DRR132 USER MANUAL

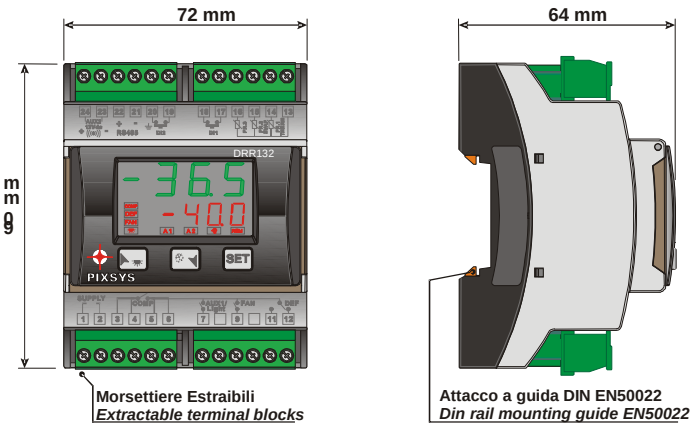
1. General description

DRR132 is a digital controller designed to control cooling/HVAC systems. Available models are equipped with up to four relays to control compressor, defrosting and fans; the fourth relay can be configured as light command, auxiliary alarm or like the others. Memory cards are available for configurations in series.
Referring to the following table it is possible to find required model.

2. Ordering codes

DRR132	X	X	X	
	3			1 relay (30A), 1 deviation relay (8A), 1 relay (8A)
	4			1 relay (30A), 1 deviation relay (8A), 2 relays (8A)
		B		230Vac ±10% 50/60Hz
			T	Rs485 with ModbusRTU/slave protocol.

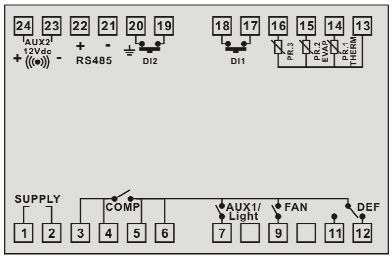
3. Size and installation



Morsettiere Estraibili
Extractable terminal blocks

Attacco a guida DIN EN50022
Din rail mounting guide EN50022

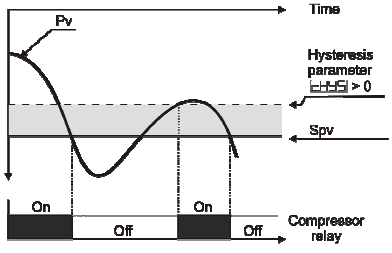
4. Wiring plan



DRR132 is equipped with screw terminals suitable for wires of max. 2.5mm2. The NTC/PTC 2 wires have no polarity. It is a good safety guideline to separate power line from the probe wirings.

5. Operating modes

5.1 Compressor



Temperature controlling is always subject to hysteresis: the compressor stops when the setpoint is reached and starts up again when the temperature exceeds the high setpoint plus the hysteresis value.
There are also various solutions to protect the compressor against closer starts (start delay, minimum off time and minimum time between the two successive activations).
If there is a thermostat probe failure, compressor status will be the one set on parameter 13 [cSEr].

5.2 Defrosting

Two defrosting types are available: electrical (compressor stops) or hot gas (compressor continues functioning). Other programmable functions are included: defrosting frequency, time counting type, end defrosting temperature (if the probe 2 is enabled) and max. defrosting time. When defrosting ends drainage is managed.

5.3 Evaporator fans

During compressor functioning or defrosting cycle it is possible to set fans status by parameter. Moreover there is the possibility to select temperature above which the fan switches off and the delay time for start-up after a defrosting.

6. Front panel

Key	Description
SET	Press to visualize setpoint. Press for 3" to enter password (1234) and start configuration. When entering password next digit flashes. Pressed during configuration allows to save parameters and esc procedure.
	Controls light relay switch-on/switch-off (if enabled by parameter). During setpoint visualization allows to modify setpoint value. In configuration mode scrolls parameters. If pressed with SET modifies visualized parameter.
	If pressed for 2" allows to start manual defrosting cycle. During setpoint visualization allows the modification. During configuration scrolls parameters. If pressed with SET modifies visualized parameter.
SET +	Allows to lock/unlock keyboard.

Led	Description
COMP	Shows compressor status
DEF	ON during defrosting
FAN	Shows fan status
	Shows light status
A1	Shows auxiliary out. 1 status
A2	Shows auxiliary out. 2 status
	ON when alarm is active
REM	ON during Modbus communication

7. Error messages

	Cause	What to do
Pr. 1	Cell probe damaged or temperature out of limit.	Verify probe connection and its integrity.
Pr. 2	Evaporator probe damaged or temperature out of limit.	Verify probe connection and its integrity.
Pr. 3	Probe 3 damaged or temperature out of limit.	Verify probe connection and its integrity.
P. AL	Pressure switch alarm.	Alarm enabled by digital input. Switch-off and restart the device.
E. AL	External alarm.	Alarm enabled by digital input.
doAL	Door alarm.	Alarm enabled by digital input.
H AL	Hight temperature alarm.	-
LoAL	Low temperature alarm.	-
E-01	Error in EEPROM cell programming.	Contact technical support
E-04	Incorrect configuration data: possible loss of device calibrations.	Verify that configuration parameters are correct.

8. Technical data

BOX:	DIN rail 4 modules
POWER SUPPLY:	230Vac ±10% 50/60Hz
CONSUMPTION:	2.5VA
DISPLAY:	4 digits 0,4" green 4 digits 0,3" red 8 red LEDs
OPERATING CONDITIONS:	0…40°C, 0…95rH%
INPUT:	2NTC10K (βvalue3435K) / PTC 1K 1 NTC 10K (βvalue3435K)
ACCURACY:	0.5%±1digits
SAMPLING TIME:	20ms
REGULATION:	ON/OFF with histeresys
OUTPUT:	1 relay 30A 277Vac 8310 VA max. 1 relay 8A 230Vac with change-over relay. 2 relays 8A 230Vac
SEALING:	IP65 front panel,IP20 box and terminal blocks.
CONFIGURATION:	Parameters protected by password (1234) and memory-card for production in series.

9. Table of configuration parameters

To enter configuration, press SET for 3", enter password 1234 with the arrow keys and move the blinking digit with SET. To scroll parameters press arrow keys, while to modify them press SET plus the arrow keys.

REGULATION

N.	Display	Parameter description	Entering range
1	cHYS.	(Compressor Hysteresis) Selects hysteresis into the calculation of intervention thresholds for compressor relay output.	**-30.0..30.0°C (°F)** Default: 2.0°C.
2	LoLS.	**(Lower Limit Setpoint)** SET Lower limit. Setpoint cannot be selected under this value.	**-40..** uPLS. **°C (°F)** Default: -40°C.
3	uPLS.	**(Upper Limit Setpoint)** SET Upper limit. Setpoint cannot be selected over this value.	LoLS. **..210°C (°F)** Default: 40°C.
4	Pr. 1	**(Probe 1)** Selects input 1 type.	ntc **(NTC)** Cell probe type NTC 10KΩ (β3435K). Default. Ptc **(PTC)** Cell probe type PTC 1KΩ
5	Pr.1o.	**(Probe 1 Offset)** Offset correction of Cell probe (adds/subtracts degrees to the visualization).	**-20.0..20.0°C (°F)** Default: 0.0°C.
6	Pr. 2	**(Probe 2)** Selects input 2 type.	dIS. **(Disabled)** ntc **(NTC)** Evaporator probe type NTC 10KΩ (β3435K). Default. Ptc **(PTC)** Evaporator probe type PTC 1KΩ
7	Pr2.o.	**(Probe 2 Offset)** Offset correction of Evaporator probe (adds/subtracts degrees to the visualization).	**-20.0..20.0°C (°F)** Default: 0.0°C.
8	Pr. 3	**(Probe 3)** Selects input 3 type.	dIS. **(Disabled)** Default. ntc **(NTC)** Probe 3 type NTC 10KΩ (β3435K).
9	Pr.3o.	**(Probe 3 Offset)** Offset correction of Probe 3 (adds/subtracts degrees to the visualization).	**-20.0..20.0°C (°F)** Default: 0.0°C.
10	odSu.	**(Output Delay Start-up)** Selects outputs exclusion time after device start up.	**0..120 minutes** Default: 0 minutes.
11	c.SPr.	**(Compressor Sel. Protection)** Selects protection type against close compressor starts.	noPr. **:(No Protection)** No protection. don **:(Delay On)** Activation delay (default). doFF **:(Delay Off)** Min. time for compressor switch-off. dbEt. **:(Delay Between)** Min. time between two compressor starts.
12	ctPr.	**(Compressor Time Protection)** Selects previous parameter duration.	**0..30 minutes** Default: 0 minutes.
13	cSEr.	**(Compressor State Error)** Selects compressor status in case of cell probe failure.	oFF on : default.

DISPLAY AND KEYS

N.	Display	Parameter description	Entering range
14	dEGr.	**(Degree)** Selects probe degrees type. When measure unit changes, setpoint and parameters have to be properly modified.	°C :Converts temperature in Celsius degrees. (Default) °F :Converts temperature in Fahrenheit degrees.
15	dP.	**(Decimal Point)** Selects type of visualized decimal.	0 :Enteger number (resolution 1°C/F). (Default) 0.0 :Decimal (resolution 0,1°C/F).
16	u d1	**(Visualization Display 1)** Selects display 1 visualization.	Pr. 1 **:(Probe 1)**. Default. Pr. 2 **:(Probe 2)** Pr. 3 **:(Probe 3)** SEt. **:(Setpoint)**
17	u d2	**(Visualization Display 2)** Selects display 2 visualization.	dIS. **(Disabled)** Pr. 1 **:(Probe 1)** Pr. 2 **:(Probe 2)** Pr. 3 **:(Probe 3)** SEt. **:(Setpoint)**. Default.
18	SEPr.	**(Setpoint Protection)** Selects type of protection against unintentional modifications of setpoint by the user	FrEE **:(Free)** No protection, user can modify setpoint (Default). Loch **:(Lock)** Setpoint cannot be modified by the user.

DEFROSTING			
N.	**Display**	**Parameter description**	**Entering range**
19	dFty	**(Defrost Type)** Selects defrost type.	EL. :**(electric)**. Compressor stopped (default). in :**(inversion)**. Compressor ON (hot gas).
20	dFt i	**(Defrost Time)** Selects break duration between two defrostings.	**1..50 hours.** Default: 6 hours.
21	dFco	**(Defrost Count)** Selects break counting type between two defrostings.	ct.on **:(Compressor Time On)**. Only compressor operating time is counted. rEt i **:(Real Time)**. Break time from defrosting start is the real elapsed time: time is always the same. (Default). Sc.dF. :**(Stop Compressor Defrost)**. Defrosting at each compressor stop. FrEE **:(Free)**. Compressor goes on regulating on SET independently from defrosting.
22	dFdE	**(Defrost Delay)** Delay time for defrosting start.	**0..120 minutes** Default: 0 minutes.
23	dFbc	**(Defrost Block Cell)** Selects cell temperature over that defrosting doesn't starts.	**-10..60°C (°F)** Default: 10°C.
24	dFbE	**(Defrost Block Evaporator)** Selects evaporator temperature over that defrosting doesn't starts.	**-10..50°C (°F)** Default: 4°C.
25	dFMt	**(Defrost Max Time)** Defrosting duration time.	**1..120 minutes** Default: 30 minutes.
26	dFEt	**(Defrost End Temperature)** End defrosting temperature.	**-40..210°C (°F)** Default: 8°C.
27	dFSu	**(Defrost Start-up)** Allows or not defrosting at device start-up.	no : default. YES
28	dFu i	**(Defrost visualization)** Selects display visualization during defrosting.	rEtE. :**(Real Temperature)**. Default. tbdF. :**(Temperature Before Defrost).** SEt. :**(Setpoint).** dEF. :**("DEF" label).**
29	dFud	**(Defrost Visualization Delay)** Selects time to be elapsed from defrosting end before allowing display to visualize real cell temperature.	**0..120 minutes** Default: 0 minutes.
30	drt i	**(Drainage Time)** Selects compressor and fan lock duration after a defrosting.	**0..120 minutes** Default: 0 minutes.

FANS			
N.	**Display**	**Parameter description**	**Entering range**
31	FAEt	**(Fan End Temperature)** Temperature above which the fans switch-off (referred to evaporator probe).	**-40..210°C (°F)** Default: 2°C.
32	FAHy	**(Fan Hysteresis)** Selects histeresys for fans intervention threshold calculation.	**0.5..50.0°C (°F)** Default: 2.0°C.
33	FAdE	**(Fan Delay)** Delay time for fans activation after defrosting.	**0..120 minutes** Default: 10 minutes.
34	FAdd	**(Fan Disable Defrost)** Locks fans during defrosting.	no YES : default.
35	FAco	**(Fan Compressor Off)** Selects fans status when compressor is off.	oFF on : default.

ALARMS			
N.	**Display**	**Parameter description**	**Entering range**
36	ALty	**(Alarm Type)** Selects type of alarm related to parameters uPAL and LoAL.	d. AL. **:(Deviation Alarm)** Alarm intervention thresholds are determinated by the expression SET+uPAL and SET-LoAL. (Default). A. AL. **:(Absolute Alarm))** Alarm intervention thresholds are determinated by parameters uPAL and LoAL.
37	uPAL	**(Upper Alarm)** Enter the temperature threshold which will activate visual alarm signal if its upper limit will be exceeded . The threshold depends on parameter ALty.	**-40..210°C (°F)** Default: 5°C.
38	LoAL	**(Lower Alarm)** Enter the temperature threshold which will activate visual alarm signal if its lower limit will be exceeded. The threshold depends on parameter ALty.	**-40..210°C (°F)** Default: 5°C.
39	ALHy	**(Alarm Hysteresis)** Selects hysteresis into alarm intervention threshold calculation.	**0.5..50.0°C (°F)** Default: 2.0°C.
40	ALtd	**(Temperature Alarm Delay)** Selects alarm activation delay.	**0..120 minutes** Default: 10 minutes.
41	ALdS	**(Alarm Delay Start-up)** Selects alarm exclusion time after device start-up.	**0..10 hours.** Default: 2 hours.
42	ALdd	**(Alarm Delay Defrost)** Selects alarm exclusion time after a defrosting.	**0..10 ore.** Default: 1 hours.

DIGITAL INPUT				
N.	**Display**	**Parameter description**		**Entering range**
43	i1cF	**(Digital Input 1Configuration)** Selects digital input operating mode.	dis door E. AL PSAL dEF rEty 2ThS	**(Disabled)**.Default. **(Door)**.With active input display visualizes doAL (Door Alarm). With open port high/low temperature alarms are disabled. **(External Alarm)** With active input display visualizes E. AL. **(Pressure Switch Alarm)** If during the break time selected on i1t input detects a number of activation equal to the value selected on i1PS controller stops compressor and visualizes P. AL (Pressure Alarm). When input is active compressor is off. To restart normal regulation it is necessary to switch-off and restart controller. **(Defrost)** With active input defrosting function starts. **(Regulation Type)** With active input the device follows an hot type regulation, otherwise regulation is cold. **(2 Thresholds Switch)** If active, the controller works according to SET2, otherwise on SET1.	
44	i1Po	**(Digital Input 1 Polarity)** Selects type of contact for digital input 1 activation.		oc: **(Open Contact)**. cc: **(Closed Contact)**. Default	
45	i1oo	**(Digital Input 1 Output Off)** If i1cF = door, E. AL: selects outputs to be switched-off during digital input activation. If i1cF = PSAL: in case of pressure alarm, selects outputs to be switched-off, excluded the compressor that is stopped.		nonE: **(None)**. Default. FAn: **(Fan)**. cMP: **(Compressor)**. FAco: **(Fan and Compressor)**. ALL: **(All)**.	
46	i1tE	**(Digital Input 1 Temperature)** If i1cF = door: determinates threshold (SET + i1tE) to be surpassed so that option selected on parameter i1oo restart, also with active digital input.		**0.0..50.0°C (°F)** Default: 0.0°C. Selecting 0 control will not be done (Selected options restart with digital input deactivation).	
47	i1t	**(Digital Input Time)** If i1cF = door: Max. deactivation time for outputs selected on parameter i1oo with active digital input. Selecting 0 control will not be done (Selected options restart with digital input deactivation). If i1cF = E. AL: delay between digital input activation and signaling. If i1cF = PSAL: break time to calculate number of pressure switch activations.			**0..120 minutes** Default: 0 minutes.
48	i1PS	**(Digital Input 1 Pressure Switch Number)** If i1cF = PSAL: max. pressure switch activations during i1t time before alarm signaling.			**1..15 activations** Default: 2 activations.
49	i2cF	**(Digital Input 2 Configuration)** Selects digital input operating mode.	dis door E. AL PSAL dEF rEty 2ThS	**(Disabled)**.Default. **(Door)**.With active input display visualizes doAL (Door Alarm). With open port low/high temperature alarms are disabled. **(External Alarm)** With active input display visualizes E. AL. **(Pressure Switch Alarm)** If during break time selected on i2t the input detects a number of activations equal to the value selected on i2PS controller stops and visualizes P. AL (Pressure Alarm). When input is active, compressor is off. To return to the standard regulation it is necessary to restart the device. **(Defrost)** Defrosting function starts with active input. **(Regulation Type)** With active input device realizes an hot type regulation, otherwise the regulation is cold. **(2 Thresholds Switch)** If active, the controller works according to SET2, otherwise on SET1.	
50	i2Po	**(Digital Input 2 Polarity)** Selects type of contact for digital input activation.		oc: **(Open Contact)**. cc: **(Closed Contact)**. Default	
51	i2oo	**(Digital Input 2 Output Off)** If i2cF = door, E. AL: selects outputs to be switched-off during digital input activation. If i2cF = PSAL: in case of pressure alarm, selects outputs to be switched-off excluded the compressor that is stopped.		nonE: **(None)**. Default. FAn: **(Fan)**. cMP: **(Compressor)**. FAco: **(Fan and Compressor)**. ALL: **(All)**.	
52	i2tE	**(Digital Input 2 Temperature)** If i2cF = door: determinates threshold (SET + i2tE) to be surpassed so that option selected on parameter i2oo restart, also with active digital input.		**0.0..50.0°C (°F)** Default: 0.0°C. Selecting 0 control will not be done (Selected options restart with digital input deactivation).	
53	i2t	**(Digital Input 2 Time)** If i2cF = door: Max. deactivation time for outputs selected on parameter i2oo with active digital input. Selecting 0 control will not be done (Selected options restart with digital input deactivation). If i2cF = E. AL: delay between digital input activation and signaling. If i2cF = PSAL: break time to calculate number of pressure switch activations.			**0..120 minutes** Default: 0 minutes.
54	i2PS	**(Digital Input 2 Pressure Switch Number)** If i2cF = PSAL: max. pressure switch activations during i2t time before alarm signaling.			**1..15 activations.** Default: 2 activations.

LIGHT			
N.	**Display**	**Parameter description**	**Entering range**
55	LGt.	**(Light Key)** Configuring 1 lcF. or 2cF. = door and A. lcF. or A2cF. = d. in 1 or d. in2 it is possible to select AUX 1 or AUX 2 as light command. This parameter allows or not to command light output by keyboard.	dis. : **(Disabled)**. Default. En. : **(Enabled)**.
56	Lnt 1	**(Light Max Time)** Selects max. time for light output activation.	**0..120 minutes.** If 0 output has to be deactivated manually by keyboard or by digital input. Default: 0 minutes.

USCITE			
N.	**Display**	**Parameter description**	**Entering range**
57	A. lcF.	**(Aux 1 Configuration)** Selects AUX1 ouptut functioning.	dis. :**(Disabled)**. Default. on :**(On)**. Always On with device switched-on. cMP. : **(Compressor)**. On with active compressor. FAn : **(Fan)**. On with active fans. dEF. : **(Defrost)**. On with active defrosting. AL. :**(Alarm)**. On with active alarm. d. in 1 :**(Digital Input 1)**. On with active digital input 1 signaling. d. in2 :**(Digital Input 2)**. On with active digital input 2 signaling.
58	A. Po.	**(Aux 1 Polarity)** Selects AUX1 output contact type.	no. :**(Normally Open)**. (Default). nc. :**(Normally Closed)**.
59	A. dS.	**(Aux 1 Disabling)** If A. lcF. = AL. , d. in 1 , d. in2 : selects AUX1 outuput deactivation type (excluded light functioning).	ALoF. :**(Alarm Off)**. Output deactivates when alarm conditions disappears (Default). Key :**(Key)**. Output deactivates pressing a key.
60	A2cF.	**(Aux 2 Configuration)** Selects AUX2 ouptut functioning.	dis. :**(Disabled)**. Default. on :**(On)**. Always On with device switched-on. cMP. : **(Compressor)**. On with active compressor. FAn : **(Fan)**. On with active fans. dEF. : **(Defrost)**. On with active defrosting. AL. :**(Alarm)**. On with active alarm. d. in 1 :**(Digital Input 1)**. On with active digital input 1 signaling. d. in2 :**(Digital Input 2)**. On with active digital input 2 signaling. bEEP : **(Beeper)**.
61	A2Po.	**(Aux 2 Polarity)** Selects AUX2 output contact type.	no. :**(Normally Open)**. (Default). nc. :**(Normally Closed)**.
62	A2dS.	**(Aux 2 Disabling)** If A2cF. = AL. , d. in 1 , d. in2 : selects output AUX 2 deactivation (excluded light functioning).	ALoF. :**(Alarm Off)**. Output deactivates when alarm conditions disappears. (Default). Key :**(Key)**. Output deactivates pressing a key.
63	bEEP	**(Beeper)** If A2cF. = bEEP selects beeper operating mode.	Key :**(Key)** Beep during key pressure. AL. :**(Alarm)** Active in case of alarm. KEAL. :**(Key and Alarm)** Beep during key pressure and active in case of alarm. (Default)

SERIALE			
N.	**Display**	**Parameter description**	**Entering range**
64	bdrt.	**(Baud Rate)** Serial communication Baud Rate.	4.8 4800 bit/s. 9.6 9600 bit/s. 19.2 19200 bit/s (Default). 28.8 28800 bit/s. 38.4 38400 bit/s. 57.6 57600 bit/s.
65	SLAd.	**(Slave Address)** Device serial address.	**1..254** Default: 254.
66	SEdE.	**(Serial delay)** Answer delay for serial communication.	**0..100 ms** Default: 10 ms.

10. Serial communication

DRR132 is provided with RS485 and can receive/broadcast data via MODBUS-RTU protocol. Device can be configured only as Slave. This function allows to control multiple controllers connected to a supervisory system. RS485 line has to be free from LT termination resistances to avoid malfunctioning.

Each instrument will answer to a Master query only if contains same address as on parameter SLAd. Allowed addresses are from 1 to 254 and there should not be controllers with the same address on the same line. Address 255 can be used by the Master to communicate with
all connected equipments (broadcast mode), while with 0 all devices receive command, but no answer is expected. DRR132 can introduce an answer delay (in milliseconds) to Master request; this delay has to be set on parameter SEdE.
At each parameters modification, instrument stores values in EEPROM memory (100000 writing cycles), while setpoints are stored with a delay of 10 seconds after last modifi cation.
NB: Modifications made to Words different from those described in the following table can lead to instrument malfunction.

Baudrate	Selectable by parameter bdrt. 4800bit/s, 9600bit/s, 19200bit/s, 28800bit/s, , 38400bit/s, 57600bit/s
Format	8, N, 1 (8bit, no parity, 1 stop)
Supported functions	WORD READING (max 20 word) (0x03, 0x04) SINGLE WORD WRITING (0x06) MULTIPLE WORDS WRITING (0x10) (max 20 word)

MODBUS ADDRESS	DESCRIPTION	READ/ WRITE	RESET VALUE
0	Device type	RO	104
1	Software version	RO	FLASH
5	Address Slave	RO	EEPR
6	Boot version	RO	FLASH
50	Automatic addressing	WO	-
51	Installation code comparison	WO	-
500	Loading default values: **9999** restore all values **9998** restore all values excluded baud-rate and address slave **9997** restore all values excluded address slave **9996** restore all values excluded baud-rate	R/W	0
1000	Process 1 value	RO	0
1001	Process 2 value	RO	0
1002	Process 3 value	RO	0
1003	Setpoint 1 value	R/W	EEPR
1004	Setpoint 2 value	R/W	EEPR
1005	Relay status (0=off, 1=on): **Bit0**: Compressor relay **Bit1**: Defrosting relay **Bit2**: Light relay **Bit3**: Auxiliary relay **Bit4**: FAN1 output **Bit5**: FAN2 output	RO	0
1006	Alarm status (0=off, 1=on): **Bit0**: High Alarm **Bit1**: Low Alarm **Bit2**: Digital Input 1 Alarm **Bit3**: Digital Input 2 Alarm	RO	0
1007	Digital input status (0=off, 1=on): **Bit0**: Active digital input 1 **Bit1**: Active digital input 2	RO	0
1008	Error signalling flags (0=off, 1=on): **Bit0**: Errore in eeprom writing **Bit1**: Errore in eeprom reading **Bit2**: Process error 1 **Bit3**: Process error 2 **Bit4**: Process error 3 **Bit5**: Process error 4 **Bit6**: Missing calibration error	RO	0
2001	Parameter 1	R/W	EEPR
2002	Parameter 2	R/W	EEPR
2003	Parameter 3	R/W	EEPR
….	….	R/W	EEPR
2069	Parameter 69	R/W	EEPR
2070	Parameter 70	R/W	EEPR

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