eliwell
by Schneider Electric

ICPlus

Electronic controllers with 1 or 2 intervention points

ICPlus series are devices with single or double stage depending on the model.
Outputs are dependent or independent, with Neutral Zone and are used for temperature, pressure and humidity applications.

MODBUS MANUAL

CONTENTS

ICPlus

Modbus is a client/server protocol for communication between devices connected in a network.
Modbus devices communicate using a master-slave technique in which only one device (master) can send messages.
The other devices in the network (slave) respond, returning the data requested by the master or executing the action contained in the message sent. A slave is a device connected to a network that processes information and sends the results to the master using the Modbus protocol. The master device can send messages to individual slaves or to the entire network (broadcast) whilst slaves can only respond individually to the master.
The Modbus standard used by Eliwell employs the RTU code for data transmission.

1.1 - DATA FORMAT (RTU)

The coding model used defines the structure of messages transmitted on the network and the way in which this information is deciphered. The type of coding is usually selected on the basis of specific parameters (baud rate, parity, etc.); furthermore, some devices support only specific coding models, although it must be the same one for all devices connected in a Modbus network.
The protocol uses the RTU binary method with bytes configured as follows: **8 bits for data, non-parity bit (configurable), 2 stop bits.**

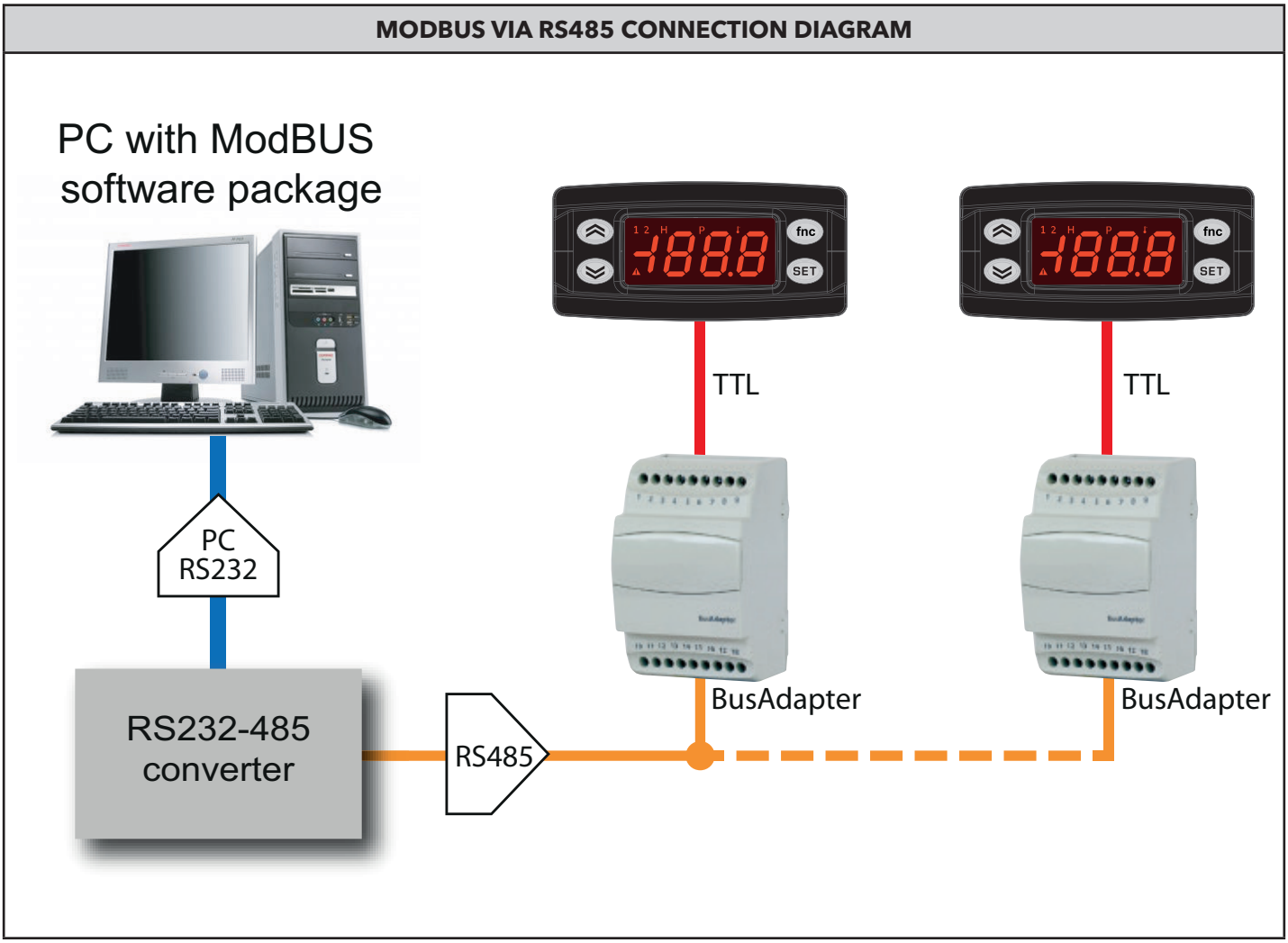
NOTE: the transmission speed must be set at 9600 baud.
Parameter setting allows the full configuration of the device
They can be modified using:

- Device keypad
- Copy Card
- Sending data via Modbus protocol directly to an individual controller or broadcasting it using the address 0.

1.1.1 - NETWORK

A connection diagrams for using Modbus is shown below:

MODBUS VIA RS485 CONNECTION DIAGRAM



1.1.2 - MODBUS COMMANDS AVAILABLE AND DATA AREAS

The following commands are implemented:

Modbus command	Description of command
03 (hex 0x03)	Read 16 consecutive registers for Client side. Read 1 single register for parameters.
16 (hex 0x10)	Write 15 consecutive registers for Client side. Write 1 register for the parameters.
43 (hex 0x2B)	Read device ID. It is possible to read the following 3 fields:

Field code	Field description
0	Manufacturer ID (="Invensys")
1	Device model/polycarbonate ID
2	Identification of device family (MSK 52**x**)/version

Length restrictions

Maximum length in bytes of messages sent to device	30 BYTES
Maximum length in bytes of messages received by the device	30 BYTES

1.1.3 - ADDRESS CONFIGURATION

The serial TTL - which we will call COM1 – can be used to configure the device, parameters, states, and variables with Modbus via the Modbus protocol.

The address of a device in a ModBus message is set via parameter **Adr.**

The address 0 is used for broadcast messages that all slaves recognize. Slaves don't respond to broadcast messages.
The parameters for configuring the device are:

Parameter	Description	Values	Range
PtS	Selection of communication protocol	t	• t = Televis • d = Modbus
Adr	Modbus protocol controller address	1	• 1 ... 255
bAU	Baudrate selection	96	• 48 = 4800 • 96 = 9600 • 192 = 19200 • 384 = 38400
Pty	Modbus protocol parity bit	E	• n = NONE • E = EVEN • o = ODD
StP	MODBUS stop bit	1b	• 1b = 1 BIT • 2b = 2 BIT

NOTE: To guarantee correct operation, the controller must be switched off and switched on again after modification of parameters Pty and bAU.

1.1.4 - PARAMETER VISIBILITY AND VALUES

IMPORTANT:

1. When not indicated otherwise, the parameter is always visible and modifiable, unless customised settings have been configured via serial.
2. If folder visibility is modified, the new setting will apply to all parameters in the folder.

1.2 - MODBUS TABLES

The tables below list all information required to read, write and decode all accessible resources in the device.

There are three tables:

- The "**PARAMETERS TABLE**" contains all device configuration parameters stored in the controller's non-volatile memory, including visibility
- The "**FOLDER VISIBILITY TABLE**" indicates the visibility of the folders containing the parameters
- The "**CLIENT TABLE**" includes all I/O and alarm status resources available in the volatile memory of the instrument.

Description of columns:

FOLDER
This indicates the label of the folder containing the parameter in question.

LABEL
This indicates the label used to display the parameters in the menu of the controller.

PAR. ADDRESS VALUE
The integer part represents the address of the MODBUS register containing the value of the resource to be read or written in the controller. The value after the point indicates the position of the most significant data bit inside the register; if not indicated it is taken to be zero. This information is always provided when the register contains more than one information item, and it is necessary to distinguish which bits actually represent the data (the working size of the data indicated in the column DATA SIZE is also taken into consideration).
Given that the modbus registers have the size of one WORD (16 bit), the index number after the point can vary from 0 (least significant bit –LSb–) to 15 (most significant bit –MSb–).
Examples (in binary form the least significant bit is the first on the right):

PAR. ADDRESS VALUE	DATA SIZE	Value	Content of register	
8806	WORD	1350	1350	(0000010101000110)
8806	BYTE	70	1350	(00000101**01000110**)
8806.8	BYTE	5	1350	(**00000101**01000110)
8806.14	1 BIT	0	1350	(0**0**00010101000110)
8806.7	4 BIT	10	1350	(00000**1010**1000110)

ATTENZIONE: when the register contains more than one piece of data, the write procedure is as follows:

- read current value of register
- modify bits for the resource concerned
- write register

VIS PAR. ADDRESS
The same as above. In this case, the MODBUS register address contains the visibility value of the parameter.
By default all parameters have:

- Data size: 2 bit
- Range: 0…3
- **Visibility: 3
- M.U.: num

****Value Meaning**

- Value 3 = parameter or folder always visible
- Value 2 = **manufacturer level**; these parameters can only be viewed by enter the manufacturer's password (see parameter PS2) (all parameters declared as always visible, parameters visible at the installer level and manufacturer's level will be visible)
- Value 1 = **installer level**; these parameters can only be viewed by enter the installer's password (see parameter PS1) (all parameters declared as always visible and parameters visible at the installer level)
- Value 0 = parameter or folder NOT visible

1. Parameters and/or folders with a level of visibility <>3 (password-protected) will be visible only if the correct password is entered (installer or manufacturer) following this procedure:
2. Parameters and/or folders with a level of visibility =3 are always visible even without a password: in this case, the following procedure is not necessary.

Examples (in binary form the least significant bit is the first on the right):
Default visibility:

PAR. ADDRESS VALUE	DATA SIZE	Value	Content of register	
49336.6	2 BIT	3	65535	----------(0000000011111111111111)
49337	2 BIT	3	65535	(0000000011111111111111)
49337.2	2 BIT	3	65535	(0000000011111111111111)
49337.4	2 BIT	3	65535	(0000000011111111111111)
49337.6	2 BIT	3	65535	(0000000011111111111111)

R/W
Indicates if resources are read/write, read-only or write-only:

- R = The resource is read-only
- W = The resource is write-only
- RW = The resource can be both read and written to

DESCRIPTION
This is the description of the meaning of the **parameters** in the **LABEL** column.

DATA SIZE
Indicates the size of the data in bits.

- WORD = 16 bit
- Byte = 8 bit
- "n" bit = 0...15 bit based on the value of "n"

CPL
When the field indicates "Y", the value read by the register needs to be converted because the value represents a number with a sign. In the other cases the value is always positive or null.
To carry out conversion, proceed as follows:

- If the value in the register is between 0 and 32.767, the result is the value itself (zero and positive values)
- If the value in the register is between 32.768 and 65.535, the result is the value of the register - 65.536 (negative values)

RANGE
Describes the interval of values that can be assigned to the parameter. It can be correlated with other instrument parameters (indicated with the parameter label).

M.U.
Measurement unit for values converted according to the rules indicated in the CPL and EXP columns.

2.1 - PARAMETERS TABLE

FOLDER	LABEL	Value PAR. ADDRESS	Vis. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
	SP1	16386	49410.6	RW	Regulation set point 1	WORD	Y	LS1 ... HS1	°C/°F
	SP2	16402	49414.4	RW	Regulation set point 2	WORD	Y	LS2 ... HS2	°C/°F
rE1	HC1	49210	49410.4	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		H/C	flag
rE1	OS1	16388	49411.0	RW	Offset on set point 1	WORD	Y	-30,0 ... 30,0	°C/°F
rE1	db1	16390	49411.2	RW	Tripping band above set point 1	WORD		0,0 ... 30,0	°C/°F
rE1	dF1	16392	49411.4	RW	Differential of set point 1	WORD		0,0 ... 30,0	°C/°F
rE1	HS1	16394	49411.6	RW	Maximum value settable for set point 1	WORD	Y	LS1 ... HdL	°C/°F
rE1	LS1	16396	49412.0	RW	Minimum value settable for set point 1	WORD	Y	LdL ... HS1	°C/°F
rE1	HA1	16398	49412.2	RW	Max. alarm regulator 1	WORD	Y	LA1 ... 150,0	°C/°F
rE1	LA1	16400	49412.4	RW	Min. alarm regulator 1	WORD	Y	-150,0 ... HA1	°C/°F
rE1	dn1	49212	49412.6	RW	Start-up delay of regulator 1	BYTE		0 ... 250	secs
rE1	do1	49213	49413.0	RW	Shutdown delay of regulator 1	BYTE		0 ... 250	min
rE1	di1	49214	49413.2	RW	Delay between two consecutive starts of regulator 1	BYTE		0 ... 250	min
rE1	dE1	49215	49413.4	RW	Start-up delay after the shutdown of regulator 1	BYTE		0 ... 250	secs
rE1	On1	49216	49413.6	RW	ON time of regulator 1 due faulty probe	BYTE		0 ... 250	min
rE1	OF1	49217	49414.0	RW	OFF time of regulator 1 due faulty probe	BYTE		0 ... 250	min
rE2	HC2	49211	49414.2	RW	Operating mode of set point 2 (Heating/Cooling)	BYTE		H/C	flag
rE2	OS2	16404	49414.6	RW	Offset on set point 2	WORD	Y	-30,0 ... 30,0	°C/°F
rE2	db2	16406	49415.0	RW	Tripping band above set point 2	WORD		0,0 ... 30,0	°C/°F
rE2	dF2	16408	49415.2	RW	Differential of set point 2	WORD		0,0 ... 30,0	°C/°F
rE2	HS2	16410	49415.4	RW	Maximum value settable for set point 2	WORD	Y	LS2 ... HdL	°C/°F
rE2	LS2	16412	49415.6	RW	Minimum value settable for set point 2	WORD	Y	LdL ... HS2	°C/°F
rE2	HA2	16414	49416.0	RW	Max. alarm regulator 2	WORD	Y	LA2 ... 150,0	°C/°F
rE2	LA2	16416	49416.2	RW	Min. alarm regulator 2	WORD	Y	-150,0 ... HA2	°C/°F
rE2	dn2	49218	49416.4	RW	Start-up delay of regulator 2	BYTE		0 ... 250	secs
rE2	do2	49219	49416.6	RW	Shutdown delay of regulator 2	BYTE		0 ... 250	min
rE2	di2	49220	49417.0	RW	Delay between two consecutive starts of regulator 2	BYTE		0 ... 250	min
rE2	dE2	49221	49417.2	RW	Start-up delay after the shutdown of regulator 2	BYTE		0 ... 250	secs
rE2	On2	49222	49417.4	RW	ON time of regulator 2 due faulty probe	BYTE		0 ... 250	min
rE2	OF2	49223	49417.6	RW	OFF time of regulator 2 due faulty probe	BYTE		0 ... 250	min
SFt	dSi	49224	49418.0	RW	Value of soft start regulator step	BYTE		0,0 ... 25,0	°C/°F
SFt	dSt	49225	49418.2	RW	Duration of soft start regulator step	BYTE		0 ... 250	min
SFt	Unt	49226	49418.4	RW	Unit of measurement for step duration	BYTE		0/1/2	num
SFt	SEn	49228	49419.0	RW	Selects the regulator on which the soft start function must be enabled	BYTE		0/1/2/3	num
SFt	Sdi	16418	49419.2	RW	Automatic back swing of Soft start function	WORD		1,0 ... 50,0	°C/°F
cLc	Con	49229	49419.4	RW	ON time for cyclic regulator output	BYTE		0 ... 250	min
cLc	Cof	49230	49419.6	RW	OFF time for cyclic regulator output	BYTE		0 ... 250	min
AL	Att	49231	49420.0	RW	Mode of parameter HA1-HA2 and LA-LA2 (absolute or relative)	BYTE		AbS/rEL	flag
AL	AFd	16420	49420.2	RW	Alarm differential	WORD		1,0 ... 50,0	°C/°F
AL	PAO	49232	49420.4	RW	Alarm disabling after Power On	BYTE		0 ... 10	hours
AL	SAO	49233	49420.6	RW	Timeout for "set point not reached" alarm	BYTE		0 ... 10	hours
AL	tAO	49234	49421.0	RW	Alarm signalling delay	BYTE		0 ... 250	min
AL	AOP	49235	49421.2	RW	Polarity of alarm output	BYTE		nC/nO	flag
AL	tP	49236	49421.4	RW	Enable alarm reset with all buttons	BYTE		n/y	flag
Add	PtS	49277	49431.2	RW	Protocol selection	BYTE		t/d	flag
Add	dEA	49237	49421.6	RW	Device address	BYTE		0 ... 14	num

FOLDER	LABEL	Value PAR. ADDRESS	Vis. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
Add	FAA	49238	49422.0	RW	Family address	BYTE		0 ... 14	num
Add	Adr	49278	49431.4	RW	Modbus protocol controller address	BYTE		1 ... 255	num
Add	bAU	49276	49431.6	RW	Baudrate selection	BYTE		48/96/192/384	num
Add	PtY	49274	49430.6	RW	Modbus parity bit	BYTE		n/E/o	num
Add	StP	49275	49431.0	RW	Modbus stop bit	BYTE		1b/2b	flag
diS	LOC	49239	49422.2	RW	Enable keyboard lock	BYTE		n/y	flag
diS	PS1	49240	49422.4	RW	Value of password 1	BYTE		0 ... 250	num
diS	PS2	49241	49422.6	RW	Value of password 2	BYTE		0 ... 250	num
diS	ndt	49242	49423.0	RW	Display with decimal point	BYTE		n/y	flag
diS	CA1	16422	49423.2	RW	Cell probe calibration	WORD	Y	-30,0 ... 30,0	°C/°F
diS	CAI	49243	49423.4	RW	Calibration enabling	BYTE		0/1/2	num
diS	LdL	16424	49423.6	RW	Minimum value that can be displayed	WORD	Y	-199,9 ... HdL	°C/°F
diS	HdL	16426	49424.0	RW	Maximum value that can be displayed	WORD	Y	LdL ... 199,9	°C/°F
diS	dro	49244	49424.2	RW	Selection of °C/°F	BYTE		C/F	flag
CnF	H00	49246	49424.6	RW	Type of probe selection	BYTE		Ptc/ntC	flag
CnF	H01	49259	49425.0	RW	Output link	BYTE		0/1/2	num
CnF	H02	49247	49425.2	RW	Keyboard functions enabling time	BYTE		0 ... 15	secs
CnF	H05	16502	49425.6	RW	Windows filter setting	WORD		-2/-1/0/1/2	num
CnF	H06	49249	49426.0	RW	Key or aux./light digital input ON with unit OFF	BYTE		n/y	flag
CnF	H08	49250	49426.2	RW	Standby operating mode	BYTE		0/1/2	num
CnF	H10	49251	49426.4	RW	Delay output enabling from Power On	BYTE		0 ... 250	min
CnF	H11	49252	49426.6	RW	Configurability of digital inputs	BYTE		0 ... 9	num
CnF	H13	49253	49427.0	RW	Polarity and priority of digital inputs	BYTE		no/nc/noP/ncP	num
CnF	H14	49254	49427.2	RW	Enabling delay of digital inputs	BYTE		0 ... 250	min
CnF	H21	49255	49427.4	RW	Configurability of digital output 1 – Regulator 1	BYTE		0 ... 6	num
CnF	H22	49256	49427.6	RW	Configurability of digital output 2 – Regulator 2	BYTE		0 ... 6	num
CnF	H31	49260	49428.2	RW	UP button configurability	BYTE		0 ... 7	num
CnF	H32	49261	49428.4	RW	DOWN button configurability	BYTE		0 ... 7	num
CnF	H33	49262	49428.6	RW	ESC button configurability	BYTE		0 ... 7	num
CnF	vis_rEL	---	49429.2	RW	Parameter visibility	2 BIT		0 ... 3	num
CnF	vis_tAb	---	49429.4	RW	Parameter visibility	2 BIT		0 ... 3	num
FPr	vis_UL	---	49430.0	RW	Function visibility	2 BIT		0 ... 3	num
FPr	vis_dL	---	49430.2	RW	Function visibility	2 BIT		0 ... 3	num
FPr	vis_Fr	---	49430.4	RW	Function visibility	2 BIT		0 ... 3	num
FnC	vis_SOn	---	49440.0	RW	SoftStart visibility	1 BIT		0 ... 3	num
FnC	vis_OSP	---	49440.1	RW	ReducedSetPoint visibility	1 BIT		0 ... 3	num
FnC	vis_bon	---	49440.2	RW	ActuationBlock visibility	1 BIT		0 ... 3	num
FnC	vis_Cyc	---	49440.3	RW	Cycle visibility	1 BIT		0 ... 3	num
FnC	vis_Aon	---	49440.4	RW	Aux visibility	1 BIT		0 ... 3	num
FnC	vis_oF	---	49440.5	RW	StandBy visibility	1 BIT		0 ... 3	num
FnC	vis_tAL	---	49440.7	RW	Silencing visibility	1 BIT		0 ... 3	num

2.2 - FOLDER VISIBILITY TABLE

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
vis_rE1	49408.0	RW	**rE1** (Controller 1) folder visibility	2 BIT	0 ... 3	num
vis_rE2	49408.2	RW	**rE2** (Controller 2) folder visibility	2 BIT	0 ... 3	num
vis_SFt	49408.4	RW	**SFt** (Soft Start controller) folder visibility	2 BIT	0 ... 3	num
vis_cLc	49408.6	RW	**cLc** (Cyclic Controller) folder visibility	2 BIT	0 ... 3	num
vis_AL	49409.0	RW	**AL** (Alarms) folder visibility	2 BIT	0 ... 3	num
vis_Add	49409.2	RW	**Add** (Communication) folder visibility	2 BIT	0 ... 3	num
vis_diS	49409.4	RW	**diS** (Display) folder visibility	2 BIT	0 ... 3	num
vis_CnF	49409.6	RW	**CnF** (Configuration) folder visibility	2 BIT	0 ... 3	num
vis_FPr	49410.0	RW	**FPr** (Copy Card) folder visibility	2 BIT	0 ... 3	num
vis_FnC	49410.2	RW	**FnC** (Functions) folder visibility	2 BIT	0 ... 3	num
vis_PA2	49446.1	RW	**PA2** folder visibility **(Password for accessing Installer parameters)**	1 BIT	0 ... 3	num

2.3 - CLIENT TABLE

WARNING!:
RW (Reading/Writing) commands are enabled by activating a timer: it is mandatory to write a WORD (containing a time in seconds) at address 109 (0x6D) before sending any command.
The commands will be accepted only within the time herewith set.

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
ST1	117	R	Analogue input (control)	WORD	-199,9 ... 199,9	°C/°F
SEt1	382	R	Control setpoint value 1	WORD	-199,9 ... 199,9	°C/°F
SEt2	384	R	Control setpoint value 2	WORD	-199,9 ... 199,9	°C/°F
DI1	32882.0	R	Digital input	1 BIT	0 ... 1	flag
E1	32894.4	R	Analog input 1 failure	1 BIT	0 ... 1	flag
AH1	32894.0	R	High alarm reg. 1	1 BIT	0 ... 1	flag
AL1	32894.2	R	Low alarm reg. 1	1 BIT	0 ... 1	flag
AH2	32894.1	R	High alarm reg. 2	1 BIT	0 ... 1	flag
AL2	32894.3	R	Low alarm reg. 2	1 BIT	0 ... 1	flag
EA	32894.5	R	External	1 BIT	0 ... 1	flag
ON	32895.5	R	On	1 BIT	0 ... 1	flag
AL	32893.4	R	Alarm	1 BIT	0 ... 1	flag
SETR	32895.1	R	Reduced set-point	1 BIT	0 ... 1	flag
REG1	32892.5	R	Regulator status 1	1 BIT	0 ... 1	flag
REG2	32892.6	R	Regulator status 2	1 BIT	0 ... 1	flag
AUX	32895.4	R	Auxiliary	1 BIT	0 ... 1	flag
CYC	32895.3	R	Cont. Cycle command output	1 BIT	0 ... 1	flag
BLKOUT	32895.2	R	Output lock	1 BIT	0 ... 1	flag
ROnOn	32875.6	RW	Instrument On	1 BIT	0 ... 1	flag
ROffOff	32875.7	RW	Instrument Off	1 BIT	0 ... 1	flag
ROnAux	32875.1	RW	Auxiliary output On	1 BIT	0 ... 1	flag
ROffAux	32875.5	RW	Auxiliary output Off	1 BIT	0 ... 1	flag

3.1 - PARAMETERS TABLE

FOLDER	LABEL	Value PAR. ADDRESS	Vis. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
	SP1	16386	49410.6	RW	Regulation set point 1	WORD	Y	LS1 ... HS1	num
	SP2	16402	49414.4	RW	Regulation set point 2	WORD	Y	LS2 ... HS2	num
rE1	HC1	49210	49410.4	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		H/C	flag
rE1	OS1	16388	49411.0	RW	Offset on set point 1	WORD	Y	-30 ... 30	°C/°F
rE1	db1	16390	49411.2	RW	Tripping band above set point 1	WORD		0 ... 30	num
rE1	dF1	16392	49411.4	RW	Differential of set point 1	WORD		0 ... 30	num
rE1	HS1	16394	49411.6	RW	Maximum value settable for set point 1	WORD	Y	LS1 ... HdL	num
rE1	LS1	16396	49412.0	RW	Minimum value settable for set point 1	WORD	Y	LdL ... HS1	num
rE1	HA1	16398	49412.2	RW	Max. alarm regulator 1	WORD	Y	LA1 ... 150	num
rE1	LA1	16400	49412.4	RW	Min. alarm regulator 1	WORD	Y	-150 ... HA1	num
rE1	dn1	49212	49412.6	RW	Start-up delay of regulator 1	BYTE		0 ... 250	secs
rE1	do1	49213	49413.0	RW	Shutdown delay of regulator 1	BYTE		0 ... 250	min
rE1	di1	49214	49413.2	RW	Delay between two consecutive starts of regulator 1	BYTE		0 ... 250	min
rE1	dE1	49215	49413.4	RW	Start-up delay after the shutdown of regulator 1	BYTE		0 ... 250	secs
rE1	On1	49216	49413.6	RW	ON time of regulator 1 due faulty probe	BYTE		0 ... 250	min
rE1	OF1	49217	49414.0	RW	OFF time of regulator 1 due faulty probe	BYTE		0 ... 250	min
rE2	HC2	49211	49414.2	RW	Operating mode of set point 2 (Heating/Cooling)	BYTE		H/C	flag
rE2	OS2	16404	49414.6	RW	Offset on set point 2	WORD	Y	-30 ... 30	num
rE2	db2	16406	49415.0	RW	Tripping band above set point 2	WORD		0 ... 30	num
rE2	dF2	16408	49415.2	RW	Differential of set point 2	WORD		0 ... 30	num
rE2	HS2	16410	49415.4	RW	Maximum value settable for set point 2	WORD	Y	LS2 ... HdL	num
rE2	LS2	16412	49415.6	RW	Minimum value settable for set point 2	WORD	Y	LdL ... HS2	num
rE2	HA2	16414	49416.0	RW	Max. alarm regulator 2	WORD	Y	LA2 ... 150	num
rE2	LA2	16416	49416.2	RW	Min. alarm regulator 2	WORD	Y	-150 ... HA2	num
rE2	dn2	49218	49416.4	RW	Start-up delay of regulator 2	BYTE		0 ... 250	secs
rE2	do2	49219	49416.6	RW	Shutdown delay of regulator 2	BYTE		0 ... 250	min
rE2	di2	49220	49417.0	RW	Delay between two consecutive starts of regulator 2	BYTE		0 ... 250	min
rE2	dE2	49221	49417.2	RW	Start-up delay after the shutdown of regulator 2	BYTE		0 ... 250	secs
rE2	On2	49222	49417.4	RW	ON time of regulator 2 due faulty probe	BYTE		0 ... 250	min
rE2	OF2	49223	49417.6	RW	OFF time of regulator 2 due faulty probe	BYTE		0 ... 250	min
SFt	dSi	49224	49418.0	RW	Value of soft start regulator step	BYTE		0 ... 25	num
SFt	dSt	49225	49418.2	RW	Duration of soft start regulator step	BYTE		0 ... 250	min
SFt	Unt	49226	49418.4	RW	Unit of measurement for step duration	BYTE		0/1/2	num
SFt	SEn	49228	49419.0	RW	Selects the regulator on which the soft start function must be enabled	BYTE		0/1/2/3	num
SFt	Sdi	16418	49419.2	RW	Automatic back swing of Soft start function	WORD		1 ... 50	num
cLc	Con	49229	49419.4	RW	ON time for cyclic regulator output	BYTE		0 ... 250	min
cLc	Cof	49230	49419.6	RW	OFF time for cyclic regulator output	BYTE		0 ... 250	min
AL	Att	49231	49420.0	RW	Mode of parameter HA1-HA2 and LA-LA2 (absolute or relative)	BYTE		AbS/rEL	flag
AL	AFd	16420	49420.2	RW	Alarm differential	WORD		1 ... 50	num
AL	PAO	49232	49420.4	RW	Alarm disabling after Power On	BYTE		0 ... 10	hours
AL	SAO	49233	49420.6	RW	Timeout for "set point not reached" alarm	BYTE		0 ... 10	hours
AL	tAO	49234	49421.0	RW	Alarm signalling delay	BYTE		0 ... 250	min
AL	AOP	49235	49421.2	RW	Polarity of alarm output	BYTE		nC/nO	flag
AL	tP	49236	49421.4	RW	Enable alarm reset with all buttons	BYTE		n/y	flag
Add	PtS	49277	49431.2	RW	Protocol selection	BYTE		t/d	flag
Add	dEA	49237	49421.6	RW	Device address	BYTE		0 ... 14	num

FOLDER	LABEL	Value PAR. ADDRESS	Vis. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
Add	FAA	49238	49422.0	RW	Family address	BYTE		0 ... 14	num
Add	Adr	49278	49431.4	RW	Modbus protocol controller address	BYTE		1 ... 255	num
Add	bAU	49276	49431.6	RW	Baudrate selection	BYTE		48/96/192/384	num
Add	PtY	49274	49430.6	RW	Modbus parity bit	BYTE		n/E/o	num
Add	StP	49275	49431.0	RW	Modbus stop bit	BYTE		1b/2b	flag
diS	LOC	49239	49422.2	RW	Enable keyboard lock	BYTE		n/y	flag
diS	PS1	49240	49422.4	RW	Value of password 1	BYTE		0 ... 250	num
diS	PS2	49241	49422.6	RW	Value of password 2	BYTE		0 ... 250	num
diS	ndt	49242	49423.0	RW	Display with decimal point	BYTE		n/y	flag
diS	CA1	16422	49423.2	RW	Cell probe calibration	WORD	Y	-30 ... 30	num
diS	CAI	49243	49423.4	RW	Calibration enabling	BYTE		0/1/2	num
diS	LdL	16424	49423.6	RW	Minimum value that can be displayed	WORD	Y	-199,9 ... HdL	num
diS	HdL	16426	49424.0	RW	Maximum value that can be displayed	WORD	Y	LdL ... 199,9	num
diS	dro	49244	49424.2	RW	Selection of unit of measurement for probe 1	BYTE		n/t/P/H	num
CnF	H00	49246	49424.6	RW	Type of probe selection	BYTE		420/020 010/05/01	num
CnF	H01	49259	49425.0	RW	Output link	BYTE		0/1/2	num
CnF	H02	49247	49425.2	RW	Keyboard functions enabling time	BYTE		0 ... 15	secs
CnF	H03	16428	49425.4	RW	Minimum limit for current input	WORD		-1999 ... 1999	num
CnF	H04	16430	49425.4	RW	Maximum limit for current input	WORD		-1999 ... 1999	num
CnF	H05	16502	49425.6	RW	Windows filter setting	WORD		-2/-1/0/1/2	num
CnF	H06	49249	49426.0	RW	Key or aux./light digital input ON with unit OFF	BYTE		n/y	flag
CnF	H08	49250	49426.2	RW	Standby operating mode	BYTE		0/1/2	num
CnF	H10	49251	49426.4	RW	Delay output enabling from Power On	BYTE		0 ... 250	min
CnF	H21	49255	49427.4	RW	Configurability of digital output 1 – Regulator 1	BYTE		0 ... 6	num
CnF	H22	49256	49427.6	RW	Configurability of digital output 2 – Regulator 2	BYTE		0 ... 6	num
CnF	H31	49260	49428.2	RW	UP button configurability	BYTE		0 ... 7	num
CnF	H32	49261	49428.4	RW	DOWN button configurability	BYTE		0 ... 7	num
CnF	H33	49262	49428.6	RW	ESC button configurability	BYTE		0 ... 7	num
CnF	vis_rEL	---	49429.2	RW	Parameter visibility	2 BIT		0 ... 3	num
CnF	vis_tAb	---	49429.4	RW	Parameter visibility	2 BIT		0 ... 3	num
FPr	vis_UL	---	49430.0	RW	Function visibility	2 BIT		0 ... 3	num
FPr	vis_dL	---	49430.2	RW	Function visibility	2 BIT		0 ... 3	num
FPr	vis_Fr	---	49430.4	RW	Function visibility	2 BIT		0 ... 3	num
FnC	vis_SOn	---	49440.0	RW	SoftStart visibility	1 BIT		0 ... 3	num
FnC	vis_OSP	---	49440.1	RW	ReducedSetPoint visibility	1 BIT		0 ... 3	num
FnC	vis_bon	---	49440.2	RW	ActuationBlock visibility	1 BIT		0 ... 3	num
FnC	vis_Cyc	---	49440.3	RW	Cycle visibility	1 BIT		0 ... 3	num
FnC	vis_Aon	---	49440.4	RW	Aux visibility	1 BIT		0 ... 3	num
FnC	vis_oF	---	49440.5	RW	StandBy visibility	1 BIT		0 ... 3	num
FnC	vis_tAL	---	49440.7	RW	Silencing visibility	1 BIT		0 ... 3	num

3.2 - FOLDER VISIBILITY TABLE

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
vis_rE1	49408.0	RW	**rE1** (Controller 1) folder visibility	2 BIT	0 ... 3	num
vis_rE2	49408.2	RW	**rE2** (Controller 2) folder visibility	2 BIT	0 ... 3	num
vis_SFt	49408.4	RW	**SFt** (Soft Start controller) folder visibility	2 BIT	0 ... 3	num
vis_cLc	49408.6	RW	**cLc** (Cyclic Controller) folder visibility	2 BIT	0 ... 3	num
vis_AL	49409.0	RW	**AL** (Alarms) folder visibility	2 BIT	0 ... 3	num
vis_Add	49409.2	RW	**Add** (Communication) folder visibility	2 BIT	0 ... 3	num
vis_diS	49409.4	RW	**diS** (Display) folder visibility	2 BIT	0 ... 3	num
vis_CnF	49409.6	RW	**CnF** (Configuration) folder visibility	2 BIT	0 ... 3	num
vis_FPr	49410.0	RW	**FPr** (Copy Card) folder visibility	2 BIT	0 ... 3	num
vis_FnC	49410.2	RW	**FnC** (Functions) folder visibility	2 BIT	0 ... 3	num
vis_PA2	49446.1	RW	**PA2** folder visibility **(Password for accessing Installer parameters)**	1 BIT	0 ... 3	num

3.3 - CLIENT TABLE

WARNING!:
RW (Reading/Writing) commands are enabled by activating a timer: it is mandatory to write a WORD (containing a time in seconds) at address 107 (0x6B) before sending any command.
The commands will be accepted only within the time herewith set.

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
ST1	115	R	Analogue input (control)	WORD	-199,9 ... 199,9	°C/°F
SEt1	381	R	Control setpoint value 1	WORD	-199,9 ... 199,9	°C/°F
SEt2	383	R	Control setpoint value 2	WORD	-199,9 ... 199,9	°C/°F
DI1	32880.0	R	Digital input	1 BIT	0 ... 1	flag
E1	32892.4	R	Analog input 1 failure	1 BIT	0 ... 1	flag
AH1	32892.0	R	High alarm reg. 1	1 BIT	0 ... 1	flag
AL1	32892.2	R	Low alarm reg. 1	1 BIT	0 ... 1	flag
AH2	32892.1	R	High alarm reg. 2	1 BIT	0 ... 1	flag
AL2	32892.3	R	Low alarm reg. 2	1 BIT	0 ... 1	flag
EA	32892.5	R	External	1 BIT	0 ... 1	flag
ON	32893.5	R	On	1 BIT	0 ... 1	flag
AL	32891.4	R	Alarm	1 BIT	0 ... 1	flag
SETR	32893.1	R	Reduced set-point	1 BIT	0 ... 1	flag
REG1	32890.5	R	Regulator status 1	1 BIT	0 ... 1	flag
REG2	32890.6	R	Regulator status 2	1 BIT	0 ... 1	flag
AUX	32893.4	R	Auxiliary	1 BIT	0 ... 1	flag
CYC	32893.3	R	Cont. Cycle command output	1 BIT	0 ... 1	flag
BLKOUT	32893.2	R	Output lock	1 BIT	0 ... 1	flag
ROnOn	32873.6	RW	Instrument On	1 BIT	0 ... 1	flag
ROffOff	32873.7	RW	Instrument Off	1 BIT	0 ... 1	flag
ROnAux	32873.1	RW	Auxiliary output On	1 BIT	0 ... 1	flag
ROffAux	32873.5	RW	Auxiliary output Off	1 BIT	0 ... 1	flag

4.1 - PARAMETERS TABLE

FOLDER	LABEL	Value PAR. ADDRESS	Vis. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
	SP1	16386	49410.6	RW	Regulation set point 1	WORD	Y	LS1 ... HS1	°C/°F
	SP2	16402	49414.4	RW	Regulation set point 2	WORD	Y	LS2 ... HS2	°C/°F
rE1	HC1	49210	49410.4	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		H/C	flag
rE1	OS1	16388	49411.0	RW	Offset on set point 1	WORD	Y	-30,0 ... 30,0	°C/°F
rE1	db1	16390	49411.2	RW	Tripping band above set point 1	WORD		0,0 ... 30,0	°C/°F
rE1	dF1	16392	49411.4	RW	Differential of set point 1	WORD		0,0 ... 30,0	°C/°F
rE1	HS1	16394	49411.6	RW	Maximum value settable for set point 1	WORD	Y	LS1 ... HdL	°C/°F
rE1	LS1	16396	49412.0	RW	Minimum value settable for set point 1	WORD	Y	LdL ... HS1	°C/°F
rE1	HA1	16398	49412.2	RW	Max. alarm regulator 1	WORD	Y	LA1 ... 1999	°C/°F
rE1	LA1	16400	49412.4	RW	Min. alarm regulator 1	WORD	Y	-328 ... HA1	°C/°F
rE1	dn1	49212	49412.6	RW	Start-up delay of regulator 1	BYTE		0 ... 250	secs
rE1	do1	49213	49413.0	RW	Shutdown delay of regulator 1	BYTE		0 ... 250	min
rE1	di1	49214	49413.2	RW	Delay between two consecutive starts of regulator 1	BYTE		0 ... 250	min
rE1	dE1	49215	49413.4	RW	Start-up delay after the shutdown of regulator 1	BYTE		0 ... 250	secs
rE1	On1	49216	49413.6	RW	ON time of regulator 1 due faulty probe	BYTE		0 ... 250	min
rE1	OF1	49217	49414.0	RW	OFF time of regulator 1 due faulty probe	BYTE		0 ... 250	min
rE2	HC2	49211	49414.2	RW	Operating mode of set point 2 (Heating/Cooling)	BYTE		H/C	flag
rE2	OS2	16404	49414.6	RW	Offset on set point 2	WORD	Y	-30,0 ... 30,0	°C/°F
rE2	db2	16406	49415.0	RW	Tripping band above set point 2	WORD		0,0 ... 30,0	°C/°F
rE2	dF2	16408	49415.2	RW	Differential of set point 2	WORD		0,0 ... 30,0	°C/°F
rE2	HS2	16410	49415.4	RW	Maximum value settable for set point 2	WORD	Y	LS2 ... HdL	°C/°F
rE2	LS2	16412	49415.6	RW	Minimum value settable for set point 2	WORD	Y	LdL ... HS2	°C/°F
rE2	HA2	16414	49416.0	RW	Max. alarm regulator 2	WORD	Y	LA2 ... 1999	°C/°F
rE2	LA2	16416	49416.2	RW	Min. alarm regulator 2	WORD	Y	-328 ... HA2	°C/°F
rE2	dn2	49218	49416.4	RW	Start-up delay of regulator 2	BYTE		0 ... 250	secs
rE2	do2	49219	49416.6	RW	Shutdown delay of regulator 2	BYTE		0 ... 250	min
rE2	di2	49220	49417.0	RW	Delay between two consecutive starts of regulator 2	BYTE		0 ... 250	min
rE2	dE2	49221	49417.2	RW	Start-up delay after the shutdown of regulator 2	BYTE		0 ... 250	secs
rE2	On2	49222	49417.4	RW	ON time of regulator 2 due faulty probe	BYTE		0 ... 250	min
rE2	OF2	49223	49417.6	RW	OFF time of regulator 2 due faulty probe	BYTE		0 ... 250	min
SFt	dSi	49224	49418.0	RW	Value of soft start regulator step	BYTE		0,0 ... 25,0	°C/°F
SFt	dSt	49225	49418.2	RW	Duration of soft start regulator step	BYTE		0 ... 250	min
SFt	Unt	49226	49418.4	RW	Unit of measurement for step duration	BYTE		0/1/2	num
SFt	SEn	49228	49419.0	RW	Selects the regulator on which the soft start function must be enabled	BYTE		0/1/2/3	num
SFt	Sdi	16418	49419.2	RW	Automatic back swing of Soft start function	WORD		1,0 ... 50,0	°C/°F
cLc	Con	49229	49419.4	RW	ON time for cyclic regulator output	BYTE		0 ... 250	min
cLc	Cof	49230	49419.6	RW	OFF time for cyclic regulator output	BYTE		0 ... 250	min
AL	Att	49231	49420.0	RW	Mode of parameter HA1-HA2 and LA-LA2 (absolute or relative)	BYTE		AbS/rEL	flag
AL	AFd	16420	49420.2	RW	Alarm differential	WORD		1,0 ... 50,0	°C/°F
AL	PAO	49232	49420.4	RW	Alarm disabling after Power On	BYTE		0 ... 10	hours
AL	SAO	49233	49420.6	RW	Timeout for "set point not reached" alarm	BYTE		0 ... 10	hours
AL	tAO	49234	49421.0	RW	Alarm signalling delay	BYTE		0 ... 250	min
AL	AOP	49235	49421.2	RW	Polarity of alarm output	BYTE		nC/nO	flag
AL	tP	49236	49421.4	RW	Enable alarm reset with all buttons	BYTE		n/y	flag
Add	PtS	49277	49431.2	RW	Protocol selection	BYTE		t/d	flag
Add	dEA	49237	49421.6	RW	Device address	BYTE		0 ... 14	num

FOLDER	LABEL	Value PAR. ADDRESS	Vis. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
Add	FAA	49238	49422.0	RW	Family address	BYTE		0 ... 14	num
Add	Adr	49278	49431.4	RW	Modbus protocol controller address	BYTE		1 ... 255	num
Add	bAU	49276	49431.6	RW	Baudrate selection	BYTE		48/96/192/384	num
Add	PtY	49274	49430.6	RW	Modbus parity bit	BYTE		n/E/o	num
Add	StP	49275	49431.0	RW	Modbus stop bit	BYTE		1b/2b	flag
diS	LOC	49239	49422.2	RW	Enable keyboard lock	BYTE		n/y	flag
diS	PS1	49240	49422.4	RW	Value of password 1	BYTE		0 ... 250	num
diS	PS2	49241	49422.6	RW	Value of password 2	BYTE		0 ... 250	num
diS	ndt	49242	49423.0	RW	Display with decimal point	BYTE		n/y	flag
diS	CA1	16422	49423.2	RW	Cell probe calibration	WORD	Y	-30,0 ... 30,0	°C/°F
diS	CAI	49243	49423.4	RW	Calibration enabling	BYTE		0/1/2	num
diS	LdL	16424	49423.6	RW	Minimum value that can be displayed	WORD	Y	-328 ... HdL	°C/°F
diS	HdL	16426	49424.0	RW	Maximum value that can be displayed	WORD	Y	LdL ... 1350	°C/°F
diS	dro	49244	49424.2	RW	Selection of °C/°F	BYTE		C/F	flag
CnF	H00	49246	49424.6	RW	Type of probe selection	BYTE		Jtc/Htc/Pt1	num
CnF	H01	49259	49425.0	RW	Output link	BYTE		0/1/2	num
CnF	H02	49247	49425.2	RW	Keyboard functions enabling time	BYTE		0 ... 15	secs
CnF	H05	16502	49425.6	RW	Windows filter setting	WORD		-2/-1/0/1/2	num
CnF	H06	49249	49426.0	RW	Key or aux./light digital input ON with unit OFF	BYTE		n/y	flag
CnF	H08	49250	49426.2	RW	Standby operating mode	BYTE		0/1/2	num
CnF	H10	49251	49426.4	RW	Delay output enabling from Power On	BYTE		0 ... 250	min
CnF	H11	49252	49426.6	RW	Configurability of digital inputs	BYTE		0 ... 9	num
CnF	H13	49253	49427.0	RW	Polarity and priority of digital inputs	BYTE		no/nc/noP/ncP	num
CnF	H14	49254	49427.2	RW	Enabling delay of digital inputs	BYTE		0 ... 250	min
CnF	H21	49255	49427.4	RW	Configurability of digital output 1 – Regulator 1	BYTE		0 ... 6	num
CnF	H22	49256	49427.6	RW	Configurability of digital output 2 – Regulator 2	BYTE		0 ... 6	num
CnF	H31	49260	49428.2	RW	UP button configurability	BYTE		0 ... 7	num
CnF	H32	49261	49428.4	RW	DOWN button configurability	BYTE		0 ... 7	num
CnF	H33	49262	49428.6	RW	ESC button configurability	BYTE		0 ... 7	num
CnF	vis_rEL	---	49429.2	RW	Parameter visibility	2 BIT		0 ... 3	num
CnF	vis_tAb	---	49429.4	RW	Parameter visibility	2 BIT		0 ... 3	num
FPr	vis_UL	---	49430.0	RW	Function visibility	2 BIT		0 ... 3	num
FPr	vis_dL	---	49430.2	RW	Function visibility	2 BIT		0 ... 3	num
FPr	vis_Fr	---	49430.4	RW	Function visibility	2 BIT		0 ... 3	num
FnC	vis_SOn	---	49440.0	RW	SoftStart visibility	1 BIT		0 ... 3	num
FnC	vis_OSP	---	49440.1	RW	ReducedSetPoint visibility	1 BIT		0 ... 3	num
FnC	vis_bon	---	49440.2	RW	ActuationBlock visibility	1 BIT		0 ... 3	num
FnC	vis_Cyc	---	49440.3	RW	Cycle visibility	1 BIT		0 ... 3	num
FnC	vis_Aon	---	49440.4	RW	Aux visibility	1 BIT		0 ... 3	num
FnC	vis_oF	---	49440.5	RW	StandBy visibility	1 BIT		0 ... 3	num
FnC	vis_tAL	---	49440.7	RW	Silencing visibility	1 BIT		0 ... 3	num

4.2 - FOLDER VISIBILITY TABLE

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
vis_rE1	49408.0	RW	**rE1** (Controller 1) folder visibility	2 BIT	0 ... 3	num
vis_rE2	49408.2	RW	**rE2** (Controller 2) folder visibility	2 BIT	0 ... 3	num
vis_SFt	49408.4	RW	**SFt** (Soft Start controller) folder visibility	2 BIT	0 ... 3	num
vis_cLc	49408.6	RW	**cLc** (Cyclic Controller) folder visibility	2 BIT	0 ... 3	num
vis_AL	49409.0	RW	**AL** (Alarms) folder visibility	2 BIT	0 ... 3	num
vis_Add	49409.2	RW	**Add** (Communication) folder visibility	2 BIT	0 ... 3	num
vis_diS	49409.4	RW	**diS** (Display) folder visibility	2 BIT	0 ... 3	num
vis_CnF	49409.6	RW	**CnF** (Configuration) folder visibility	2 BIT	0 ... 3	num
vis_FPr	49410.0	RW	**FPr** (Copy Card) folder visibility	2 BIT	0 ... 3	num
vis_FnC	49410.2	RW	**FnC** (Functions) folder visibility	2 BIT	0 ... 3	num
vis_PA2	49446.4	RW	**PA2** folder visibility **(Password for accessing Installer parameters)**	1 BIT	0 ... 3	num

4.3 - CLIENT TABLE

WARNING!:
RW (Reading/Writing) commands are enabled by activating a timer: it is mandatory to write a WORD (containing a time in seconds) at address 107 (0x6B) before sending any command.
The commands will be accepted only within the time herewith set.

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
ST1	115	R	Analogue input (control)	WORD	-199,9 ... 199,9	°C/°F
SEt1	549	R	Control setpoint value 1	WORD	-199,9 ... 199,9	°C/°F
SEt2	551	R	Control setpoint value 2	WORD	-199,9 ... 199,9	°C/°F
DI1	32880.0	R	Digital input	1 BIT	0 ... 1	flag
E1	32888.4	R	Analog input 1 failure	1 BIT	0 ... 1	flag
AH1	32888.0	R	High alarm reg. 1	1 BIT	0 ... 1	flag
AL1	32888.2	R	Low alarm reg. 1	1 BIT	0 ... 1	flag
AH2	32888.1	R	High alarm reg. 2	1 BIT	0 ... 1	flag
AL2	32888.3	R	Low alarm reg. 2	1 BIT	0 ... 1	flag
EA	32888.5	R	External	1 BIT	0 ... 1	flag
ON	32889.5	R	On	1 BIT	0 ... 1	flag
AL	32887.4	R	Alarm	1 BIT	0 ... 1	flag
SETR	32889.1	R	Reduced set-point	1 BIT	0 ... 1	flag
REG1	32886.5	R	Regulator status 1	1 BIT	0 ... 1	flag
REG2	32886.6	R	Regulator status 2	1 BIT	0 ... 1	flag
AUX	32889.4	R	Auxiliary	1 BIT	0 ... 1	flag
CYC	32889.3	R	Cont. Cycle command output	1 BIT	0 ... 1	flag
BLKOUT	32889.2	R	Output lock	1 BIT	0 ... 1	flag
ROnOn	32873.6	RW	Instrument On	1 BIT	0 ... 1	flag
ROffOff	32873.7	RW	Instrument Off	1 BIT	0 ... 1	flag
ROnAux	32873.1	RW	Auxiliary output On	1 BIT	0 ... 1	flag
ROffAux	32873.5	RW	Auxiliary output Off	1 BIT	0 ... 1	flag

5.1 - DISCLAIMER

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5.2 - DISPOSAL

The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal

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