DR4000

- Serial Communication Protocol –

CONTENTS

1 MODBUS FUNCTIONS AND RESOURCES

The TTL serial - referred to also as COM1 – can be used to configure the device, parameters, states, and variables using the Modbus protocol.

DEVICE CONFIGURATION PARAMETERS			
Parameter	*Description*	**Value**	*Range*
PtS	Protocol selection	t	t=Televis d=modbus
dEA	Device address	0	0...14
FAA	Family address	0	0...14
PtY	Modbus parity bit (none, Even, odd)	E	n=none, E=Even, o=odd
Stp	Setting stop bit (1b,2b)	1b	1b 2b
Note: If parameters **PtS, PtY** and **Stp** are changed, the controller must be turned off and then on again after they are changed to operate correctly.			

See the following table:

1.1   Configuration with Modbus RTU

Modbus is a client/server protocol for communication between network linked devices.
Modbus devices communicate using a master-slave technique in which a single device (the master) can send messages. All other devices in the network (slaves) respond by returning the data required to the master or executing the action indicated in the message received. A slave is defined as a device connected to a network that processes information and sends the results to a master using the Modbus protocol.
The master can send messages to individual slaves or to the entire network (broadcast) whilst slaves can only reply to messages received individually from the master.
The Modbus standard used by Eliwell uses RTU coding for data transmission.

1.1.1   Data format (RTU)

The data coding model used defines the structure of messages sent to the network and the way in which the information is decoded. The type of coding selected is generally based on specific parameters (baud rate, parity, etc)*** and some devices only support specific code models. However, the same model must be used for all devices connected to a Modbus network.
The protocol uses the RTU binary method with the following bytes:
8 data bits, configurable parity bit (see parameter **PtY**, *default* value= Even),
1 configurable stop bit (see parameter **StP**, *default* value = 1b)

NOTE: the baud rate must be set to 9600 bauds.

Every aspect of the device can be configured via parameters.
They can be modified by means of:
- Instrument keyboard
- Copy Card
- by sending data via the Modbus protocol straight to individual instruments, or via broadcast, using the address 0 (broadcast).

The connection diagram when using Modbus is shown below:

With a RS485 serial connection	Using a TTL serial connection + BusAdapter
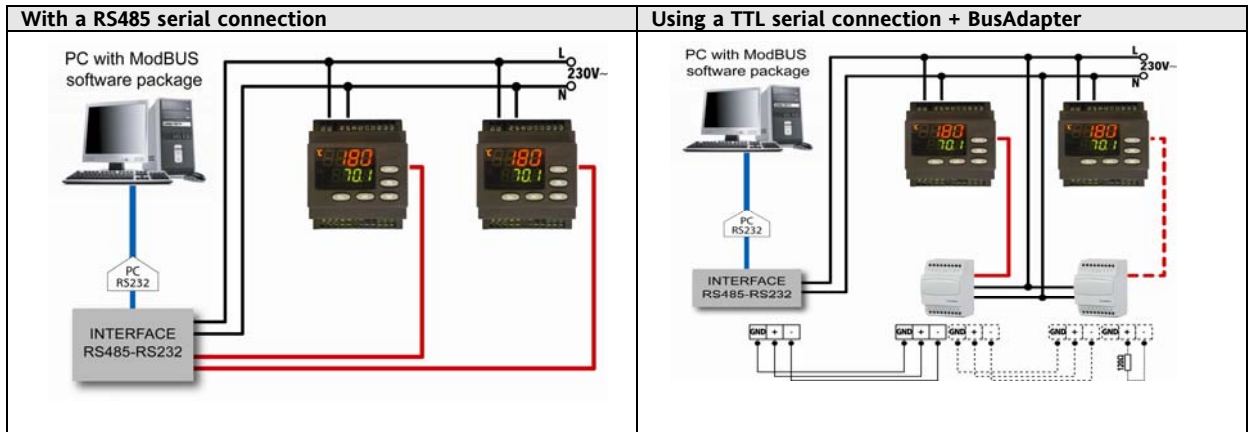
PC/Interface connection	RS232 cable	PC/Interface connection	RS232 cable
Device/BusAdapter connection	RS485 cable shielded and twisted (e.g.: Belden cable model 8762)	**Device/BusAdapter connection**	5-path connector TTL cable (30cm) (other sizes/lengths available)
		BusAdapter	BA150
		BusAdapter/Interface connection	RS485 cable shielded and twisted (e.g.: Belden cable model 8762)

1.1.2   Modbus commands available and data areas

The commands implemented are:

Modbus command	Description of command
3	Reading multiple registers A maximum of 60 consecutive registers can be read. **Parameters belonging to two different non-consecutive blocks cannot be read using a single command.**
16	Writing multiple registers A maximum of 60 consecutive registers can be written.
43	Reading instrument ID The following 3 fields can be read:

Field code	Field description
0	Manufacturer ID (="Invensys")
1	Instrument model ID
2	Instrument version ID

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Length restrictions

maximum length in bytes of messages sent to device	30 BYTE
maximum length in bytes of messages received by device	30 BYTE

1.2 Address configuration

The device address in a ModBus message comprises one byte and consists of the family code and the device code, indicated by dBA, made up of parameters FAA and dEA respectively.
The Device Address therefore consists of two nibbles:
- **dEA:** low nibble
- **FAA:** high nibble

To calculate the address using parameters FAA and dEA:

$$dBA = FAA \times 16 + dEA$$

Address 0 is used for broadcast queries that are recognized by all the slaves. Slaves do not respond to broadcast queries.

1.3 Parameters/visibility table and Client table description

The **tables below** list all information required to read, write and decode all accessible resources in the device.
There are two tables:
- the **parameters** table contains all device configuration parameters stored in the instrument's non-volatile memory and the visibility.
- the **client** table includes all I/O and alarm state resources available in the instrument's volatile memory.

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 instrument's menu.
VALUE PAR ADDRESS	The whole part represents the address of the MODBUS register containing the value of the resource to be read or written to the instrument. The value after the point indicates the position of the most significant data bit in 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 *DATA SIZE* colum is also taken into consideration). Given that the modbus registers are 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):

VAL PAR ADDRESS	*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**000101000110)
8806,7	4 bit	10	1350	(00000**1010**1000110)

Important: when the register contains more than one data item, during the write operation proceed as follows:
- read current register value
- modify the bits that represent the resource concerned
- write the register

VIS	**** Value Visibility**

- Value 3 = parameter or *folder* always visible
- Value 2 = **installation level;** these parameters can only be seen by entering the manufacturer's password (see parameter PA2) (all parameters specified as always visible, parameters that are visible at the installation level, and manufacturer level parameters will be visible).
- Value 1 = **user level**; these parameters can only be viewed by entering the installation password (see parameter PA1) (all parameters specified as always visible and parameters that are visible at the installation level will be visible)
- Value 0 = parameter or *folder* NOT visible

1. Parameters and/or folders with visibility level <>3 (i.e. password protected) will only be visible if the correct password is entered (installation or user) following the procedure outlined below:
2. Parameters and/or folders with visibility level =3 are always visible and no password is required; in this case, the procedure below is not required.

VIS PAR ADDRESS	Same as above. In this case, the parameter visibility value is in the MODBUS register address. By *default*, all parameters have:

- *Data size*   2 bit
- *Range*   0...3
- **Visibilità   1, 2 or 3
- *U.M.*   num

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

VIS PAR ADDRESS	DATA SIZE	Value	Content of register	
49747	2 bit	0	120	(0000000001111000)
49747,2	2 bit	2	120	(0000000001111000)
49747,4	2 bit	3	120	(0000000001111000)
49747,6	2 bit	1	120	(0000000001111000)

To modify the visibility value of parameter LS1 (address 49747,6) from 3 to 0:

Visibility modified

VAL PAR ADDRESS	DATA SIZE	Value	Content of register	
49747,4	2 bit	0	72	(0000000001001000)

R/W

Indicates if resources are read/write, read-only or write-only:
- R   Read-only resource.
- W   Write-only resource.
- RW   Read / write resource.

DESCRIPTION

It is the *description* of the **parameters** meaning in the *LABEL* column.

DATA SIZE

Indicates the size of the data in bits.
- WORD =   16 bits
- Byte =   8 bits
- "n" bit =   0...15 bits depending on value of "n"

CPL

When the field indicates "Y", the value read by the register must 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 parameters in the instrument (indicated with the parameter *label*).

DEFAULT

Indicates the factory setting for the standard model of the instrument.

EXP

If = -1 the value read from the register is divided by 10 (value/10) to convert it to the values given in the *RANGE* and *DEFAULT* column and the unit of measure specified in the *U.M.* column.
Example: parameter CF04 = 50.0. Column *EXP* = -1:
- The value read by the device/ParamManager is 50.0.
- The value read from the register is 500 --> 500/10 = 50.0.

U.M.

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

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1.4.1   DR4000 Thermocouple – Parameters / visibility table

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT TcJ	EXP	M.U.
rE1	SP1	16392	0	49746,4	RW	Regulation set point 1	WORD	Y	LS1 … HS1	0	-1	°C/°F
rE1	OS1	16394	2	49746,6	RW	Offset on set point 1	WORD	Y	-300 … 300	0	-1	°C/°F
rE1	db1	16396	3	49747	RW	Tripping band above set point 1	WORD		0 … 300	10	-1	°C/°F
rE1	dF1	16398	3	49747,2	RW	Differential of set point 1	WORD		1 … 300	10	-1	°C/°F
rE1	HC1	49269	3	49768	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		0 … 1	0		flag
rE1	HS1	16400	3	49747,4	RW	Maximum value settable for set point 1	WORD	Y	LS1 … HdL	7600	-1	°C/°F
rE1	LS1	16402	3	49747,6	RW	Minimum value settable for set point 1	WORD	Y	LdL … HS1	-400	-1	°C/°F
rE1	HA1	16404	3	49748	RW	Max. alarm regulator 1	WORD	Y	LA1 … 29100	29100	-1	°C/°F
rE1	LA1	16406	3	49748,2	RW	Min. alarm regulator 1	WORD	Y	-3280 … HA1	-400	-1	°C/°F
rE1	dn1	49216	2	49748,4	RW	Start-up delay of regulator 1	BYTE		0 … 255	0		secs
rE1	do1	49217	2	49748,6	RW	Shutdown delay of regulator 1	BYTE		0 … 255	0		min
rE1	di1	49218	2	49749	RW	Delay between two consecutive starts of regulator 1	BYTE		0 … 255	0		min
rE1	dE1	49219	2	49749,2	RW	Start-up delay after the shutdown of regulator 1	BYTE		0 … 255	0		secs
rE1	On1	49220	2	49749,4	RW	ON time of regulator 1 due faulty probe	BYTE		0 … 255	0		min
rE1	OF1	49221	2	49749,6	RW	OFF time of regulator 1 due faulty probe	BYTE		0 … 255	1		min
rE2	SP2	16408	0	49750	RW	Regulation set point 2	WORD	Y	LS2 … HS2	0	-1	°C/°F
rE2	OS2	16410	2	49750,2	RW	Offset on set point 2	WORD	Y	-300 … 300	0	-1	°C/°F
rE2	db2	16412	3	49750,4	RW	Tripping band above set point 2	WORD		0 … 300	10	-1	°C/°F
rE2	dF2	16414	3	49750,6	RW	Differential of set point 2	WORD		1 … 300	10	-1	°C/°F
rE2	HC2	49270	3	49768,2	RW	Operating mode of set point 2 (Heating/Cooling)	BYTE		0 … 1	0		flag
rE2	HS2	16416	3	49751	RW	Maximum value settable for set point 2	WORD	Y	LS2 … HdL	7600	-1	°C/°F
rE2	LS2	16418	3	49751,2	RW	Minimum value settable for set point 2	WORD	Y	LdL … HS2	-400	-1	°C/°F
rE2	HA2	16420	3	49751,4	RW	Max. alarm regulator 2	WORD	Y	LA2 … 29100	29100	-1	°C/°F
rE2	LA2	16422	3	49751,6	RW	Min. alarm regulator 2	WORD	Y	-3280 … HA2	-400	-1	°C/°F
rE2	dn2	49223	2	49752	RW	Start-up delay of regulator 2	BYTE		0 … 255	0		secs
rE2	do2	49224	2	49752,2	RW	Shutdown delay of regulator 2	BYTE		0 … 255	0		min
rE2	di2	49225	2	49752,4	RW	Delay between two consecutive starts of regulator 2	BYTE		0 … 255	0		min
rE2	dE2	49226	2	49752,6	RW	Start-up delay after the shutdown of regulator 2	BYTE		0 … 255	0		secs
rE2	On2	49227	2	49753	RW	ON time of regulator 2 due faulty probe	BYTE		0 … 255	0		min
rE2	OF2	49228	2	49753,2	RW	OFF time of regulator 2 due faulty probe	BYTE		0 … 255	1		min
AnOu	AOL	49264	3	49766,6	RW	Analog output configuration	BYTE		0 … 4	0		num
AnOu	AOF	49265	3	49767	RW	Operation mode of analogue output	BYTE		0 … 4	1		num

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT TcJ	EXP	M.U.
AnOu	AOS	49266	3	49767,2	RW	Operation mode of analogue output with probe error	BYTE		0 … 1	1		flag
AnOu	LAO	16442	3	49767,4	RW	Lower limit of analogue output	WORD	Y	LdL … HdL	0	-1	num
AnOu	HAO	16444	3	49767,6	RW	Upper limit of analogue output	WORD	Y	LdL … HdL	1000	-1	num
SFt	dSi	49229	2	49753,4	RW	Value of soft start regulator step	BYTE		0 … 250	0	-1	°C/°F
SFt	Std	49230	2	49753,6	RW	Duration of soft start regulator step	BYTE		0 … 255	0		hh/min/secs
SFt	unt	49231	2	49754	RW	Unit of measurement for step duration	BYTE		0 … 2	1		num
SFt	SEn	49232	2	49754,2	RW	Selects the regulator on which the soft start function must be enabled	BYTE		0 … 3	1		num
SFt	Sdi	16428	2	49754,4	RW	Automatic back swing of Soft start function	WORD		0 … 300	0	-1	°C/°F
cLc	Con	49233	2	49754,6	RW	ON time for cyclic regulator output	BYTE		0 … 255	0		min
cLc	Cof	49234	2	49755	RW	OFF time for cyclic regulator output	BYTE		0 … 255	0		min
ALAr	Att	49235	2	49755,2	RW	Mode of parameter HA1-HA2 and LA-LA2 (absolute or relative)	BYTE		0 … 1	0		flag
ALAr	Afd	16430	2	49755,4	RW	Alarm differential	WORD		10 … 500	20	-1	°C/°F
ALAr	PAO	49236	3	49755,6	RW	Temperature alarms disabling time from Power On	BYTE		0 … 10	0		ore
ALAr	SAO	49237	3	49756	RW	Timeout for "set point not reached" alarm	BYTE		0 … 24	0		ore
ALAr	tAO	49238	3	49756,2	RW	Temperature alarms delay time	BYTE		0 … 255	0		min
ALAr	AOP	49239	2	49756,4	RW	Polarity of alarm output	BYTE		0 … 1	0		flag
Add	PtS	49241	3	49757	RW	Protocol selection	BYTE		0 … 1	0		flag
Add	dEA	49243	3	49757,2	RW	Device address	BYTE		0 … 14	0		num
Add	FAA	49242	3	49757,4	RW	Family address	BYTE		0 … 14	0		num
Add	PtY	49244	3	49757,6	RW	Modbus parity bit	BYTE		0 … 2	1		num
Add	StP	49245	3	49758	RW	Modbus stop bit	BYTE		0 … 1	0		flag
diSP	LOC	49246	3	49758,2	RW	Enable keyboard lock	BYTE		0 … 1	0		flag
diSP	PA1	16432	3	49758,4	RW	Value of password 1	WORD		0 … 999	0		num
diSP	PA2	16434	2	49758,6	RW	Value of password 2	WORD		0 … 999	0		num
diSP	CA1	16436	3	49759,2	RW	Probe calibration	WORD	Y	-300 … 300	0	-1	°C/°F
diSP	Cai	49248	2	49759,4	RW	Calibration enabling	BYTE		0 … 2	2		num
diSP	LdL	16438	2	49759,6	RW	Minimum value that can be displayed	WORD	Y	-3280 … HdL	-400	-1	°C/°F
diSP	HdL	16440	2	49760	RW	Maximum value that can be displayed	WORD	Y	LdL … 29100	29100	-1	°C/°F
diSP	dro	49249	3	49760,2	RW	°C/°F selection	BYTE		0 … 1	0		flag
diSP	ddd	49271	3	49768,4	RW	Select main display	BYTE		0 … 2	0		num
CnF	H00	49250	3	49760,4	RW	Type of probe selection	BYTE		0 … 1	0		num
CnF	H01	49252	2	49760,6	RW	Configure type of regulators	BYTE		0 … 6	4		num
CnF	H02	49251	2	49761	RW	Keyboard functions enabling time	BYTE		0 … 15	5		secs
CnF	H06	49253	2	49761,6	RW	Key or aux./light digital input ON with unit OFF	BYTE		0 … 1	1		flag

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT TcJ	EXP	M.U.
CnF	H08	49254	2	49762	RW	Standby operating mode	BYTE		0 ... 2	2		num
CnF	H10	49255	3	49762,2	RW	Delay output enabling from Power On	BYTE		0 ... 255	0		min
CnF	H11	49256	2	49762,4	RW	ID configuration	BYTE		0 ... 11	0		num
CnF	H13	49257	2	49762,6	RW	Polarity and priority of digital inputs	BYTE		0 ... 3	0		num
CnF	H14	49258	2	49763	RW	Enabling delay of digital inputs	BYTE		0 ... 255	0		min
CnF	H21	49214	2	49763,2	RW	Configurability of digital output 1	BYTE		0 ... 4	0		num
CnF	H22	49259	2	49763,4	RW	Configurability of digital output 2	BYTE		0 ... 4	0		num
CnF	H31	49261	2	49764,2	RW	UP button configurability	BYTE		0 ... 9	0		num
CnF	H32	49262	2	49764,4	RW	DOWN button configurability	BYTE		0 ... 9	0		num
CnF	H34	49268	2	49764,6	RW	Free button configurability	BYTE		0 ... 9	0		num
CnF	rEL	---	3	49765,4	R	Parameter visibility	2 bit		0 ... 3	3		num
CnF	tAb	---	3	49765,6	R	Parameter visibility	2 bit		0 ... 3	3		num

(1) See Paragraph "Visibility and Value of Parameters "

1.4.2   DR4000 Thermocouple – Client table

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT Tcj	EXP	M.U.
ValSondeVis[0]	135	R	Analogue input 1	WORD	Y	-580 … 3020	0	-1	°C/°F
D.I. 1	32888,6	R	Digital input 1	1 bit		0 … 1	0		flag
E1	32891,1	R	Analog input 1 failure	1 bit		0 … 1	0		flag
AH1	32891,2	R	High alarm reg. 1	1 bit		0 … 1	0		flag
AL1	32891,3	R	Low alarm reg. 1	1 bit		0 … 1	0		flag
EA	32891,4	R	External	1 bit		0 … 1	0		flag
AH2	32891,5	R	High alarm reg. 2	1 bit		0 … 1	0		flag
AL2	32891,6	R	Low alarm reg. 2	1 bit		0 … 1	0		flag
SPnr	32900	R	Setpoint not reached	1 bit		0 … 1	0		flag
RL1	32818,3	R	Out 1	1 bit		0 … 1	0		flag
RL2	32827	R	Out 2	1 bit		0 … 1	0		flag
RL3	32827,2	R	Out 3	1 bit		0 … 1	0		flag
Buzzer	34009	R	Buzzer	BYTE		0 … 1	0		flag
Set ridotto	33076	R	Reduced set-point	1 bit		0 … 1	0		flag
on/off	33076,1	R	On	1 bit		0 … 1	0		flag
soft start	33076,2	R	Soft Start	1 bit		0 … 1	0		flag
AUX	33076,4	R	Auxiliary	1 bit		0 … 1	0		flag
modifica parametri	33076,5	R	Modified parameters	1 bit		0 … 1	0		flag
RCContOn	32898	W	Continuous Cycle On	1 bit		0 … 1	1		flag
RCContOff	32898,1	W	Continuous Cycle Off	1 bit		0 … 1	1		flag
RAttSetR	32898,2	W	Economy Mode On	1 bit		0 … 1	1		flag
RDisAttSetR	32898,3	W	Economy Mode Off	1 bit		0 … 1	1		flag
ROnAux	32898,4	W	Auxiliary output On	1 bit		0 … 1	1		flag
ROffAux	32898,5	W	Auxiliary output Off	1 bit		0 … 1	1		flag
ROnOn	32898,6	W	Instrument On	1 bit		0 … 1	1		flag
ROffOff	32898,7	W	Instrument Off	1 bit		0 … 1	1		flag
RTacAllarm	32899	W	Alarm silencing	1 bit		0 … 1	1		flag
TelRSetPar	32899,3	W	Reset changed parameters indicator	1 bit		0 … 1	1		flag
ROffMan	32899,4	W	Instrument Off for maintenance	1 bit		0 … 1	1		flag
ROnSStart	32899,5	W	Soft Start On	1 bit		0 … 1	1		flag
ROffSStart	32899,6	W	Soft Start Off	1 bit		0 … 1	1		flag

DR4000 NTC – PTC – PT100

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1.5.1 DR4000 NTC/PTC/PT100 – Parameters / visibility table

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT NTC PTC	DEFAULT PT100	EXP	M.U.
rE1	SP1	16392	0	49746,4	RW	Regulation set point 1	WORD	Y	LS1 … HS1	0	0	-1	°C/°F
rE1	OS1	16394	2	49746,6	RW	Offset on set point 1	WORD	Y	-300 … 300	0	0	-1	°C/°F
rE1	db1	16396	3	49747	RW	Tripping band above set point 1	WORD		0 … 300	20	20	-1	°C/°F
rE1	dF1	16398	3	49747,2	RW	Differential of set point 1	WORD		1 … 300	20	20	-1	°C/°F
rE1	HC1	49269	3	49768	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		0 … 1	1	1		flag
rE1	HS1	16400	3	49747,4	RW	Maximum value settable for set point 1	WORD	Y	LS1 … HdL	8000	8000	-1	°C/°F
rE1	LS1	16402	3	49747,6	RW	Minimum value settable for set point 1	WORD	Y	LdL … HS1	-2000	-2000	-1	°C/°F
rE1	HA1	16404	2	49748	RW	Max. alarm regulator 1	WORD	Y	LA1 … 29100	29100	29100	-1	°C/°F
rE1	LA1	16406	2	49748,2	RW	Min. alarm regulator 1	WORD	Y	-3280 … HA1	-3280	-3280	-1	°C/°F
rE1	dn1	49216	2	49748,4	RW	Start-up delay of regulator 1	BYTE		0 … 255	0	0		secs
rE1	do1	49217	2	49748,6	RW	Shutdown delay of regulator 1	BYTE		0 … 255	0	0		min
rE1	di1	49218	2	49749	RW	Delay between two consecutive starts of regulator 1	BYTE		0 … 255	0	0		min
rE1	dE1	49219	2	49749,2	RW	Start-up delay after the shutdown of regulator 1	BYTE		0 … 255	0	0		secs
rE1	On1	49220	2	49749,4	RW	ON time of regulator 1 due faulty probe	BYTE		0 … 255	0	0		min
rE1	OF1	49221	2	49749,6	RW	OFF time of regulator 1 due faulty probe	BYTE		0 … 255	1	1		min
rE2	SP2	16408	0	49750	RW	Regulation set point 2	WORD	Y	LS2 … HS2	0	0	-1	°C/°F
rE2	OS2	16410	2	49750,2	RW	Offset on set point 2	WORD	Y	-300 … 300	0	0	-1	°C/°F
rE2	db2	16412	3	49750,4	RW	Tripping band above set point 2	WORD		0 … 300	20	20	-1	°C/°F
rE2	dF2	16414	3	49750,6	RW	Differential of set point 2	WORD		1 … 300	20	20	-1	°C/°F
rE2	HC2	49270	3	49768,2	RW	Operating mode of set point 2 (Heating/Cooling)	BYTE		0 … 1	1	1		flag
rE2	HS2	16416	3	49751	RW	Maximum value settable for set point 2	WORD	Y	LS2 … HdL	8000	8000	-1	°C/°F
rE2	LS2	16418	3	49751,2	RW	Minimum value settable for set point 2	WORD	Y	LdL … HS2	-2000	-2000	-1	°C/°F
rE2	HA2	16420	2	49751,4	RW	Max. alarm regulator 2	WORD	Y	LA2 … 29100	29100	29100	-1	°C/°F
rE2	LA2	16422	2	49751,6	RW	Min. alarm regulator 2	WORD	Y	-3280 … HA2	-3280	-3280	-1	°C/°F
rE2	dn2	49223	2	49752	RW	Start-up delay of regulator 2	BYTE		0 … 255	0	0		secs
rE2	do2	49224	2	49752,2	RW	Shutdown delay of regulator 2	BYTE		0 … 255	0	0		min
rE2	di2	49225	2	49752,4	RW	Delay between two consecutive starts of regulator 2	BYTE		0 … 255	0	0		min
rE2	dE2	49226	2	49752,6	RW	Start-up delay after the shutdown of regulator 2	BYTE		0 … 255	0	0		secs
rE2	On2	49227	2	49753	RW	ON time of regulator 2 due faulty probe	BYTE		0 … 255	0	0		min
rE2	OF2	49228	2	49753,2	RW	OFF time of regulator 2 due faulty probe	BYTE		0 … 255	1	1		min
AnOu	AOL	49264	2	49766,6	RW	Analog output configuration	BYTE		0 … 4	0	0		num
AnOu	AOF	49265	2	49767	RW	Operation mode of analogue output	BYTE		0 … 4	1	1		num

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT NTC PTC	PT100	EXP	M.U.
AnOu	AOS	49266	2	49767,2	RW	Operation mode of analogue output with probe error	BYTE		0 … 1	1	1		flag
AnOu	LAO	16442	2	49767,4	RW	Lower limit of analogue output	WORD	Y	LdL … HdL	0	0	-1	num
AnOu	HAO	16444	2	49767,6	RW	Upper limit of analogue output	WORD	Y	LdL … HdL	1000	1000	-1	num
SFt	dSi	49229	2	49753,4	RW	Value of soft start regulator step	BYTE		0 … 250	0	0	-1	°C/°F
SFt	Std	49230	2	49753,6	RW	Duration of soft start regulator step	BYTE		0 … 255	0	0		hh/min/secs
SFt	unt	49231	2	49754	RW	Unit of measurement for step duration	BYTE		0 … 2	1	1		num
SFt	SEn	49232	2	49754,2	RW	Selects the regulator on which the soft start function must be enabled	BYTE		0 … 3	1	1		num
SFt	Sdi	16428	2	49754,4	RW	Automatic back swing of Soft start function	WORD		0 … 300	0	0	-1	°C/°F
cLc	Con	49233	2	49754,6	RW	ON time for cyclic regulator output	BYTE		0 … 255	0	0		min
cLc	Cof	49234	2	49755	RW	OFF time for cyclic regulator output	BYTE		0 … 255	0	0		min
ALAr	Att	49235	2	49755,2	RW	Mode of parameter HA1-HA2 and LA-LA2 (absolute or relative)	BYTE		0 … 1	0	0		flag
ALAr	Afd	16430	2	49755,4	RW	Alarm differential	WORD		10 … 500	20	20	-1	°C/°F
ALAr	PAO	49236	2	49755,6	RW	Temperature alarms disabling time from Power On	BYTE		0 … 10	0	0		hours
ALAr	SAO	49237	2	49756	RW	Timeout for "set point not reached" alarm	BYTE		0 … 24	0	0		hours
ALAr	tAO	49238	2	49756,2	RW	Temperature alarms delay time	BYTE		0 … 255	0	0		min
ALAr	AOP	49239	2	49756,4	RW	Polarity of alarm output	BYTE		0 … 1	0	0		flag
Add	PtS	49241	2	49757	RW	Protocol selection	BYTE		0 … 1	0	0		flag
Add	dEA	49243	2	49757,2	RW	Device address	BYTE		0 … 14	0	0		num
Add	FAA	49242	2	49757,4	RW	Family address	BYTE		0 … 14	0	0		num
Add	PtY	49244	2	49757,6	RW	Modbus parity bit	BYTE		0 … 2	1	1		num
Add	StP	49245	2	49758	RW	Modbus stop bit	BYTE		0 … 1	0	0		flag
diSP	LOC	49246	3	49758,2	RW	Enable keyboard lock	BYTE		0 … 1	0	0		flag
diSP	PA1	16432	3	49758,4	RW	Value of password 1	WORD		0 … 999	0	0		num
diSP	PA2	16434	2	49758,6	RW	Value of password 2	WORD		0 … 999	0	0		num
diSP	ndt	49247	3	49759	RW	Display with decimal point	BYTE		0 … 1	1	1		flag
diSP	CA1	16436	2	49759,2	RW	Probe calibration	WORD	Y	-300 … 300	0	0	-1	°C/°F
diSP	Cai	49248	3	49759,4	RW	Calibration enabling	BYTE		0 … 2	0	0		num
diSP	LdL	16438	2	49759,6	RW	Minimum value that can be displayed	WORD	Y	-3280 … HdL	-3280	-3280	-1	°C/°F
diSP	HdL	16440	2	49760	RW	Maximum value that can be displayed	WORD	Y	LdL … 29100	29100	29100	-1	°C/°F
diSP	dro	49249	3	49760,2	RW	°C/°F selection	BYTE		0 … 1	0	0		flag
diSP	ddd	49271	2	49768,4	RW	Select main display	BYTE		0 … 2	0	0		num
CnF	H00**	49250	3	49760,4	RW	Type of probe selection	BYTE		0 … 3	1	▮		num
CnF	H01	49252	3	49760,6	RW	Configure type of regulators	BYTE		0 … 6	4	4		num
CnF	H02	49251	2	49761	RW	Keyboard functions enabling time	BYTE		0 … 15	5	5		secs

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT		EXP	M.U.
										NTC PTC	PT100		
CnF	H06	49253	2	49761,6	RW	Key or aux./light digital input ON with unit OFF	BYTE		0 ... 1	1	1		flag
CnF	H08	49254	2	49762	RW	Standby operating mode	BYTE		0 ... 2	2	2		num
CnF	H10	49255	2	49762,2	RW	Delay output enabling from Power On	BYTE		0 ... 255	0	0		min
CnF	H11	49256	2	49762,4	RW	ID configuration	BYTE		0 ... 11	0	0		num
CnF	H13	49257	2	49762,6	RW	Polarity and priority of digital inputs	BYTE		0 ... 3	0	0		num
CnF	H14	49258	2	49763	RW	Enabling delay of digital inputs	BYTE		0 ... 255	0	0		min
CnF	H21	49214	2	49763,2	RW	Configurability of digital output 1	BYTE		0 ... 4	0	0		num
CnF	H22	49259	2	49763,4	RW	Configurability of digital output 2	BYTE		0 ... 4	0	0		num
CnF	H31	49261	2	49764,2	RW	UP button configurability	BYTE		0 ... 9	0	0		num
CnF	H32	49262	2	49764,4	RW	DOWN button configurability	BYTE		0 ... 9	0	0		num
CnF	H34	49268	2	49764,6	RW	Free button configurability	BYTE		0 ... 9	0	0		num
CnF	rEL	---	3	49765,4	R	Parameter visibility	2 bit		0 ... 3	3	3		num
CnF	tAb	---	3	49765,6	R	Parameter visibility	2 bit		0 ... 3	3	3		num

(1) See Paragraph "Visibility and Value of Parameters "
** Parameter visible only for models DR4000 NTC and DR4000 PTC

1.5.2   DR4000 NTC/PTC/PT100 – Client table

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	M.U.
ValSondeVis[0]	135	R	Analogue input 1	WORD	Y	-580 … 3020	0	-1	°C/°F
D.I. 1	32888,6	R	Digital input 1	1 bit		0 … 1	0		flag
E1	32891,1	R	Analog input 1 failure	1 bit		0 … 1	0		flag
AH1	32891,2	R	High alarm reg. 1	1 bit		0 … 1	0		flag
AL1	32891,3	R	Low alarm reg. 1	1 bit		0 … 1	0		flag
EA	32891,4	R	External	1 bit		0 … 1	0		flag
AH2	32891,5	R	High alarm reg. 2	1 bit		0 … 1	0		flag
AL2	32891,6	R	Low alarm reg. 2	1 bit		0 … 1	0		flag
SPnr	32900	R	Setpoint not reached	1 bit		0 … 1	0		flag
RL1	32818,3	R	Out 1	1 bit		0 … 1	0		flag
RL2	32827	R	Out 2	1 bit		0 … 1	0		flag
RL3	32827,2	R	Out 3	1 bit		0 … 1	0		flag
Buzzer	34009	R	Buzzer	BYTE		0 … 1	0		flag
Set ridotto	33076	R	Reduced set-point	1 bit		0 … 1	0		flag
on/off	33076,1	R	On	1 bit		0 … 1	0		flag
soft start	33076,2	R	Soft Start	1 bit		0 … 1	0		flag
AUX	33076,4	R	Auxiliary	1 bit		0 … 1	0		flag
modifica parametri	33076,5	R	Modified parameters	1 bit		0 … 1	0		flag
RCContOn	32898	W	Continuous Cycle On	1 bit		0 … 1	1		flag
RCContOff	32898,1	W	Continuous Cycle Off	1 bit		0 … 1	1		flag
RAttSetR	32898,2	W	Economy Mode On	1 bit		0 … 1	1		flag
RDisAttSetR	32898,3	W	Economy Mode Off	1 bit		0 … 1	1		flag
ROnAux	32898,4	W	Auxiliary output On	1 bit		0 … 1	1		flag
ROffAux	32898,5	W	Auxiliary output Off	1 bit		0 … 1	1		flag
ROnOn	32898,6	W	Instrument On	1 bit		0 … 1	1		flag
ROffOff	32898,7	W	Instrument Off	1 bit		0 … 1	1		flag
RTacAllarm	32899	W	Alarm silencing	1 bit		0 … 1	1		flag
TelRSetPar	32899,3	W	Reset changed parameters indicator	1 bit		0 … 1	1		flag
ROffMan	32899,4	W	Instrument Off for maintenance	1 bit		0 … 1	1		flag
ROnSStart	32899,5	W	Soft Start On	1 bit		0 … 1	1		flag
ROffSStart	32899,6	W	Soft Start Off	1 bit		0 … 1	1		flag

1.6 Tabelle DR4000 V-I

DR4000 V – I

MSK453

1.6.1 DR4000 V-I - Parameters / visibility table

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	M.U.
rE1	SP1	16392	0	49746,4	RW	Regulation set point 1	WORD	Y	LS1 ... HS1	0	-1	°C/°F
rE1	OS1	16394	2	49746,6	RW	Offset on set point 1	WORD	Y	-300 ... 300	0	-1	°C/°F
rE1	db1	16396	3	49747	RW	Tripping band above set point 1	WORD		0 ... 300	10	-1	°C/°F
rE1	dF1	16398	3	49747,2	RW	Differential of set point 1	WORD		1 ... 300	-10	-1	°C/°F
rE1	HC1	49269	3	49768	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		0 ... 1	1		flag
rE1	HS1	16400	3	49747,4	RW	Maximum value settable for set point 1	WORD	Y	LS1 ... HdL	1000	-1	°C/°F
rE1	LS1	16402	3	49747,6	RW	Minimum value settable for set point 1	WORD	Y	LdL ... HS1	0	-1	°C/°F
rE1	HA1	16404	3	49748	RW	Max. alarm regulator 1	WORD	Y	LA1 ... 9999	1000	-1	°C/°F
rE1	LA1	16406	3	49748,2	RW	Min. alarm regulator 1	WORD	Y	-1999 ... HA1	0	-1	°C/°F
rE1	dn1	49216	2	49748,4	RW	Start-up delay of regulator 1	BYTE		0 ... 255	0		secs
rE1	do1	49217	2	49748,6	RW	Shutdown delay of regulator 1	BYTE		0 ... 255	0		min
rE1	di1	49218	2	49749	RW	Delay between two consecutive starts of regulator 1	BYTE		0 ... 255	0		min
rE1	dE1	49219	2	49749,2	RW	Start-up delay after the shutdown of regulator 1	BYTE		0 ... 255	0		secs
rE1	On1	49220	2	49749,4	RW	ON time of regulator 1 due faulty probe	BYTE		0 ... 255	0		min
rE1	OF1	49221	2	49749,6	RW	OFF time of regulator 1 due faulty probe	BYTE		0 ... 255	1		min
rE2	SP2	16408	0	49750	RW	Regulation set point 2	WORD	Y	LS2 ... HS2	0	-1	°C/°F
rE2	OS2	16410	2	49750,2	RW	Offset on set point 2	WORD	Y	-300 ... 300	0	-1	°C/°F
rE2	db2	16412	3	49750,4	RW	Tripping band above set point 2	WORD		0 ... 300	10	-1	°C/°F
rE2	dF2	16414	3	49750,6	RW	Differential of set point 2	WORD		1 ... 300	-10	-1	°C/°F
rE2	HC2	49270	3	49768,2	RW	Operating mode of set point 1 (Heating/Cooling)	BYTE		0 ... 1	0		flag
rE2	HS2	16416	3	49751	RW	Maximum value settable for set point 2	WORD	Y	LS2 ... HdL	1000	-1	°C/°F
rE2	LS2	16418	3	49751,2	RW	Minimum value settable for set point 2	WORD	Y	LdL ... HS2	0	-1	°C/°F
rE2	HA2	16420	3	49751,4	RW	Max. alarm regulator 2	WORD	Y	LA2 ... 9999	1000	-1	°C/°F
rE2	LA2	16422	3	49751,6	RW	Min. alarm regulator 2	WORD	Y	-1999 ... HA2	0	-1	°C/°F
rE2	dn2	49223	2	49752	RW	Start-up delay of regulator 2	BYTE		0 ... 255	0		secs
rE2	do2	49224	2	49752,2	RW	Shutdown delay of regulator 2	BYTE		0 ... 255	0		min
rE2	di2	49225	2	49752,4	RW	Delay between two consecutive starts of regulator 2	BYTE		0 ... 255	0		min
rE2	dE2	49226	2	49752,6	RW	Start-up delay after the shutdown of regulator 2	BYTE		0 ... 255	0		secs
rE2	On2	49227	2	49753	RW	ON time of regulator 2 due faulty probe	BYTE		0 ... 255	0		min
rE2	OF2	49228	2	49753,2	RW	OFF time of regulator 2 due faulty probe	BYTE		0 ... 255	1		min
AnOu	AOL	49264	3	49766,6	RW	Analog output configuration	BYTE		0 ... 4	0		num
AnOu	AOF	49265	3	49767	RW	Operation mode of analogue output	BYTE		0 ... 4	1		num

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	M.U.
AnOu	AOS	49266	3	49767,2	RW	Operation mode of analogue output with probe error	BYTE		0 … 1	1		flag
AnOu	LAO	16442	3	49767,4	RW	Lower limit of analogue output	WORD	Y	LdL … HdL	0	-1	num
AnOu	HAO	16444	3	49767,6	RW	Upper limit of analogue output	WORD	Y	LdL … HdL	1000	-1	num
SFt	dSi	49229	2	49753,4	RW	Value of soft start regulator step	BYTE		0 … 250	0	-1	°C/°F
SFt	Std	49230	2	49753,6	RW	Duration of soft start regulator step	BYTE		0 … 255	0		hh/min/secs
SFt	unt	49231	2	49754	RW	Unit of measurement for step duration	BYTE		0 … 2	1		num
SFt	SEn	49232	2	49754,2	RW	Selects the regulator on which the soft start function must be enabled	BYTE		0 … 3	1		num
SFt	Sdi	16428	2	49754,4	RW	Automatic back swing of Soft start function	WORD		0 … 300	0	-1	°C/°F
cLc	Con	49233	2	49754,6	RW	ON time for cyclic regulator output	BYTE		0 … 255	0		min
cLc	Cof	49234	2	49755	RW	OFF time for cyclic regulator output	BYTE		0 … 255	0		min
ALAr	Att	49235	2	49755,2	RW	Mode of parameter HA1-HA2 and LA-LA2 (absolute or relative)	BYTE		0 … 1	0		flag
ALAr	Afd	16430	2	49755,4	RW	Alarm differential	WORD		10 … 500	20	-1	°C/°F
ALAr	PAO	49236	3	49755,6	RW	Temperature alarms disabling time from Power On	BYTE		0 … 10	0		hours
ALAr	SAO	49237	3	49756	RW	Timeout for "set point not reached" alarm	BYTE		0 … 24	0		hours
ALAr	tAO	49238	3	49756,2	RW	Temperature alarms delay time	BYTE		0 … 255	0		min
ALAr	AOP	49239	2	49756,4	RW	Polarity of alarm output	BYTE		0 … 1	0		flag
Add	PtS	49241	3	49757	RW	Protocol selection	BYTE		0 … 1	0		flag
Add	dEA	49243	3	49757,2	RW	Device address	BYTE		0 … 14	0		num
Add	FAA	49242	3	49757,4	RW	Family address	BYTE		0 … 14	0		num
Add	PtY	49244	3	49757,6	RW	Modbus parity bit	BYTE		0 … 2	1		num
Add	StP	49245	3	49758	RW	Modbus stop bit	BYTE		0 … 1	0		flag
diSP	LOC	49246	3	49758,2	RW	Enable keyboard lock	BYTE		0 … 1	0		flag
diSP	PA1	16432	3	49758,4	RW	Value of password 1	WORD		0 … 999	0		num
diSP	PA2	16434	2	49758,6	RW	Value of password 2	WORD		0 … 999	0		num
diSP	ndt	49247	3	49759	RW	Display with decimal point	BYTE		0 … 3	1		num
diSP	CA1	16436	3	49759,2	RW	Probe calibration	WORD	Y	-300 … 300	0	-1	°C/°F
diSP	Cai	49248	2	49759,4	RW	Calibration enabling	BYTE		0 … 2	2		num
diSP	LdL	16438	2	49759,6	RW	Minimum value that can be displayed	WORD	Y	-1999 … HdL	0	-1	°C/°F
diSP	HdL	16440	2	49760	RW	Maximum value that can be displayed	WORD	Y	LdL … 9999	1000	-1	°C/°F
diSP	dro	49249	3	49760,2	RW	°C/°F selection	BYTE		0 … 6	0		num
CnF	ddd	49271	3	49768,4	RW	Select main display	BYTE		0 … 2	0		num
CnF	H00	49250	3	49760,4	RW	Type of probe selection	BYTE		0 … 4	3		num
CnF	H01	49252	2	49760,6	RW	Configure type of regulators	BYTE		0 … 6	4		num
CnF	H02	49251	2	49761	RW	Keyboard functions enabling time	BYTE		0 … 15	5		secs

FOLDER	LABEL	VALUE PAR. ADDRESS	VIS.	VIS. PAR. ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	M.U.
CnF	H03	16424	2	49761,2	RW	Minimum limit for current input	WORD	Y	-1999 … 9999	0		num
CnF	H04	16426	2	49761,4	RW	Maximum limit for current input	WORD	Y	-1999 … 9999	100		num
CnF	H06	49253	2	49761,6	RW	Key or aux./light digital input ON with unit OFF	BYTE		0 … 1	1		flag
CnF	H08	49254	2	49762	RW	Standby operating mode	BYTE		0 … 2	2		num
CnF	H10	49255	3	49762,2	RW	Delay output enabling from Power On	BYTE		0 … 255	0		min
CnF	H11	49256	2	49762,4	RW	ID configuration	BYTE		0 … 11	0		num
CnF	H13	49257	2	49762,6	RW	Polarity and priority of digital inputs	BYTE		0 … 3	0		num
CnF	H14	49258	2	49763	RW	Enabling delay of digital inputs	BYTE		0 … 255	0		min
CnF	H21	49214	2	49763,2	RW	Configurability of digital output 1	BYTE		0 … 4	0		num
CnF	H22	49259	2	49763,4	RW	Configurability of digital output 2	BYTE		0 … 4	0		num
CnF	H31	49261	2	49764,2	RW	UP button configurability	BYTE		0 … 9	0		num
CnF	H32	49262	2	49764,4	RW	DOWN button configurability	BYTE		0 … 9	0		num
CnF	H34	49268	2	49764,6	RW	Free button configurability	BYTE		0 … 9	0		num
CnF	rEL	---	3	49765,4	R	Parameter visibility	2 bit		0 … 3	3		num
CnF	tAb	---	3	49765,6	R	Parameter visibility	2 bit		0 … 3	3		num

(1) See Paragraph "Visibility and Value of Parameters "

1.6.2 DR4000 V-I – Client table

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	DEFAULT	EXP	M.U.
AI *vis*	135	R	Analogue input (display)	WORD	Y	-1999 … 9999	0	-1	°C/°F
AI reg	137	R	Analogue input (control)	WORD	Y	-1999 … 9999	0	-1	°C/°F
D.I. 1	32888,6	R	Digital input 1	1 bit		0 … 1	0		flag
E1	32891,1	R	Analog input 1 failure	1 bit		0 … 1	0		flag
AH1	32891,2	R	High alarm reg. 1	1 bit		0 … 1	0		flag
AL1	32891,3	R	Low alarm reg. 1	1 bit		0 … 1	0		flag
EA	32891,4	R	External	1 bit		0 … 1	0		flag
AH2	32891,5	R	High alarm reg. 2	1 bit		0 … 1	0		flag
AL2	32891,6	R	Low alarm reg. 2	1 bit		0 … 1	0		flag
SPnr	32900	R	Setpoint not reached	1 bit		0 … 1	0		flag
RL1	32818,3	R	Out 1	1 bit		0 … 1	0		flag
RL2	32827	R	Out 2	1 bit		0 … 1	0		flag
RL3	32827,2	R	Out 3	1 bit		0 … 1	0		flag
Buzzer	33817	R	Buzzer	BYTE		0 … 1	0		flag
Set ridotto	33076	R	Reduced set-point	1 bit		0 … 1	0		flag
on/off	33076,1	R	On	1 bit		0 … 1	0		flag
soft start	33076,2	R	Soft Start	1 bit		0 … 1	0		flag
AUX	33076,4	R	Auxiliary	1 bit		0 … 1	0		flag
modifica parametri	33076,5	R	Modified parameters	1 bit		0 … 1	0		flag
RCContOn	32898	W	Continuous Cycle On	1 bit		0 … 1	1		flag
RCContOff	32898,1	W	Continuous Cycle Off	1 bit		0 … 1	1		flag
RAttSetR	32898,2	W	Economy Mode On	1 bit		0 … 1	1		flag
RDisAttSetR	32898,3	W	Economy Mode Off	1 bit		0 … 1	1		flag
ROnAux	32898,4	W	Auxiliary output On	1 bit		0 … 1	1		flag
ROffAux	32898,5	W	Auxiliary output Off	1 bit		0 … 1	1		flag
ROnOn	32898,6	W	Instrument On	1 bit		0 … 1	1		flag
ROffOff	32898,7	W	Instrument Off	1 bit		0 … 1	1		flag
RTacAllarm	32899	W	Alarm silencing	1 bit		0 … 1	1		flag
TelRSetPar	32899,3	W	Reset changed parameters indicator	1 bit		0 … 1	1		flag
ROffMan	32899,4	W	Instrument Off for maintenance	1 bit		0 … 1	1		flag
ROnSStart	32899,5	W	Soft Start On	1 bit		0 … 1	1		flag
ROffSStart	32899,6	W	Soft Start Off	1 bit		0 … 1	1		flag

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3 ANALITIC INDEX

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