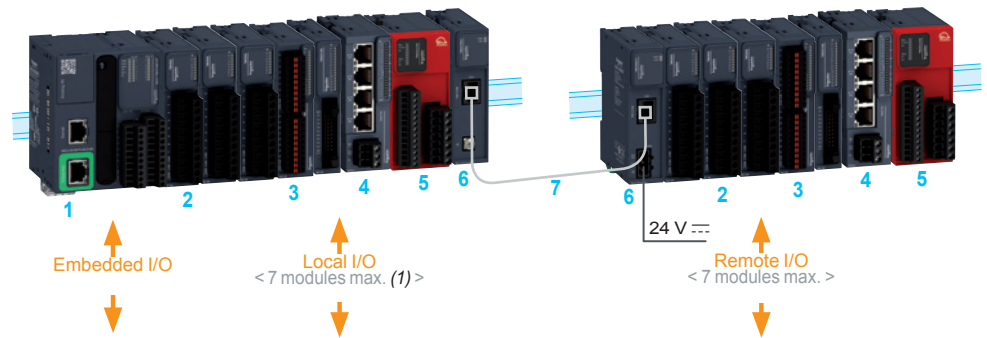
Bus expansion system

Presentation

Modicon TM3 bus expansion system

A PLC configuration consists of a controller with its embedded input and output channels, used in conjunction with local or remote expansion modules which are used to increase the number of channels and/or functions.

- Expansion modules are connected directly by simple interlocking with the controller (local I/O) or remotely (remote I/O) with a TM3 bus expansion cable, up to 5 meters (16.404 ft.) away.
- The bus expansion connector, located on the side of the controllers and on each side of the Modicon TM3 expansion modules, transmits and synchronizes data.



3

- 1 Logic controller (M221, M221 Book, M241, M251)
- 2 Modicon TM3 digital I/O modules.
- 3 Modicon TM3 analog I/O modules.
- 4 Modicon TM3 expert module: control of TeSys motor starters.
- 5 Modicon TM3 functional safety modules.
- 6 Modicon TM3 bus expansion module (transmitter and receiver).
- 7 TM3 bus expansion cable.

■ Local I/O

Maximum configuration: 7 Modicon TM3 expansion modules associated with an M2●● logic controller.

With limited number of relay or transistor outputs.

■ Remote I/O


Maximum configuration: 14 Modicon TM3 expansion modules (7 local modules + 7 remote modules) with the use of Modicon TM3 bus expansion system (transmitter and receiver modules).

The transmitter and receiver bus expansion modules can be used to:

- increase from 7 to 14 the number of I/O expansion modules that can be connected to an M2●● logic controller
- locate Modicon TM3 expansion modules remotely, up to 5 meters (16.404 ft.) away

The transmitter module and receiver module are physically linked by a **VDIP184546●●●** bus expansion cable.

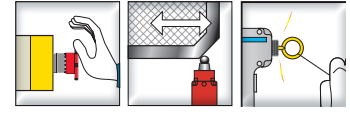
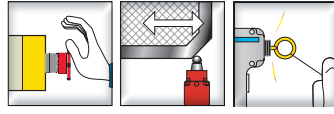
Mounting

- Modicon TM3 expansion modules are mounted on a  symmetrical rail. They have a locking clip on the top of their casing.
- For plate or panel mounting, use the **TMAM2** kit.

(1) Depending on type of TM3 module used.



Safety application



Control of Emergency stop and switches

Control of Emergency stop and switches

Compatibility

- Modicon M221 and Modicon M221 Book logic controllers
- Modicon M241 logic controllers
- Modicon M251 logic controllers

3



Maximum achievable safety level	
Standards (product)	
Standards (machine assembly)	Emergency stop circuits
	Switches in protective devices
	Type 4 light curtains equipped with solid-state safety outputs with test function
	4-wire pressure-sensitive mats or edges
Product certifications	

PLd/Category 3 conforming to EN/ISO 13849-1 SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1 SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061
EN/IEC 60947-1 EN/IEC 60947-5-1	EN/IEC 60947-1 EN/IEC 60947-5-1
EN/IEC 60204-1 EN/ISO 13850	EN/IEC 60204-1 EN/ISO 13850
EN/ISO 14119	EN/ISO 14119
–	–
–	–
UL, CSA, TÜV, CCC	UL, CSA, TÜV, CCC

Safety circuits	Number
	Type
Module fuse protection	
LEDs	
Power supply	

3 NO	3 NO
Instantaneous opening relay	Instantaneous opening relay
Internal, electronic	Internal, electronic
6 LEDs	6 LEDs
24 V $\overline{\text{DC}}$	24 V $\overline{\text{DC}}$

Synchronization time between inputs
Input channel voltage

Unlimited	Unlimited
24 V $\overline{\text{DC}}$	24 V $\overline{\text{DC}}$

Safety module type	Channels and power supply connected:
	with removable screw terminals
	with removable spring terminal blocks

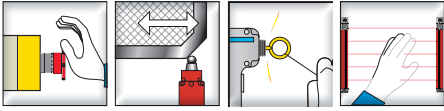
TM3SAC5R	TM3SAF5R
TM3SAC5RG	TM3SAF5RG

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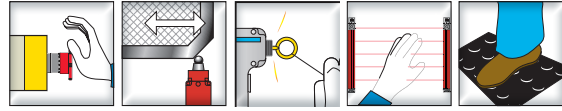


More technical information on www.schneider-electric.com



Control of Emergency stop, switches or solid-state output safety light curtains

- Modicon M221 and Modicon M221 Book logic controllers
- Modicon M241 logic controllers
- Modicon M251 logic controllers



Control of Emergency stop, switches, pressure-sensitive mats and edges or solid-state output safety light curtains



PLd / Category 3 conforming to EN/ISO 13849-1 SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061	PLe/Category 4 conforming to EN/ISO 13849-1 SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061
EN/IEC 60947-1 EN/IEC 60947-5-1	EN/IEC 60947-1 EN/IEC 60947-5-1
EN/IEC 60204-1 EN/ISO 13850	EN/IEC 60204-1 EN/ISO 13850
EN/ISO 14119	EN/ISO 14119
Also designed for use with equipment conforming to EN/IEC 61496-1 up to type 4	Also designed for use with equipment conforming to EN/IEC 61496-1 up to type 4
—	Also designed for use with equipment conforming to standard EN 1760-1
UL, CSA, TÜV, CCC	UL, CSA, TÜV, CCC
3 NO	3 NO
Instantaneous opening relay	Instantaneous opening relay
Internal, electronic	Internal, electronic
6 LEDs	6 LEDs
24 V ~	24 V ~
Unlimited	Unlimited or 2 s, 4 s (depending on wiring), can be configured in the software
24 V ~	24 V ~

TM3SAFL5R	TM3SAK6R
TM3SAFL5RG	TM3SAK6RG

Monitor and Processing

Modicon TM3 functional safety modules

(Powered by **Preventa** technology)



3

Presentation

Modicon TM3 functional safety modules are designed using Preventa technology. They can be used to incorporate machine safety into the overall machine control.

Data acquisition: control of safety products

- Emergency stop button: complementary protection measures
- Monitoring devices used in protective systems to control access to hazardous areas
- Light curtains and safety mats to detect intrusion into hazardous areas

Monitoring and processing

- Modicon TM3 functional safety modules control the input signals from monitoring devices and act as an interface with contactors and variable speed drives, causing the machine to stop.
- Modicon TM3 functional safety modules complement the embedded I/O on M221, M221 Book, M241 and M251 logic controllers.

Modicon TM3 functional safety modules	Safety system/Performance level reached
---------------------------------------	---

For control of emergency stops	Category 3/PLd, SIL2 architecture
For control of switches	Category 4/PLe, SIL3 architecture
For control of type 4 light curtains	Category 3/PLd, SIL2 architecture
For control of pressure-sensitive mats or edges	Category 4/PLe, SIL3 architecture

- The safety outputs available on the 4 modules are relay type, guided by microprocessor technology.
- Diagnostic utilities use LEDs, found on the module front face. They provide information on the monitoring circuit status.
- The diagnostic information is shared via the TM3 bus.
- The Start button monitoring function is configurable depending on the wiring.

Connections

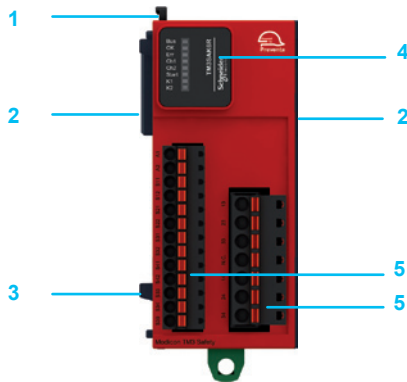
Equipped, depending on the model, with removable screw or spring-type terminals for connecting the safety channels.

Configuration

Modicon TM3 functional safety modules connect to M221, M221 Book, M241 and M251 logic controllers according to the general rules for the TM3 system: 7 modules max. and 14 modules max. with the use of Modicon TM3 bus expansion system (transmitter and receiver).

Mounting

- Modicon TM3 functional safety modules are mounted on a symmetrical rail.
- For plate or panel mounting, use the **TMAM2** kit.



TM3SAC5R



TM3SAC5RG



TM3SAF5R



TM3SAF5RG



TM3SAFL5R



TM3SAFL5RG



TM3SAK6R



TM3SAK6RG

Description

Modicon TM3 functional safety modules

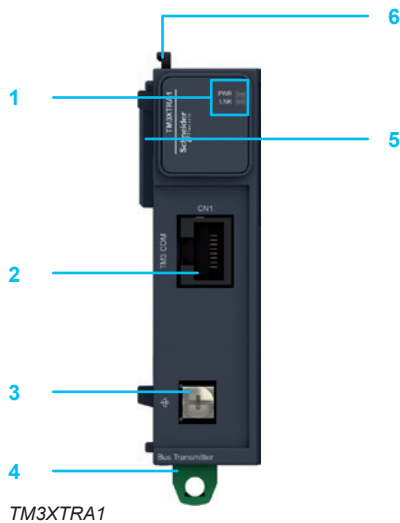
- 1 Adjacent module locking catch.
- 2 TM3 bus connectors (one on each side). These are designed to provide continuity of the link between connected modules.
- 3 symmetrical rail locking clip.
- 4 Display block (6 LEDs - green, red) for the module channels and diagnostics.
- 5 Removable spring or screw-type terminal blocks (depending on the model) for connecting the safety channels and the power supply.

References

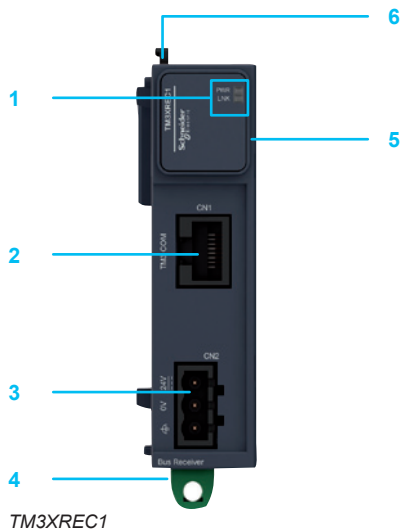
Designation	Maximum achievable safety level	Term. block for input conn. (1)	Reference	Weight kg lb
24 V ~ power supply				
Functional Safety modules for control of <input type="checkbox"/> emergency stops <input type="checkbox"/> switches	PLd/Category 3 conforming to EN/ISO 13849-1 SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061	screw	TM3SAC5R	0.190 0.420
		spring	TM3SAC5RG	0.190 0.420
Functional Safety modules for control of <input type="checkbox"/> emergency stops <input type="checkbox"/> switches	PLe/Category 4 conforming to EN/ISO 13849-1 SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	screw	TM3SAF5R	0.190 0.420
		spring	TM3SAF5RG	0.190 0.420
Functional Safety modules for control of <input type="checkbox"/> emergency stops <input type="checkbox"/> switches <input type="checkbox"/> safety light curtains with solid-state outputs	PLd / Category 3 conforming to EN/ISO 13849-1 SILCL2 conforming to EN/IEC 61508 and EN/IEC 62061	screw	TM3SAFL5R	0.190 0.420
		spring	TM3SAFL5RG	0.190 0.420
Functional Safety modules for control of <input type="checkbox"/> emergency stops <input type="checkbox"/> switches <input type="checkbox"/> safety light curtains with solid-state outputs <input type="checkbox"/> pressure-sensitive mats or edges	PLe/Category 4 conforming to EN/ISO 13849-1 SILCL3 conforming to EN/IEC 61508 and EN/IEC 62061	screw	TM3SAK6R	0.190 0.420
		spring	TM3SAK6RG	0.190 0.420
Separate parts				
Designation	Description		Reference	Weight kg lb
Mounting kit Sold in lots of 10	For mounting Functional Safety modules on a plate or panel		TMAM2	0.065 0.143

(1) Removable terminal blocks equipped with screw terminals or spring terminals, supplied with the controller.

3



TM3XTRA1



TM3XREC1

Presentation

Modicon TM3 transmitter and receiver modules can be used to:

- increase from 7 to 14 the number of I/O expansion modules that can be connected to an M2●● logic controller
- locate Modicon TM3 expansion modules remotely, up to 5 m (16.404 ft.) away

The transmitter and receiver modules are physically linked by a **VDIP184546●●●** bus expansion cable.

Mounting

- TM3 bus expansion modules are mounted on a \perp symmetrical rail.
- For plate or panel mounting, use the **TMAM2** kit.

Description

TM3XTRA1 transmitter module

- 1 Block with 2 LEDs displaying the communication status and power supply status.
- 2 RJ 45 connector for connecting the **VDIP184546●●●** bus expansion cable.
- 3 Screw terminal for the functional ground (FG) connection.
- 4 \perp symmetrical rail locking clip.
- 5 TM3 bus connector providing continuity of the link with the connected module.
- 6 Adjacent module locking catch.

TM3XREC1 receiver module

- 1 Block with 2 LEDs displaying the communication status and power supply status.
- 2 RJ 45 connector for connecting the **VDIP184546●●●** bus expansion cable.
- 3 Screw terminal block for connecting the power supply.
- 4 \perp symmetrical rail locking clip.
- 5 TM3 bus connector providing continuity of the link with the connected module.
- 6 Adjacent module locking catch.

Monitor and Processing

Modicon TM3 bus expansion system

Transmitter module and receiver module



TM3XTRA1



TM3XREC1

References

Modicon TM3 bus expansion system

Designation	Characteristics	Reference	Weight kg lb
Transmitter module	Data transmission module Power supply: using the TM3 bus	TM3XTRA1	0.065 0.143
Receiver module	Data reception module Power supply: 24 V $\overline{\text{DC}}$ (with external power supply)	TM3XREC1 (1)	0.075 0.165

Cordsets

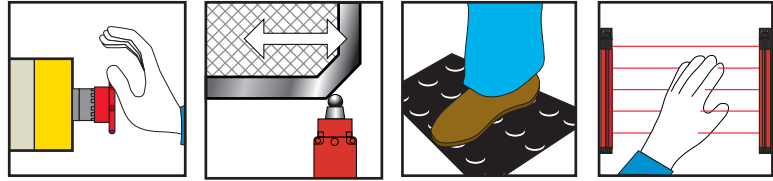
Designation	Used for	Length	Reference	Weight kg lb
Shielded category 5E TM3 bus expansion cables	TM3 bus expansion by linking transmitter and receiver modules Equipped with an RJ 45 connector at each end	0.5 m 1.64 ft	VDIP184546005	–
		1 m 3.28 ft	VDIP184546010	–
		2 m 6.56 ft	VDIP184546020	–
		3 m 9.84 ft	VDIP184546030	–
		5 m 16.40 ft	VDIP184546050	–
Functional ground cable	Functional ground for the TM3XTRA1 transmitter module	0.12 m 0.39 ft	Cable supplied with the TM3XTRA1 transmitter module	–

Spare parts

Designation	Description	Unit reference	Weight kg lb
Mounting kit Sold in lots of 10	For mounting bus expansion modules on a plate or panel	TMAM2	0.065 0.143
Set of terminal blocks for connecting the power supply	8 removable terminal blocks with screw terminals	TMAT2PSET	0.127 0.280
	8 removable terminal blocks with spring terminals	TMAT2PSETG	0.127 0.280

(1) The TM3XREC1 module is supplied with a removable screw terminal block for connecting the power supply.

Applications



Modules

Controllers for monitoring 2 independent safety functions simultaneously. User selection of 2 functions from a choice of 15, programmable from front face of controller.



3

Functions

- Emergency stop monitoring
- Switch monitoring
- Enabling switch monitoring
- Sensing mat or edges monitoring
- Light curtain monitoring, relay output type
- etc.

Maximum achievable safety level

PL e/Category 4 conforming EN ISO 13849-1, SILCL 3 conforming to EN/IEC 61508 and EN/IEC 62061

Conformity to standards

EN/IEC 60204-1, EN/IEC 60947-1, EN/IEC 60947-5-1

Product certifications

UL, CSA, TÜV

Number of circuits

Safety

6 NO (3 NO per function)

Additional

3 solid-state outputs for signalling to PLC

Display

12 LEDs

Supply voltage

24 V $\overline{\text{---}}$

Communication

CANopen bus

–

Profibus bus

–

Modbus bus

–

Module type

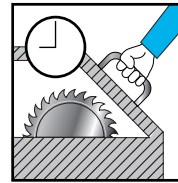
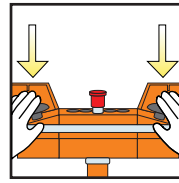
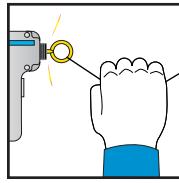
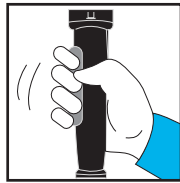
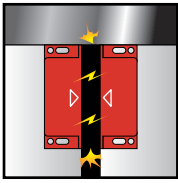
XPSMP

Pages

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More technical information on www.schneider-electric.com



Configurable controllers using software, for several independent safety functions: selection of safety functions using configuration software running on Windows (16 or 32 inputs and 8 independent safety outputs)



- Emergency stop monitoring
- Limit switch monitoring
- Two-hand control monitoring
- Safety light curtain monitoring, with or without "muting" function
- Enabling switch monitoring, coded magnetic switch monitoring
- Safety mat monitoring
- Hydraulic press solenoid valve monitoring
- Eccentric press safety stop at top dead centre monitoring. Zero speed detection
- Hydraulic press monitoring
- Eccentric press monitoring
- Foot switch monitoring
- Chain shaft breakage monitoring
- Safe tool
- Position selector

PL e/Category 4 conforming to EN ISO 13849-1,
SILCL 3 conforming to EN/IEC 61508 and EN/IEC 62061

EN/IEC 60204-1,
EN 1760-1/ISO 13856-1,
EN/IEC 61496-1,
EN 574/ISO 13851,
EN/IEC 60947-1,
EN/IEC 60947-5-1

UL, CSA, TÜV

4 NO (2 NO per function) + 6 solid-state

1 "muting" signalling output

LED display on front face

24 V $\overline{\text{DC}}$

Via SUB-D 9-pin male connector, only on XPSMC16ZC and XPSMC32ZC

Via SUB-D 9-pin female connector, only on XPSMC16ZP and XPSMC32ZP

Via RJ45 connector, on all controllers XPS MC●●Z●

XPSMC

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More technical information on www.schneider-electric.com

Monitor and Processing

Preventa safety controllers type XPSMP

With pre-defined functions

Presentation

Operating principle

Preventa safety controller modules XPSMP are designed for a Performance Level of up to PL e/Category 4 conforming to standard EN/ISO 13849-1.

They enable two independent safety functions (selected from a choice of 15 pre-defined configurations) to be performed using the same product. Configuration selection is easily made using 3 buttons on the front face of the module.

These 15 pre-programmed safety functions provide a solution for the majority of safety applications, for example: monitoring Emergency stops, limit switches, safety mats and sensing edges, enabling switches, coded magnetic switches, type 4 safety light curtains conforming to EN/IEC 61496-1.

Safety controllers XPSMP incorporate 6 safety outputs (3 per function) and 3 solid-state signalling outputs for signalling to the process PLC.

To aid diagnostics, the modules have LEDs on the front face which provide information on the monitoring circuit status. They also indicate and assist selection of the 2 required configurations.

3

	Configuration	Synchronisation time	Type of start (1)		Start test	Notes
			Automatic or unmonitored	Monitored		
Functions disabled	0	–	–	–	–	Factory setting
Emergency stop monitoring, 1-channel wiring (category 2)	1	–	X	–	–	–
	2	–	–	X	–	–
Emergency stop monitoring, 2-channel wiring, or guard monitoring (category 4)	3	Unlimited	X	–	X	–
	4	Unlimited	–	X	X	–
	5	1.5 s	X	–	X	–
	6	1.5 s	–	X	X	–
	7	Unlimited	X	–	–	–
	8	Unlimited	–	X	–	–
Guard monitoring for injection press or blowing machine (category 4)	9	1.5 s	–	X	X	Uses both safety outputs (2)
Enabling grip switch monitoring (3 position switch) (category 4)	10	–	X	–	X	The start button acts as start-up preparation
Sensing mat and edges monitoring (category 3)	11	–	X	–	–	Mats with circuit making contacts
	12	–	–	X	–	
Relay output safety light curtain monitoring (category 4)	13	0.5 s	–	X	X	–
Coded magnetic switch monitoring (category 4)	14	1.5 s	X	–	–	Magnetic switches with 2 contacts, 1 NO and 1 NC
	15	1.5 s	–	X	–	

(1) Automatic start: there is no contact or it is shunted.
 Unmonitored start: The output is activated on closing of the start contact.
 Monitored start: the start input is monitored so that there is no start-up in the event of the start contact being shunted or the start circuit being closed for more than 10 seconds.
 Start-up is triggered following activation of the start button (push-release function) on opening of the contact.

(2) Tool zone guard with 3rd switch.
 Additional rear guard (optional) with automatic start. The opening of the guard cuts all outputs.

Monitor and Processing

Preventa safety controllers type XPSMP

With pre-defined functions



XPSMP11123



XPSMP11123P

References

Description	Type of terminal block connection	Number of safety circuits	Additional outputs	Supply	Reference	Weight kg
Modules for 2 independent safety functions	Integrated in module	3 NO per function (6 NO total)	3 solid-state	24 V $\overline{\text{---}}$	XPSMP11123	0.320
	Removable from module	3 NO per function (6 NO total)	3 solid-state	24 V $\overline{\text{---}}$	XPSMP11123P	0.320

Monitor and Processing

Preventa configurable safety controllers

Type XPSMC

3



XPSMC16ZC



XPSMC32ZC

Presentation

Configurable safety controllers XPSMC●●Z● are designed to provide a solution for safety applications requiring conformity to Performance Level PL e/Category 4 EN/ISO 13849-1 and SIL 3 EN/IEC 61508.

The range of configurable safety controllers comprises 6 products, each with different technical characteristics.

Configurable controllers	Safety inputs	Safety outputs (1)	Communication via		
			CANopen bus	Profibus bus	Modbus serial link
XPSMC16Z	16	6 + 2 x 2	–	–	Yes, slave
XPSMC16ZC	16	6 + 2 x 2	Yes, slave	–	Yes, slave
XPSMC16ZP	16	6 + 2 x 2	–	Yes, slave	Yes, slave
XPSMC32Z	32	6 + 2 x 2	–	–	Yes, slave
XPSMC32ZC	32	6 + 2 x 2	Yes, slave	–	Yes, slave
XPSMC32ZP	32	6 + 2 x 2	–	Yes, slave	Yes, slave

Line control

The safety inputs are supplied by the various control outputs (2), in such a manner so as to monitor for short-circuits between the inputs, short-circuits between each input and earth or the presence of residual voltages.

The controller, assisted by the control outputs, continuously tests all the connected inputs. As soon as an error is detected on an input, all the outputs associated with this input are disconnected. Safety outputs associated with other inputs remain active.

Configuration

Safety controllers XPSMC●●Z● are configurable and addressable using software XPSMCWIN running on a PC. Connection accessories required: see page 3/105.

Connections

For connection of safety inputs and outputs, safety controllers XPSMC●●Z● can be fitted with a choice of:

- screw connectors type XPSMCTS●●, or
- spring clip connectors type XPSMCTC●●.

These connectors are to be ordered separately, see page 3/105.

(1) 8 independent safety outputs = 6 solid-state safety outputs + 2 x 2 relay outputs (4 relay outputs with mechanically linked contacts).

(2) 8 control outputs are available but they are not safety outputs.

Safety functions

Configuration of the safety functions is carried out using software XPSMCWIN which is available on the Safety Suite V2 CD-ROM.

30 certified safety functions are available with this software and they are easily assignable to the safety outputs. The safety functions have multiple combination possibilities and various starting conditions.

The safety functions are:

- certified in accordance with EN/ISO 13849-1 and IEC 61508,
- configurable in controller XPSMC using software XPSMCWIN which is available on the Safety Suite V2 software pack.

All 8 safety outputs are suitable for use in safety related parts of control systems conforming to Performance Level PL e/Category 4 in accordance to EN/ISO 13849-1.

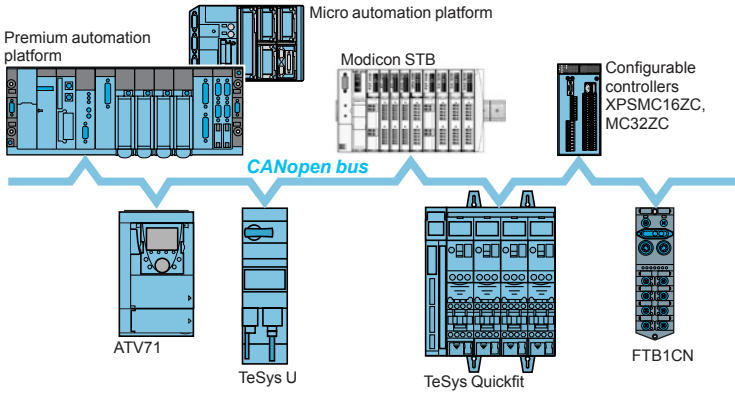
Main safety functions

- Emergency stop monitoring, with or without time delay, 1 or 2-channel wiring
- Two-hand control (type III- A and C conforming to EN 574/ISO 13851)
- Guard monitoring with 1 or 2 limit switches
- Guard monitoring for injection presses and blowing machines
- Magnetic switch monitoring
- Sensing mat monitoring
- Light curtain (type 4 conforming to EN/IEC 61496, relay or solid-state output) monitoring
- Zero speed detection
- Dynamic monitoring of hydraulic valves on linear presses
- Monitoring safety stop at top dead centre on eccentric press
- Safety time delays
- "Muting" function of light curtains
- Enabling switch monitoring, 2 or 3 contact
- Hydraulic press
- Eccentric press
- Foot switch monitoring
- Chain shaft breakage monitoring
- Position selector

Application schemes and functional diagrams

See instruction sheet on www.schneider-electric.com

Communication



CANopen fieldbus

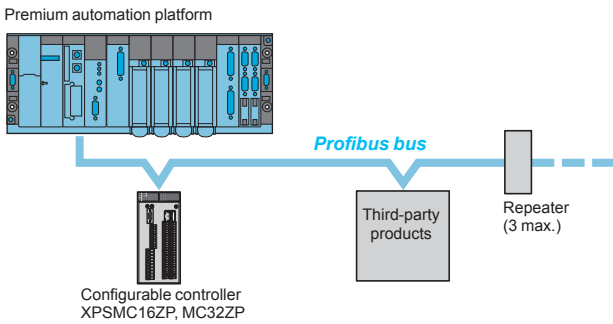
Configurable safety controllers XPSMC●●ZC incorporate a SUB-D 9-pin male connector for direct connection on CANopen bus.

CANopen bus is an open bus that ensures deterministic and reliable access to the real-time data of automation equipment. The bus uses a shielded dual twisted pair on which a maximum of 127 devices can be connected by chaining. The baud rate varies between 10 Kbps and 1Mbps depending on the length of the bus (5000 m to 20 m).

Profibus bus

Configurable safety controllers XPSMC●●ZP incorporate a SUB-D 9-pin male connector for connection on Profibus bus. Configurable safety controllers XPSMC●●ZP are slaves on the Profibus bus.

Profibus bus is a fieldbus that meets industrial communication requirements. The topology of the Profibus bus is of the linear type with a centralised master/slave type access procedure. The physical link is a single shielded twisted pair.



Modbus serial link

Configurable safety controllers XPSMC●●Z● incorporate a Modbus communication interface (RJ45 connector) for configuration and diagnostics.

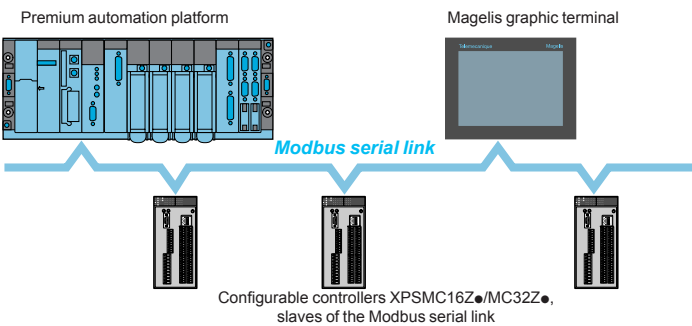
This interface enables connection of the controllers to:

- a PC (configuration),
- a PLC (diagnostics), or
- an operator dialogue terminal (diagnostics).

The Modbus serial link comprises a master station (Premium automation platform) and slave stations (configurable controllers XPSMC16/32Z●).

Two exchange mechanisms are possible:

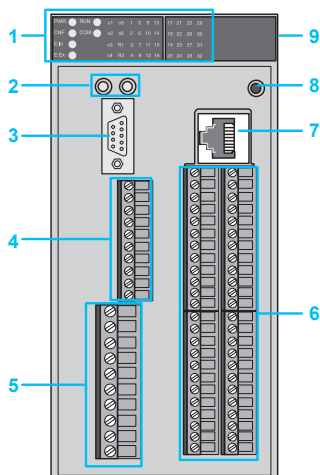
- **Question/response:** the questions from the master are addressed to a given slave. The response is expected by return from the interrogated slave.
- **Distribution:** the master distributes a message to all the stations of the Modbus serial link. The latter execute the order without transmitting a reply.



Monitor and Processing

Preventa configurable safety controllers

Type XPSMC



Configurable safety controller XPSMC●●Z●, with screw connectors

Description

Configurable safety controllers XPSMC●●Z●

Front face of controllers:

- 1 LED display and system diagnostics.
- 2 Two LEDs for CANopen or Profibus (1) connection status.
- 3 SUB-D 9-pin male connector for connection on CANopen bus (XPSMC16ZC/MC32ZC) or SUB-D 9-pin female connector for connection on Profibus bus (XPSMC16ZP/MC32ZP).
- 4 Solid-state safety output and "muting" indicator light terminals.
- 5 Power supply (24 V $\overline{\text{---}}$) and relay safety output terminals.
- 6 Control output terminals for power supply to safety inputs and safety input terminals.
- 7 RJ45 connector for connection on Modbus serial link.
- 8 RESET button (resetting of controller).

Rear face of controllers:

- 9 Fixing plate for mounting on rail.

(1) Depending on controller model.

Monitor and Processing

Preventa configurable safety controllers

Type XPSMC



XPSMC16Z



XPSMC32Z



XPSMC16ZC



XPSMC32ZC



XPSMC16ZP



XPSMC32ZP

References

Configurable safety controllers (connector not included)

Number of inputs	Number of outputs		Communication (Link and bus)	Reference	Weight kg
	Relay	Solid-state			
16	4 (2 x 2)	6	Modbus	XPSMC16Z	0.820
			Modbus, CANopen	XPSMC16ZC	0.820
			Modbus, Profibus	XPSMC16ZP	0.820
32	4 (2 x 2)	6	Modbus	XPSMC32Z	0.840
			Modbus, CANopen	XPSMC32ZC	0.840
			Modbus, Profibus	XPSMC32ZP	0.840

Plug-in connectors for configurable safety controllers (1)

Description	For use with	Reference	Weight kg
Screw connectors	XPSMC16Z, MC16ZC, MC16ZP	XPSMCTS16	0.080
	XPSMC32Z, MC32ZC, MC32ZP	XPSMCTS32	0.110
Spring clip connectors	XPSMC16Z, MC16ZC, MC16ZP	XPSMCTC16	0.080
	XPSMC32Z, MC32ZC, MC32ZP	XPSMCTC32	0.110

Configuration software

■ Reference XPSMCWIN is the full version of configuration software XPSMCWIN version 2.4 and must be installed if no previous version of this software has been installed.

Description	Operating system	Languages	Reference	Weight kg
Configuration software for controllers XPSMC●●Z● CD-ROM + user manual	Windows 2000, Windows XP	FR, EN, DE, IT, ES, PT	XPSMCWIN	0.520
XPSMCWIN software update CD-ROM + user manual	Windows 2000, Windows XP	Software update available on www.schneider-electric.com		

Starter packs

The Starter packs contain the necessary components to start using the safety controller containing:

- Safety controller (pack reference designates type of safety controller)
- XPSMCWIN configuration software
- Configurations cable
- Connectors

Description	Controller included in the pack	Reference	Weight kg
Starter packs	XPSMC16Z	XPSMC16ZPACK	–
	XPSMC16ZC	XPSMC16ZCPACK	–
	XPSMC16ZP	XPSMC16ZPPACK	–
	XPSMC32Z	XPSMC32ZPACK	–
	XPSMC32ZC	XPSMC32ZCPACK	–
	XPSMC32ZP	XPSMC32ZPPACK	–

(1) To be ordered separately to the controllers.



XPSMCCPC



TSXPCX1031



TSXCANTDM4

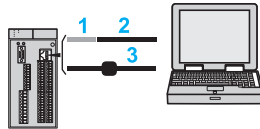


ABL8RPS24100

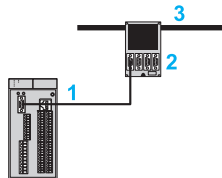
References

Connecting cables (1)

Function	Length m	Reference	Weight kg
Diagnostics using Magelis operator dialogue terminal type XBTGT	3	VW3A8306R30	1.130
Configuration software			
1 Adaptor: RJ45 socket/PC connection cables	–	XPSMCCPC	0.011
2 Cable to PC serial port (type SUB-D9)	2.5	TSXPCX1031	0.170
3 USB / RJ45 cable: used to connect the controller to a PC Equipped with a USB connector (PC end) and an RJ45 connector (controller end)	2.5	TSCMCNAM3M002P	–



Function	Medium	Length m	Reference	Weight kg
Modbus serial link access	Premium automation platform TSXSCY21601	–	XPSMCSCY	–
CANopen bus access				
1 CANopen connection cables (fitted with: 1 SUB-D 9-pin female connector at each end)		0.3	TSXCANCADD03	–
		1	TSXCANCADD1	–
		3	TSXCANCADD3	–
		5	TSXCANCADD5	–
2 CANopen tap-off box		–	TSCCANTDM4	–
3 Standard CANopen cables		50	TSXCANCA50	–
		100	TSXCANCA100	–
		300	TSXCANCA300	–
Profibus bus access		100	TSXPBSCA100	–
		400	TSXPBSCA400	–



Accessories (1)

Regulated switch mode power supply, single-phase	Output voltage: 24...28.8 V $\overline{\text{---}}$ Nominal current: 10 A Nominal power: 240 W	ABL8RPS24100	1.000
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(1) To be ordered separately.

Monitor and Processing

Preventa safety PLCs type XPSMF, compact and modular

Safety remote input/output modules type XPSMF1/2/3



Preventa compact/Modular Safety PLCs and remote I/O enable the monitoring of simple to complex safety functions for all industrial applications relating to the protection of personnel and machine safety.

Designed for use with numerous machine safety functions, these safety PLCs and remote I/O are intended for use in safety related parts of control systems.

They can manage up to category 4 performance level e EN/ISO 13849-1, SIL 3 (safety integrity level) EN/IEC 61508 or EN/IEC 62061.

Safety PLCs

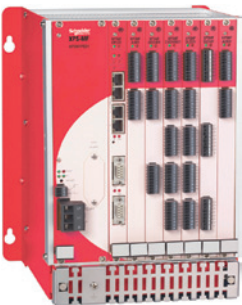
In order to meet safety requirements, the compact/modular safety PLCs incorporate two essential functions (**Redundancy** and **Self-monitoring**).

In addition uses **SafeEthernet** safe communications protocol between the safety PLCs and safe remote I/O modules.

3



Compact safety PLCs



Modular safety PLCs



Safety remote input/output modules

Redundancy

- > The double or triple (1) processors integrated in the compact and modular safety PLCs analyses and compares the data received from the safety inputs and outputs.
- > The incoming and outgoing data (programmed values and received values) are received in parallel by the processors and compared in real-time.

Self-monitoring (Watchdog)

The safety PLCs and remote I/O continuously monitor the data processing cycle and the execution of tasks, and intervenes if the cycle time does not conform to the predefined values.

Integrated switch

The integrated switch stores for a very short time and sends at very high speed the data provided by the inputs and outputs of the safety PLCs and remote I/O on the Ethernet network, whilst avoiding signal collisions and excessive amounts of data on the network.

(1) With XPSMF40 PLC only

Monitor and Processing

Preventa safety PLCs type XPSMF, compact and modular

Safety remote input/output modules type XPSMF1/2/3

Line control for safety PLCs and safety remote I/O modules

Line control is a means of short circuit and line break monitoring. Using line control outputs enables category 4 performance level e EN/ISO 13849-1, SIL 3 (safety integrity level) EN/IEC 61508 or EN/IEC 62061 to be achieved.

The line control outputs provide a high signal with a very short low signal enabling a wiring fault (short-circuit, line break) to be identified on the inputs of the safety PLCs and safety remote I/O.

Programming automated safety functions

Software **XPSMFWIN** (reference **SSV1XPSMFWIN**) running on a PC enables the programming of all safety remote I/O modules and safety PLCs, as well as configuration of the communication settings.

Monitor and Processing

Preventa safety PLCs

Compact and modular, XPSMF

Presentation

Products referenced XPSMF31222, XPSMF3022 and XPSMF3500 are marked HIMatrix F31, HIMatrix F30 and HIMatrix F35.

Compact PLCs:

- Designed for use with numerous machine safety functions and for the protection of personnel.
- Designed for use in safety related parts of control systems up to category 4, performance level "e" EN/ISO 13849-1, and up to SIL 3 EN/IEC 61508 or EN/IEC 62061



3

User memory	Application
	Data
Response time	
Maximum consumption	
Supply	
Inputs Digital	Number of channels
	Current at state 0
	Current at state 1
Analogue	Number of channels
	Range: voltage/current
Counting	Number of channels
	Current
Outputs Digital	Number of channels
	Output current
Analogue	Number of channels
	Range: voltage/current
Relay	Number
	Switching voltage
Line control	
Input/output connections	
■ Safe communication using SafeEthernet protocol	
■ Non safe communication using Modbus TCP/IP protocol, server (slave)	
Communication on fieldbus	
Non safety using Modbus RTU protocol, slave (RS 485)	
Non safety using PROFIBUS DP protocol, (V0 slave)	
Safety PLC type	
See page	
"In rack" card type	
See page	

250 kB			
250 kB			
Depending on size of application			
8 A			9 A
External $\bar{\text{---}}$ 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)			
24 , configurable, not electrically isolated	20 , not electrically isolated		24 , not electrically isolated
1.5 mA max. at $\bar{\text{---}}$ 24 V	1.5 mA max., 1.25 mA at 5 V		
3.5 mA at $\bar{\text{---}}$ 24 V	≥ 2 mA at $\bar{\text{---}}$ 15 V	> 2 mA at $\bar{\text{---}}$ 15 V	3.5 mA at $\bar{\text{---}}$ 24 V
4.5 mA at $\bar{\text{---}}$ 30 V			4.5 mA at $\bar{\text{---}}$ 30 V
–	–	–	8 , single-pole
–	–	–	0...10 V/0...20 mA (1)
–	–	–	2
–	–	–	1.4 mA at $\bar{\text{---}}$ 5 V, 6.5 mA at $\bar{\text{---}}$ 24 V
24 , configurable, not electrically isolated	8 (2), not electrically isolated		8 , not electrically isolated
Chnl. 1 to 3, 5 to 7, 9 to 11, 13 to 15, 17 to 19, 21 to 23: 0.5 A at 60 °C Channels 4, 8, 12, 16, 20 and 24: 1 A at 60 °C, 2 A at 50 °C	Channels 1 to 3 and 5 to 7: 0.5 A at 60 °C Channels 4 and 8: 1 A at 60 °C, 2 A at 50 °C		
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
2 x 4	(2)	(2)	–
Removable screw terminals are provided with all Safety compact PLCs Reference XPSMF4000 is also provided with cage clamp terminal			
yes	yes	yes	yes
yes (XPSMF4002/4022/4042)	yes (XPSMF31222)	yes (XPSMF3022)	yes (XPSMF3502/MF3522/MF3542)
yes (XPSMF4020/4022)	–	yes (XPSMF3022)	yes (XPSMF3522)
yes (XPSMF4040/4042)	–	–	yes (XPSMF3542)
oui (XPSMF4040/4042)	–	–	oui (XPSMF3542)
XPSMF4000/MF4020/MF4040	XPSMF31222	XPSMF3022	XPSMF3502/MF3522/MF3542
3/110	3/113	3/113	3/113
–	–	–	–
–	–	–	–

(1) With shunt 500 Ω .

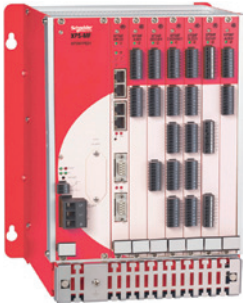
(2) Digital inputs can be supplied by the line control outputs of the same I/O card.



More technical information on www.schneider-electric.com

Modular PLC XPSMF60: metal rack **XPSMFGEH01** with slots for power supply module **XPSMFPS01**, central processing unit **XPSMFCPU22** and six "in rack" I/O cards.

- Designed for use with numerous machine safety functions and for the protection of personnel.
- Designed for use in safety related parts of control systems up to category 4, performance level "e" EN/ISO 13849-1, and up to SIL 3 EN/IEC 61508 or EN/IEC 62061



500 kB						
500 kB						
Depending on size of application						
30 A max., 32 A external fuse						
External \approx 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)						
–	–	–	24, electrically isolated	32 (2), electrically isolated	24 (2), electrically isolated	–
–	–	–	–	1 mA at 5 V	1 mA at 5 V	–
–	–	–	≥ 2.2 mA at 79 V	2 mA at \approx 10 V, 5 mA at \approx 24 V	2 mA at \approx 10 V, 5 mA at \approx 24 V	–
8 single-pole or 4 2-pole, configurable, electrically isolated	–	–	–	–	–	–
- 10...+ 10 V/0...20 mA (1)	–	–	–	–	–	–
–	–	2	–	–	–	–
–	–	0.8 A at \approx 3.3 V 0.1 A at \approx 5 V 0.1 A + output current at \approx 24 V	–	–	–	–
–	–	4	–	–	16 (3), electrically isolated	–
–	–	0.5 A per channel, 2 A max. per "in rack" card	–	–	2 A per channel at 30 °C, 8 A max. at 30 °C per "in rack" card	–
–	8, electrically isolated	–	–	–	–	–
–	- 10...10 V / 0...20 mA	–	–	–	–	–
–	–	–	–	–	–	8
–	–	–	–	–	–	\approx 6...250 V
–	–	–	–	–	(3)	–

Removable screw terminals are provided with "in rack" I/O cards and Power supply module

yes

yes

yes

yes

oui

XPSMFGEH01 (rack) + XPSMFPS01 (power supply) + XPSMFCPU22 (central processing unit) + "in rack" I/O cards (to be selected from below)

3/114

XPSMFAI801	XPSMFAO801	XPSMFCIO2401	XPSMFDI2401	XPSMFDI3201	XPSMFDIO241601	XPSMFDO801
3/118	3/119	3/119	3/120	3/120	3/121	3/121

(1) With 250 Ω or 500 Ω shunt. (2) Digital inputs can be supplied by the line control outputs of the same I/O card. (3) The digital outputs (n° 1... n° 16) can be configured as line control outputs.



More technical information on www.schneider-electric.com

Monitor and Processing

Preventa safety PLCs

Compact, XPSMF40

3



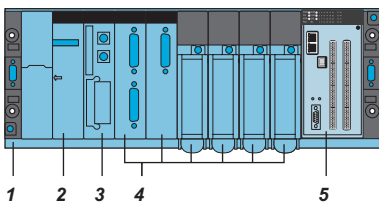
XPSMF4000
XPSMF4002



XPSMF4020
XPSMF4022



XPSMF4040
XPSMF4042



Example of mechanical integration of a compact safety PLC XPSMF40 on a Premium automation platform.

- 1 Premium rack
- 2 Power supply module
- 3 Premium processor module
- 4 Other Premium modules (communication, I/O)
- 5 Compact safety PLC XPSMF40

Presentation

The compact safety PLC range XPSMF40●● comprises of 6 versions that are differentiated by their non safety related communication protocols.

Compact PLCs	Digital Inputs/Outputs	Line control outputs	Communication		
			On Ethernet network		On fieldbus
			Safety protocol	Non safety protocol	
XPSMF4000	24, configurable	8	SafeEthernet	–	–
XPSMF4002	24, configurable	8	SafeEthernet	Modbus TCP/IP Server	–
XPSMF4020	24, configurable	8	SafeEthernet	–	Modbus serial Slave (RTU)
XPSMF4022	24, configurable	8	SafeEthernet	Modbus TCP/IP Server	Modbus serial Slave (RTU)
XPSMF4040	24, configurable	8	SafeEthernet	–	PROFIBUS DP V0 slave
XPSMF4042	24, configurable	8	SafeEthernet	Modbus TCP/IP Server	PROFIBUS DP V0 slave

Digital inputs

Compact safety PLCs XPSMF40●● incorporate up to 24 digital inputs for the connection of safety related input devices, such as emergency stop contacts, magnetic switches, light curtains, etc.

Digital outputs

Compact safety PLCs XPSMF40●● incorporate up to 24 digital outputs for the connection of safety related output devices, such as contactors, illuminated beacons, sirens, etc.

Line control outputs

Compact safety PLCs XPSMF40 incorporate 8 line control outputs for short-circuits and line break monitoring.

Remote inputs and outputs

In addition to the inputs/outputs integrated as standard, compact safety PLCs XPSMF40●● can be connected to safety remote input modules XPSMF1 and/or safety remote output modules XPSMF2 and/or safety remote mixed I/O modules XPSMF3.

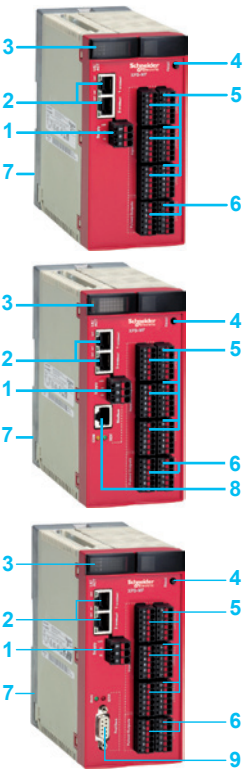
The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.

Communication between these safety remote I/O modules and safety PLCs XPSMF40●● is performed on an Ethernet network using the SafeEthernet safety protocol, via the integrated RJ45 switched Ethernet communications ports.

Integrating safety PLCs XPSMF40 on a Premium automation platform

Designed for mechanical integration on a Premium automation platform, safety PLCs XPSMF40●● occupy 2 slots on the Premium rack TSXRKY.

There is interaction between the two programming environments (Unity and XPSMFWIN): the variables defined using software XPSMFWIN can be retrieved by Unity (platform programming software) by using a tool included in the software.



Description

Safety PLCs XPS
XPSMF4000/MF4002/ MF4020/MF4022/ MF4040/MF4042

On the front face of the enclosure:

- 1 One terminal block (1) for \pm 24 V supply.
- 2 Two integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus TCP/IP server protocol).
- 3 Process status LEDs.
- 4 One "Reset" button.
- 5 Six terminal blocks (1) for connection of configurable digital I/Os.
- 6 Two terminal blocks (1) for connection of line control outputs.
- 7 **On the rear face:** one removable plate with spring fixing for mounting on 35 mm U rail.

Safety PLCs XPSMF4020/MF4022

On the front face of the enclosure:

- 8 One RJ45 connector for connection on Modbus serial (RTU), with 2 process status LEDs.

Safety PLCs XPSMF4040/MF4042

On the front face of the enclosure:

- 9 One SUB-D (9-pin female) connector for connection on PROFIBUS DP, with 2 process status LEDs.

(1) Removable Screw and Cage clamp terminals are provided with compact safety PLCs XPSMF40.



XPSMF4000
XPSMF4002



XPSMF4020
XPSMF4022



XPSMF4040
XPSMF4042

Compact safety PLCs

\pm 24 V supply

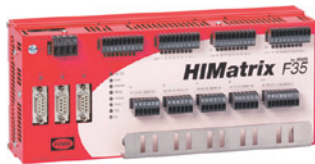
Digital Inputs or Outputs	Line control outputs	Communication on Ethernet network	Communication on		Reference	Weight kg/ lb		
			SafeEthernet protocol	Modbus TCP/IP protocol			Modbus serial (RTU)	PROFIBUS DP
0...24 configurable channels	2 x 4	Yes	–	–	–	XPSMF4000	1.000/2.205	
			Yes, server	–	–	XPSMF4002	1.000/2.205	
			–	Yes, slave	–	XPSMF4020	1.000/2.205	
			Yes, server	Yes, slave	–	XPSMF4022	1.000/2.205	
–	–	–	–	Yes, V0 slave	–	XPSMF4040	1.000/2.205	
			Yes, server	–	Yes, V0 slave	XPSMF4042	1.000/2.205	



XPSMF31222



XPSMF3022



XPSMF35●●

Products referenced **XPSMF31222**, **XPSMF3022** and **XPSMF35●●** are marked **HIMatrix F31**, **HIMatrix F30** and **HIMatrix F35**

Presentation

The compact safety PLC range **XPSMF31/30/35** comprises 5 versions that are differentiated by their characteristics, detailed below. Compact safety PLCs **XPSMF3●●●●** incorporate up to 24 digital inputs for the connection of safety related input devices.

Compact PLCs	Inputs			Outputs Digital	Communication	
	Digital	Analogue	Counter		On Ethernet network	On fieldbus
XPSMF31222	20	–	–	8 (1)	For all compact PLCs XPSMF31/30/35 using SafeEthernet safety protocol, and with non safety protocol Modbus TCP/IP server	–
XPSMF3022	20	–	–	8 (1)		Modbus serial Slave (RTU)
XPSMF3502	24	8	2	8		–
XPSMF3522	24	8	2	8		Modbus serial Slave (RTU)
XPSMF3542	24	8	2	8		PROFIBUS DP V0 slave

Digital inputs

Compact safety PLCs **XPSMF3●●●●** incorporate up to 24 digital inputs for the connection of safety related input devices.

Analogue inputs

Compact safety PLCs **XPSMF35●●** incorporate 8 analogue measuring inputs that receive analogue safety related signals from the machines to be monitored (1).

- Closed circuit scanning of input channels,
- Single-pole measuring of 0 to 10 V voltages,
- Measuring 0 to 20 mA currents using shunt

Counter inputs

Compact safety PLCs **XPSMF3502**, **XPSMF3522**, **XPSMF3542** incorporate 2 independent and configurable counting channels:

- Incremental encoders (≐ 5 V),
- Sensors, 2/3-wire PNP/NPN (≐ 24 V).

Digital outputs

Each compact safety PLC **XPSMF●●●●** incorporate 8 digital outputs for connection to signalling equipment and machines to be controlled (2).

Remote inputs and outputs

In addition to the inputs/outputs integrated as standard, compact safety PLCs **XPSMF31/30/35** can be connected to safety remote input modules **XPSMF1** and/or safety remote output modules **XPSMF2** and/or safety remote mixed I/O modules **XPSMF3**.

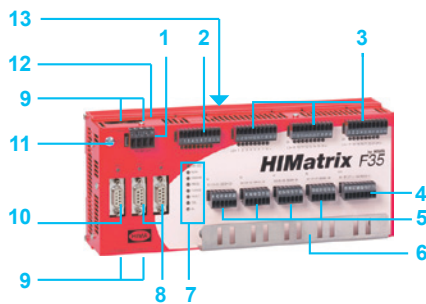
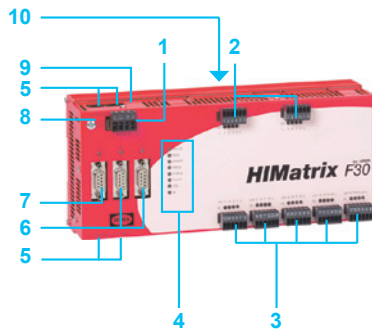
The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.

Communication between these safety remote I/O modules and compact safety PLCs **XPSMF31/30/35** is performed on an Ethernet network using the SafeEthernet safety protocol, via the Integrated RJ45 switched Ethernet communications ports.

(1) Digital outputs can be configured for line control.

(2) Use shielded dual twisted pair cables, maximum length 300 m, short-circuit unused analogue inputs.

3



Description

Safety PLCs XPSMF31222 and XPSMF3022

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 2 Two terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 3 Five terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 4 Eight process status LEDs.
- 5 Four integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus TCP/IP server protocol).
- 6 On XPSMF3022 only: two unused SUB-D connectors (FB1 and FB2).
- 7 On XPSMF3022 only: one SUB-D 9-pin connector for connection on Modbus serial (RTU) (FB3).
- 8 One earth connection screw.
- 9 **On the top:** one "Reset" button.
- 10 **On the rear face:** one spring operated fixing device for mounting on 35 mm U rail.

Safety PLCs XPSMF35●●

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 2 One terminal block (1) for connection of digital outputs, with four digital output status LEDs.
- 3 Three terminal blocks (1) for connection of digital inputs, with input status LED (eight LEDs per terminal block).
- 4 One terminal block (1) for connection of 2 counting input channels.
- 5 Four terminal blocks (1) for connection of analogue inputs.
- 6 One plate for securing shielded analogue input connection cables.
- 7 Eight process status LEDs.
- 8 Two unused SUB-D connectors (FB1 and FB2).
- 9 Four integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus TCP/IP server protocol).
- 10 One type SUB-D 9-pin connector (FB3) for connection on PROFIBUS DP (XPSMF3542) or Modbus serial (RTU) (XPSMF3522).
- 11 One earth connection screw.
- 12 **On the top:** one "Reset" button.
- 13 **On the rear face:** one spring operated fixing device for mounting on 35 mm U rail.

(1) Removable screw terminals are provided with compact safety PLCs XPSMF31/30/35.

Compact safety PLCs

$\bar{\text{---}}$ 24 V supply



XPSMF31222



XPSMF3022



XPSMF35●●

Inputs	Outputs			Communication on Ethernet network	Communication on			Reference	Weight kg/ lb	
	Digital	Analogue	Counting		Safe Ethernet protocol	Modbus TCP/IP server protocol	Modbus serial (RTU)			PROFIBUS DP
20	–	–	–	8	Yes	Yes	–	–	XPSMF31222	1,000/ 2.205
							Yes Slave	–	XPSMF3022	1.200/ 2.646
24	8	2	–	8	Yes	Yes	–	–	XPSMF3502	1.200/ 2.646
							Yes Slave	–	XPSMF3522	1.200/ 2.646
							–	Yes V0 slave	XPSMF3542	1.200/ 2.646

Products referenced XPSMF31222, XPSMF3022 and XPSMF35●● are marked HIMatrix F31, HIMatrix F30 and HIMatrix F35.

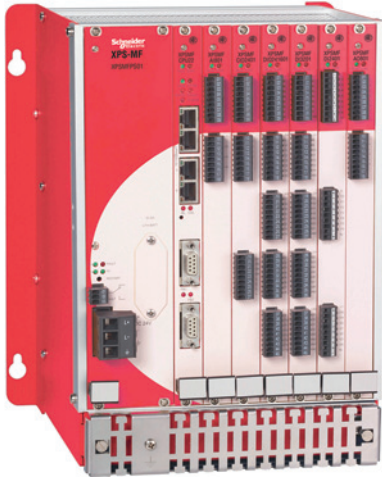
Monitor and Processing

Preventa safety PLCs

Modular, XPSMF60

Rack, power supply and CPU

3



XPSMF60

Presentation

Safety PLC **XPSMF60** offers a modular solution for monitoring simple to complex safety functions for all industrial applications relating to the protection of personnel and machine safety.

Modularity

The safety PLC **XPSMF60** is a modular system comprising a metal housing or rack, fitted with a power supply module, a CPU and “in rack” I/O cards.

- Various types of “in rack” I/O cards are catalogue listed and are selected according to the application.

- Mounting the “in rack” cards is a simple operation using the guide rails (6 slots). Electrical connection is automatic and assured by the back plane bus of the rack.

- The mounting order of the “in rack” I/O cards is open to the user, but the order, however, must correspond to the programming software.

- The removal of the “in rack” cards, performed with the supply switched-off, is facilitated by a grip at the base of the cards.

- Covering plates for unused “in rack” I/O card slots are available to protect the system in polluted environments.

Composition of the modular safety PLC XPSMF60

Minimum basic equipment	Optional “in rack” I/O cards	
	Type	Details
Metal rack XPSMFGEH01 with back plane bus assuring electrical connection of components installed + metal securing plate for shielded cables (EMC), two cooling fans + a power supply module (≐ 24 V) XPSMFPS01, + a central processing unit XPSMFPCU22 with 4 x RJ45 integrated switched Ethernet ports for Programming, and for Safety and non-safety related communication on Ethernet (safety related using SafeEthernet protocol and Non-safety related using Modbus TCP/IP server protocol) and in addition a SUB-D (FB2) connector for communication on Modbus serial (RTU)	XPSMFAI801	8 single-pole analogue inputs or 4 2-pole analogue inputs
	XPSMFAO801	8 analogue outputs
	XPSMFCIO2401	2 counting inputs, 4 digital outputs
	XPSMFDI2401	24 digital inputs (≐ 110 V / ~ 127 V)
	XPSMFDI3201	32 digital inputs
	XPSMFDIO241601	24 digital inputs, 16 digital outputs
	XPSMFD0801	8 relay outputs (≈ 6...250 V)

Monitor and Processing

Preventa safety PLCs

Modular, XPSMF60

I/O cards



XPSMFDI2401

XPSMFDI3201



XPSMFAI801

XPSMFCIO2401



XPSMFDIO241601

XPSMFAO801



XPSMFDO801

Safety inputs and outputs

The modularity of the PLC **XPSMF60** allows the user to select and install, in the six slots of the rack, various input, output and input/output cards to alter the number and type of safety inputs and/or outputs to be monitored.

6 identical cards can be installed in the same rack.

The cards listed below indicate the number of inputs and outputs available for connection to the machines to be monitored.

Digital inputs cards (1)

- **XPSMFDI2401**: 24 Digital inputs
- **XPSMFDI3201**: 32 Digital inputs

Analogue input card (1) (2)

- **XPSMFAI801**: 8 single-pole or 4 2-pole:
 - Closed circuit scanning of input channels,
 - Single-pole measuring of 0 to 10 V voltages,
 - 2-pole measuring of -10 to +10 V voltages,
 - Single-pole measuring of 0 to 20 mA currents

Mixed I/O cards (1)

- **XPSMFCIO2401**:
 - 2 Counting inputs
 - Incremental encoders (\pm 5 V),
 - Sensors 2/3-wire PNP/NPN (\pm 24 V)
 - 4 Digital outputs
- **XPSMFDIO241601**:
 - 24 digital outputs
 - 16 digital outputs

Analogue output card (1) (2)

- **XPSMFAO801**: 8 analog outputs for function:
 - Closed circuit scanning of output channels,
 - Single-pole measuring of 0 to 10 V voltages,
 - Measuring, using shunt, 0/4 to 20 mA currents (with 500 Ω external resistor)

Relay output card (1) (2)

- **XPSMFDO801**: 8 relay outputs

Remote inputs and outputs

In addition to the inputs/outputs available as standard on the optional "in rack" cards, the modular safety PLC **XPSMF60** can be connected to safety remote input modules **XPSMF1** and/or safety remote output modules **XPSMF2** and/or safety remote mixed I/O modules **XPSMF3**. The safety remote input, output and mixed I/O modules can be located within the vicinity of the machines to be monitored, thus reducing cabling.

Communication between these safety modules and the safety PLC **XPSMF60** is performed on an Ethernet network using the SafeEthernet safety protocol, via the integrated RJ45 switched Ethernet communications ports.

(1) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.
 (2) Use shielded dual twisted pair cables, maximum length 300 m, short-circuit unused analogue inputs.

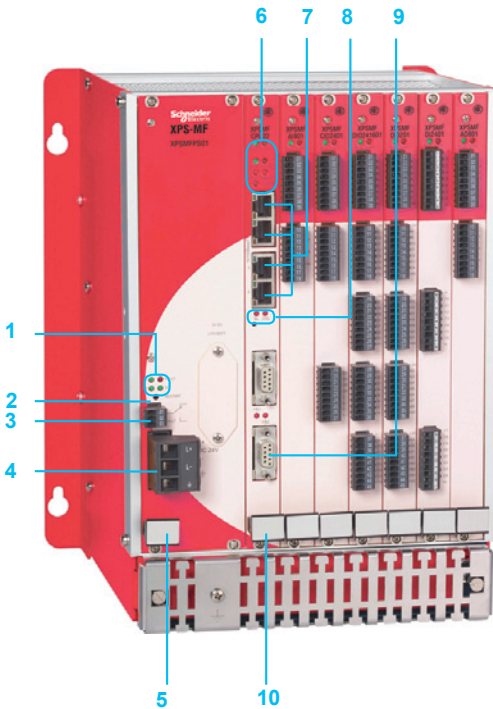
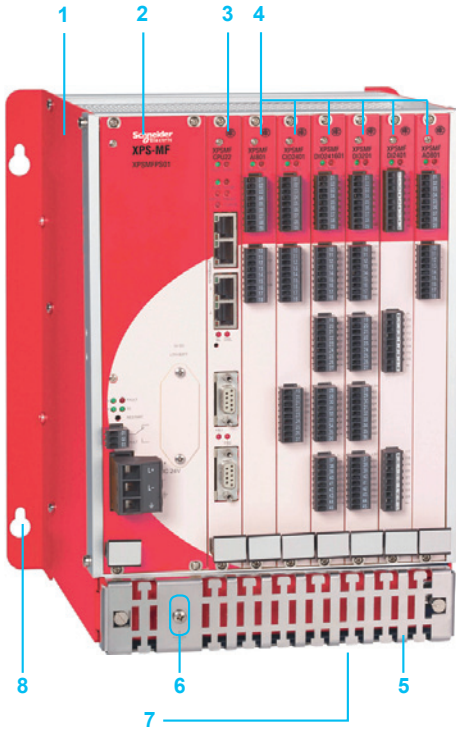
Monitor and Processing

Preventa safety PLCs

Modular, XPSMF60

Rack, power supply and CPU

3



Description

Modular safety PLC

Modular assembly comprising:

- 1 A metal rack XPSMFGEH01.
- 2 A 24 V power supply module XPSMFPS01.
- 3 A central processing unit XPSMFCPU22.
- 4 Six optional "in rack" I/O cards (back plane bus assures the electrical connection of "in rack" cards installed, the power supply module and the CPU).
- 5 A metal plate for securing shielded analogue input connection cables (EMC).
- 6 One earth connection screw.
- 7 Two cooling fans (beneath the metal rack).
- 8 Four Ø 14 mm elongated holes for mounting the rack on a vertical support.

Power supply module XPSMFPS01 and Central processing unit XPSMFCPU22 comprising:

- 1 Four voltage status LEDs (FAULT, 24 V, 3.3 V or 5 V).
- 2 A RESTART button (accessible using fine pointed tool).
- 3 A 3-pole terminal block (3 captive screws) for "Fault contact" function (1).
- 4 A 24 V supply terminal block, including earth connection (2).
- 5 A grip to assist installation/removal of the power supply module.
- 6 Seven process status LEDs.
- 7 Four integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for Programming, and for Safety and non-safety related communication on Ethernet. (safety related using SafeEthernet protocol and Non-safety related using Modbus TCP server protocol).
- 8 Two process status LEDs.
- 9 A SUB-D 9-pin connector (FB2) for connection on Modbus serial (RTU) (FB1 not used), with process status LED.
- 10 A grip to assist installation/removal of the CPU

(1) "Fault contact" function: the power supply module incorporates a volt-free changeover contact. Operating errors occurring in the system are read and displayed by the LEDs. The errors are analysed on the programming PC:

	Contact positions	Status
01		Normal operation of the PLC.
02		Absence of supply to the PLC or the CPU is in ERROR STOP mode.
03	FAULT	

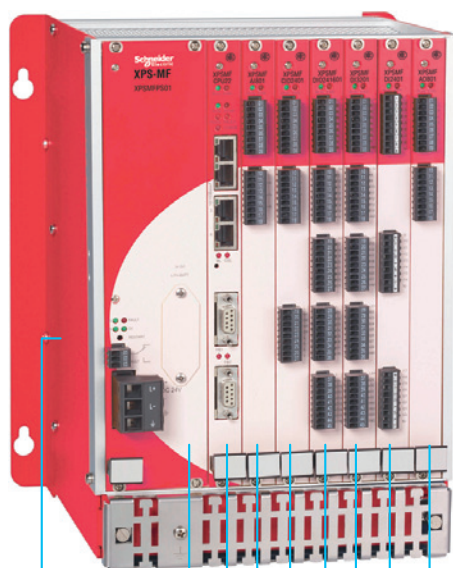
(2) Removable screw terminal blocks are provided with the power supply and "in rack" I/O cards.

Monitor and Processing

Preventa safety PLCs

Modular, XPSMF60

Rack, power supply and CPU



XPSMFGEH01

XPSMFPS01

XPSMFCPU22

XPSMFAI801

XPSMFCIO2401

XPSMFDIO241601

XPSMFDI3201

XPSMFDI2401

XPSMFAO801

Modular PLC (— 24 V supply)

Minimum basic equipment

Description	Reference	Weight kg/ lb
-------------	-----------	---------------------

Metal rack (1) fitted with:

- a back plane bus, assuring electrical connection of components installed: power supply module, CPU and “in rack” cards
- two cooling fans
- a metal securing plate for shielded cables (EMC)

XPSMFGEH01 —

— 24 V power supply module (1)

XPSMFPS01 0.820/
1.808

CPU (1) fitted with:

- 4 x integrated RJ45 (type 10BASE-T/100BASE-TX) switched ports for Programming, and for Safety and non-safety related communication on Ethernet. (safety related using SafeEthernet protocol and Non-safety related using Modbus TCP/IP server protocol)
- 1 x SUB-D 9-pin port (FB2) for access to Modbus serial (RTU)

XPSMFCPU22 0.280/
0.617

Optional “in rack” I/O cards

Description	Functions		Reference	Weight kg/ lb
	Inputs	Outputs		
“In rack” I/O card (1)	Analogue: 8 single-pole or 4 2-pole, configurable	—	XPSMFAI801	0.240/ 0.529
	—	8 analogue	XPSMFAO801	0.280/ 0.617
	2 counting	4 digital	XPSMFCIO2401	0.260/ 0.573
	24 digital (— 110 V / ~ 127 V)	—	XPSMFDI2401	0.260/ 0.573
	32 digital	—	XPSMFDI3201	0.260/ 0.573
	24 digital	16 digital (2)	XPSMFDIO241601	0.260/ 0.573
	—	8 relay ~ 6...250 V	XPSMFDO801	0.600/ 1.323

Accessories for modular PLC

Description	For use with	Reference	Weight kg/ lb
Covering plate	Unused “in rack” I/O card slots	XPSMFBLK	—

(1) Removable screw terminal blocks are provided with the power supply and “in rack” I/O cards.
(2) Configurable for line control.

Monitor and Processing

Preventa safety PLCs

Modular, XPSMF60

“In rack” analogue input card

Presentation

The “in rack” analogue input card **XPSMF801** incorporates 8 analogue inputs:

- electrically isolated from the back plane bus of rack **XPSMFGEH01**,
- configured by choice of connection for managing eight single-pole or four 2-pole functions.

The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Input values (1)

Number	Type	Voltage	Current	Value range	Example
8 inputs	Single-pole	$\pm 10\text{ V}$	–	± 1000	Single-pole measuring of 0 to 10 V voltages
		–	0...20 mA	0...1000 (2) 0...2000 (3)	Measuring 0 to 20 mA currents using shunt
4 inputs	2-pole	$\pm 10\text{ V}$	–	± 1000	Closed circuit scanning of input channels

Description

On the front face of the card:

- 1 Two process status LEDs (RUN, ERR).
- 2 Two removable screw terminal blocks (9 terminals per block) for connection of inputs (4).
- 3 Grip to assist installation/removal.
- 4 **On the rear:** terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

References

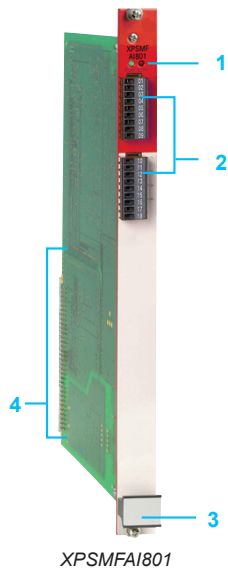
Description	Number of channels	Voltage Current	Reference	Weight kg/ lb
Analogue input card	8 single-pole	$\pm 10\text{ V}$ 0...20 mA (1)	XPSMF801	0.240/ 0.529
	4 2-pole	$\pm 10\text{ V}$		

(1) The unused input channels must be short-circuited on the reference pole (L-).

(2) With 250 Ω external shunt.

(3) With 500 Ω external shunt.

(4) Removable screw terminals are provided with the “in rack” card **XPSMF801**.



XPSMF801

Monitor and Processing

Preventa safety PLCs

Modular, XPSMF60

“In rack” analogue output card

“In rack” mixed card: counting inputs/digital outputs

Presentation

The analogue output card **XPSMFAO801** incorporates 8 configurable analogue outputs (0...20 mA, 0...+ 10 V ou - 10...+ 10 V) for selection of the type of voltage/current measurement: a switch enables selection of 6 functions for each output channel.

Switch position	Outputs	
	Voltage ± 10 V	Current 0...+ 20 mA
1	–	On
2	–	On
3	–	On
4	On	–
5	On	–
6	On	–

□ Selection of measuring scale using software XPSMFWIN: the “Properties” sub-menu displays the scale options in the “Type” window (...FS1000 or ...FS2000).

Configurable output values

Type	Voltage	Current	Value range	
			Half scale (FS1000)	Full scale (FS2000)
8 analogue outputs	–	0...20 mA	0...+ 1000	0...+ 2000
	0...+ 10 V	–	0...+ 1000	0...+ 2000
	- 10...+ 10 V	–	- 1000...+ 1000	- 2000...+ 2000

The card can be installed in rack **XPSMFGHE01** as many times as required in the six slots available.

Description

On the front face of the card:

- Two process status LEDs (RUN, ERR).
- Two removable screw terminal blocks (9 terminals per block) for connection of outputs (1).
- Grip to assist installation/removal.
- On the rear: terminals for automatic electrical connection to the back plane bus of rack **XPSMFGHE01**.

References

Description	Number of channels	Configuration		Reference	Weight kg/ lb
		Current	Voltage		
Analogue output card	8	0...20 mA	- 10...+ 10 V	XPSMFAO801	0.280/ 0.617

Presentation

The mixed counting input and digital output card **XPSMFCIO2401** incorporates:

□ 2x 24-bit independent and configurable counting channels (one channel for counting and one channel for increasing or decreasing counting direction). They are configured using software **XPSMFWIN**.

□ 4 digital outputs.

The card can be installed in rack **XPSMFGHE01** as many times as required in the six slots available.

Description

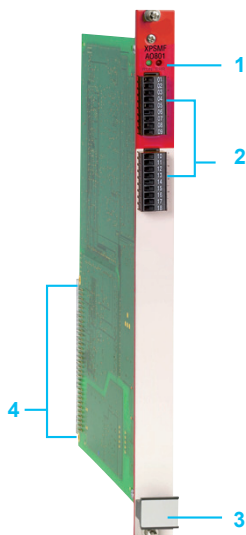
On the front face of the card:

- Two process status LEDs (RUN, ERR).
- Two removable screw terminal blocks (9 terminals per block) for connection of inputs (1).
- One removable screw terminal block (9 terminals) for connection of outputs (1) with four output status LEDs.
- Grip to assist installation/removal.
- On the rear:** terminals for automatic electrical connection to the back plane bus of rack **XPSMFGHE01**.

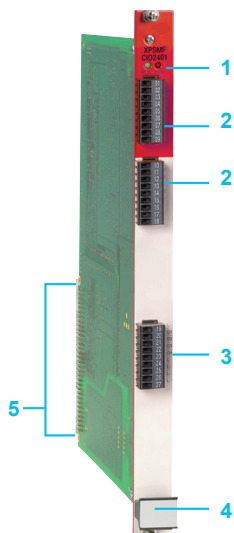
References

Description	Characteristics	Reference	Weight kg/ lb
Mixed I/O card	<ul style="list-style-type: none"> ■ 2 x 24-bit counting inputs, configurable: 5 V...24 V ■ 4 digital outputs 	XPSMFCIO2401	0.260/ 0.573

(1) Removable screw terminals are provided with the “in rack” card.



XPSMFAO801

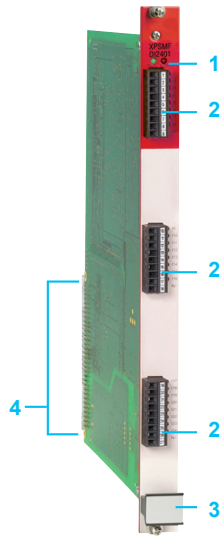


XPSMFCIO2401

Monitor and Processing

Preventa safety PLCs
Modular, XPSMF60
“In rack” digital input cards

3



XPSMFDI2401

Presentation

The digital input card **XPSMFDI2401** incorporates 24 $\bar{\text{U}}$ 110 / \sim 127 V digital inputs that are configurable using software **XPSMFWIN**.

The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Description

On the front face of the card:

- 1 Two process status LEDs (RUN, ERR).
- 2 Three removable terminal blocks (9 terminals per block) for connection of inputs (1), each with eight input status LEDs.
- 3 Grip to assist installation/removal.
- 4 **On the rear:** terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

References

Description	Characteristics	Reference	Weight kg/ lb
Input card	24 digital inputs $\bar{\text{U}}$ 110 V / \sim 127 V	XPSMFDI2401	0.260/ 0.573

Presentation

The digital input card **XPSMFDI3201** incorporates 32 digital inputs that are configurable using programming software **XPSMFWIN**.

The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Description

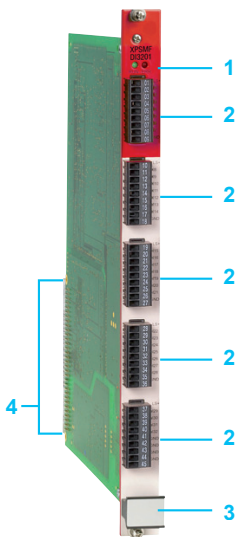
On the front face of the card:

- 1 Two process status LEDs (RUN, ERR).
- 2 Five removable terminal blocks (9 terminals per block) for connection of inputs (1), with a status LED for each input terminal.
- 3 Grip to assist installation/removal.
- 4 **On the rear:** terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**.

References

Description	Characteristics	Reference	Weight kg/ lb
Input card	32 digital inputs	XPSMFDI3201	0.260/ 0.573

(1) Removable screw terminals are provided with the “in rack” card.



XPSMFDI3201

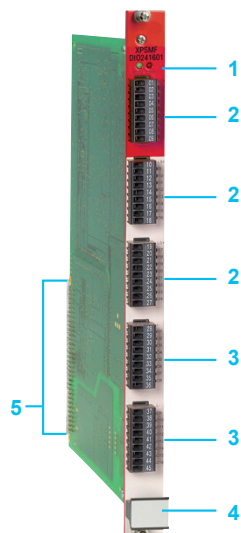
Monitor and Processing

Preventa safety PLCs

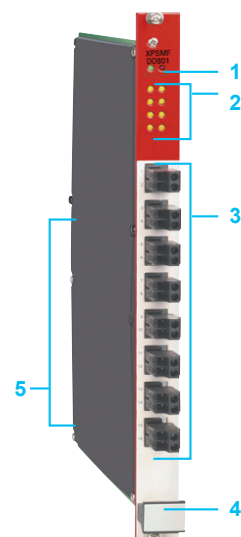
Modular, XPSMF60

“In rack” digital I/O card

“In rack” relay output card



XPSMFDIO241601



XPSMFD0801

Presentation

The digital I/O card **XPSMFDIO241601** incorporates 24 digital inputs and 16 digital outputs.

The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Description

On the front face of the card:

- 1 Two process status LEDs (RUN, ERR).
- 2 Three removable terminal blocks (9 terminals per block) for connection of inputs (1), each with eight input status LEDs.
- 3 Two removable screw terminal blocks (9 terminals per block) for connection of outputs (1), each with eight output status LEDs.
- 4 Grip to assist installation/removal.
- 5 **On the rear:** terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH01**

References

Description	Characteristics	Reference	Weight kg/ lb
I/O card	<ul style="list-style-type: none"> ■ 24 digital inputs ■ 16 digital outputs, configurable for line control 	XPSMFDIO241601	0.260/ 0.573

Presentation

The relay output card **XPSMFD0801** incorporates 8 relay safety outputs (3.15 A fuse) that are configurable using software **XPSMFWIN**.

The card can be installed in rack **XPSMFGEH01** as many times as required in the six slots available.

Description

On the front face of the card:

- 1 Two process status LEDs (RUN, ERR).
- 2 Eight output status LEDs.
- 3 Eight removable screw terminal blocks (2 terminals per block) for connection of outputs (1).
- 4 Grip to assist installation/removal.
- 5 **On the rear:** terminals for automatic electrical connection to the back plane bus of rack **XPSMFGEH0**.

References

Description	Characteristics	Reference	Weight kg/ lb
Output card	8 relay outputs ≈ 6 V...250 V	XPSMFD0801	0.600/ 1.323

(1) Removable screw terminals are provided with the “in rack” card.

Monitor and Processing

Preventa safety PLCs

Compact and modular, XPSMF

Communication on network and bus

Presentation

To communicate, Preventa compact and modular safety PLCs **XPSMF** are fitted with:

- Integrated 2 or 4 RJ45 Ethernet switched ports for transfer Safety and Non-safety related data (Safety Related using SafeEthernet protocol, Non-Safety Related using Modbus TCP/IP protocol),
- and/or serial communication ports for transferring non safety related data.

Safety communication on a single network

The Ethernet network supports the SafeEthernet protocol: physically, a single network is possible for communication between:

- safety products (SafeEthernet protocol),
- non safety related products (Modbus TCP/IP and other protocols),
- safety related and non safety related products (Modbus TCP/IP protocol).

Communication on more than one network: a minimum of two separate cabling systems are established.

- An Ethernet network with Modbus TCP/IP protocol is used for communication between non safety related products and the safety PLCs.
- An Ethernet network with SafeEthernet protocol is used for communication between the safety PLCs **XPSMF** and safety remote I/O modules **XPSMF1/2/3**.
- A Modbus serial network with Modbus serial (RTU) protocol is used for communication between the safety PLCs **XPSMF** and non safety related products.
- A PROFIBUS DP network with PROFIBUS protocol is used for communication between the safety PLCs **XPSMF** and non safety related products.

3

Safety PLCs	Communication on Ethernet network			Communication on fieldbus	
	Port (number x type)	SafeEthernet protocol: safe communication	Modbus TCP/IP protocol: non safe communication	Modbus serial (RTU) protocol	PROFIBUS DP protocol
Compact					
XPSMF31222	4 x RJ45	yes	yes	no	no
XPSMF3022	4 x RJ45	yes	yes	yes (slave) / 1 x SUB-D (9-pin)	no
XPSMF3502	4 x RJ45	yes	yes	no	no
XPSMF3522	4 x RJ45	yes	yes	yes (slave) / 1 x SUB-D (9-pin)	no
XPSMF3542	4 x RJ45	yes	yes	no	yes (slave) / 1 x SUB-D (9-pin)
XPSMF4000	2 x RJ45	yes	no	no	no
XPSMF4002	2 x RJ45	yes	yes	no	no
XPSMF4020	2 x RJ45	yes	no	yes (slave) / 1 x RJ45	no
XPSMF4022	2 x RJ45	yes	yes	yes (slave) / 1 x RJ45	no
XPSMF4040	2 x RJ45	yes	no	no	yes (slave) / 1 x SUB-D (9-pin)
XPSMF4042	2 x RJ45	yes	yes	no	yes (slave) / 1 x SUB-D (9-pin)
Modular					
XPSMFCPU22 (central processing unit)	4 x RJ45	yes	yes	yes (slave) / 1 x SUB-D (9-pin)	no

Characteristics			
Protocol		SafeEthernet	
Compatibility with compact and modular safety PLCs		XPSMF4000, XPSMF4002, XPSMF4020, XPSMF4022, XPSMF4040, XPSMF4042	XPSMF31222, XPSMF3022, XPSMF3502, XPSMF3522, XPSMF3542, XPSMFCPU22 (central processing unit of modular PLC XPSMF60)
Transmission	Speed (Baud rate)	100 Mbps Half duplex, 10 Mbps Full duplex, Autonegotiation	
	Communication ports	Integrated 2 RJ45 switched Ethernet communications ports	Integrated 4 RJ45 switched Ethernet communications ports
	Medium	Dual twisted pair cable, category 5D or better	
Structure		10BASE-T/100BASE-TX	
Transparent Ready service	Class	A10	
	Standard Ethernet TCP/IP communication services (supported by compact and modular safety PLCs)	Modbus TCP/IP	
	TCP port	Standard 502	
	Max. number of TCP/IP connections	1 to 20	
Bus type		Modbus serial (RTU)	
Compatibility with compact and modular safety PLCs		XPSMF3022, XPSMF3522	XPSMF4020, XPSMF4022
Serial link port	Number and type	1 x SUB-D 9-pin female (FB3)	1 x RJ45 (Modbus)
	Master/Slave	Slave	
Addressing		122 slave addresses. Addressing range: 1...247	
Medium		Shielded twisted pair cable	
Physical layer		RS 485	
Services		13 Modbus functions (reading/writing of bits and words, event counters, connection events, diagnostics, identification)	
	Functions	Code	
		01	Reading n bits of output
		02	Reading n bits of inputs
		03	Reading n words of output
		04	Reading n words of inputs
		23	Reading/writing variables
		15	Writing bit variables
		16	Writing word variables
		05	Writing 1 bit of output
		06	Writing 1 word of output
		08	Diagnostics
		43	Reading equipment identification
Transmission	Binary transfer rate (bps)	115 200, 76 800, 62 500, 57 600, 38 400, 19 200, 9600, 4800, 2400, 1200, 600, 300. Default value: 57 600	
Elements	Parity	None. Odd. Even. Default value: even	
	Stop bit	Standard. 1 stop bit. 2 stop bits. Default value: standard	
Bus type		PROFIBUS DP	
Compatibility with compact safety PLCs		XPSMF3542	XPSMF4040, XPSMF4042
Serial port	Number and type	1 x SUB-D 9-pin female (FB3)	1 x SUB-D 9-pin female (PROFIBUS)
	Master/Slave	Slave, V0	
Physical layer		RS 485	
Topology		Linear, with line terminators at each end	
Medium		Shielded twisted pair cable	
Number of slaves		32 slaves on each segment, 126 slaves maximum with repeaters	
Data exchange speed		9.6 kbps...12 Mbps, depending on the length of the segment (1200 m...100 m)	

Monitor and Processing

Programming software XPSMFWIN for Preventa compact and modular safety PLCs XPSMF

Presentation

Conforming to standard IEC 61131-3, programming software **XPSMFWIN** is designed for programming all safety PLCs **XPSMF** and safety remote I/O modules.

To create a program the user can use predefined function blocks, such as the elementary logic functions and certified function blocks, by dragging the blocks into the software programming area.

The “drag and drop” operation of the Windows programming environment enables quick and simple creation of configurations.

Using the **XPSMFWIN** software, it is possible to program complete systems comprising several safety PLCs and safety remote I/O modules. The conditions detailed in the software manual must be adhered to and a complete report accompanying the certificate should be established.

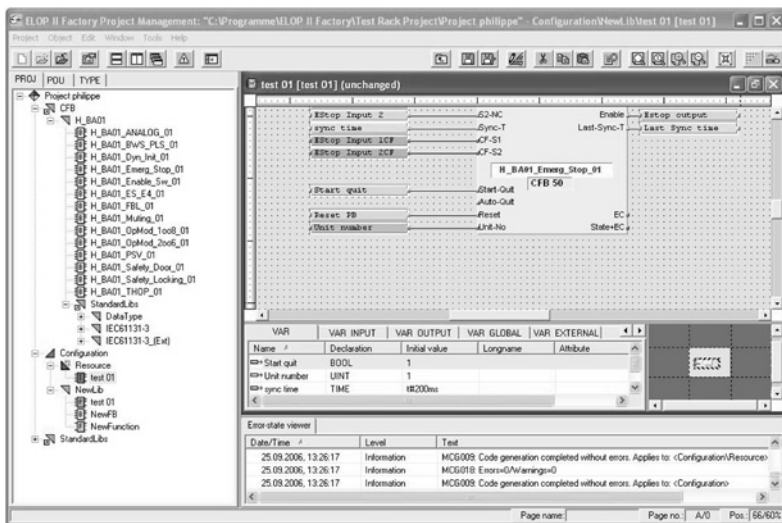
3

Reference

■ Reference **SSV1XPSMFWIN** is the full version of software **XPSMFWIN** version 4.1 and must be installed if no previous version of this software has been installed.

Description	Operating system	Composition	Language	Reference	Weight kg/ lb
Configuration software XPSMFWIN for programming compact XPSMF40 , XPSMF3 and modular XPSMF60 safety PLCs	Windows 2000, Windows XP	CD-ROM + user manual	English, German, French	SSV1XPSMFWIN	0.520/ 1.146

Installation



Software **XPSMFWIN**: project management

Software **XPSMFWIN** uses an electronic key (dongle) for protection against unauthorised use.

A USB dongle is available. It must be connected to the PC before the software is installed. Drivers must also be installed on the computer to recognise the dongle. These drivers are included with software **XPSMFWIN** and are automatically installed during installation.

To install software **XPSMFWIN**:

- Connect the dongle.
- Insert the **SSV1XPSMFWIN** software CD-ROM into the computer.
- Launch installation.
- Select the preferred language from the configuration menu.
- Follow the guided installation procedure for the software.
- Restart the computer.
- Launch the software by clicking on the Safety Suite icon on the desktop.

The computer hardware requirements are as follows:

- Processor (Intel Pentium II 400 MHz minimum, Intel Pentium III 800 MHz recommended).
- RAM (128 Mb minimum, 256 Mb recommended).
- Graphics card (2 Mb XGA, 1024 x 768, 256 colours minimum, 8 Mb XGA, 1280 x 1024 True colour recommended).
- Hard disk (1 Gigabyte minimum).
- Operating system:
 - Windows 2000 Professional with Service Pack 1 or higher.
 - Windows XP with Service pack 1.

Monitor and Processing

Programming software XPSMFWIN for Preventa compact and modular safety PLCs XPSMF

Interface

XPSMFWIN features two distinct windows, one for internal configuration and one for hardware management.

- Project management

This window enables creation, archiving and recalling of all the user programs. It contains all the logic functions and predefined certified function blocks.

- Hardware management

This window enables all hardware specific data, inputs and outputs and signal transfer between safety controllers to be defined, as well as the various safety PLCs being used or safety remote I/O modules.

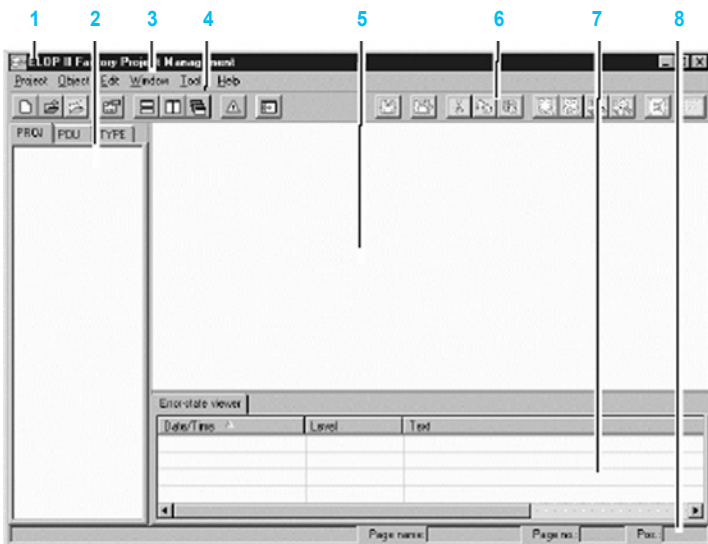
Items included in the XPSMFWIN interface

- Menu and title bar
- Toolbar and status bar
- Windows layout, structure window and work space
- Error display window

XPSMFWIN is a program offering numerous functions and features intuitive, Windows style, operation, making it a very user-friendly programming environment.

Project Management window layout

On launching software XPSMFWIN, the standard screen shown below opens. This screen generally includes the following items:



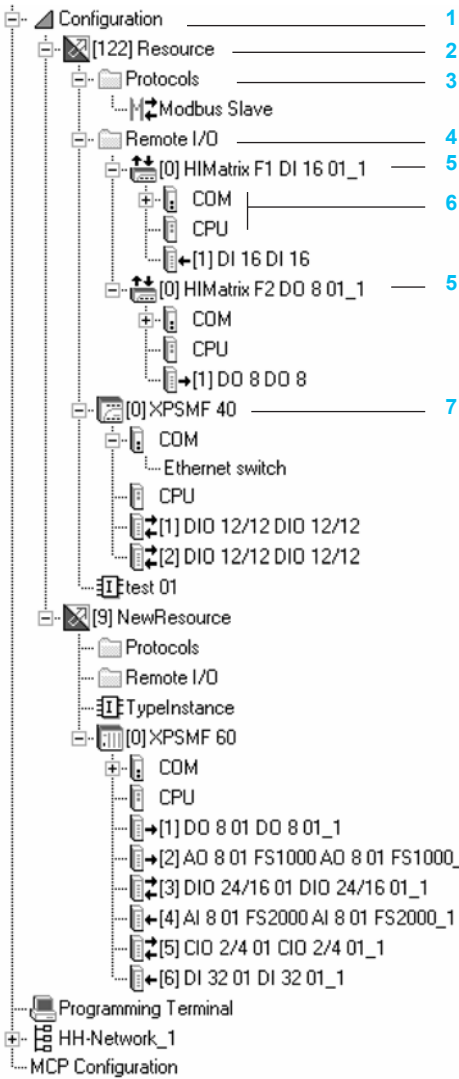
- 1 Title bar.
- 2 Structure window.
- 3 Menu bar.
- 4 Project management toolbar.
- 5 Work space.
- 6 FBD (Function Block Diagram) editor toolbar.
- 7 Error display window.
- 8 Status bar with coordinate information of the function plan editor.

Monitor and Processing

Programming software XPSMFWIN
for Preventa compact and modular
safety PLCs XPSMF

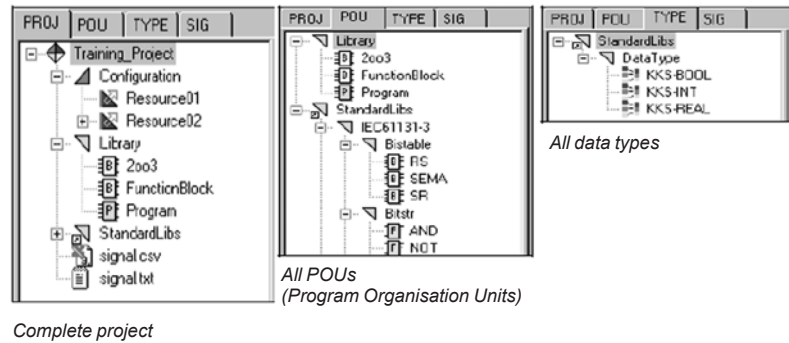
3

Structure window



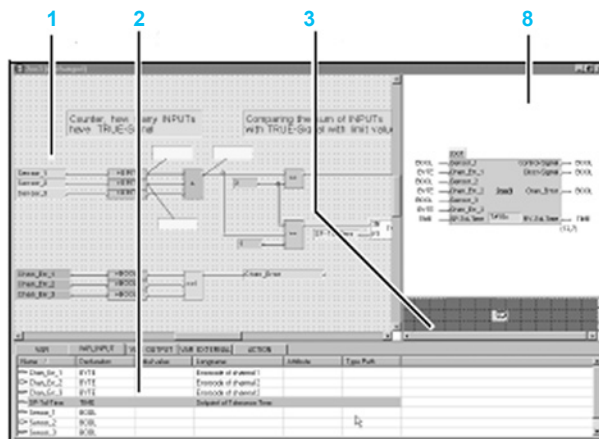
- 1 Configuration.
- 2 Resource folder.
- 3 Communication protocols.
- 4 Remote I/O folder.
- 5 Remote I/O type.
- 6 Components and modules.
- 7 Resource type

The structure window displays the hierarchical structure of the project. Selecting one of three views provides the user with different levels of detail.



FBD (Function Block Diagram) editor

Using this editor, the user can create function blocks in FBD (Function Block Diagram) language or SFC (Sequential Function Chart) language. The FBD editor comprises the following panes:



- 1 Drawing field.
- 2 Variable declaration editor.
- 3 Overview window.
- 4 Interface declaration editor.

Monitor and Processing

Programming software XPSMFWIN for Preventa compact and modular safety PLCs XPSMF

Programming

Software **XPSMFWIN** enables programming of the entire range of Preventa safety PLCs **XPSMF**.

The powerful and easy to use methodology of this software enables users to quickly and simply familiarise themselves with the product. The Windows based look and user-friendliness provides users with trouble free operation of the software.

On launching the software, the program's start-up assistant opens simultaneously. This assistant enables the user to easily open a new or existing file, delete a file or archive a file. Once a new or existing file is opened, the user quickly accesses the working environment.

Configuration

The user can begin creating a configuration as soon as a personal library is set-up, that will contain the user configuration(s).

Once the personal library is opened, the user can use the standard library function blocks (And, Or, Not, Flip-Flop, etc.) to create exactly what is required.

The user drags the function blocks into the configuration environment and places them where required. Once the function blocks are placed, the user can define specific signals or variables for the inputs and outputs.

The Hardware menu enables assigning of all the signals to the relevant inputs and outputs.

From within the Hardware menu the relevant safety PLCs are selected using the pull-down menu of each resource.

To add additional safety PLCs a new resource is easily created and assigned with the type of safety PLC.

Up to 64 remote inputs/outputs can be assigned to each safety PLC.

Once all the safety PLCs and remote I/Os have been selected, the signals can be simply connected to the relevant safety modules.

The "drag and drop" function enables defining of the inputs and outputs.

Therefore, configuration is very quick and simple.

Once all the inputs and outputs have been defined the user can compile the entire program, which is performed in the configuration menu.

Compilation must be performed twice and the results of both compilations printed and compared. If both results match, the program can be downloaded via the Ethernet RJ45 communication port on any of the safety PLCs.

Program execution

The program will automatically be stored in all the safety PLCs.

The safety PLCs can then execute the configuration and full diagnostics can be viewed on screen.

The software incorporates various diagnostic options that can be used to quickly identify the presence of errors. Some of these diagnostic options are "On-line test": which displays the logic condition of all the I/Os. Others allow the user to view the status of the transmission line, the cycle time and errors that have occurred on the communication line.

The programming tool enables the user to create and design to suit their needs.

Other certified function blocks are available, which enable the overall configuration time to be further reduced. Included in these additional blocks are "Muting" and "Emergency stop" functions, together with 12 other certified functions.

Modbus TCP/IP, Modbus serial (RTU) and PROFIBUS DP protocols are included in software **XPSMFWIN**. They can be used for non safety related data transfer.



Products referenced XPSMF2●●●●●● and XPSMF3●●●●●● are marked HIMatrix F2DO and HIMatrix F3...

Depending on size of application					
0.6 A	0.6 A	8 A	14 A	8 A	0.8 A
External ~ 24 V supply (with separate protection conforming to EN/IEC 60950, SELV (Safety Extra Low Voltage) or PELV (Protection Extra Low Voltage) rated)					
–	–	8, not electrically isolated	16, not electrically isolated	20, not electrically isolated	–
–	–	1.5 mA max. 1.25 mA at ~ 5 V	1.5 mA max. 1 mA at ~ 5 V	1.5 mA max. 1.25 mA at ~ 5 V	–
–	–	> 2 mA at ~ 15 V	> 2 mA at ~ 15 V	≥ 2 mA at ~ 15 V	–
–	–	–	–	–	8 single-pole
–	–	–	–	–	~ 0...10 V/0...20 mA (1)
–	–	–	–	–	–
–	–	8 DO+ (reference pole L-) 2 DO- (reference pole S+)	8 2-pole or 16 single-pole, not electrically isolated	8, not electrically isolated (2)	–
–	–	DO+: channels 1 to 3 and 5 to 7: 0.5 A at 60 °C channels 4 and 8: 1 A at 60 °C, 2 A at 40 °C DO-: channels 1 and 2: 1 A at 60 °C	2 A max. at 40 °C, 1 A max. at 60 °C, 10 mA min.	Channels 1 to 3 and 5 to 7: 0.5 A at 60 °C Channels 4 and 8: 1 A at 60 °C, 2 A at 50 °C	–
–	–	–	–	–	4 non safety related outputs
–	–	–	–	–	Usable range: 0...20 mA Nominal range: 4...20 mA
8	16	–	–	–	–
≥ 5 V, ≤ ~ 250 V/ ~ 250 V	≥ 5 V, ≤ ~ 60 V/ ~ 30 V	–	–	–	–
–	–	2, not electrically isolated	–	–	–
–	–	60 mA/20 V	60 mA/20 V	–	–

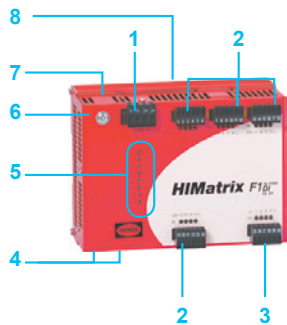
Removable screw terminal blocks (3)

Yes, access to network via integrated 2 RJ45 switched Ethernet communications ports

XPSMF2DO801	XPSMF2DO1602	XPSMF3DIO8801	XPSMF3DIO16801	XPSMF3DIO20802	XPSMF3AIO8401
3/132		3/135			

(1) With 500 Ω shunt
 (2) Configurable for Line control.
 (3) Removable screw terminal blocks are provided with safety remote I/O modules XPSMF1/2/3.





XPSMF1DI1601

This product, referenced XPSMF1DI1601, is marked HIMatrix F1DI.

Presentation

XPSMF1DI1601 is a compact safety remote input module which is designed to extend the input capacity of safety PLCs XPSMF, either compact or modular, to which it is associated.

The communication with either the compact or modular safety PLCs is managed via one of its' integrated 2 RJ45 switched Ethernet communications ports.

The safety remote input module XPSMF1DI1601 does not have a user program: it receives its instructions from its' parent safety PLC.

Safety remote input module XPSMF1DI1601

- Remote digital inputs: 16
- Remote line control outputs: 4 (Short-circuit and line break monitoring)

Safety communication on Ethernet network

The safety input module XPSMF1DI1601 incorporates two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs XPSMF.

- Baud rate: 100 Mbps Half duplex, 10 Mbps Full duplex, + Autonegotiation,
- Structure: 10BASE-T/100BASE-TX,
- Medium : Dual twisted pair cable, category 5D or better (Ethernet).

Description

Safety remote input module XPSMF1DI1601

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{0}$ 24 V supply.
- 2 Four terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 3 One terminal block (1) for connection of digital line control outputs, with four digital output status LEDs.
- 4 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 5 Eight process status LEDs.
- 6 One earth connection screw.
- 7 On the top: one "Reset" button.
- 8 On the rear face: one spring operated fixing device for mounting on 35 mm \bar{L} rail.

References

Safety remote input module ($\bar{0}$ 24 V supply)

For use with	Digital inputs	Line control outputs	Ports	Reference	Weight kg/lb
Safety PLCs, modular XPSMF60 or compact XPSMF40 and XPSMF31/30/35	16	4	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF1DI1601	0.700/ 1.543

Presentation

XPSMF2DO●●●● are compact safety remote output modules which are designed to extend the output capacity of safety PLCs XPSMF, either compact or modular, to which they are associated.

The communication with either the compact or modular safety PLCs is managed via one of its' integrated 2 RJ45 switched Ethernet communications ports.

Safety modules XPSMF2DO●●●● do not have a user program: they receive their instructions from its' parent safety PLC.

Safety remote output modules XPSMF2DO●●●●

- XPSMF2DO401 : 4 digital power outputs
- XPSMF2DO1601 : 16 digital outputs
- XPSMF2DO801 : 8 relay outputs
- XPSMF2DO1602 : 16 relay outputs

Safety communication on Ethernet network

The safety remote output modules XPSMF2DO●●●● incorporate two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs XPSMF.

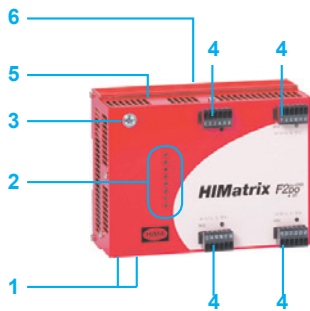
- Baud rate: 100 Mbps Half duplex, 10 Mbps Full duplex, + Autonegotiation,
- Structure: 10BASE-T/100BASE-TX,
- Medium: Dual twisted pair cable, category 5D or better (Ethernet)

Description

Remote output module XPSMF2DO401

On the front face of the metal enclosure:

- 1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 2 Eight process status LEDs.
- 3 One earth connection screw.
- 4 Four terminal blocks (1) for connection of digital outputs, with output status LED (one LED per terminal block).
- 5 On the top: one "Reset" button.
- 6 On the rear face: one spring operated fixing device for mounting on 35 mm U rail.

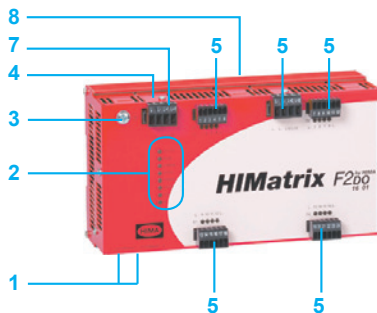


XPSMF2DO401

Remote output module XPSMF2DO1601

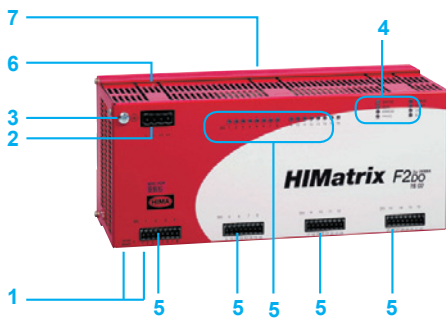
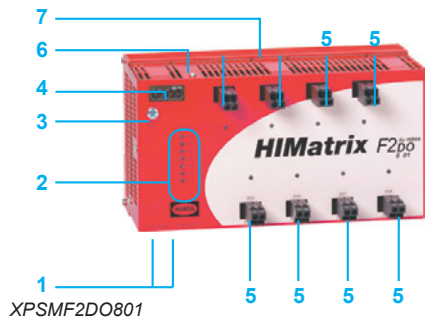
On the front face of the metal enclosure:

- 1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 2 Eight process status LEDs.
- 3 One earth connection screw.
- 4 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 5 Four terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 6 One terminal block for connection of output channels.
- 7 On the top: one "Reset" button.
- 8 On the rear face: one spring operated fixing device for mounting on 35 mm U rail.



XPSMF2DO1601

Products referenced
XPSMF2●●●●● are
marked HIMatrix F2 DO...



Description (continued)

Remote output module XPSMF2DO801

On the front face of the metal enclosure:

- 1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 2 Eight process status LEDs.
- 3 One earth connection screw.
- 4 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 5 Eight terminal blocks (1) for connection of relay outputs, with output status LED (one LED per terminal block).
- 6 **On the top:** one "Reset" button.
- 7 **On the rear face:** one spring operated fixing device for mounting on 35 mm U rail.

Remote output module XPSMF2DO1602

On the front face of the metal enclosure:

- 1 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 2 One terminal block (1) for $\bar{\text{---}}$ 24 V supply.
- 3 One earth connection screw.
- 4 Eight process status LEDs.
- 5 Four terminal blocks (1) for connection of relay outputs, with relay output status LEDs.
- 6 **On the top:** one "Reset" button.
- 7 **On the rear face:** one spring operated fixing device for mounting on 35 mm U rail.

(1) Removable screw terminals are provided with the safety output modules XPSMF2.

Products referenced
XPSMF2●●●●● are
marked HIMatrix F2 DO...

References

Safety remote output modules ($\bar{\text{---}}$ 24 V supply)

For use with	Outputs		Ports	Reference	Weight kg/ lb
	Digital	Relay			
Safety PLCs, modular 4 XPSMF60 or compact XPSMF40 and XPSMF31/30/35	4	–	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF2DO401	0.800/ 1.764
	16	–	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF2DO1601	0.850/ 1.874
	–	8	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF2DO801	1.300/ 2.866
	–	16	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF2DO1602	2.000/ 4.409

Monitor and Processing

Preventa safety PLCs

Compact and modular

Safety remote mixed I/O modules XPSMF3



XPSMF3DIO8801



XPSMF3DIO16801



XPSMF3DIO20802



XPSMF3AIO8401

Products referenced XPSMF2●●●●●● are marked HIMatrix F2 DO...

Presentation

XPSMF3DIO/AIO are compact safety remote input/output modules which are designed to extend the I/O capacity of safety PLCs XPSMF, either compact or modular, to which they are associated.

The communication with either the compact or modular safety PLCs is managed via one of its' integrated 2 RJ45 switched Ethernet communications ports.

Safety modules XPSMF3DIO/AIO do not have a user program: they receive their instructions from its' parent safety PLC.

Safety remote mixed I/O modules XPSMF3DIO/AIO

Mixed I/O safety modules	Remote inputs		Remote outputs	
	N°	Type	N°	Type
XPSMF3DIO8801	8	Digital	8 DO+ / 2 DO-	Digital
			2	Line control
XPSMF3DIO16801	16	Digital	8 2-pole or 16 single-pole	Digital
			2	Line control
XPSMF3DIO20802	20	Digital	8	Digital
XPSMF3AIO8401	8	Analogue	4	Analogue (non safety outputs)

Safety communication on Ethernet network

The safety remote mixed I/O modules XPSMF3●IO●●●● incorporate two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, that enable communication on the Ethernet network using SafeEthernet communication protocol and therefore, data exchange with compact or modular safety PLCs XPSMF.

- Baud rate: 100 Mbps Half duplex, 10 Mbps Full duplex, + Autonegotiation,
- Structure: 10BASE-T/100BASE-TX,
- Medium: Dual twisted pair cable, category 5D or better (Ethernet).

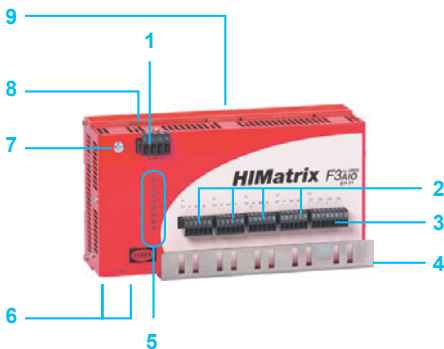
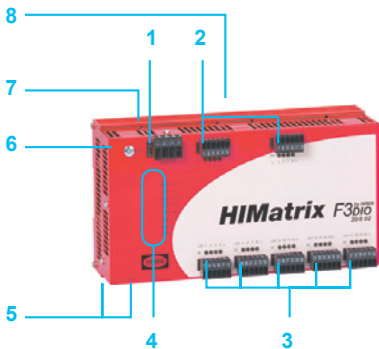
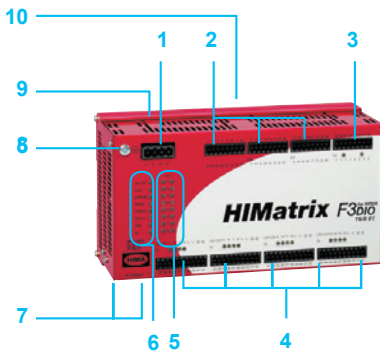
Monitor and Processing

Preventa safety PLCs

Compact and modular

Safety remote mixed I/O modules XPSMF3

3



Description

Remote mixed I/O module XPSMF3DIO8801

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{0}$ 24 V supply.
- 2 One terminal block (1) for connection of line control outputs, with four line control output status LEDs.
- 3 Two terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block).
- 4 Two terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 5 Eight process status LEDs.
- 6 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 7 One earth connection screw.
- 8 One "Reset" button (on the top).
- 9 **On the rear face:** One spring operated fixing device for mounting on 35 mm \bar{L} rail.

Remote mixed I/O module XPSMF3DIO16801

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{0}$ 24 V supply.
- 2 Three terminal blocks for connection of digital output channels.
- 3 One terminal block (1) for connection of line control outputs.
- 4 Four terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 5 Sixteen digital output status LEDs.
- 6 Eight process status LEDs.
- 7 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 8 One earth connection screw.
- 9 One "Reset" button (on the top).
- 10 **On the rear face:** One spring operated fixing device for mounting on 35 mm \bar{L} rail.

Remote mixed I/O module XPSMF3DIO20802

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{0}$ 24 V supply.
- 2 Two terminal blocks (1) for connection of digital outputs, with output status LED (four LEDs per terminal block)
- 3 Five terminal blocks (1) for connection of digital inputs, with input status LED (four LEDs per terminal block).
- 4 Eight process status LEDs.
- 5 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 6 One earth connection screw.
- 7 One "Reset" button (on the top).
- 8 **On the rear face:** One spring operated fixing device for mounting on 35 mm \bar{L} rail.

Remote mixed I/O module XPSMF3AIO8401

On the front face of the metal enclosure:

- 1 One terminal block (1) for $\bar{0}$ 24 V supply.
- 2 Four terminal blocks (1) for connection of analogue inputs.
- 3 One terminal block (1) for connection of analogue outputs.
- 4 One metal plate for securing shielded analogue input/output connection cables (EMC).
- 5 Eight process status LEDs.
- 6 Two RJ45 (type 10BASE-T/100BASE-TX) integrated switched ports, for connection on Ethernet network and for configuring IP address.
- 7 One earth connection screw.
- 8 One "Reset" button (on the top).
- 9 **On the rear face:** one spring operated fixing device for mounting on 35 mm \bar{L} rail.

(1) Removable screw terminals are provided with the safety remote mixed I/O modules XPSMF3DIO/AIO.

Monitor and Processing

Preventa safety PLCs

Compact and modular

Safety remote mixed I/O modules XPSMF3

References

Safety remote mixed I/O modules (24 V supply)

For use with	Inputs		Outputs		Ports	Reference	Weight kg/ lb
	Digital	Analogue	Digital	Line control			

Safety PLCs, modular 8 XPSMF60 or compact XPSMF40 and XPSMF31/30/35	-	-	8 DO+ 2 DO-	2	-	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF3DIO8801 1.000/ 2.205
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XPSMF3DIO8801

	16	-	8 x 2 or 16 x 1	2	-	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF3DIO16801 1.300/ 2.866
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XPSMF3DIO16801

	20	-	8 (1)	-	-	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF3DIO20802 1.000/ 2.205
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XPSMF3DIO20802

	-	8	-	-	4	Integrated 2 RJ45 switched Ethernet communications ports	XPSMF3AIO8401 0.950/ 2.094
--	---	---	---	---	---	--	----------------------------------



XPSMF3AIO8401

Products referenced
XPSMF3●●●●● are
marked HIMatrix F3...

(1) Configurable for line control.

Configuration software

■ Reference **SSV1XPSMFWIN** is the full version of software **XPSMFWIN** version 4.1 and must be installed if no previous version of this software has been installed.

Description	Operating system	Languages	Reference	Weight kg/ lg
Configuration software XPSMFWIN for programming compact safety PLCs CD-ROM + user manual	Windows 2000, Windows XP	English, German, French	SSV1XPSMFWIN	0,520/ 1.146

Phaseo regulated switch mode power supplies

Mains input voltage	Output voltage	Nominal power	Nominal current	Auto-protect reset	Conformity to standard	Reference	Weight
V	⋯ V	W	A		IEC EN 61000-3-2 and IEC EN 60950		kg/ lg
Single-phase (N-L1) or 2-phase (L1-L2) connection							
~ 100...120 V/200...500 - 15%, + 10% 50/60 Hz	24...28.8	72	3	Auto/Manual	Yes	ABL8RPS24030	0.300/ 0.661
		120	5	Auto/Manual	Yes	ABL8RPS24050	0.700/ 1.543
		240	10	Auto/Manual	Yes	ABL8RPS24100	1.000/ 2.205
Single-phase connection							
~ 100...240 (1) wide range, 47...63 Hz	12	60	5	Auto	No	ABL1REM12050	0.440/ 0.970
	24	60	2.5	Auto	No	ABL1REM24025	0.440/ 0.970
~ 100...120/200...240 (2)	24	240	10	Auto	No	ABL1REM24100	0.880/ 1.940

Magelis multifunction graphic terminals

Magelis multifunction graphic terminals with touch sensitive screen and on-board Ethernet:
see our offer on www.schneider-electric.com

3



ABL8RPS24050



ABL1REM24025



490NTW000●●

Connecting cables for network and bus

Connection to Ethernet network
 Cable conforming to standard EIA/TIA-568 category 5 and IEC 1180/EN 50 173 class D. For UL and CSA 22.1 approved cables, add the letter U to the end of the reference.

Description	Pre-fitted connectors	Length (m)	Reference	Weight kg
Shielded twisted pair cables, straight through	2 RJ45 connectors For connection to DTE (Data Terminal Equipment)	2	490NTW00002	-
		5	490NTW00005	-
		12	490NTW00012	-
		40	490NTW00040	-
		80	490NTW00080	-
Shielded twisted pair cables, crossed wires	2 RJ45 connectors For connection between hubs, switches and transceivers	5	490NTC00005	-
		15	490NTC00015	-
		40	490NTC00040	-
		80	490NTC00080	-

Connection to Modbus serial link

Description	Use		Length (m)	Reference	Weight kg/lb
	From	To			
Trunk cables, shielded dual twisted pair, RS 485	Compact safety PLCs XPSMF4020/MF4022 (RJ45)	Modbus splitter box LU9GC3 (RJ45)	100	TSXCSA100	5.680/ 12.552
			200	TSXCSA200	10.920/ 24.074
			500	TSXCSA500	30.000/ 66.139
Adaptor for cable XBTZ938	Graphic terminals XBTGT (SUB-D 9-pin)	Modbus splitter box LU9GC3 (RJ45)	2.5	XBTZ938 (1)	0.210/ 0.463
			0.2	XBTZG909	-

Description	Characteristics	Sold in lots of	Unit reference	Weight kg/lb
End of line adaptors For RJ45 connector	R = 120 Ω, C = 1 nF	2	VW3A8306RC	0.200/ 0.441
	R = 150 Ω	2	VW3A8306R	0.010/ 0.022

PROFIBUS DP bus connection components

Description	Profile	Services	Reference	Weight kg/lb
PROFIBUS DP module set for Premium PLCs	Master, 12 Mbps	Class 1 and Class 2 master V0 functions, see characteristics. PROFIBUS FMS messaging not supported	TSXPBY100	0.870/ 1.918

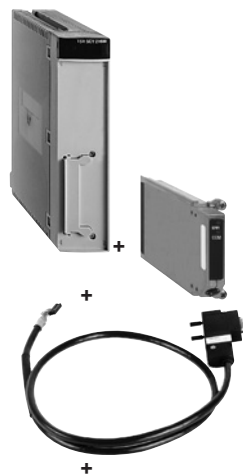
Description	Use	Reference	Weight kg/lb
Remote inputs/outputs on PROFIBUS DP bus	Modicon STB network interface module	STBNDP2112	0.140/ 0.309
	Momentum communication module	170DTN11000	-

Description	Use	Reference	Weight kg
Connectors for remote I/O communication module	Line terminators	490NAD91103	-
	Intermediate connection	490NAD91104	-
	Intermediate connection and terminal port	490NAD91105	-

Description	Length (m)	Reference	Weight kg
PROFIBUS DP connecting cables	100	TSXPBSCA100	-
	400	TSXPBSCA400	-

Description	Reference	Weight kg
Replacement parts	Main bus junction box	490NAE91100
	PCMCIA card	467NHP81100

(1) Requires adaptor XBTZG909.



TSXPBY100



490NAD91103

3

Applications

Illuminated beacons and tower lights



Features

Conformity to standards

Protective treatment

Ambient temperature
For operation
For storage

Electric shock protection conforming to IEC 61140

Degree of protection conforming to IEC 60529, UL 508 and CSA C22-2 n° 14

Rated insulation voltage

Rated impulse withstand voltage conforming to EN/IEC 60947-1

Type references

Pages

Direct fixing or on support tube

EN/IEC 60947-5-1,
UL 508,
CSA C22-2 n°14,
CCC,
Gost

Standard version, "TC"

See page 3/140
- 40...+ 70 °C

Class I: mounted on support tube
Class II: mounted directly

IP 65 (mounted on fixing base XVB Z0●)
IP 66 (mounted directly on base unit)

Ui = 250 V conforming to EN/IEC 60947-1

Uimp = 4 kV

XVBL, XVBC

3/140

Rotating beacons for long distance signalling applications

Sirens and electronic alarms for long distance signalling applications



3

Super Bright LED	Power - 106 db, 2 tones - 105 db, 43 tones
Ø 84 to 120 mm : EN/IEC 61000-6-2 and EN/IEC 61000-6-4, Ø 130 mm: EN/IEC 60947-1 and EN/IEC 60947-5-1, UL 508, CSA C22-2-14	XVS10 and XVS14 : EN/IEC 60947-1 and EN/IEC 60947-5-1, XVS14BMW : EN/IEC 61000-6-2 and EN/IEC 61000-6-3
Standard version, "TC"	Standard version, "TC"
Ø 84 to 120 mm: - 10..+ 50 °C, Ø 130 mm: - 30..+ 50 °C ()	XVS10 : - 30..+ 50 °C XVS14 : - 10..+ 50 °C
- 35...+ 70 °C	- 35...+ 70 °C
Class II	Class II
Ø 84: IP 23 (IP 65 with accessory), Ø 106: IP 23 (IP 55 with accessory), Ø 120: IP 23, Ø 130: IP 66 and/or IP 67	IP 53
-	-
Ø 84 to 120 mm: Uimp = 0.8 kV, Ø 130 mm: Uimp = 4 kV	⎓ 12-24 and ⎓ 12/24 V: Uimp = 0.8 kV, ⎓ 120/230 and ~ 120/240 V: Uimp = 4 kV
XVR	XVS10, XVS14
3/149	3/151



More technical information on www.schneider-electric.com

Stop the machine

Modular tower lights

Harmony® type XVBL Ø 70 mm

Illuminated beacons for incandescent bulbs or LEDs
(BA 15d base fitting)



PF11045B

XVBL3●

3



PF11045B

XVBL4B●

Illuminated beacons with steady light signalling

Description	Light source, to be ordered separately (1)	Colour	Reference	Weight kg
Complete unit comprising: - 1 illuminated unit - 1 base unit for direct fixing (IP 66) or tube fixing (IP 65)	Incandescent bulb 7 W max. 250 V max.	Green	XVBL33	0.260
		Red	XVBL34	0.260
		Orange	XVBL35	0.260
		Blue	XVBL36	0.260
		Clear	XVBL37	0.260
		Yellow	XVBL38	0.260

Illuminated beacons with integral flashing light signalling

Description	Light source, to be ordered separately (1)	Colour	Reference	Weight kg	
Complete unit comprising: - 1 illuminated unit - 1 base unit for direct fixing (IP 66) or tube fixing (IP 65)	Incandescent bulb 7 W max. ~ 24 V --- 24...48 V	Green	XVBL4B3	0.280	
		Red	XVBL4B4	0.280	
		Orange	XVBL4B5	0.280	
		Blue	XVBL4B6	0.280	
		Clear	XVBL4B7	0.280	
		Yellow	XVBL4B8	0.280	
		Incandescent bulb 7 W max. ~ 48...230 V	Green	XVBL4M3	0.280
			Red	XVBL4M4	0.280
Orange	XVBL4M5		0.280		
Blue	XVBL4M6		0.280		
Clear	XVBL4M7		0.280		
Yellow	XVBL4M8		0.280		

(1) Incandescent bulbs and LEDs, see page 3/147.

Stop the machine

Modular tower lights

Harmony® type XVBL Ø 70 mm

Illuminated beacons with LED light source

101407SE



XVBL0B●

PF110455



XVBL1B●

Illuminated beacons with steady light signalling

Description	Light source	Colour	Reference	Weight kg	
Complete unit comprising: - 1 illuminated unit - 1 base unit for direct fixing (IP 66) or tube fixing (IP 65)	LED, included ~ 24 V	Green	XVBL0B3	0.270	
		Red	XVBL0B4	0.270	
		Orange	XVBL0B5	0.270	
		Blue	XVBL0B6	0.270	
		Clear	XVBL0B7	0.270	
		Yellow	XVBL0B8	0.270	
		LED, included ~ 120 V	Green	XVBL0G3	0.270
			Red	XVBL0G4	0.270
Orange	XVBL0G5		0.270		
Blue	XVBL0G6		0.270		
Clear	XVBL0G7		0.270		
Yellow	XVBL0G8		0.270		
LED, included ~ 230 V	Green		XVBL0M3	0.270	
	Red		XVBL0M4	0.270	
	Orange	XVBL0M5	0.270		
	Blue	XVBL0M6	0.270		
	Clear	XVBL0M7	0.270		
	Yellow	XVBL0M8	0.270		

Protected
LED

Illuminated beacons with integral flashing light signalling

Description	Light source	Colour	Reference	Weight kg	
Complete unit comprising: - 1 illuminated unit - 1 base unit for direct fixing (IP 66) or tube fixing (IP 65)	LED, included ~ 24 V	Green	XVBL1B3	0.280	
		Red	XVBL1B4	0.280	
		Orange	XVBL1B5	0.280	
		Blue	XVBL1B6	0.280	
		Clear	XVBL1B7	0.280	
		Yellow	XVBL1B8	0.280	
		LED, included ~ 120 V	Green	XVBL1G3	0.280
			Red	XVBL1G4	0.280
Orange	XVBL1G5		0.280		
Blue	XVBL1G6		0.280		
Clear	XVBL1G7		0.280		
Yellow	XVBL1G8		0.280		
LED, included ~ 230 V	Green		XVBL1M3	0.280	
	Red		XVBL1M4	0.280	
	Orange	XVBL1M5	0.280		
	Blue	XVBL1M6	0.280		
	Clear	XVBL1M7	0.280		
	Yellow	XVBL1M8	0.280		

Protected
LED

Stop the machine

Modular tower lights

Harmony® type XVBL Ø 70 mm

Illuminated beacons with flash discharge tube



XVBL6B●

3



XVBL8B●

Illuminated beacons with 5 Joule flash discharge tube

Description	Light source	Colour	Reference	Weight kg	
Complete unit comprising: - 1 illuminated unit - 1 base unit for direct fixing (IP 66) or tube fixing (IP 65)	Integral flash discharge tube ~ 24 V	Green	XVBL6B3	0.440	
		Red	XVBL6B4	0.440	
		Orange	XVBL6B5	0.440	
		Blue	XVBL6B6	0.440	
		Clear	XVBL6B7	0.440	
		Yellow	XVBL6B8	0.440	
		Integral flash discharge tube ~ 120 V	Green	XVBL6G3	0.425
				XVBL6G4	0.425
XVBL6G5	0.425				
XVBL6G6	0.425				
XVBL6G7	0.425				
XVBL6G8	0.425				
Integral flash discharge tube ~ 230 V	Green			XVBL6M3	0.435
				XVBL6M4	0.435
		XVBL6M5	0.435		
		XVBL6M6	0.435		
		XVBL6M7	0.435		
		XVBL6M8	0.435		

Illuminated beacons with 10 Joule flash discharge tube

Description	Light source	Colour	Reference	Weight kg	
Complete unit comprising: - 1 illuminated unit - 1 base unit for direct fixing (IP 66) or tube fixing (IP 65)	Integral flash discharge tube ~ 24 V	Green	XVBL8B3	0.450	
		Red	XVBL8B4	0.450	
		Orange	XVBL8B5	0.450	
		Blue	XVBL8B6	0.450	
		Clear	XVBL8B7	0.450	
		Yellow	XVBL8B8	0.450	
		Integral flash discharge tube ~ 120 V	Green	XVBL8G3	0.460
				XVBL8G4	0.460
XVBL8G5	0.460				
XVBL8G6	0.460				
XVBL8G7	0.460				
XVBL8G8	0.460				
Integral flash discharge tube ~ 230 V	Green			XVBL8M3	0.460
				XVBL8M4	0.460
		XVBL8M5	0.460		
		XVBL8M6	0.460		
		XVBL8M7	0.460		
		XVBL8M8	0.460		

Stop the machine

Modular tower lights

Harmony® type XVBC Ø 70 mm

Tower lights for customer assembly (up to 5 units)

Illuminated units for incandescent bulbs or LEDs (BA 15d base fitting)

For use with base unit XVBC●●: see page 3/146

101405SE



XVBC3●

821002



XVBC4●●

Illuminated units with steady light signalling

Description	Light source, to be ordered separately (1)	Colour	Reference	Weight kg
Illuminated units	Incandescent bulb 7 W max. 250 V max. or LED	Green	XVBC33	0.140
		Red	XVBC34	0.140
		Orange	XVBC35	0.140
		Blue	XVBC36	0.140
		Clear	XVBC37	0.140
		Yellow	XVBC38	0.140

Illuminated units with integral flashing light signalling

Description	Light source, to be ordered separately (1)	Colour	Reference	Weight kg	
Illuminated units	Incandescent bulb 7 W max. ~ 24 V ~ 24...48 V or LED	Green	XVBC4B3	0.160	
		Red	XVBC4B4	0.160	
		Orange	XVBC4B5	0.160	
		Blue	XVBC4B6	0.160	
		Clear	XVBC4B7	0.160	
		Yellow	XVBC4B8	0.160	
		Incandescent bulb 7 W max. ~ 48...230 V or LED	Green	XVBC4M3	0.160
			Red	XVBC4M4	0.160
	Orange		XVBC4M5	0.160	
	Blue		XVBC4M6	0.160	
	Clear		XVBC4M7	0.160	
	Yellow		XVBC4M8	0.160	

(1) Incandescent bulbs and LEDs, see page 3/147.

Stop the machine

Modular tower lights

Harmony® type XVBC Ø 70 mm

Tower lights for customer assembly (up to 5 units)

Illuminated units with integral LED

For use with base unit XVBC●●: see page 3/146



XVBC2●●

3



XVBC5●●

Illuminated units with steady light signalling

Description	Voltage	Colour	Reference	Weight kg	
Illuminated units with integral LED	≈ 24 V	Green	XVBC2B3 (1)	0.150	
		Red	XVBC2B4 (1)	0.150	
		Orange	XVBC2B5 (1)	0.150	
		Blue	XVBC2B6 (1)	0.150	
		Clear	XVBC2B7 (1)	0.150	
		Yellow	XVBC2B8 (1)	0.150	
		~ 120 V	Green	XVBC2G3	0.150
			Red	XVBC2G4	0.150
	Orange		XVBC2G5	0.150	
	Blue		XVBC2G6	0.150	
	Clear		XVBC2G7	0.150	
	Yellow		XVBC2G8	0.150	
	~ 230 V		Green	XVBC2M3	0.150
			Red	XVBC2M4	0.150
		Orange	XVBC2M5	0.150	
		Blue	XVBC2M6	0.150	
Clear		XVBC2M7	0.150		
Yellow		XVBC2M8	0.150		

Protected LED

Illuminated units with integral flashing light signalling

Description	Voltage	Colour	Reference	Weight kg	
Illuminated units with integral LED	≈ 24 V	Green	XVBC5B3	0.170	
		Red	XVBC5B4	0.170	
		Orange	XVBC5B5	0.170	
		Blue	XVBC5B6	0.170	
		Clear	XVBC5B7	0.170	
		Yellow	XVBC5B8	0.170	
		~ 120 V	Green	XVBC5G3	0.170
			Red	XVBC5G4	0.170
	Orange		XVBC5G5	0.170	
	Blue		XVBC5G6	0.170	
	Clear		XVBC5G7	0.170	
	Yellow		XVBC5G8	0.170	
	~ 230 V		Green	XVBC5M3	0.170
			Red	XVBC5M4	0.170
		Orange	XVBC5M5	0.170	
		Blue	XVBC5M6	0.170	
		Clear	XVBC5M7	0.170	
		Yellow	XVBC5M8	0.170	

Protected LED

(1) To order an illuminated unit with integral LED pre-fitted with light diffuser XVBCZ18, add the letter "D" to the end of the reference. Example: XVBC2B3D.

Stop the machine

Modular tower lights

Harmony® type XVBC Ø 70 mm

Tower lights for customer assembly (up to 5 units)

Illuminated units with integral flash discharge tube

For use with base unit XVBC●●: see page 3/146

821006



XVBC6●●

821006



XVBC8●●

Illuminated units with 5 Joule flash discharge tube (1)

Description	Light source	Colour	Reference	Weight kg	
Illuminated units	Integral flash discharge tube ~ 24 V	Green	XVBC6B3	0.295	
		Red	XVBC6B4	0.295	
		Orange	XVBC6B5	0.295	
		Blue	XVBC6B6	0.295	
		Clear	XVBC6B7	0.295	
		Yellow	XVBC6B8	0.295	
		Integral flash discharge tube ~ 120 V	Green	XVBC6G3	0.280
			Red	XVBC6G4	0.280
	Orange		XVBC6G5	0.280	
	Blue		XVBC6G6	0.280	
	Clear		XVBC6G7	0.280	
	Yellow		XVBC6G8	0.280	
	Integral flash discharge tube ~ 230 V	Green	XVBC6M3	0.290	
		Red	XVBC6M4	0.290	
		Orange	XVBC6M5	0.290	
		Blue	XVBC6M6	0.290	
		Clear	XVBC6M7	0.290	
		Yellow	XVBC6M8	0.290	

Illuminated units with 10 Joule flash discharge tube (1)

Description	Light source	Colour	Reference	Weight kg	
Illuminated units	Integral flash discharge tube ~ 24 V	Green	XVBC8B3	0.305	
		Red	XVBC8B4	0.305	
		Orange	XVBC8B5	0.305	
		Blue	XVBC8B6	0.305	
		Clear	XVBC8B7	0.305	
		Yellow	XVBC8B8	0.305	
		Integral flash discharge tube ~ 48 V	Orange	XVBC8E5	0.315
	Integral flash discharge tube ~ 120 V	Green	XVBC8G3	0.315	
		Red	XVBC8G4	0.315	
		Orange	XVBC8G5	0.315	
		Blue	XVBC8G6	0.315	
		Clear	XVBC8G7	0.315	
		Yellow	XVBC8G8	0.315	
	Integral flash discharge tube ~ 230 V	Green	XVBC8M3	0.315	
		Red	XVBC8M4	0.315	
		Orange	XVBC8M5	0.315	
		Blue	XVBC8M6	0.315	
		Clear	XVBC8M7	0.315	
		Yellow	XVBC8M8	0.315	

(1) **Warning:** illuminated units with a flash discharge tube are not suitable for steady light signalling due to the heat generated.

Stop the machine

Modular tower lights

Harmony® type XVBC Ø 70 mm

Tower lights for customer assembly (up to 5 units)

Audible units, base units, cover, accessories

821007



XVBC9●

Audible units

Description	Characteristics	Reference	Weight kg
Buzzer, 90 dB at 1 m Adjustable with microswitch: - from 70 to 90 dB - continuous or intermittent tone	≈ 12...48 V	XVBC9B	0.170
	≈ 120...230 V	XVBC9M	0.180

Base units - for direct (IP 66) or tube fixing

Description	For use with	Type	Reference	Weight kg
Base unit + cover with bottom or side cable entry	Modular tower lights without flash discharge tube unit	Standard	XVBC21	0.190
Base unit only with bottom or side cable entry	Modular tower lights with flash discharge tube unit	Standard	XVBC07	0.160
Base unit + cover with side cable entry	All types of modular tower lights	AS-Interface (1)	XVBC21A	–
Base unit + cover with bottom entry, pre-cabled (length 1 m) and fitted with M12 end connector	All types of modular tower lights	AS-Interface (1)	XVBC21B	–

Accessories specific to tower lights XVBC

Description	Application	Unit reference	Weight kg
Cover only	For use with XVBC2, XVBC3, XVBC4, XVBC5 and XVBC9	XVBC081	0.030
Set of 6 coloured markers	For identification of the position of units in the event of dismantling the modular tower light	XVBC22	0.001
Set of 5 legend holders	For identification of stacked units on base unit	XVBC23	0.002
Sheet of 85 legends	For use with base unit legend holder XVBC23	XVBCY1	0.005
Sheet of 52 legends	For identification of stacked units, used on locking ring	XVBCY2	0.005
Adaptor for side entry through base unit	With 13P cable gland	XVBC14	0.015
SIS labelling software (in English, French, German, Italian and Spanish)	For creating legends	XBY2U	0.100
Light diffuser, clear plastic (Sold in boxes)	Only for use with LED illuminated units (all colours) One box allows to equip 5 illuminated units.	XVBZ18	0.080

(1) For further information on AS-Interface connections, refer to our "Industrial communication in machines and installations" catalogue.

3

1013965E



XVBC07

1078308E



XVBC081

DF54420



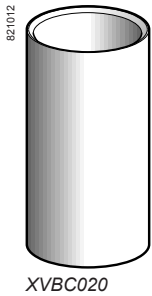
XVBZ18

Stop the machine

Modular tower lights

Harmony® type XVB Ø 70 mm

Illuminated beacons, tower lights for customer assembly (up to 5 units)



DL1BD●●/DL1BK●●

Accessories common to beacons XVB L and tower lights XVB C

Description	Height under base unit (mm)	Colour	Reference	Weight kg
Fixing bases comprising Ø 25 mm aluminium support tube glued into a black plastic fixing plate (IP 65)	80	Black aluminium	XVBZ02	0.110
	380	Aluminium	XVBZ02A	0.110
		Black aluminium	XVBZ03	0.200
	780	Aluminium	XVBZ03A	0.200
		Black aluminium	XVBZ04	0.325
	Aluminium	XVBZ04A	0.325	

Description	For use with	Material	Reference	Weight kg
Support tube concealment cover	Support tubes XVBZ02, XVBZ02A	ABS	XVC020	0.080
	Support tubes XVBZ03, XVBZ03A	ABS	XVC030	0.305
	Support tubes XVBZ04, XVBZ04A	ABS	XVC040	0.610
Ø 25 mm aluminium support tube	Fixing plate XVBZ01 (to be glued into the plastic fixing plate)	Plastic	XVBZ14	0.690
Fixing plate for use on horizontal support	Ø 25 mm aluminium support tube	Plastic	XVBZ01	0.050
Fixing plate for use on vertical support	Base unit (direct mounting), fixing plate XVBZ01 or fixing bases XVBZ0●	Zamak	XVC12	0.380

Description	Characteristics	Sold in lots of	Unit reference	Weight kg	
Incandescent bulbs (1) BA 15d base fitting	12 V	7 W	10	DL1BEJ	0.090
	24 V	6.5 W	10	DL1BEB	0.090
	48 V	6 W	10	DL1BEE	0.090
	120 V	7 W	10	DL1BEG	0.090
	230 V	7 W	10	DL1BEM	0.090

LEDs (1) BA 15d base fitting	~ 24 V	White	1	DL1BDB1	0.015	
Protected LED	~ 24 V	Green	1	DL1BDB3	0.015	
		Red	1	DL1BDB4	0.015	
		Orange	1	DL1BDB5	0.015	
		Blue	1	DL1BDB6	0.015	
		Yellow	1	DL1BDB8	0.015	
		~ 120 V	White	1	DL1BDG1	0.015
			Green	1	DL1BDG3	0.015
			Red	1	DL1BDG4	0.015
	Orange		1	DL1BDG5	0.015	
	Blue		1	DL1BDG6	0.015	
	Yellow		1	DL1BDG8	0.015	
	~ 230 V		White	1	DL1BDM1	0.015
			Green	1	DL1BDM3	0.015
		Red	1	DL1BDM4	0.015	
		Orange	1	DL1BDM5	0.015	
		Blue	1	DL1BDM6	0.015	
Yellow		1	DL1BDM8	0.015		

Flashing LEDs (1) BA 15d base fitting	~ 24 V	White	1	DL1BKB1	0.015	
Protected LED	~ 24 V	Green	1	DL1BKB3	0.015	
		Red	1	DL1BKB4	0.015	
		Orange	1	DL1BKB5	0.015	
		Blue	1	DL1BKB6	0.015	
		Yellow	1	DL1BKB8	0.015	
		~ 120 V	White	1	DL1BKG1	0.015
			Green	1	DL1BKG3	0.015
			Red	1	DL1BKG4	0.015
	Orange		1	DL1BKG5	0.015	
	Blue		1	DL1BKG6	0.015	
	Yellow		1	DL1BKG8	0.015	
	~ 230 V		White	1	DL1BKM1	0.015
			Green	1	DL1BKM3	0.015
		Red	1	DL1BKM4	0.015	
		Orange	1	DL1BKM5	0.015	
		Blue	1	DL1BKM6	0.015	
		Yellow	1	DL1BKM8	0.015	

(1) Warning: illuminated units with incandescent bulbs must not be combined with LED illuminated units, due to the risk of overheating. Also, when different units (e.g. steady, flashing...) are combined, the maximum temperature is limited to that of the weaker unit.



Stop the machine

Rotating beacons Harmony® type XVR (equipped with Super Bright LED)



XVR13...L

3

Presentation

The rotating beacons in the Harmony® XVR range are optical signalling units designed for long distance signalling applications. They are used mainly in the iron and steel industry, on industrial handling vehicles or for safety applications.

The range involves complete products offering simplicity of use and speed of installation: they are supplied pre-cabled, and equipped with their light source. The use of "Super-bright" LED's guarantees a good illuminating power and a long service life (reduced time for maintenance) owing to their high resistance to mechanical shock and vibration. These light sources are also energy saving with low power consumption. A reflecting prism can be used for increasing light diffusion.

4 sizes are available:

- Ø 84 mm (XVR08). Colours : red, orange, green and blue,
- Ø 106 mm (XVR10). Colours : red, orange, green and blue,
- Ø 120 mm (XVR12). Colours : red, orange, green and blue,
- Ø 130 mm (XVR13). Colours : red, orange.

For more efficiency, Ø 120 mm rotating beacons may be delivered with a complementary audible unit: a buzzer present at the base of the product, with a continuous or intermittent tone and an adjustable sound level of 50 dB to 90 dB at 1 m.

Environment

XVR rotating beacons can offer a high degree of protection:

- owing to the adjunction of an accessory : a rubber base guarantees a degree of protection type IP 55 or IP 65 for small models,
- according to the selected model: Ø 130 mm rotating beacons guarantee a degree of protection type IP 66 (resistant to vibration) or IP 67 (see opposite page).

These products meet the requirements of the following standards:

- EN/IEC 61000-6-2 and EN/IEC 61000-6-4 for Ø 84 mm (XVR08), 106 mm (XVR10), 120 mm (XVR12) and 130 mm with direct current (XVR13B●● and XVR13J●●),
- EN/IEC 60947-1 and EN/IEC 60947-5-1 for the other Ø 130 mm rotating beacons (XVR13●●L) with voltage 24V A.C./D.C., 120 V A.C. or 230 V A.C.

These products are CE, UL and CSA certified.

Connection

The connection is through flying leads, length 400 mm (500 mm for XVR08) and section 0.83 mm² (1,25 mm² for XVR13).

Stop the machine

Rotating beacons Harmony® type XVR (equipped with Super Bright LED)



Complete, pre-cabled rotating beacons

Diameter mm	Sound option	IP degree of protection	Voltage V	Colour	Reference	Weight kg	
Ø 84	Without buzzer	IP 23 (IP 65 With accessories)	~ 12	Red	XVR08J04	0.300	
				Orange	XVR08J05	0.300	
				Green	XVR08J03	0.300	
			~ 24	Blue	XVR08J06	0.300	
				Red	XVR08B04	0.300	
				Orange	XVR08B05	0.300	
	Ø 106	Without buzzer	IP 23 (IP 55 With accessories)	~ 12	Red	XVR10J04	0.500
					Orange	XVR10J05	0.500
					Green	XVR10J03	0.500
				~ 24	Blue	XVR10J06	0.500
					Red	XVR10B04	0.500
					Orange	XVR10B05	0.500
Ø 120	Without buzzer	IP 23	~ 12	Red	XVR12J04	0.500	
				Orange	XVR12J05	0.500	
				Green	XVR12J03	0.500	
			~ 24	Blue	XVR12J06	0.500	
				Red	XVR12B04	0.500	
				Orange	XVR12B05	0.500	
	Ø 120	With buzzer Continuous or intermittent tone Sound level at 1 m: 50 to 90 dB	IP 23	~ 12	Red	XVR12J04S	0.500
					Orange	XVR12J05S	0.500
					Green	XVR12J03S	0.500
				~ 24	Blue	XVR12J06S	0.500
					Red	XVR12B04S	0.500
					Orange	XVR12B05S	0.500
Ø 130	Without buzzer	IP 66 Resistant to vibration	~ 12	Red	XVR13J04	0.800	
				Orange	XVR13J05	0.800	
			~ 24	Red	XVR13B04	0.800	
		Orange		XVR13B05	0.800		
		IP 66 and IP 67		~ 24	Red	XVR13B04L	0.820
			Orange		XVR13B05L	0.820	
	~ 120		Red	XVR13G04L	0.990		
		Orange	XVR13G05L	0.990			
		~ 230	Red	XVR13M04L	0.990		
	Orange		XVR13M05L	0.990			

Accessories for rotating beacons

Description	To be used for / with	Diameter mm	Height mm	Reference	Weight kg
Reflecting prism	Increasing light diffusion	84	–	XVRZR1	0.010
		106	–	XVRZR2	0.015
		120/130	–	XVRZR3	0.020
Rubber base	Reaching IP 65	84	–	XVRZ081	0.040
	Reaching IP 55	106	–	XVRZ082	0.050
Metal angle bracket	Horizontal support	84, 106, 120	–	XVCZ23	0.380
		130	–	XVR012L	1.300
Metal fixing plate	Horizontal support	106, 120	300	XVCZ13	0.700

Stop the machine

Sound units Harmony® type XVS

Sirens and electronic alarms



XVS10●M

3

Presentation

The sirens and electronic alarms in the Harmony® XVS range are audible signalling units used for long distance indication of the operating status or sequences of a machine or installation. They are mainly used on conveyor belts, on automated industrial trucks and on the doors of electrical control panels.

The range involves several types of ready to use products:

- sirens with 2 tones, with very compact size, type XVS10,
- multisound sirens (43 tones), pre-cabled, 8 channels, type XVS14.

The sound, with continuous or intermittent tone:

- guarantees a sound level of 106 dB at 1 m for XVS10,
- can be adjusted from 0 to 105 dB at 1 m for XVS14.

Environment

The XVS sirens and electronic alarms offer the following degree of protection: IP 53 for sirens type XVS10 and XVS14.

These products meet the requirements of the following standards:

- EN/IEC 61000-6-2 and EN/IEC 61000-6-3 for voltages 120 V and 230 V A.C. (XVS14BMW),
- EN/IEC 60947-1 and EN/IEC 60947-5-1 for voltages 12 V and 24 V A.C. (XVS10, XVS14GMW and MMW).

They are CE, UL and CSA certified.

Connection

Products are to be connected:

- through cable-glands for using 6.5 mm to 8.5 mm cables (XVS10)
- through power wire c.s.a.: 0.52 mm² and signal wire c.s.a.: 0.33 mm², with flying leads, length 500 mm (XVS14),

For more technical information, please refer to our website www.schneider-electric.com.

Stop the machine

Sound units Harmony® type XVS

Sirens and electronic alarms



XVS10●M



XVS14●MW

References				
Description	Voltage	Colour	Reference	Weight
	V			kg
Sirens 106 dB, 2 tones	~ 12-24	White	XVS10BMW	0.800
	~ 120	White	XVS10GMW	1.000
	~ 230	White	XVS10MMW	1.000
Multisound sirens 0 to 105 dB, 43 tones 8 channels Pre-wired	~ 12/24	White	XVS14BMW	1.000
	~ 120	White	XVS14GMW	1.200
	~ 240	White	XVS14MMW	1.200

Stop the machine

Mini-VARIO and VARIO switch disconnectors

Applications

Mini-Vario and Vario rotary switch disconnectors from 12 to 175 A are suitable for on-load making and breaking of resistive or mixed resistive and inductive circuits where frequent operation is required. They can also be used for direct switching of motors in utilisation categories AC-3 and DC-3. Vario switch disconnectors are suitable for isolator applications with fully visible breaking (since the handle cannot indicate the "open" position unless all the contacts are actually open and separated by the appropriate isolation distance) and it is possible to padlock the handles in the open position.

3



Application

Standard applications

Presentation

Bare switches		Enclosed switches	
---------------	--	-------------------	--

Assembly

Pre-assembled	For customer assembly	Pre-assembled	For customer assembly
---------------	-----------------------	---------------	-----------------------

Thermal current

12 and 20 A	10...32 A	10 and 16 A
-------------	-----------	-------------

Operational current AC-23 at 400 V

8.1 and 11 A	8.1...29 A	8.1...11 A
--------------	------------	------------

Number of poles

3	3...5	3	3...5
---	-------	---	-------

Number of auxiliary contacts

–	1 or 2	–	1 or 2
---	--------	---	--------

Reversible terminal blocks

Yes

Mounting

On door	At back of enclosure	On door or at back of enclosure	–
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Operator

Direct	Offset with door interlock mechanism	Direct or offset with door interlock mechanism	Direct
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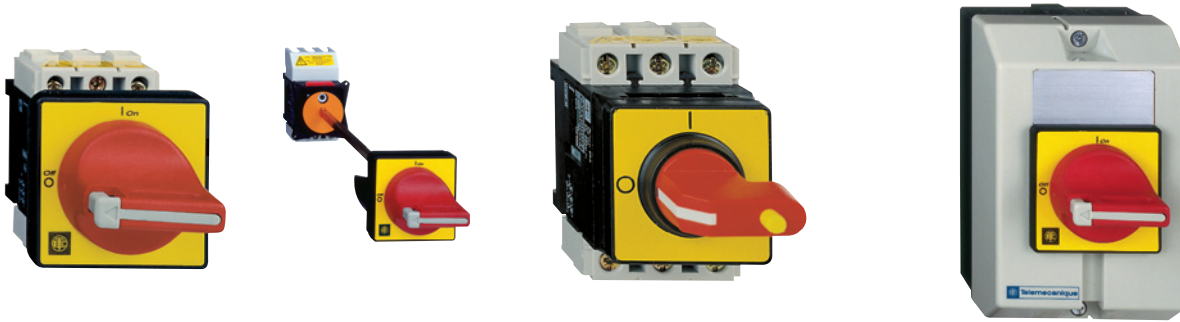
Switch type

VCDN12 VCDN20	VCCDN12 VCCDN20	VN12 VN20	VCFN12GE to VCFN40GE	VN12, VN20 + VCFXGE1
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Pages

3/154	3/155	3/162	3/163 to 3/165
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Mini-Vario and Vario rotary switch disconnectors from 12 to 175 A are suitable for on-load making and breaking of resistive or mixed resistive and inductive circuits where frequent operation is required. They can also be used for direct switching of motors in utilisation categories AC-3 and DC-3. Vario switch disconnectors are suitable for isolator applications with fully visible breaking (since the handle cannot indicate the “open” position unless all the contacts are actually open and separated by the appropriate isolation distance) and it is possible to padlock the handles in the open position.



High performance applications					
Bare switches			Enclosed switches		
Pre-assembled		For customer assembly	Pre-assembled	For customer assembly	
12...175 A			10...140 A	10...63 A	
8.1...83 A				8.1...41 A	
3		3...6 (up to 80 A) 3 (for 125 and 175 A ratings)	3	3... 6	
-		1 or 2	-	2	
Yes					
On door	At back of enclosure	In enclosure or modular distribution boards	On door, at back of enclosure, in enclosure or modular distribution boards	-	
Direct	Indirect with door interlock mechanism	Direct	Direct or indirect with door interlock mechanism	Direct	
VC●02 to VC●6	VCC●02 to VCC●6	VVE0 to VVE4	V02 to V6	VCF02GE to VCF6GE	V02 to V4 + VCFXGE1 to VCFXGDXE
3/156			3/157 to 3/161	3/162	3/163

Stop the machine

Mini-VARIO switch disconnectors for standard applications

Complete units

- 3-pole rotary switch disconnectors, 12 to 20 A
- Padlockable operating handle (padlocks not supplied).
- Degree of protection IP 65.
- Marking on operator $\circ \downarrow$.

Main and Emergency stop switch disconnectors

For door mounting

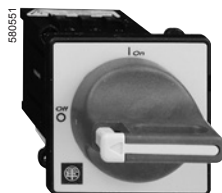
Operator	Front plate	Fixing	Ith	Reference	Weight
Handle	mm	mm	A		kg
Red, padlockable with up to 3 padlocks (\varnothing 4 to \varnothing 8)	Yellow 60 x 60	\varnothing 22.5	12	VCDN12	0.177
			20	VCDN20	0.177

Main and Emergency stop switch disconnectors

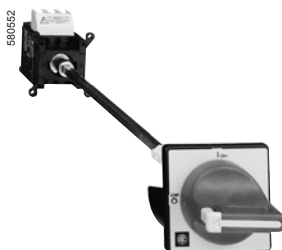
For mounting at back of an enclosure (1)

Operator	Front plate	Fixing	Ith	Reference	Weight
Handle	mm	mm	A		kg
Red, padlockable with up to 3 padlocks (\varnothing 4 to \varnothing 8)	Yellow 60 x 60	\varnothing 22.5	12	VCCDN12	0.334
			20	VCCDN20	0.334

(1) Switches supplied with a shaft extension VZN17 and a door interlock plate KZ32.



VCDN20

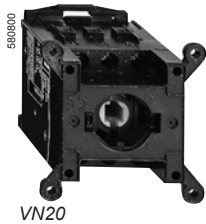


VCCDN20

Stop the machine

Mini-VARIO switch disconnectors for standard applications

For customer assembly



VN20



VZN11



VZN14



VZN05

Switch bodies

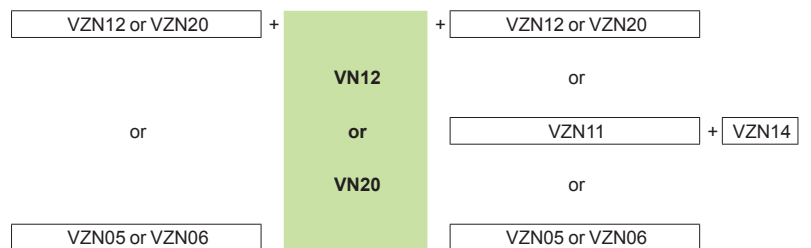
Description	Rating A	Reference	Weight kg
3-pole switch disconnectors	12	VN12	0.110
	20	VN20	0.110

Add-on modules

Description	Rating A	Reference	Weight kg
Main pole modules	12	VZN12	0.020
	20	VZN20	0.020
Neutral pole module with early make and late break contacts	12 and 20	VZN11	0.020
Earthing module	12 and 20	VZN14	0.016
Auxiliary contact block modules	1 N/O late make contact	VZN05	0.020
	1 N/C early break contact	VZN06	0.020
Input terminal protection shrouds	For add-on pole modules or auxiliary contact block modules (single-pole shroud)	VZN26	0.004
	For switch bodies (3-pole shroud)	VZN08	0.007

3

Maximum number of add-on modules that can be fitted on a switch body



Stop the machine

VARIO switch disconnectors for high performance applications

Complete units



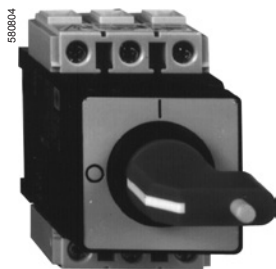
VCF0



VCF5



VCCF0



VVE1

- 3-pole rotary switch disconnectors, 12 to 175 A
 - Marking on operator On/Off.
 - Padlockable operating handle (padlocks not supplied).
- Degree of protection IP 65.

Main and Emergency stop switch disconnectors

For door mounting

Handle	Front plate mm	Fixing	Rating A	Reference	Weight kg
Red, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 60 x 60	Ø 22.5	12	VCD02	0.215
			20	VCD01	0.215
			25	VCD0	0.215
			32	VCD1	0.215
			40	VCD2	0.215
		4 screws	12	VCF02	0.250
			20	VCF01	0.250
			25	VCF0	0.250
			32	VCF1	0.250
			40	VCF2	0.250
			63	VCF3	0.560
Red, long, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 90 x 90	4 screws	125	VCF5	1.200
			175	VCF6	1.200

For mounting at back of an enclosure (1)

Handle	Front plate mm	Fixing	Rating A	Reference	Weight kg
Red, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 60 x 60	Ø 22.5	12	VCCD02	0.392
			20	VCCD01	0.392
			25	VCCD0	0.392
			32	VCCD1	0.392
			40	VCCD2	0.392
		4 screws	12	VCCF02	0.527
			20	VCCF01	0.527
			25	VCCF0	0.527
			32	VCCF1	0.527
			40	VCCF2	0.527
			63	VCCF3	0.440
Red, long, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 90 x 90	4 screws	125	VCCF5	1.320
			175	VCCF6	1.320

For mounting in an enclosure or for modular distribution boards

Handle	Front plate mm	Fixing	Rating A	Reference	Weight kg
Red, padlockable with 1 padlock (Ø 4 to Ø 6)	Yellow 45 x 45		25	VVE0	0.250
			32	VVE1	0.250
			40	VVE2	0.250
			63	VVE3	0.530
			80	VVE4	0.530

(1) Switches supplied with a shaft extension VZN17 and a door interlock plate KZ32 or KZ74 (see page 3/160).

Stop the machine

VARIO switch disconnectors
for high performance applications
Complete units



V0



V5



VZ0



VZ11



VZ15



VZ20

Switch bodies

Description	Rating A	Reference	Weight kg
3-pole switch disconnectors (1)	12	V02	0.200
	20	V01	0.200
	25	V0	0.200
	32	V1	0.200
	40	V2	0.200
	63	V3	0.500
	80	V4	0.500
	125	V5	0.900
	175	V6	0.900

Add-on modules

Description	Rating A	Reference	Weight kg
Main pole modules	12	VZ02	0.050
	20	VZ01	0.050
	25	VZ0	0.050
	32	VZ1	0.050
	40	VZ2	0.050
	63	VZ3	0.100
	80	VZ4	0.100
Neutral pole modules with early make and late break contacts (1)	12 to 40	VZ11	0.050
	63 to 80	VZ12	0.100
	125 and 175	VZ13	0.250
Earthing modules	12 to 40	VZ14	0.050
	63 and 80	VZ15	0.100
	125 and 175	VZ16	0.250

Auxiliary contact block modules

Auxiliary contact block	N/O + N/C (2)	VZ7	0.050
modules with 2 auxil. contacts	N/O + N/O	VZ20	0.050

Maximum no. of add-on modules that can be fitted on a switch body

1 add-on module on each side of the switch body

VZ7 or VZ20	+	V0●	+	VZ7 or VZ20		VZ7	+		+	VZ7
or				or		or				or
VZ11 or VZ12	+	V0	+	VZ11 or VZ12		VZ20	+	V5	+	VZ20
or				or		or		or		or
VZ14 or VZ15	+	to	+	VZ14 or VZ15		VZ13	+	or	+	VZ13
or				or		or		V6		or
VZ0●/VZ0 to VZ4	+	V4	+	VZ0●/VZ0 to VZ4		VZ16	+		+	VZ16

2 add-on modules on each side of the switch body

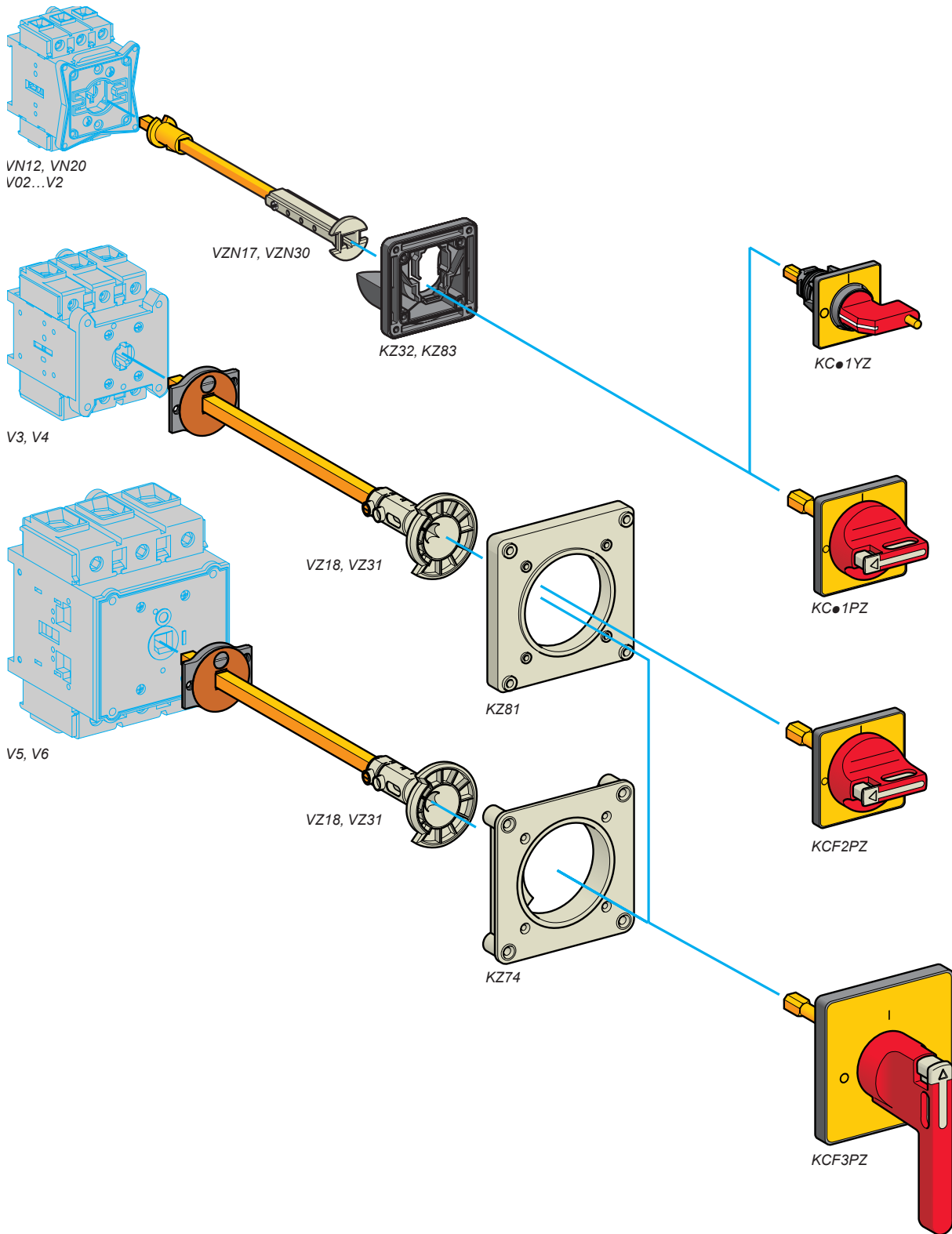
VZ0●	+	VZ0●	+	V0●	+	VZ0●	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ0	+	VZ0	+	V0	+	VZ0	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ1	+	VZ1	+	V1	+	VZ1	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ2	+	VZ2	+	V2	+	VZ2	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ3	+	VZ3	+	V3	+	VZ3	+	VZ7	or	VZ20	or	VZ12	or	VZ15
VZ4	+	VZ4	+	V4	+	VZ4	+	VZ7	or	VZ20	or	VZ12	or	VZ15

Note : The add-on modules mounted next to the switch body are main poles. Maximum of 3 main pole modules per switch body.

(1) Protection shrouds are available if required: see page 3/160.

(2) Late make N/O, early break N/C contacts

3



Stop the machine

Mini-VARIO and VARIO switch disconnectors
Operators, handles and front plates
(for customer assembly)

- Padlockable operating handle (padlocks not supplied).
- Degree of protection IP 65.
- Marking on operator $\circ \downarrow$.

Handles and front plates for main and Emergency stop switch disconnectors

For switch body	Operator Handle	Front plate		Reference	Weight
		Dimensions	Fixing		
		mm			
VN12, VN20 V02...V2	Red, padlockable with up to 1 padlock (Ø 4 to Ø 6)	Yellow 45 x 45	Ø 22.5	KCC1YZ	0.050
			4 screws	KCE1YZ	0.040
	Red, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 60 x 60	Ø 22.5	KCD1PZ	0.082
4 screws			KCF1PZ	0.075	
V3 and V4	Red, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 60 x 60	4 screws	KCF2PZ	0.070
V5 and V6	Red, long, padlockable with up to 3 padlocks (Ø 4 to Ø 8)	Yellow 90 x 90	4 screws	KCF3PZ (1)	0.160

(1) For door mounting of 63 and 80 A switch disconnectors, adapter plate KZ106 must be ordered separately (see page 3/160).

Stop the machine

Mini-VARIO and VARIO switch disconnectors

Accessories



VZ8



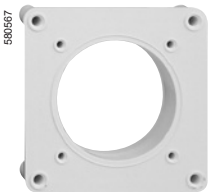
VZ26



VZ18



KZ32



KZ81

Input terminal protection shrouds

Description	For use on	Reference	Weight kg
For switch bodies (3-pole shroud)	V02...V2	VZ8	0.015
	V3 and V4	VZ9	0.020
	V5 and V6	VZ10	0.060
For add-on pole modules (single-pole shroud)	VZ02...VZ2, VZ11, VZ14	VZ26	0.005
	VZ3, VZ4, VZ12, VZ15	VZ27	0.007
	VZ13, VZ16	VZ28	0.020
For contact blocks with 2 auxiliary contacts	–	VZ29	0.005

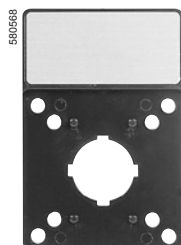
Components for door interlocking

For rear fixing switch disconnectors mounted at the back of an enclosure, in addition to a direct operator

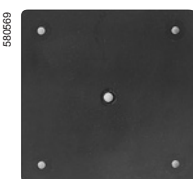
Description	For use on	Distance enc.back/door mm	Sold in lots of	Unit reference	Weight kg
Shaft extensions	VN12, VN20 V02...V2	300...330	1	VZN17 (1)	0.100
		400...430	1	VZN30 (1)	0.130
	V02...V2	300...330	1	VZ17	0.075
		400...430	1	VZ30	0.125
	V3 and V4	300...320	1	VZ18	0.170
		400...420	1	VZ31	0.215
V5 and V6	330...350	1	VZ18	0.170	
	430...450	1	VZ31	0.215	
Door interlock plates	VN12, VN20 V02...V2	–	5	KZ32	0.177
		V3...V6	–	5	KZ74

Description	For use on	Front plate dimensions mm	Sold in lots of	Unit reference	Weight kg
Plates for door mounting of handles with 4 screw fixing	VN12, VN20 V02...V2	45 x 45 or 60 x 60	5	KZ83	0.205
		V3...V6	60 x 60 or 90 x 90	5	KZ81
Adapter plate for switch disconnectors	V3 and V4	90 x 90	5	KZ106	0.075

(1) Can be used with V02 to V2 switches.



KZ15



KZ67



Z01

Accessories for operators

Description	For use on	Front plate dimensions mm	Sold in lots of	Unit reference	Weight kg	
Legend holder with silver coloured blank legend plate	Front plate	45 x 45	5	KZ13	0,060	
		60 x 60	5	KZ15	0,065	
		90 x 90	5	KZ103	0,070	
Legend holders without legend plate	Front plate	45 x 45	20	KZ14	0,060	
		60 x 60	10	KZ16	0,065	
		90 x 90	5	KZ101	0,070	
Silver coloured blank legend plates for engraving by customer	KZ14	–	20	KZ76	0,020	
	KZ16	–	10	KZ77	0,010	
	KZ101	–	5	KZ100	0,005	
Seals	VN12, VN20	45 x 45	5	KZ65	0,037	
		V02...V2	60 x 60	5	KZ66	0,033
		V3 and V4	60 x 60	5	KZ62	0,033
		V3...V6	90 x 90	5	KZ67	0,064
Tightening tool	For operators with Ø 22.5 fixing	–	5	Z01	0,050	

Stop the machine

VARIO enclosed switch disconnectors (pre-assembled)

Enclosed switch disconnectors for high performance applications

- Marking on operator $\circ \downarrow$.
- 3-pole rotary switch disconnectors from 10 to 140 A
- Padlockable operating handle (padlock not included).
- IP 65 degree of protection enclosures, sealable and lockable.
- Cover lockable in position "I" (ON) up to 63 A rating.



VCF0GE

3-pole main and Emergency stop switch disconnectors

Operator Handle	Front plate Dimensions	lthe	Power AC-23 at 400 V	Incorporated switch body	Possible attachments (1)	Reference	Weight
	mm	A	kW				kg
Red, padlockable with up to 3 padlocks (Ø 4 to Ø 8 shank)	Yellow 60 x 60	10	4	V02	2	VCF02GE	0.500
		16	5.5	V01	2	VCF01GE	0.500
		20	7.5	V0	2	VCF0GE	0.500
		25	11	V1	2	VCF1GE	0.500
		32	15	V2	2	VCF2GE	0.500
		50	22	V3	3	VCF3GE	0.930
Red, long padlockable with up to 3 padlocks (Ø 4 to Ø 8 shanks)	Yellow 90 x 90	100	37	V5	1	VCF5GE	2.190
		140	45	V6	1	VCF6GE	2.190

Enclosed switch disconnectors for standard applications

- 3-pole rotary switch disconnectors from 10 to 32 A
- Degree of protection IP 55.



VCF3GE

3-pole main and Emergency stop switch disconnectors

Operator Handle	Front plate Dimensions	lthe	Power AC-23 at 400 V	Incorporated switch body	Possible attachments (1)	Reference	Weight
	mm	A	kW				kg
Red, padlockable with 1 padlock (Ø 8 shank) or up to 3 padlocks (Ø 6 shank)	Yellow 60 x 60	10	4	VN12	2	VCFN12GE (1)	0.422
		16	5.5	VN20	2	VCFN20GE (1)	0.422
		20	7.5	V0	0	VCFN25GE	0.512
		25	11	V1	0	VCFN32GE	0.512
		32	15	V2	0	VCFN40GE	0.512

(1) For enclosures VCF and VCFN, see page 3/164



VCFN12GE

3

Stop the machine

VARIO enclosed switch disconnectors (assembled by the user)

590574



VCFXGE2

Empty enclosures

IP 65 enclosure with red padlockable handle operator and yellow front plate
(for mounting a main or Emergency stop switch disconnector)

For switch body type	Ithe	Possible attachments (1)	Reference	Weight
A				
				kg
VN12, VN20 V02...V2	10...32	2	VCFXGE1	0.340
V02...V2	10...32	4	VCFXGE4	0.660
V3 and V4	50...63	3	VCFXGE2	0.660
		4	VCFXGDxE	0.660

Switch bodies for standard applications

Description	Rating	Reference	Weight
A			
			kg
3-pole switch disconnectors	10	VN12	0.110
	16	VN20	0.110

Switch bodies for high performance applications (2)

Description	Rating	Reference	Weight
A			
			kg
3-pole switch disconnectors	10	V02	0.200
	16	V01	0.200
	20	V0	0.200
	25	V1	0.200
	32	V2	0.200
	50	V3	0.200
	63	V4	0.200

590575



V0

(1) See page 3/164.

Stop the machine

VARIO enclosed switch disconnectors

Add-on modules



VZ0



VZ11



VZ15



VZ20

Add-on modules for enclosure VCF

Description	Rating	Reference	Weight
A			
Main pole modules (mounted in enclosure)	10	VZ02	0.050
	16	VZ01	0.050
	20	VZ0	0.050
	25	VZ1	0.050
	32	VZ2	0.050
	50	VZ3	0.100
Neutral pole modules with early make and late break contacts	10 to 32	VZ11	0.050
	50 and 63	VZ12	0.100
	100 and 140	VZ13	0.250
Earthing modules	10 to 32	VZ14	0.050
	50 and 63	VZ15	0.100
	100 and 140	VZ16	0.250
Auxiliary contact block modules with 2 auxiliary contacts	N/O + N/C (1)	VZ7	0.050
	N/O + N/O	VZ20	0.050

Maximum number of add-on modules that can be fitted on a switch body

1 add-on module on each side of the switch body

VZ7 or VZ20	+	V0●	+	VZ7 or VZ20
or				or
VZ11 or VZ12	+	V0	+	VZ11 or VZ12
or				or
VZ14 or VZ15	+	to	+	VZ14 or VZ15
or				or
VZ0●/VZ0 to VZ4	+	V4	+	VZ0●/VZ0 to VZ4

2 add-on modules on each side of the switch body

VZ0●	+	VZ0●	+	V0●	+	VZ0●	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ0	+	VZ0	+	V0	+	VZ0	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ1	+	VZ1	+	V1	+	VZ1	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ2	+	VZ2	+	V2	+	VZ2	+	VZ7	or	VZ20	or	VZ11	or	VZ14
VZ3	+	VZ3	+	V3	+	VZ3	+	VZ7	or	VZ20	or	VZ12	or	VZ15
VZ4	+	VZ4	+	V4	+	VZ4	+	VZ7	or	VZ20	or	VZ12	or	VZ15

Note : The add-on modules mounted next to the switch body are main pole modules. Maximum of 3 main pole modules per switch body.

(1) Late make N/O, early break N/C contacts

3

Stop the machine

Mini-VARIO enclosed switch disconnectors

Add-on modules



VZN11



VZN14

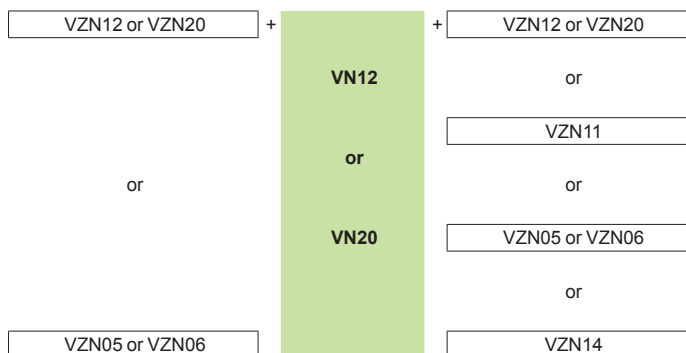


VZN05

Add-on modules for enclosures VCFN12GE and 20GE

Description	Rating	Reference	Weight
A			
kg			
Main pole modules	10	VZN12	0.020
	16	VZN20	0.020
Neutral pole module with early make and late break contacts	10 and 16	VZN11	0.020
Earthing module	10 and 16	VZN14	0.016
Auxiliary contact block modules	1 late make N/O contact	VZN05	0.020
	1 early break N/C contact	VZN06	0.020

Maximum number of add-on modules that can be fitted on a switch body



3

Stop the machine

TeSys contactors

TeSys D low consumption contactors

3

Applications

Automation systems



Rated operational current	le max AC-3 (Ue ≤ 440 V)
	le AC-1 (θ ≤ 60 °C)

9 A
20/25 A

12 A
20/25 A

18 A
25/32 A

Rated operational voltage

690 V

Number of poles

3 or 4

3 or 4

3 or 4

Rated operational power in AC-3	220/240 V
	380/400 V
	415/440 V
	500 V
	660/690 V

2.2 kW
4 kW
4 kW
5.5 kW
5.5 kW

3 kW
5.5 kW
5.5 kW
7.5 kW
7.5 kW

4 kW
7.5 kW
9 kW
10 kW
10 kW

Coil consumption

2.4 W (100 mA - 24 V)

Operating ranges

0.7...1.25 Uc

Operating time at 20 °C and at Uc	Closing
	Opening

70 ms
25 ms

Auxiliary contact block modules

1 N/C and 1 N/O instantaneous contacts incorporated in the contactors, with add-on blocks common to the whole range, comprising up to 2 N/C or 2 N/O instantaneous standard contacts

Interference suppression

Built-in suppression as standard, by bi-directional peak limiting diode

Contactor type	3-pole
	4-pole

LC1D09
LC1DT20/D098

LC1D12
LC1DT25/D128

LC1D18
LC1DT32/D188

Reversing contactor type	3-pole
	4-pole

LC2D09
LC2DT20

LC2D12
LC2DT25

LC2D18
LC2DT32

Pages	Contactors
	Reversing contactors

Please consult our website www.schneider-electric.com

Please consult our website www.schneider-electric.com

(1) With low consumption kit **LA4DBL** ("Please refer to our website www.schneider-electric.com").
 (2) With 2 low consumer kits **LA4DBL** ("Please refer to our website www.schneider-electric.com").



25 A	32 A	38 A	40 A	50 A	65 A
25/40 A	50 A	50 A	60 A	–	80 A
690 V			690 V		
3 or 4	3	3	3	3	3
5.5 kW	7.5 kW	9 kW	11 kW	15 kW	18.5 kW
11 kW	15 kW	18.5 kW	18.5 kW	22 kW	30 kW
11 kW	15 kW	18.5 kW	22 kW	25/30 kW	37 kW
15 kW	18.5 kW	18.5 kW	22 kW	30 kW	37 kW
15 kW	18.5 kW	18.5 kW	30 kW	33 kW	37 kW
2.4 W (100 mA - 24 V)			0.6 W (25 mA - 24 V) for relay LA4DFB + the power consumed by the contactor coil		
0.7...1.25 U _c			–	–	–
70 ms			–	–	–
25 ms			–	–	–

1 N/C and 1 N/O instantaneous contacts incorporated in the contactors, with add-on blocks common to the whole range, comprising up to 2 N/C or 2 N/O instantaneous standard contacts

Built-in suppression as standard, by bi-directional peak limiting diode

LC1D25	LC1D32	LC1D38	LC1D40A (1)	LC1D50A (1)	LC1D65A (1)
LC1DT40/D258			–	–	–
LC2D25	LC2D32	LC2D38	LC2D40A (2)	LC2D50A (2)	LC2D65A (2)
LC2DT40					

Please consult our website www.schneider-electric.com

Please consult our website www.schneider-electric.com

3

Applications

Simple automation systems



Rated operational current	le max AC-3 (Ue ≤ 440 V)
	le AC-1 (θ ≤ 40 °C)

6 A
12 A

6 A
–

Rated operational voltage

690 V

Number of poles

2 or 3

3

Rated operational power in category AC-3	220/240 V
	380/400 V
	415/440 V
	500 V
	660/690 V
	1000 V

1.1 kW
2.2 kW
2.2 kW
–
–
–

1.5 kW
2.2 kW
2.2/3 kW
3 kW
3 kW
–

Add-on auxiliary contact blocks	Front
	Side
	Front time delay
	Front dust and damp protected

Up to 2 N/C or N/O
–
–
–

Up to 4 N/C or N/O
–
1 N/C
–

Associated manual-auto thermal overload relays	Class 10 A
	Class 20 A

–
–

0.11...16 A
–

Suppressor modules

Varistor or diode

Varistor, diode + Zener diode or RC circuit

Contactor type references	~
	≡

LC1SK
LP1SK

LC1 or LC7K06
LP1K06

Reversing contactor with mechanical interlock type references	~
	≡

–
–

LC2 or LC8K06
LP2K06

Pages	Contactors
	Reversing contactors

Please consult our website www.schneider-electric.com
Please consult our website www.schneider-electric.com



9 A	12 A	16 A
20 A	–	–

3 or 4

2.2 kW	3 kW	3 kW
4 kW	5.5 kW	7.5 kW
4 kW	5.5 kW	7.5 kW
4 kW	4 kW	5.5 kW
4 kW	4 kW	4 kW
–	–	–

LC1 or LC7K09	LC1 or LC7K12	LC1K16
LP1K09	LP1K12	–

LC2 or LC8K09	LC2 or LC8K12	LC2K16
LP2K09	LP2K12	–

Please consult our website www.schneider-electric.com

Please consult our website www.schneider-electric.com

Stop the machine

TeSys protection components
Thermal-magnetic motor circuit-breakers

Applications

Protection of motors against short-circuits and overloads



3

Tripping threshold on short-circuit

13 In

Standard motor power ratings in AC-3, 415 V

Up to 15 kW	Up to 30 kW	37 kW
-------------	-------------	-------

Operational current at 415 V

0.1...32 A	9...65 A	56...80 A
------------	----------	-----------

Breaking capacity at 415 V (Icu) to IEC 60947-2

10...100 kA	35...100 kA	50...100 kA	15 kA
-------------	-------------	-------------	-------

Door interlock mechanism

Without	With	With	Without
---------	------	------	---------

Circuit-breaker type

GV2ME	GV2P	GV3P	GV3ME80
--------------	-------------	-------------	----------------

Pages

Please consult our website www.schneider-electric.com

Protection of motors with high current peak on starting



7.5...110 kW

12...220 A

35 and 36 kA

With

GV7RE

70 kA

GV7RS

20 In

Up to 11 kW

0.25...23 A

15...100 kA

With

GV2RT

Please consult our website www.schneider-electric.com

Stop the machine

Variable speed drives for asynchronous and synchronous motors

3

Application

Variable speed drives without sensor (velocity control)
 For material handling (conveyors), transfer machines, packaging machines, hoisting, special machines (textile, transfer), wood-working or metal processing machines, etc.



Power range for 50...60 Hz (kW/HP) line supply

Single-phase 100...120 V (kW)
Single-phase 200...240 V (kW)
Three-phase 200...230 V (kW)
Three-phase 200...240 V (kW)
Three-phase 380...480 V (kW)
Three-phase 380...500 V (kW)
Three-phase 500...600 V (kW)
Three-phase 525...600 V (kW)
Three-phase 500...690 V (kW)

0.18...15/0.25...20
–
0.18...2.2/0.25...3
–
–
–
0.37...15/0.5...20
–
–
–

Degree of protection
Type of cooling

IP 20
 Heatsink

Drive system

Output frequency	
Type of control	Asynchronous motor
	Synchronous motor
Transient overtorque	

0.1...599 Hz
 Voltage/frequency ratios: U/f and 5-point U/f
 Sensorless flux vector control ratio
 Kn² quadratic ratio (pump/fan)
 Energy saving ratio
 Ratio for synchronous motor without sensor
 170...200% of the nominal motor torque

Functions (number)

150

Safety functions

Integrated
Available as an option

1: STO (Safe Torque Off)
 3: SLS (Safe Limited Speed), SDI (Safe Direction Information), SS1 (Safe Stop 1)

Number of preset speeds

–

Number of I/O

Analog inputs
Logic inputs
Analog outputs
Logic outputs
Relay outputs

3
 6
 1 : configurable as voltage (0-10 V) or current (0-20 mA)
 1
 2

Communication

Integrated
Available as an option
Bluetooth link®

Modbus, CANopen
 DeviceNet, PROFIBUS DP V1, EtherNet/IP, Modbus TCP, EtherCat
 Integrated

Options

Filters, braking resistors, line chokes

Dialogue tools

IP 54 or IP 55 drive navigator
 IP 54 or IP 55 remote graphic display terminal

Configuration

Setup software
Configuration tools

SoMove
 Simple Loader, Multi-Loader

Standards and certifications

IEC 61800-5-1, EN/IEC 61800-5-2, IEC 61800-3 (environments 1 and 2, category C2), UL508C, EN/ISO 13849-1/- 2 category 3 (PL e), IEC 61508 SIL 3, IEC 60 721-3-3 classes 3C3 and 3S2
 CE, UL, CSA, C-Tick, NOM, GOST

References

ATV32

Catalogues

"Altivar 32 variable speed drives"

Variable speed drive

For pumps and fans (building : *Heating, Ventilation and Air Conditioning*)

For hoisting, material handling, packaging, textile machines, wood-working machines, process machines



0.37...800/0.5...900	0.37...630/0.5...700
–	–
0.37...5.5/0.5...7.5	0.37...5.5/0.5...7.5
–	–
0.75...90/1...125	0.37...75/0.5...100
0.75...630/1...900	0.75...500/1...700
–	–
2.2...7.5/3...10	1.5...7.5/2...10
–	–
2.2...800/3...800	1.5...630/2...700
IP 20	IP 20
Heatsink or water-cooled system	Heatsink, base plate or water-cooled circuit
0.1...500 Hz for the entire range 0.1...599 Hz up to 37 kW/50 HP at 200...240 V ~ and 380...480 V ~	0.1...500 Hz across the entire range 0.1...599 Hz up to 37 kW at 200...240 V ~ and 380...480 V ~
Sensorless flux vector control Voltage/frequency ratio (2 or 5 points) Energy saving ratio	Flux vector control with or without sensor Voltage/frequency ratio (2 or 5 points). ENA System
Vector control without speed feedback 120% of the nominal motor torque for 60 seconds	Vector control with or without speed feedback 220% of nominal motor torque for 2 seconds, 170% for 60 seconds
> 100	> 150
"Power removal" (PWR) safety function	"Power removal" (PWR) safety function
–	–
8	16
2...4	2...4
6...20	6...20
1...3	1...3
0...8	0...8
2...4	2...4
Modbus, CANopen Modbus TCP Daisy Chain, Modbus/Uni-Telway, EtherNet/IP, DeviceNet, PROFIBUS DP V0 and V1, INTERBUS, CC-LINK, LONWORKS, METASYS N2, APOGEE FLN, BACnet	Modbus, CANopen Modbus TCP Daisy Chain, Modbus/Uni-Telway, EtherNet/IP, DeviceNet, PROFIBUS DP V0 and V1, INTERBUS, CC-Link
–	–
TVIMC integrated controller card, I/O extension cards, "Controller Inside" programmable card, multi-pump cards, encoder interface cards IP 54 or IP 65 remote graphic display terminal	ATVIMC integrated controller card, interface cards for incremental, resolver, SinCos, SinCos Hiperface®, EnDat® or SSI encoders, I/O extension cards, "Controller Inside" programmable card IP 54 or IP 65 remote graphic display terminal
SoMove Simple Loader, Multi-Loader	SoMove Simple Loader, Multi-Loader
IEC 61800-5-1, IEC 61800-3 (environments 1 and 2, categories C1 to C3), IEC 61000-4-2/4-3/4-4/4-5/4-6/4-11 CE, UL, CSA, DNV, C-Tick, NOM, GOST	IEC 61800-5-1, IEC 61800-3 (environments 1 and 2, categories C1 to C3), IEC 61000-4-2/4-3/4-4/4-5/4-6/4-11 CE, UL, CSA, DNV, C-Tick, NOM, GOST
ATV61	ATV71
"Altivar 61 variable speed drives"	"Altivar 71 variable speed drives"

Stop the machine

Motion control

Lexium 32

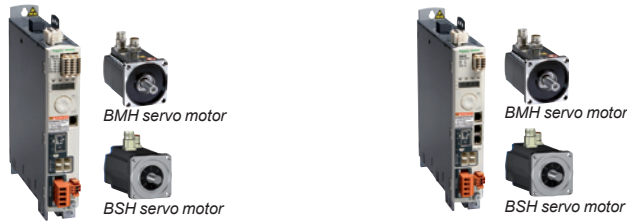
3

Application areas	Common
	Specific
Technology type	

Printing, material handling, conveying, etc.), transfer machines, packaging, textiles, etc.

Clamping, cutting, cutting to length, flying shear, rotary knife, Pick & Place, winding, marking, etc.

Lexium 32 servo drives with sensor feedback (position control)



Power range for 50...60 Hz (kW) line supply	
	Single-phase 100...120 V (kW)
	Single-phase 200...240 V (kW)
	Three-phase 380...480 V (kW)
	Three-phase 380...500 V (kW)

0.15...7
0.15...0.8
0.3...1.6
0.4...7
–

Drive system	Motor speed	
	Type of control	Asynchronous motor Synchronous motor
	Motor sensor	Integrated Available as an option
	Transient overtorque	
	Peak current	

Nominal speed:

- BMH servo motors: continuous stall torque range between 1.2...84 Nm for nominal speeds between 1200 and 5000 rpm
- BSH servo motors: continuous stall torque range between 0.5...33.4 Nm for nominal speeds between 2500 and 6000 rpm

–

Synchronous motor with sensor feedback for BMH and BSH servo motors

SinCos Hiperface[®] sensor

–

–

Peak current, up to 4 times the drive direct current for 1 second

Number of functions	
Safety functions	Integrated
	Available as an option

–

1: STO (Safe Torque Off)

4: SLS (Safe Limited Speed), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop)

Number of I/O	Inputs	Analog
		Logic
	Outputs	Analog
		Logic
Relay outputs		

2	–
6	1 capture input
–	–
5	–
–	–

Communication	Integrated
	Available as an option
	Bluetooth link [®]

Modbus	Modbus, CANopen, CANmotion
–	–
Available as an option	Available as an option

Options

SoMove setup software
Multi-Loader configuration tool
IP 54 remote graphic display terminal
Filters, braking resistors, line chokes

Standards and certifications

IEC 61800-5-1, EN/IEC 61800-5-2, IEC 61800-3 (environments 1 and 2, categories C2 and C3)
IEC 61000-4-2/4-3/4-4/4-5, EN/ISO 13849-1 (PL e), IEC 61508 SIL 3
CE, UL, CSA

References

LXM32C	LXM32A
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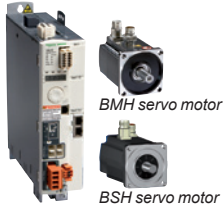
Catalogue

Please consult our website www.schneider-electric.com

Printing, material handling, conveying, etc.), transfer machines, packaging, textiles, etc.

Clamping, cutting, cutting to length, flying shear, rotary knife, Pick & Place, winding, marking, etc.

Lexium 32 servo drives with sensor feedback (position control)



0.15...7

0.15...0.8

0.3...1.6

0.4...7

—

Nominal speed:

- BMH servo motors: continuous stall torque range between 1.2...84 Nm for nominal speeds between 1200 and 5000 rpm
- BSH servo motors: continuous stall torque range between 0.5...33.4 Nm for nominal speeds between 2500 and 6000 rpm

—

Synchronous motor with sensor feedback for BMH and BSH servo motors

SinCos Hiperface[®] sensor

Resolver encoder

Analog encoder (motor and machine)

Digital encoder (machine only)

Peak current, up to 4 times the drive direct current for 1 second

—

1: STO (Safe Torque Off)

4 : SLS (Safe Limited Speed), SS1 (Safe Stop 1), SS2 (Safe Stop 2), SOS (Safe Operating Stop)

—

6 (2 of which can be used as a capture input)

—

3

—

Modbus

CANopen, CANmotion, DeviceNet, EtherNet/IP, PROFIBUS DP V1, EtherCat

Available as an option

SoMove setup software

Multi-Loader configuration tool

IP 54 remote graphic display terminal

Filters, braking resistors, line chokes

IEC 61800-5-1, IEC 61800-3 (environments 1 and 2, categories C2 and C3)

IEC 61000-4-2/4-3/4-4/4-5, EN/ISO 13849-1-1 (PL e), IEC 61508 SIL 3

CE, UL, CSA

LXM32M

3

0 to 9					
170DTN11000	3/137	TM3SAC5R	3/93	VCDN20	3/154
467NHP81100	3/137	TM3SAC5RG	3/93	VCF0	3/156
490NAD91103	3/137	TM3SAF5R	3/93	VCF0GE	3/162
490NAD91104	3/137	TM3SAF5RG	3/93	VCF01	3/156
490NAD91105	3/137	TM3SAFL5R	3/93	VCF1	3/156
490NAE91100	3/137	TM3SAFL5RG	3/93	VCF01GE	3/162
490NTC00005	3/137	TM3SAK6R	3/93	VCF1GE	3/162
490NTC00015	3/137	TM3SAK6RG	3/93	VCF2	3/156
490NTC00040	3/137	TM3XREC1	3/95	VCF2	3/156
490NTC00080	3/137	TM3XTRA1	3/95	VCF02GE	3/162
490NTW00002	3/137	TMAM2	3/93	VCF2GE	3/162
490NTW00005	3/137		3/95	VCF3	3/156
490NTW00012	3/137	TMAT2PSET	3/95	VCF3GE	3/162
490NTW00040	3/137	TMAT2PSETG	3/95	VCF4	3/156
490NTW00080	3/137	TSCCANTDM4	3/105	VCF4GE	3/162
A		TSXCANCA50	3/105	VCF5	3/156
ABL1REM12050	3/136	TSXCANCA100	3/105	VCF5GE	3/162
ABL1REM24025	3/136	TSXCANCA300	3/105	VCF6	3/156
ABL1REM24100	3/136	TSXCANCADD1	3/105	VCF6GE	3/162
ABL8RPS24030	3/136	TSXCANCADD03	3/105	VCFN12GE	3/162
ABL8RPS24050	3/136	TSXCANCADD3	3/105	VCFN20GE	3/162
ABL8RPS24100	3/105	TSXCANCADD5	3/105	VCFN25GE	3/162
	3/136	TSXCOSA100	3/137	VCFN32GE	3/162
		TSXCOSA200	3/137	VCFN40GE	3/162
		TSXCOSA500	3/137	VCFXGDXE	3/163
		TSXPBSCA100	3/105	VCFXGE●	3/163
			3/137	VDIP184546005	3/95
		TSXPBSCA400	3/105	VDIP184546010	3/95
			3/137	VDIP184546020	3/95
		TSXPBY100	3/137	VDIP184546030	3/95
		TSXPCX1031	3/105	VDIP184546050	3/95
		V		VN12	3/155
		V0	3/157		3/163
			3/163	VN20	3/155
		V01	3/157		3/163
			3/163	VVE●	3/156
		V1	3/157	VW3A8306R	3/137
			3/163	VW3A8306R30	3/105
		V02	3/157	VW3A8306RC	3/137
			3/163	VZ0	3/157
		V2	3/157		3/164
			3/163	VZ01	3/157
		V3	3/157		3/164
			3/163	VZ1	3/157
		V4	3/157		3/164
			3/163	VZ02	3/157
		V5	3/157		3/164
		V6	3/157	VZ2	3/157
		VCCD0	3/156		3/164
		VCCD01	3/156	VZ3	3/157
		VCCD1	3/156		3/164
		VCCD2	3/156	VZ4	3/157
		VCCD02	3/156		3/164
		VCCDN12	3/154	VZ7	3/157
		VCCDN20	3/154		3/164
		VCCF0	3/156	VZ8	3/160
		VCCF01	3/156	VZ9	3/160
		VCCF1	3/156	VZ10	3/160
		VCCF02	3/156	VZ11	3/157
		VCCF2	3/156		3/164
		VCCF3	3/156	VZ12	3/157
		VCCF4	3/156		3/164
		VCCF5	3/156	VZ13	3/157
		VCCF6	3/156		3/164
		VCD0	3/156	VZ14	3/157
		VCD01	3/156		3/164
		VCD1	3/156	VZ15	3/157
		VCD2	3/156		3/164
		VCDN12	3/154	VZ16	3/157
					3/164
				VZ17	3/160
				VZ18	3/160
				VZ20	3/157
					3/164
				VZ26	3/160
				VZ27	3/160
				VZ28	3/160
				VZ29	3/160
				VZ30	3/160
				VZ31	3/160
				VZN05	3/155
					3/165
				VZN06	3/155
					3/165
				VZN08	3/155
				VZN11	3/155
					3/165
				VZN12	3/155
					3/165
				VZN14	3/155
					3/165
				VZN17	3/160
				VZN20	3/155
					3/165
				VZN26	3/155
				VZN30	3/160
				X	
				XALD01	3/36
				XALD01H7	3/36
				XALD02	3/36
				XALD02H7	3/36
				XALD03	3/36
				XALD03H7	3/36
				XALD04	3/36
				XALD05	3/36
				XALD101	3/32
				XALD101H29	3/32
				XALD102	3/32
				XALD102E	3/32
				XALD103	3/32
				XALD104	3/32
				XALD111	3/32
				XALD111H29	3/32
				XALD112	3/32
				XALD112E	3/32
				XALD114	3/32
				XALD114E	3/32
				XALD115	3/32
				XALD116	3/32
				XALD117	3/32
				XALD118	3/32
				XALD132	3/34
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				XALD144E	3/34
				XALD164	3/32
				XALD211	3/34
				XALD211H29	3/34
				XALD213	3/34
				XALD213E	3/34
				XALD214	3/34
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				XALD222	3/35
				XALD222E	3/35
				XALD223	3/35
				XALD224	3/34
				XALD225	3/34
				XALD241	3/34
				XALD311	3/35
				XALD321	3/35
				XALD324	3/35
				XALD324E	3/35
				XALD325	3/35
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				XALD328	3/35
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				XALD339	3/35
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				XALD361M	3/34
				XALD363B	3/34
				XALD363G	3/34
				XALD363M	3/34
				XALK01	3/36
				XALK01H29	3/36
				XALK01H44	3/36
				XALK01HFR	3/36
				XALK0●	3/36
				XALK174	3/33
				XALK174E	3/33
				XALK174F	3/33
				XALK174G	3/33
				XALK178	3/33
				XALK178E	3/33
				XALK178F	3/33
				XALK178G	3/33
				XALK184	3/33
				XALK184E	3/33
				XALK184F	3/33
				XALK184G	3/33
				XALK188	3/33
				XALK188E	3/33
				XALK188F	3/33
				XALK188G	3/33
				XALK194	3/33
				XALK198	3/33
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				XB4BS8442	3/14
				XB4BS8444	3/14
				XB4BS8445	3/14
				XB4BS9445	3/14
				XB4BS84441	3/14
				XB4BT842	3/14
				XB4BT845	3/14
				XB5AC21	3/24
				XB5AS142	3/27
				XB5AS542	3/27
				XB5AS8444	3/26
				XB5AS8445	3/26
				XB5AS9445	3/26
				XB5AT42	3/27
				XB5AT845	3/26
				XBTZ938	3/137
				XBTZG909	3/137
				XYBY2U	3/29
					3/51
					3/146
				XCOM2514	3/59
				XPSABV1133C	3/69
				XPSABV1133P	3/69
				XPSABV11330C	3/69
				XPSABV11330P	3/69
				XPSAC1321	3/68
				XPSAC1321P	3/68
				XPSAC3421	3/68
				XPSAC3721	3/68
				XPSAC3721P	3/68
				XPSAC5121	3/68

XPSAC5121P	3/68	XPSMC16ZCPACK	3/104	XPSMFGEH01	3/117	XVBL6G●	3/142	XY2SB93	3/60
XPSAF5130	3/71	XPSMC16ZP	3/104	XPSMFPS01	3/117	XVBL6M●	3/142	XY2SB96	3/60
XPSAF5130P	3/71	XPSMC16ZPACK	3/104	XPSMP11123	3/99	XVBL8B●	3/142	XY2SB98	3/60
XPSAFL5130	3/72	XPSMC16ZPPACK	3/104	XPSMP11123P	3/99	XVBL8G●	3/142	XY2SB99	3/60
XPSAFL5130P	3/72	XPSMC32Z	3/104	XPSOT3444	3/87	XVBL8M●	3/142	XY2SB511	3/60
XPSAK311144	3/74	XPSMC32ZC	3/104	XPSOT3744	3/87	XVBL33	3/140	XY2SB531	3/60
XPSAK311144P	3/74	XPSMC32ZCPACK	3/104	XPSPVK1184	3/85	XVBL34	3/140	XY2SB714	3/59
XPSAK311144P	3/74	XPSMC32ZP	3/104	XPSPVK3484	3/85	XVBL35	3/140	XY2SB724	3/59
XPSAK351144	3/74	XPSMC32ZPACK	3/104	XPSPVK3784	3/85	XVBL36	3/140	Z	
XPSAK351144P	3/74	XPSMC32ZPPACK	3/104	XPSPVT1180	3/84	XVBL37	3/140	Z01	3/161
XPSAK361144	3/74	XPSMCCPC	3/105	XPSTSA3442P	3/80	XVBL38	3/140	ZALV●	3/37
XPSAK361144P	3/74	XPSMCCSCY	3/105	XPSTSA3742P	3/80	XVBZ01	3/147	ZALV●	3/37
XPSAK371144	3/74	XPSMCTC16	3/104	XPSTSA5142P	3/80	XVBZ02	3/147	ZALVM●	3/37
XPSAK371144P	3/74	XPSMCTC32	3/104	XPSTSW3442P	3/80	XVBZ02A	3/147	ZALY●	3/49
XPSAR311144	3/73	XPSMCTS16	3/104	XPSTSW3742P	3/80	XVBZ03	3/147	ZB2BE101	3/28
XPSAR311144P	3/73	XPSMCTS32	3/104	XPSTSW5142P	3/80	XVBZ03A	3/147	ZB2BE102	3/28
XPSAR351144	3/73	XPSMCWIN	3/104	XPSVC1132	3/75	XVBZ04	3/147	ZB2BP012	3/53
XPSAR351144P	3/73	XPSMF1DI1601	3/130	XPSVC1132P	3/75	XVBZ04A	3/147	ZB2BP013	3/53
XPSAR371144	3/73	XPSMF2DO401	3/132	XPSVNE1142HSP	3/82	XVBZ14	3/147	ZB2BP014	3/53
XPSAR371144P	3/73	XPSMF2DO801	3/132	XPSVNE1142P	3/82	XVBZ18	3/146	ZB2BP015	3/53
XPSATE3410	3/69	XPSMF2DO1601	3/132	XPSVNE3442HSP	3/82	XVCZ13	3/149	ZB2BP016	3/53
XPSATE3410P	3/69	XPSMF2DO1602	3/132	XPSVNE3442P	3/82	XVCZ23	3/149	ZB4BC●	3/12
XPSATE3710	3/69	XPSMF3AI08401	3/133	XPSVNE3742HSP	3/82	XVR08B0●	3/149	ZB4BC●4	3/12
XPSATE3710P	3/69		3/135	XPSVNE3742P	3/82	XVR08J0●	3/149	ZB4BR●	3/12
XPSATE5110	3/69	XPSMF3DIO8801	3/133	XVBC2B●	3/144	XVR10B0●	3/149	ZB4BR216	3/12
XPSATE5110P	3/69		3/135	XVBC2G●	3/144	XVR10J0●	3/149		3/60
XPSATR1153C	3/70	XPSMF3DIO16801	3/133	XVBC2M●	3/144	XVR12B03	3/149	ZB4BR316	3/12
XPSATR1153P	3/70		3/135	XVBC4B●	3/143	XVR12B03S	3/149	ZB4BR416	3/12
XPSATR3953C	3/70	XPSMF3DIO20802	3/133	XVBC4M●	3/143	XVR12B04	3/149	ZB4BR516	3/12
XPSATR3953P	3/70		3/135	XVBC5B●	3/144	XVR12B04S	3/149	ZB4BR616	3/12
XPSATR11530C	3/70	XPSMF3022	3/113	XVBC5G●	3/144	XVR12B05	3/149	ZB4BS12	3/13
XPSATR11530P	3/70		3/122	XVBC5M●	3/144	XVR12B05S	3/149	ZB4BS22	3/13
XPSATR39530C	3/70	XPSMF3502	3/113	XVBC6B●	3/145	XVR12B06	3/149	ZB4BS42	3/13
XPSATR39530P	3/70		3/122	XVBC6G●	3/145	XVR12B06S	3/149	ZB4BS52	3/13
XPSAV11113	3/69	XPSMF3522	3/113	XVBC6M●	3/145	XVR12J03	3/149	ZB4BS55	3/13
XPSAV11113P	3/69		3/122	XVBC07	3/146	XVR12J03S	3/149	ZB4BS62	3/13
XPSAV11113T050	3/69	XPSMF3542	3/113	XVBC08●	3/146	XVR12J04S	3/149	ZB4BS72	3/13
XPSAV11113Z002	3/69		3/122	XVBC8B●	3/145	XVR12J04S	3/149	ZB4BS834	3/14
XPSAXE5120C	3/68	XPSMF4000	3/111	XVBC8E5	3/145	XVR12J05	3/149	ZB4BS844	3/14
XPSAXE5120P	3/68		3/122	XVBC8G●	3/145	XVR12J05S	3/149		3/60
XPSBAE3920C	3/76	XPSMF4002	3/111	XVBC8M●	3/145	XVR12J05S	3/149	ZB4BS845S	3/60
XPSBAE3920P	3/76		3/122	XVBC9B	3/146	XVR12J06	3/149	ZB4BS864	3/14
XPSBAE5120C	3/76	XPSMF4020	3/111	XVBC9M	3/146	XVR12J06S	3/149	ZB4BS934	3/14
XPSBAE5120P	3/76		3/122	XVBC12	3/147	XVR012L	3/149	ZB4BS944	3/14
XPSBCE3110C	3/76	XPSMF4022	3/111	XVBC14	3/146	XVR13B04	3/149	ZB4BS964	3/14
XPSBCE3110P	3/76		3/122	XVBC020	3/147	XVR13B04L	3/149	ZB4BT2	3/13
XPSBCE3410C	3/76	XPSMF4040	3/111	XVBC21	3/146	XVR13B05	3/149	ZB4BT84	3/14
XPSBCE3410P	3/76		3/122	XVBC21A	3/146	XVR13B05L	3/149	ZB4BT844	3/14
XPSBCE3710C	3/76	XPSMF4042	3/111	XVBC21B	3/146	XVR13G04L	3/149	ZB4BW413	3/12
XPSBCE3710P	3/76		3/122	XVBC22	3/146	XVR13G05L	3/149	ZB4BW433	3/12
XPSBF1132	3/76	XPSMFAI801	3/114	XVBC23	3/146	XVR13J04	3/149	ZB4BW443	3/12
XPSBF1132P	3/76		3/117	XVBC030	3/147	XVR13J05	3/149	ZB4BW453	3/12
XPSCM1144	3/77		3/118	XVBC33	3/143	XVR13M04L	3/149	ZB4BW463	3/12
XPSCM1144P	3/77	XPSMFAO801	3/114	XVBC34	3/143	XVR13M05L	3/149	ZB4BW613	3/13
XPSDMB1132	3/81		3/117	XVBC35	3/143	XVRZ081	3/149	ZB4BW633	3/13
XPSDMB1132P	3/81	XPSMFBLK	3/117	XVBC36	3/143	XVRZ082	3/149	ZB4BW643	3/14
XPSDME1132	3/81		3/117	XVBC37	3/143	XVRS10BMW	3/151	ZB4BW653	3/13
XPSDME1132P	3/81	XPSMFCIO2401	3/114	XVBC38	3/143	XVS10GMW	3/151	ZB4BW663	3/13
XPSDME1132TS220	3/81		3/119	XVBC040	3/147	XVS10MMW	3/151	ZB4BX2	3/13
XPSECME5131C	3/79	XPSMFCPU22	3/117	XVBC081	3/146	XVS10MMW	3/151	ZB4BX84	3/14
XPSECME5131P	3/79		3/117	XVBC0Y●	3/146	XVS14BMW	3/151	ZB4BZ009	3/28
XPSECPE3910C	3/79	XPSMFDI2401	3/114	XVBL0B●	3/141	XVS14GMW	3/151	ZB4BZ101	3/28
XPSECPE3910P	3/79		3/120	XVBL0G●	3/141	XVS14MMW	3/151	ZB4BZ102	3/28
XPSECPE5131C	3/79	XPSMFDI3201	3/114	XVBL0M●	3/141	XY2AU●	3/55	ZB4BZ103	3/28
XPSECPE5131P	3/79		3/117	XVBL1B●	3/141	XY2AZ●	3/55	ZB4BZ104	3/28
XPSEDA5142	3/83	XPSMFDIO241601	3/114	XVBL1G●	3/141	XY2SB71	3/59		3/60
XPSLCM1150	3/78		3/117	XVBL1M●	3/141	XY2SB72	3/59	ZB4BZ105	3/28
XPSMC16Z	3/104		3/121	XVBL4B●	3/140	XY2SB75	3/59		3/60
XPSMC16ZC	3/104	XPSMFD0801	3/114	XVBL4M●	3/140	XY2SB76	3/59	ZB4BZ106	3/28
			3/117	XVBL6B●	3/142	XY2SB90	3/60	ZB4BZ107	3/28
			3/121						

ZB4BZ141	3/28	ZB5AD306	3/42	ZB5AK1443	3/46	ZB5AS944D	3/26	ZB5CV003	3/45
ZB5AA●	3/38	ZB5AD401	3/41	ZB5AK1453	3/46		3/40	ZB5CV013	3/45
ZB5AA14	3/38	ZB5AD403	3/41	ZB5AK1463	3/46	ZB5AS964	3/26	ZB5CV033	3/45
ZB5AA16	3/38	ZB5AD404	3/42	ZB5AK1513	3/46		3/40	ZB5CV043	3/45
ZB5AA18	3/38	ZB5AD405	3/42	ZB5AK1533	3/46	ZB5AT2	3/25	ZB5CV053	3/45
	3/45	ZB5AD406	3/42	ZB5AK1543	3/46		3/40	ZB5CV063	3/45
ZB5AA24	3/38	ZB5AD501	3/41	ZB5AK1553	3/46	ZB5AT4	3/27	ZB5CW313	3/45
ZB5AA26	3/38	ZB5AD503	3/41	ZB5AK1563	3/46		3/40	ZB5CW333	3/45
ZB5AA34	3/38	ZB5AD504	3/42	ZB5AK1713	3/46	ZB5AT24	3/25	ZB5CW343	3/45
ZB5AA36	3/38	ZB5AD505	3/42	ZB5AK1733	3/46		3/40	ZB5CW353	3/45
ZB5AA38	3/38	ZB5AD506	3/42	ZB5AK1743	3/46	ZB5AT44	3/27	ZB5CW363	3/45
	3/45	ZB5AD701	3/41	ZB5AK1753	3/46		3/40	ZB5SZ3	3/37
ZB5AA44	3/38	ZB5AD703	3/41	ZB5AK1763	3/46	ZB5AT84	3/26		3/53
ZB5AA46	3/38	ZB5AD704	3/42	ZB5AK1763	3/46		3/40	ZB5SZ5	3/53
ZB5AA48	3/38	ZB5AD705	3/42	ZB5AK1813	3/46	ZB5AT844	3/26	ZBA●	3/52
	3/45	ZB5AD706	3/42	ZB5AK1833	3/46		3/40	ZBA131	3/52
ZB5AA54	3/38	ZB5AD801	3/41	ZB5AK1843	3/46	ZB5AT8643M	3/26	ZBA133	3/52
ZB5AA56	3/38	ZB5AD803	3/41	ZB5AK1853	3/46		3/45	ZBA136	3/52
ZB5AA58	3/38	ZB5AD804	3/42	ZB5AK1863	3/46	ZB5AV013	3/45	ZBA137	3/52
	3/45	ZB5AD805	3/42	ZB5AL●	3/38	ZB5AV013E	3/45	ZBA138	3/52
ZB5AA64	3/38	ZB5AD806	3/42	ZB5AL232	3/39	ZB5AV013S	3/45	ZBA141	3/52
ZB5AA66	3/38	ZB5AD806	3/42	ZB5AL233	3/39	ZB5AV033	3/45	ZBA142	3/52
ZB5AA68	3/38	ZB5AD2801	3/44	ZB5AL234	3/39	ZB5AV033E	3/45	ZBA145	3/52
	3/45	ZB5AD2804	3/44	ZB5AL235	3/39	ZB5AV033S	3/45	ZBA232	3/52
ZB5AA131	3/39	ZB5AD2806	3/44	ZB5AL432	3/39	ZB5AV043	3/45	ZBA233	3/52
ZB5AA133	3/39	ZB5AG0	3/43	ZB5AL433	3/39	ZB5AV043E	3/45	ZBA234	3/52
ZB5AA136	3/39	ZB5AG0D	3/44	ZB5AL434	3/39	ZB5AV053	3/45	ZBA235	3/52
ZB5AA141	3/39	ZB5AG1	3/43	ZB5AL434	3/39	ZB5AV053E	3/45	ZBA245	3/52
ZB5AA142	3/39	ZB5AG1D	3/44	ZB5AL435	3/39	ZB5AV053S	3/45	ZBA331	3/52
ZB5AA145	3/39	ZB5AG2	3/43	ZB5AP1S	3/38	ZB5AV063	3/45	ZBA333	3/52
ZB5AA232	3/39	ZB5AG2	3/43	ZB5AP2S	3/38	ZB5AV063E	3/45	ZBA334	3/52
ZB5AA233	3/39	ZB5AG2D	3/44	ZB5AP3S	3/38	ZB5AV063S	3/45	ZBA335	3/52
ZB5AA234	3/39	ZB5AG2D	3/44	ZB5AP4S	3/38	ZB5AW113	3/45	ZBA336	3/52
ZB5AA235	3/39	ZB5AG3	3/43	ZB5AP5S	3/38	ZB5AW133	3/45	ZBA337	3/52
ZB5AA245	3/39	ZB5AG3D	3/44	ZB5AP6S	3/38	ZB5AW143	3/45	ZBA338	3/52
ZB5AA331	3/39	ZB5AG3D	3/44	ZB5AP●	3/24	ZB5AW153	3/45	ZBA341	3/52
ZB5AA333	3/39	ZB5AG4	3/43	ZB5AR●	3/24	ZB5AW163	3/45	ZBA342	3/52
ZB5AA334	3/39	ZB5AG4D	3/44	ZB5AR216	3/24	ZB5AW163	3/45	ZBA343	3/52
ZB5AA335	3/39	ZB5AG4D	3/44	ZB5AR316	3/24	ZB5AW313	3/45	ZBA344	3/52
ZB5AA336	3/39	ZB5AG04D	3/44	ZB5AR416	3/24	ZB5AW313S	3/45	ZBA346	3/52
ZB5AA341	3/39	ZB5AG5	3/43	ZB5AR516	3/24	ZB5AW333	3/45	ZBA432	3/52
ZB5AA342	3/39	ZB5AG5	3/43	ZB5AR616	3/24	ZB5AW333S	3/45	ZBA433	3/52
ZB5AA343	3/39	ZB5AG5D	3/44	ZB5AS12	3/25	ZB5AW343	3/45	ZBA434	3/52
ZB5AA344	3/39	ZB5AG05D	3/44		3/40	ZB5AW343S	3/45	ZBA435	3/52
ZB5AA432	3/39	ZB5AG6	3/43	ZB5AS14	3/27	ZB5AW353	3/45	ZBA639	3/52
ZB5AA433	3/39	ZB5AG6D	3/44		3/40	ZB5AW353S	3/45	ZBA2934	3/52
ZB5AA434	3/39	ZB5AG6D	3/44	ZB5AS22	3/25	ZB5AW363	3/45	ZBA2935	3/52
ZB5AA435	3/39	ZB5AG7	3/43	ZB5AS22	3/25	ZB5AW363S	3/45	ZBCV0113	3/53
ZB5AC●	3/24	ZB5AG7D	3/44	ZB5AS24	3/27	ZB5AW713	3/25	ZBCV0133	3/53
	3/39	ZB5AG8	3/43	ZB5AS42	3/25		3/46	ZBCV0143	3/53
ZB5AC●4	3/24	ZB5AG8	3/43	ZB5AS44	3/27	ZB5AW733	3/25	ZBCV0153	3/53
	3/39	ZB5AG8D	3/44		3/40		3/46	ZBCV0163	3/53
ZB5AD●	3/41	ZB5AG8D	3/44	ZB5AS52	3/25	ZB5AW743	3/27	ZBCW9113	3/53
ZB5AD28	3/44	ZB5AG9	3/43		3/40		3/46	ZBCW9133	3/53
ZB5AD29	3/43	ZB5AG9	3/43	ZB5AS54	3/27	ZB5AW753	3/25	ZBCW9143	3/53
ZB5AD39	3/43	ZB5AG9D	3/44		3/40		3/46	ZBCW9153	3/53
ZB5AD48	3/44	ZB5AG9D	3/44	ZB5AS55	3/25	ZB5AW763	3/25	ZBCW9163	3/53
ZB5AD49	3/43	ZB5AJ●	3/42		3/40		3/46	ZBCW9313	3/53
ZB5AD59	3/43	ZB5AK1213	3/46	ZB5AS62	3/25	ZB5AX2	3/25	ZBCW9333	3/53
ZB5AD79	3/43	ZB5AK1233	3/46	ZB5AS64	3/27	ZB5AX4	3/27	ZBCW9343	3/53
ZB5AD89	3/43	ZB5AK1243	3/46	ZB5AS72	3/25	ZB5AX84	3/26	ZBCW9353	3/53
ZB5AD201	3/41	ZB5AK1253	3/46		3/40	ZB5AZ009	3/28	ZBCW9363	3/53
ZB5AD203	3/41	ZB5AK1263	3/46	ZB5AS74	3/27		3/37	ZBCW9383	3/53
ZB5AD204	3/42	ZB5AK1263	3/46		3/40	ZB5AZ901	3/37	ZBCY2H101	3/47
ZB5AD205	3/42	ZB5AK1313	3/46	ZB5AS834	3/26	ZB5AZ905	3/37	ZBCY4H101	3/47
ZB5AD206	3/42	ZB5AK1333	3/46		3/40		3/53	ZBCY1101	3/51
ZB5AD205	3/42	ZB5AK1343	3/46	ZB5AS844	3/26	ZB5CA●	3/38	ZBCZ34	3/47
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		ZB5AK1433	3/46		3/40	ZB5CA6939	3/39		
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