USER'S MANUAL

Rev. 10/2025

CD66

Temperature Controller

003

M-CD66

CD Automation S.r.l.
Via Picasso, 34/36 - 20025 Legnano (MI)- Italy
Tel. +39 0331 577479 - Fax +39 0331 579479
E-mail: info@cdautomation.com - Web: www.cdautomation.com

Important warnings for safety

This chapter contains important information for the safety. The not observance of these instructions may result in serious personal injury or death and can cause serious damages to the Thyristor unit and to the components system included.
The installation should be performed by qualified persons.
In the manual are used symbols to give more evidence at the notes of safety and operativity for the attention for the user:

	This icon is present in all the operational procedures where the Improper operation may result in serious personal injury or death by Electrical Shock Hazard Symbol (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.
	Warning or Hazard that needs further explanation than the label on unit can provide. Consult User's Guide for further information.
	Unit is compliant with European Union directives. See Declaration of Conformity for further details on Directives and Standards used for Compliance.
	ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
	Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.

A **"NOTE"** marks a short message to alert you to an important detail.

A **"CAUTION"** safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A **"WARNING"** safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

Safety notes

WARNING! Risk of Fire and Electric Shock. This product is "Open Type Process Control Equipment". It must be mounted in an enclosure that does not allow fire to escape externally.

WARNING! If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.

WARNING! To avoid damage to property and equipment, injury and loss of life, adhere to applicable electrical codes and standard wiring practices when installing and operating this product. Failure to do so could result in damage, injury and death.

WARNING! All service including inspection, installation, wiring, maintenance, troubleshooting, fuse or other user serviceable component replacement must be performed only by properly qualified personnel. Service personnel must read this manual before proceeding with work. While service is being performed unqualified personnel should not work on the unit or be allowed in the immediate vicinity.

WARNING! Do not use in aerospace or nuclear applications.

WARNING! The device's protection rating is IP20 with all covers installed and closed. It must be installed in an enclosure that provides all the necessary additional protections appropriate for the environment and application.

CAUTION: Devices shall be supplied with limited energy according to UL 61010-1 3rd Ed, section 9.4 or LPS in conformance with UL 60950-1 or SELV in conformance with UL 60950-1 or Class 2 in compliance with UL 1310 or UL 1585.

CAUTION: A malfunction in the Digital Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Digital Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.

CAUTION: To avoid compromising the insulation, do not bend wire or other components beyond their bend radius specifications.

CAUTION: Protect the device from high temperature, humidity and vibrations.

CAUTION: Install an appropriately sized RC filter across contactor coils, relays and other inductive loads.

NOTE: Provide a local disconnect to isolate the device for servicing.

Precautions for safe use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events. Do not handle the Digital Controller in ways that exceed the ratings.

- The product is designed for indoor use only. Do not use or store the product outdoors or in any of the following places:
  - Places directly subject to heat radiated from heating equipment.
  - Places subject to splashing liquid or oil atmosphere.
  - Places subject to direct sunlight.
  - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
  - Places subject to intense temperature change.
  - Places subject to icing and condensation.
  - Places subject to vibration and large shocks.
- Installing two or more controllers in close proximity might lead to increased internal temperature and this might shorten the life cycle of electronic components. It is strongly recommended to install cooling fans or other air-conditioning devices inside the control cabinet.
- Always check the terminal names and polarity and be sure to wire properly. Do not wire the terminals that are not used.
- To avoid inductive noise, keep the controller wiring away from power cables that carry high voltages or large currents. Also, do not wire power lines together with or parallel to Digital Controller wiring. Using shielded cables and using separate conduits or ducts is recommended. Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component). When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the Digital Controller. Allow as much space as possible between the Digital Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
- A switch or circuit breaker must be provided close to device. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for the controller.
- The device must be protected by a fuse 1 A (cl. 9.6.2).
- Wipe off any dirt from the Digital Controller with a soft dry cloth. Never use thinners, benzine, alcohol, or any cleaners that contain these or other organic solvents. Deformation or discoloration may occur.
- The number of non-volatile memory write operations is limited. Therefore, use EEprom write mode when frequently overwriting data, e.g.: through communications.

Environmental policy / WEEE

Do not dispose electric tools together with household waste material.
According to European Directive 2012/19/EU on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

Maintenance

Check periodically if the screw for the power cables and safety earth are tightened correctly (See Connection Diagram)

Warranty condition

Producer gives a 12 months warranty to its products.

The warranty is limited to repairing and parts substitution in our factory and does exclude products not properly used and fuses.

Warranty does not include products with serial numbers deleted. The faulty product should be shipped to Producer at customer's cost and our Service will evaluate if product is under warranty terms.

Substituted parts remain of Producer property.

CE

General terms and conditions

Return Material Authorization (RMA)

Customers wishing to return any items, whether they are incorrectly supplied, faulty or damaged in transit, must first complete a Return Material Authorisation (RMA) form to obtain an RMA number from the Service Department.
A full repair service is available for customers. Prior to submitting the RMA form and returning products, customers are recommended to contact the technical support team to determine whether the issue can be resolved with telephone support.

How the RMA service works

The RMA form and details are available on our web sites:

https://www.cdautomation.com/rma-english-version/

When completing the RMA form, please be as specific as possible about the problem, including any pertinent application details. The more information given, the more quickly and more thoroughly the problem can be solved. The minimum information required is:

1. The Full Model Number

2. Quantity of units being returned

3. The units Serial Number(s)

4. A description of the problem ("faulty" or "unknown" is not sufficient)

Summary

1 Introduction

Thank you for choosing a CD Automation Temperature Controller.
The CD66 controller is a versatile, high-performance solution for industrial control.

1.1 Safety guidelines

Read carefully the safety guidelines and programming instructions contained in this manual before connecting/using the device.

Disconnect power supply before proceeding to hardware settings or electrical wirings to avoid risk of electric shock, fire, malfunction.

Do not install/operate the device in environments with flammable/explosive gases.

This device has been designed and conceived for industrial environments and applications that rely on proper safety conditions in accordance with national and international regulations on labour and personal safety. Any application that might lead to serious physical dama ge/ life risk or involve medical life support devices should be avoided.

Device is not conceived for applications related to nuclear power plants, weapon systems, flight control, mass transportation systems.

Only qualified personnel should be allowed to use device and/or service it and only in accordance to technical data listed in this manual.

Do not dismantle/modify/repair any internal component.

Device must be installed and can operate only within the allowed environmental conditions.

Overheating may lead to risk of fire and can shorten the lifecycle of electronic components.

1.2 Limitation in use

This product is a temperature controller which was developed, designed and manufactured on the premise that it would be used for general machinery.
In particular, if this product is to be used for applications that require the utmost safety as described below, please take into consideration of the safety of the entire system and the machine by adopting such means as a fail-safe design, a redundancy design as well as the conducting of periodical inspections.

- Safety devices for the purpose of protecting the human body.
- Direct control of transportation equipment.
- Airplanes.
- Space equipment.
- Atomic equipment, etc.

Please do not use this product for applications which directly involve human lives.

1.3 Over-Temperature Protection

Any control system design should take into account that any part of the system has the potential to fail.

For temperature control systems, continued heating should be considered the most dangerous conditions, and the machine should be designed to automatically stop heating if unregulated due to the failure of the control unit or for any other reason.

The following are the most likely causes of unwanted continued heating:

1) Controller failure with heating output constantly on

2) Disengagement of the temperature sensor from the system

3) A short circuit in the thermocouple wiring

4) A valve or switch contact point outside the system is locked to kepp the heat switched on.

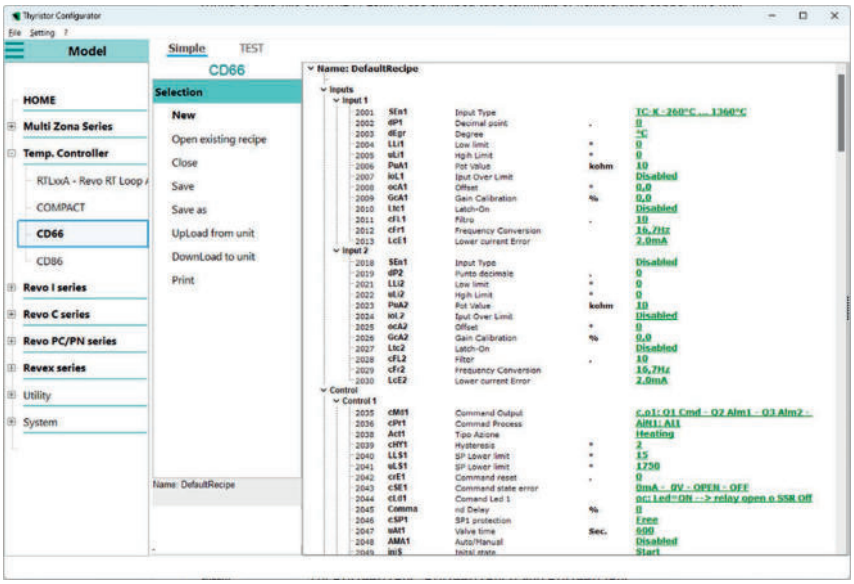
In any application where physical injury or destruction of equipment might occur, we recommend the installation of independent safety equipment, with a separate temperature sensor, to disable the heating circuit in case of overheating.

The controller alarm signal is not designed to function ad a protective measure in case of controller failure.

2

tor Software

The configurator software is free of



Software Configurator download link:
https://www.cdautomation.com/wp-content/uploads/ThyristorConfigurator_ver6.zip

charge and can be downloaded from our website.

A standard Micro USB cable (our code is CCX) is required to connect CD66 to the computer.
The Windows driver for the USB connection is installed by the setup software installer.

3 Identification and Order Code

3.1 Identification of the unit

Caution: Before to install, make sure that the unit have not damages. If the product has a fault, please contact the dealer from which you purchased the product.

The identification label give all the information regarding the factory settings of the unit, this label is on the unit, like represented in figure.

Verify that the product is the same thing as ordered.

3.2 Order Code

	1	2	3	4		5	6	7		8	9	10		11	12	13		14	15		16
ORDER CODE	C	D	6	6	-	_	_	_	-	_	_	_	-	4	8	5	-	C	T	-	M

VERSION	3	4
Description	cod	
CD66 PID Controller 48x48 2AI, 2AO, 4DI/O, 3 Relay	6	6

POWER SUPPLY	5	6	7	8	9	10
Description	cod					
115÷230 Vac	1	1	5	2	3	0
24 Vac/dc	0	2	4	0	0	0

COMUNICAZIONE	11	12	13
Description	cod		
RS485	4	8	5

CURRENT TRANSFORMER	14	15
Description	cod	
CT input 005	C	T

LOOP	16
Description	cod
1 or 2 Loop	M

*External current sensor		
Description	Size	Cod.
Current transformer 38x48x20mm	25/0.05A	CT25
Current transformer 38x48x20mm	50/0.05A	CT50
Current transformer 38x48x20mm	100/0.05A	CT100
Current transformer 50x50x30mm	100/0.05A	CTB100

4 Technical Specifications

4.1 General features

Display:	4 digits 0,52'', 5 digits 0,30''
Operating temperature:	0-45° C -Humidity 35..95 uR%
Sealing	IP65 front panel (with gasket) - IP20 box and terminals (UL not evaluated)
Material Box and front panel:	PC UL94V2 self-extinguishing
Weight	Approx. 185 g

4.2 Hardware features

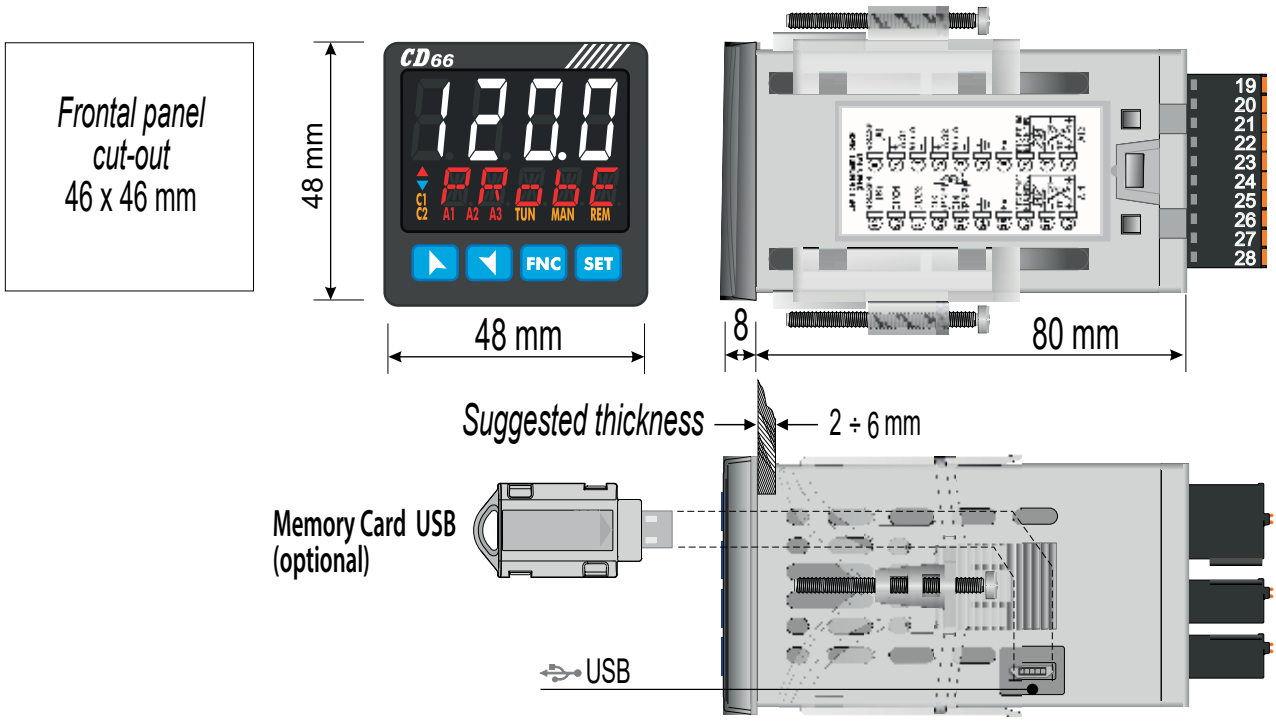
Analogue inputs AI1 – AI2	Configurable via Software. **Thermocouple Input**: type K, S, R, J, T , E, N, B. Automatic compensation of cold junction from -25÷85°C. **Thermoresistances Input**: PT100, PT500, PT1000, Ni100, PTC 1K, NTC 10K (β 3435K) **Input V/mA**: 0-1 V, 0-5 V, 0-10 V, 0-20, 4-20 mA, 0-60 mV. **Pot. Input**: 1÷150 KΩ. **Tolerance** (@25° C) ±0.2% ±1 digit (on F.s.) for thermocouple, thermoresistance and V/mA. Cold junction accuracy 0.1° C/°C. **Impedence**: 0-10V: Ri>110 KΩ 0-20mA: Ri<5 Ω 0-40mV: Ri>1 MΩ.
Current Transformer	50 mA. Max Scale Value 200A
Relay outputs	Configurable as command and alarm output. Contacts: 2A - 250Vac for resistive load.
DO/SSR Output	Configurable as command and alarm output. 12/24V, 25 mA.
Analogue outputs	Configurable as command, alarm, output or as retransmission of process/ setpoints. Configurable: 0-10V with 40000 points ±0.2% (on F.s.) 4-20mA with 40000 points ±0.2% (on F.s.)
Power-supply	**For CD66-024-230-485-CT-M** 24 Vac/Vdc ±15% 50/60 Hz **For CD66-115-230-485-CT-M** 115÷230 Vac ±15% 50/60 Hz

4.3 Software features

Controller algorithms	ON-OFF with hysteresis. - P, PI, PID, PD with proportional time
Proportional band	0÷9999°C o °F
Integral time	0,0÷999,9 sec (0 = disable function)
Derivative time	0,0÷999,9 sec (0 = disable function)
Controller functions	Manual or automatic Tuning type, selectable alarm Type, Load status detection, Fixed setup password

5 Installation

5.1 Dimensions and installation



6 Wiring instructions

This controller has been designed and manufactured in compliance with the Low Voltage Directive 2006/95/EC, 2014/35/EU (LVD) and the EMC Directive 2004/108/EC, 2014/30/EU (EMC).

For installation in industrial environments, please adhere to the following safety guidelines:

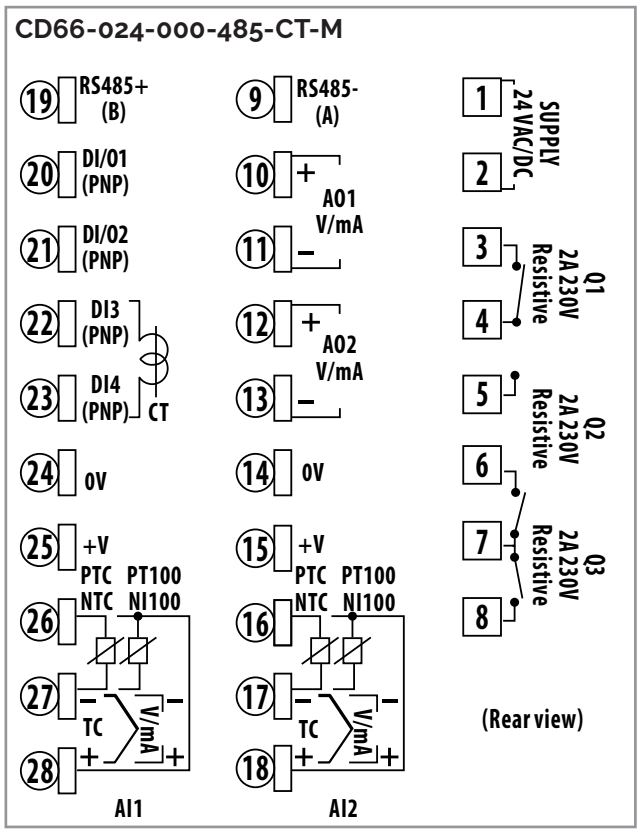
- Keep control lines separate from power cables.
- Avoid placing the controller near remote control switches, electromagnetic contactors, and powerful motors.
- Maintain distance from power units, especially those with phase control.
- It is strongly recommended to install an adequate mains filter on the power supply of the machine where the controller is installed, especially if supplied with 230Vac.

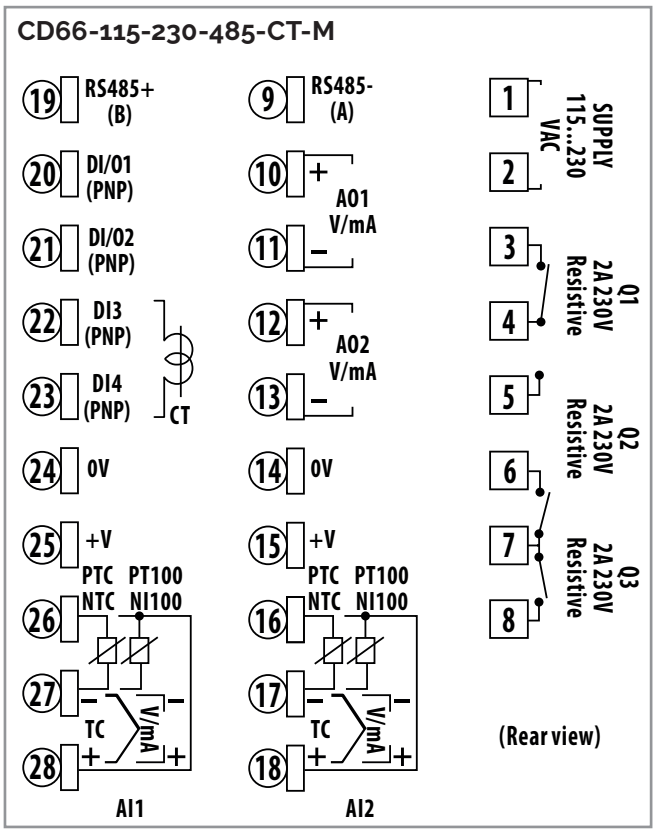
The controller is designed to be integrated into other machines, therefore, the CE marking on the controller does not exempt the machine manufacturer from the safety and conformity requirements applicable to the machine itself.

About the wiring of the pins, the following recommendations apply:

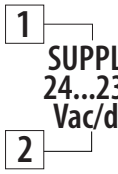
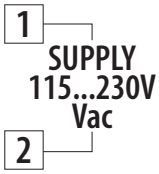
- Pins 1 to 8 on CD66-xxx-230-485-CT-M: use crimped tube terminals or flexible/rigid copper wire with a diameter of 0.2 to 2.5 mm^2 (min. AWG26, max. AWG12, operating temperature: min. 70°C). Cable stripping length: 10 to 11 mm.
- Pins 9 to 28 on CD66-xxx-230-485-CT-M: use crimped tube terminals or flexible/rigid copper wire with a diameter of 0.5 to 1 mm^2 (min. AWG24, max. AWG16, operating temperature: min. 70°C). Cable stripping length: 7 to 8 mm.

6.1 Wiring diagram

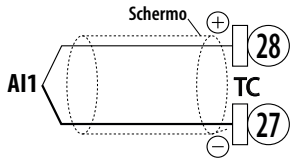
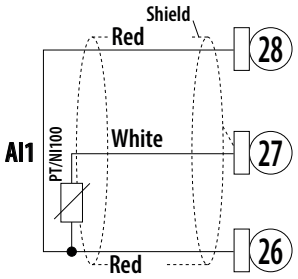
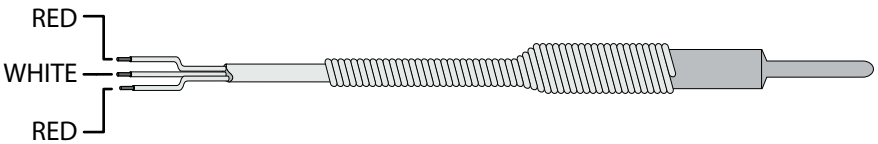
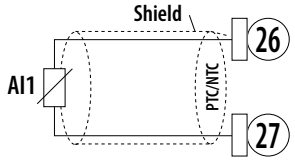
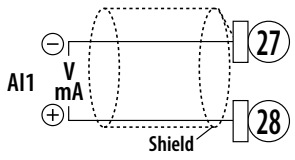
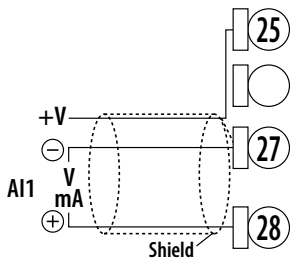




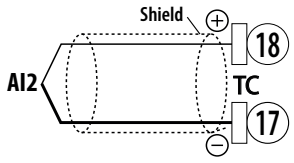
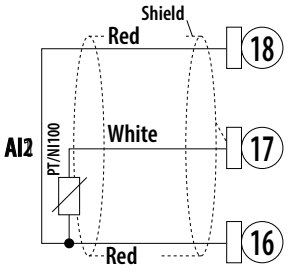
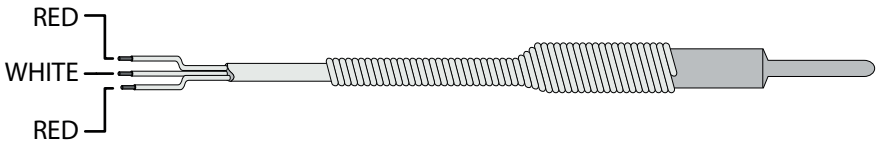
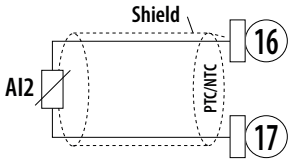
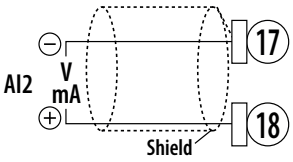
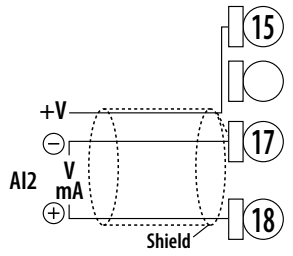
6.1.1 Power Supply

	**For CD66-024-230-485-CT-M** Switching power supply 24 Vac/Vdc ±15% 50/60 Hz - 6 Watt/VA. Galvanic insulation (1500V).
	**For CD66-115-230-485-CT-M** Switching power supply 115÷230 Vac ±15% 50/60 Hz - 6 Watt/VA. Galvanic insulation (3000V).

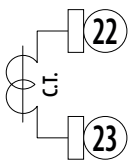
6.1.2 Analogue input 1

	**Thermocouples** • Type K, S, R, J, T, E, N, B. • Comply with polarity • For any extension, use compensated cable and terminals suitable for the thermocouples used (compensated). • When shielded cable is used, it should be grounded at one side only.
	**Thermoresistances** Type PT100, Ni100 • With the three-wire connection use wires with the same section. • For the two-wire connection short-circuit terminals 26 and 28. • When shielded cable is used, it should be grounded at one side only. 
	**Thermoresistances** Type NTC, PTC, PT500, PT1000, linear or potentiometers input. • When shielded cable is used, it should be grounded at one side only.
 With Probe power supply 	**Linear signals** Type in Volt (0-1 V, 0-5 V, 0-10 V, 60 mV) and mA (0/4-20 mA) • Comply with polarity • When shielded cable is used, it should be grounded at one side only. **Probe power supply**: +V at 12Vdc or 24Vdc can be selected by parameter 282 *o.out* (Group *diSP.* - Display and interface).

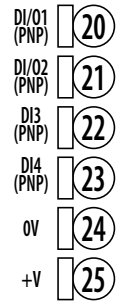
6.1.3 Analogue input 2

	**Thermocouples** • Type K, S, R, J, T, E, N, B. • Comply with polarity • If need a cable extensions, use compensated cable and terminals suitable for the thermocouples used (compensated). • When shielded cable is used, it should be grounded at one side only.
	**Thermoresistances** Type PT100, Ni100 • With the three-wire connection use wires with the same section. • For the two-wire connection short-circuit terminals 16 and 18. • When shielded cable is used, it should be grounded at one side only. 
	**Thermoresistances** Type NTC, PTC, PT500, PT1000 linear or potentiometers input . • When shielded cable is used, it should be grounded at one side only.
 With Probe power supply 	**Linear signals** Type in Volt (0-1 V, 0-5 V, 0-10 V, 60 mV) and mA (0/4-20 mA) • Comply with polarity • When shielded cable is used, it should be grounded at one side only. **Probe power supply**: +V at 12Vdc or 24Vdc can be selected by parameter 282 *u.out* (Group *diSP.* - Display and interface). • To power the sensor connected to AI2 through +V (terminal 15), short-circuit 0V (terminal 14) with AI2 ground input (terminal 17).

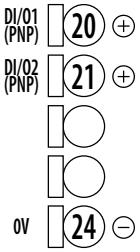
6.1.4 CT input

	**CT Input Type xxx/0.05** (50 mA amperometric transformer) • To enable CT input, modify parameter 287 *ct F.* • Sampling time 100 ms. • Span Configurable by parameters • Max span value 200A

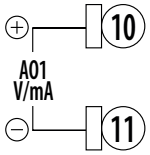
6.1.5 DI Digital Input

	**DI Digital input** Type free contact • To enable DI, modify parameters on d.i.1, d.i.2, d.i.3 and d.i.4 groups. • Sampling time 100 ms. • To activate the digital input, close the digital input on terminal +V

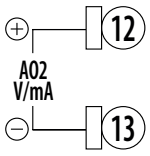
6.1.6 Digital outputs

	**Digital output** Type PNP/SSR • Used for command or alarm. • Range 12 VDC/25 mA or 24 VDC/15mA selectable by parameter 282 *u.out*. Note: Wire the positive control (+) of the solid state relay to the terminal 20 or 21. Wire the negative control (-) of the solid state relay to the terminal 24

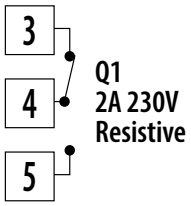
6.1.7 AO1 Analogue output 1

	**Linear output** Type V (0-10V) or mA (4-20) • Galvanically isolated • Configurable as command, alarm or retransmission of process-setpoint. • The type of output and its value is selected by parameter in *A.o.1* group

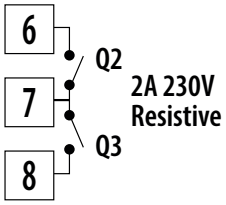
6.1.8 AO2 Analogue output 2

	**Linear output** Type V (0-10V) or mA (4-20) • Galvanically isolated • Configurable as command,alarm or retransmission of process-setpoint. • The type of output and its value is selected by parameter in *A.o.2* group

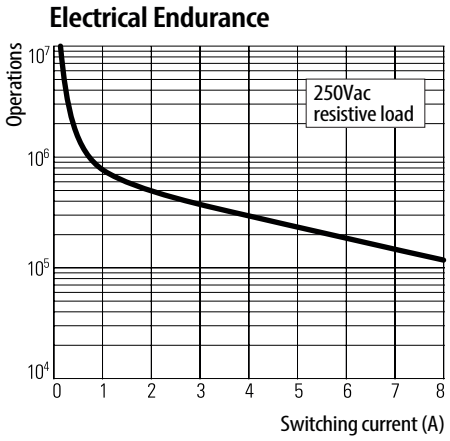
6.1.9 Relay Outputs



Q1 Relay Output
• 2A/250Vac for resistive loads.
Note: See chart below

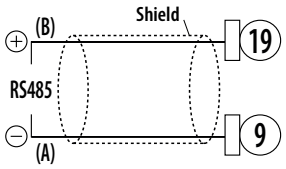


Q2/Q3 Dual Relay Output
• 2A/250Vac for resistive loads.
Note: See chart below.



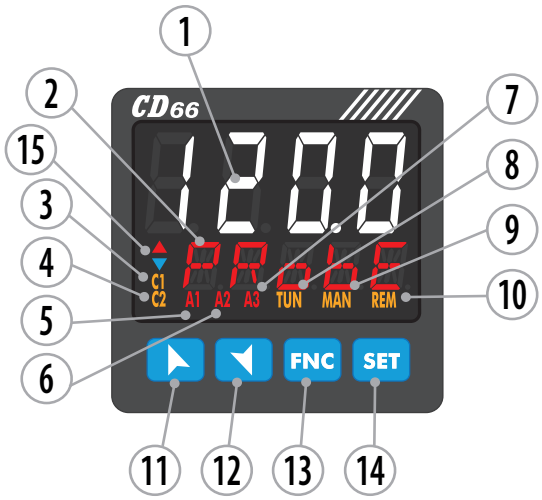
Electrical endurance Q1, Q2 and Q3:
2A, 250Vac, resistive loads, 105 operations.
20/2A, 250Vac, cosφ=0.3, 105 operations

6.1.10 Serial link



Serial Link Type RS485
• Modbus-RTU slave protocol
• Galvanically isolated
Note: It is recommended to use the twisted and shielded cable for communications

7 Leds and key function



Leds	1	120.0	As default displays the process. Can be changed with parameter on "Display and interface" group
	2	PRobE	As default displays the Set Value. Can be changed with parameter on "Display and interface" group
	3	C1	Control Heat Output state, On when active
	4	C2	Control Cool Output state, On when active
	5	A1	Alarm 1 state, On when active
	6	A2	Alarm 2 state, On when active
	7	A3	Alarm 3 state, On when active
	8	TUN	Auto Tuning Status, On when active
	9	MAN	Manual Status, On when active
	10	REM	RS485 Serial Communication activity Flashing when remote setpoint is enabled
Keys	11		Increases the main setpoint During configuration allows to scroll the parameters or the groups of parameters Increases the setpoints
	12		Decreases the main setpoint During configuration allows to scroll the parameters or the groups of parameters Decreases the setpoints
	13	SET	Allows to visualize command and alarm setpoints During configuration allows to enter the parameter to be modified and confirms the variation
	14	FNC	Allows to enter the Tuning launch function, automatic/manual selection During configuration works as exit key (ESCAPE)
Leds	15	▲	On in pre-programmed cycle during rising action
		▼	On in pre-programmed cycle during falling action
		▲▼	Both ON during parameter modification, if it's not at default value

8 Controller functions

8.1 Dual input

The controller is provided with two analogue inputs.
With this 2 inputs it is possible:

- to do mathematic operations between 2 measured process values, correlating the result to the command or alarm outputs
- to give a process value as remote setpoint.
- to use as 2 input to connect to 2 independent control loops.

8.1.1 Input associations

When second analogue input is enabled (On Group "A.in.2" parameter 18 "SEn.2" different than "dISAb.") it is possible connect the process value to Loop control, Alarms or Retransmission.

They can be associated to the following functions:

- A.In.1: Value read by input AI1;
- A.In.2: Value read by input AI2;
- MEAn: Mean between inputs AI1 and AI2;
- diFF.: Difference between inputs: AI1-AI2;
- Ab.diF: Difference between inputs as absolute value: AI1-AI2;
- SuM: Sum of 2 Inputs values

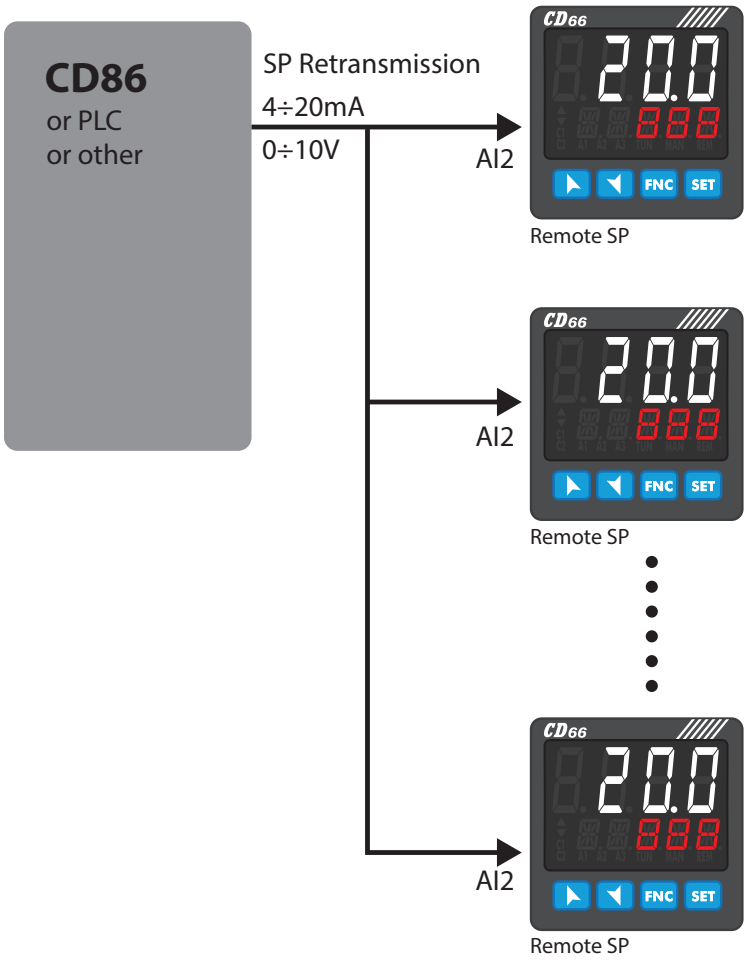
The result of calculated values can be connected to:

- Command 1 by parameter 36 "c.Pr.1"
- Command 2 by parameter 55 "c.Pr.2"
- Alarm 1 function by parameter 124 "A.1.Pr."
- Alarm 2 function by parameter 142 "A.2.Pr."
- Alarm 3 function by parameter 160 "A.3.Pr."
- Alarm 4 function by parameter 178 "A.4.Pr."
- Alarm 5 function by parameter 196 "A.5.Pr."
- Alarm 6 function by parameter 214 "A.6.Pr."
- Retransmission on AO1 by parameter 299 "rtM.1"
- Retransmission on AO2 by parameter 308 "rtM.2"

To facilitate the reading of the second input, it is possible to associate a read value on the second display via the parameter 278 "u1.d.2."

8.1.2 Remote Setpoint

With the AI2 it is possible to read a remote value via Analogue input and to use it as a remote Setpoint.
It is an easy system for receiving an external setpoint through simple analogical communication from an external instrument such as a programmer, PLC, or other.
It is possible to enable Remote setpoint from parameter 56 "rEM.S" of cMd.2 Group to "EnAb" or "En.tSt."



In the example above a CD86 (it can be a PLC too) sends SP value information using an analogue output. The CD66 take the SP information from second analogue input AI2 and use it like a working Setpoint.

8.1.3 Remote setpoint by serial input

With the RS485 serial connection it is possible to receive a value used as a remote Setpoint.
To enable communication remote setpoint function set parameter 56 "rEM.S" on cMd.2 Group to "EM.SEr." or "EM.SE.t.". Now the remote setpoint must be written via the Modbus RTU RS485 serial connection to word 1249 for command 1 and 1250 for command 2 (with the tenth of a degree if the control process is a temperature sensor).
When the "EM.SE.t." option is selected, to switch from remote to local setpoint, press and hold the SET button for 1 second.
NOTE: to use SET key like remote/local switch, set on "diSP." Group "S.K.S.F." parameter to "diSAb".
The status of the remote setpoint is indicated by the REM led.

8.2 Controller Start/Stop

To Start and Stop the controller you can:
- Use the Digital input
  you need to set the Digital input Functions, with parameters on groups d.i.1, d.i.2, d.i.3, d.i.4.
- Use the communication
  use modbus parameter address 1215
- Use the SET Key
  you need to set "S.K.S.F." parameter on "diSP." Group to "St./St."

8.3 Setpoint modification

The device can be set with single, dual or remote setpoint.

When single setpoint is set:

Increase or Decrease the setpoint value.

When dual or remote setpoint are set:

SET Select the setpoint to be modified

Increase or Decrease the setpoint value.

8.4 Tuning type

The PID control is an essential part of the controller useful for stable and fluctuation-free control of the value to be controlled.
The algorithm works well when the parameters Proportional Band (P.b) Integral Time (i.t.) and Derivative Time (d.t.) are correctly dimensioned.
The PID can be set with different procedures, from manual to different types of automatic calculation that can be used in different situations.

8.4.1 Manual Tuning

Manual tuning consists of manually setting the parameters for proportional band, integral time and derivative time, in the group "rEG.1" for the control Loop 1 and "rEG.2" for the control Loop 2.
To find the proportional band value, measure the amplitude of the oscillation that would be obtained with an On/Off control using it as proportional band value.
To find the integral time value, measure the time between two oscillation maxima and use this as the integral time value expressed in seconds.
To find the derivative time value, you can approximate it to 1/4 of the integral time.

8.4.2 Autotuning "SelfTune" type

With the autotune function, the controller intercepts fluctuations and modifies the PID parameters to try to achieve stable control.
The function is activated with the parameters:
• 73 "tun.1" = "Auto" for Loop 1
• 98 "tun.2" = "Auto" for Loop 2
If automatic parameter calculation is active, the TUN led will flash
If the PID parameters are not already set, when the instrument is switched on, the PreTuning procedure described in the next paragraph is launched automatically.

8.4.3 Autotuning "PreTune" type

The PreTune procedure allows the user to decide when to update the PID control parameters.
During PreTuning, the instrument creates a disturbance in the control, in order to analyse the inertia of the system to be controlled. Based on the data collected, it modifies the PID parameters to achieve the best control.
The function is enabled with the parameters:
• 73 "tun.1" = "MAnu" for Loop 1
• 98 "tun.2" = "MAnu" for Loop 2

PreTune can be activated from the keyboard by digital input or serial port.

PreTuning activation from keyboard:

1) press FNC button until display 2 shows "tunE",

2) press SET: display 1 shows "EnAb." and the TUN led lights up.

3) the procedure begins

Activation of PreTuning from digital input:
To enable the launch of the pretune from the digital input, the function of at least one of the available digital inputs must be configured to 'tunE'.
At the first activation of the digital input the pretune is activated by switching on the LED, at the second it is deactivated by switching off the LED.

NOTE:
In order to avoid overshoots, the threshold for triggering the PreTune calculation is set via the parameters
• 74 "S.d.t.1" for Loop1
• 99 "S.d.t.2" for Loop2
With this calculation: Threshold Tune = Setpoint - "Set Deviation Tune"
E.g.: If the setpoint is 100.0°C and Parameter 74 'S.d.t.1' is 20.0°C the start of the PreTune function will be: 100.0 - 20.0) = 80.0°C.
For greater accuracy in calculating the PID parameters, it is recommended to start the manual tuning procedure when the process deviates significantly from the setpoint.

8.4.4 Autotuning "Once"

Set parameter 73 "tun.1" = "OncE".
The auto-tuning procedure is only executed each time the instrument is switched on. If for any reason the procedure fails, it will be performed the next time the instrument is switched on.

8.5 Digital Input Functions

The CD66 has several functions that can be activated by digital inputs, which can be enabled using parameters:

• 231 "d.i.1.F." for digital input 1.

• 239 "d.i.2.F." for digital input 2.

• 247 "d.i.3.F." for digital input 3.

• 255 "d.i.4.F." for digital input 4.

Functions can be:

• "2t.SU.", "2t.SU.i", "3t.SU.i", "4t.SU.i": for changing the setpoint with a fixed or pulse signal;

• "run.": control is enabled by the active digital input;

• "tunE": enables/disables Tuning if it is set as Pretune;

• "Au.MA.i.", "Au.MA.i.": If the manual function is enabled via parameter 48 "A.MA.1." or 67 "A.MA.2.", with a fixed or pulse signal on the digital input, the instrument switches the control loop from automatic to manual and vice versa;

• "Act.ty.": selects whether the control type is hot or cold of the associated loop via the parameters 234 "d.1 .1.r.", 242 "d.1 .2.r." , 250 "d.1 .3.r." or 258 "d.1 .4.r.";

• "M.rES.": When manual reset is set, it allows the alarm and control outputs of the associated loop to be reset via the parameters 234 "d.1 .1.r.", 242 "d.1 .2.r.", 250 "d.1 .3.r." or 258 "d.1 .4.r.";

• "A.1 .0": Zero tare function: sets the associated analogue input to 0. The analogue input is selected on the parameters 233 "d.1 .1.P.", 241 "d.1 .2.P.", 249 "d.1 .3.P." or 257 "d.1 .4.P.";

• "t.1.run": if timer 1 is enabled (parameter 328 "tMr.1" other than '"diSAb"), with active digital input, the timer is put into RUN, otherwise it remains in STOP;

• "t.1.S.E.": if timer 1 is enabled (parameter 328 "tMr.1" other than "diSAb"), acting on the digital input switches the timer status from STOP to RUN and vice versa;

• "t.1.StA.": if timer 1 is enabled (parameter 328 "tMr.1" other than "diSAb"), acting on the digital input puts the timer in RUN mode;

• "t.1.End.": if timer 1 is enabled (parameter 328 "tMr.1" other than "diSAb"), acting on the digital input puts the timer in STOP mode;

• "t.2.run": if timer 2 is enabled (parameter 331 "tMr.2" other than "diSAb"), with active digital input, the timer is put into RUN, otherwise it remains in STOP;

• "t.2.S.E.": If timer 2 is enabled (parameter 331 "tMr.2" other than "diSAb"), acting on the digital input switches the timer status from STOP to RUN and vice versa;

• "t.2.StA.": if timer 2 is enabled (parameter 331 "tMr.2" other than "diSAb"), acting on the digital input puts the timer in RUN mode;

• "t.2.End.": if timer 2 is enabled (parameter 331 "tMr.2" other than "diSAb"), acting on the digital input puts the timer in STOP mode;

• "Lo.cFG.": with active digital input, access to configuration and setpoint changes is blocked;

• "rEM.S.E.": if parameter 56 "rEM.S." is set to "EnAb." or "En.SEr.", the remote setpoint is enabled when the digital input is active, otherwise the setpoint is local. On parameter 234 "d.1 .1.r.", 242 "d.1 .2.r.", 250 "d.1 .3.r." or 258 "d.1 .4.r." the reference control loop must be selected.

8.6 Output Automatic/Manual % control

This function allows switching between automatic and manual operation of the output percentage.
With parameter 48 "*A.MA.1.*" (for control loop 1) or parameter 67 "*A.MA.2.*" (for control loop 2), you can select the function:
- *diSAb* disables the function
- *ENAb* enables the function
- *EN.Sto.* enables the function with memory

If "*ENAb*" option is selected, the FNC key enables "*P.---*" on display 1, while "*AutoM*" appears on display 2. Pressing the SET button switches between "Auto" and manual mode "MANu". When in 'Manu' mode, the output percentage value changes in the standard display. To return to automatic mode, repeat the same procedure.
Selecting the "*ENAb*" option provides the same function with more options.
- In the event of a temporary power failure or in any case after a shutdown, switching on the controller will maintain both manual operation and the previously set percentage output value.
- In the event of a sensor breakage during automatic operation, the controller will switch to manual mode, maintaining the percentage control output generated by the PID immediately prior to the breakage. For example: on an extruder, percentage control of resistance (load) is maintained in the event of a break in the input sensor.

8.7 Heater Break Alarm on CT (Current Transformer)

This function allows to measure load current in order to manage an alarm during an event of partial load failure, actuator short-circuit or always open. To enable this function, set 50 Hz or 60 Hz on parameter 287 "*ct F.*" and the value of the transformer connected to the controller, on parameter 288 "*ct u.*".
In parameter 289 "*H.b.A.r.*" set the reference control loop for current measurement and diagnostics of the Heater Break Alarm.
In parameter 290 "*H.b.A.t.*" set the intervention threshold in amperes of the Heater Break Alarm.
In parameter 291 "*ocu.t.*" set the intervention threshold in amperes for overcurrent control.
In parameter 292 "*H.b.A.d.*" the delay time expressed in seconds for the intervention of the Heater Break Alarm.
To connect the Heater Break signal to an alarm, set "*H.b.A.*" to parameter 123 "*AL.1.F.*" or parameter 141 "*AL.2.F.*" or parameter 159 "*AL.3.F.*" or parameter 177 "*AL.4.F.*" or parameter 195 "*AL.5.F.*" or parameter 213 "*AL.6.F.*"
To show the average current value on display 2, set 'AMPEr.' to parameter 278 'vi.d.2.
NOTE: By setting parameter 290 "*H.b.A.t.*" to the value 0, it is possible to display the current drawn without ever generating a Heater Break Alarm.

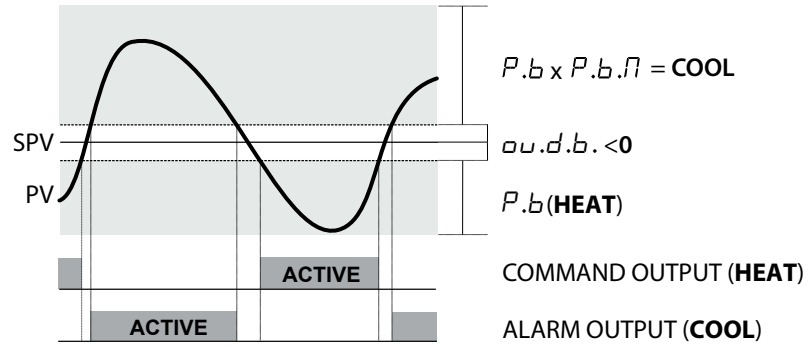
8.8 Dual Action Heating-Cooling

The CD66 is also suitable to control on systems with combined heating-cooling action.
The control output must be configured as PID (Par. 38 *Ac.t.1* or Par. 57 *Ac.t.2* = *HEAt* and *P.b.1* or *P.b.2* greater than 0), and one of the alarms (*AL.1.F.*, *AL.2.F.*, *AL.3.F.*, *AL.4.F.*, *AL.5.F.* or *AL.5.F.*) must be configured as *cooL*.
The control output must be connected to the actuator enabled for heating, while the alarm will control the cooling PID action.
The parameters to be configured for the PID are as follows:
- "*Ac.t.1*" or "*Ac.t.2*" = "*HEAt*" Control output action type (Hot);
- "*P.b.1*" or "*P.b.2*": Hot action proportional band;
- "*I.t.1*" or "*I.t.2*": Common integral time for hot cold action;
- "*d.t.1*" or "*d.t.2*": Common derivative time for hot cold action;
- "*c.t.1*" or "*c.t.2*": Hot action cycle time.

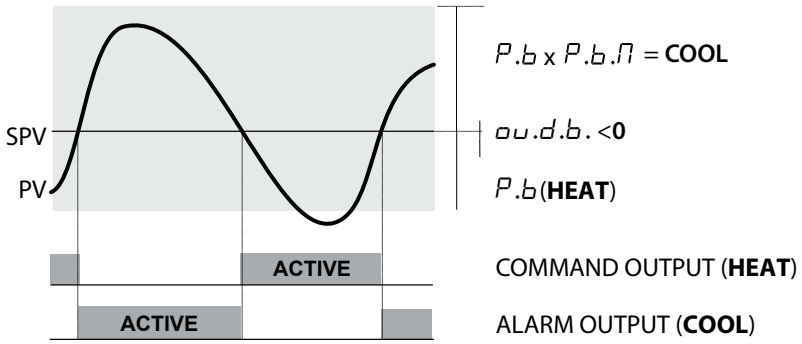
If loop cooling 1 is connected to alarm 1, the configuration parameters for cooling PID are:
- "*AL.1.F.*" = "*cooL*". Alarm selection 1 (Cooling);
- "*P.b.M.1*" : Proportional band multiplier;
- "*o.d.b.1*": Overlapping / Dead band;
- "*c.c.t.1*": Cold action cycle time.

The parameter "P.b.n.1" (with a value from 1.00 to 5.00) determines the proportional band of cooling action according to the formula:
Proportional band cooling action = "P.b. 1" x "P.b.n.1".
This will result in a proportional band for the cooling action being equal to that of the hot action if "P.b.n.1" = 1.00, or 5 times larger if "P.b.n.1" = 5.00.
Integral time and derivative time are the same for both actions.
The parameter "o.d.b.1" determines the percentage overlap between the two actions. For systems in which the heating output and the cooling output must never be active at the same time, a dead band ("o.d.b.1" ≤0) will be configured, vice versa an overlap ("o.d.b.1" >0) can be configured. The following figures show an example of a double-action PID (hot-cold) with "I.t. 1" = 0 and "d.t.1" = 0.

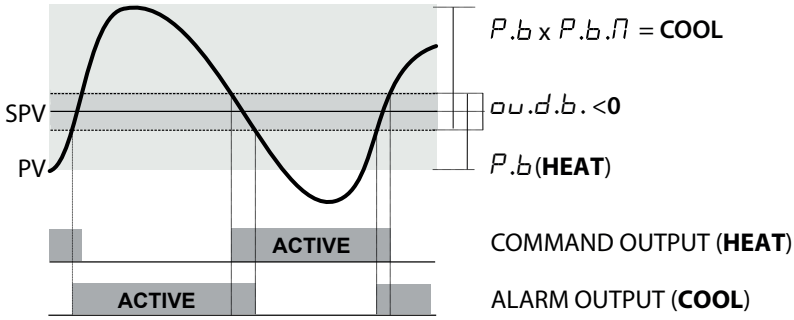
1



2



3



8.9 Retransmission function on analogue output

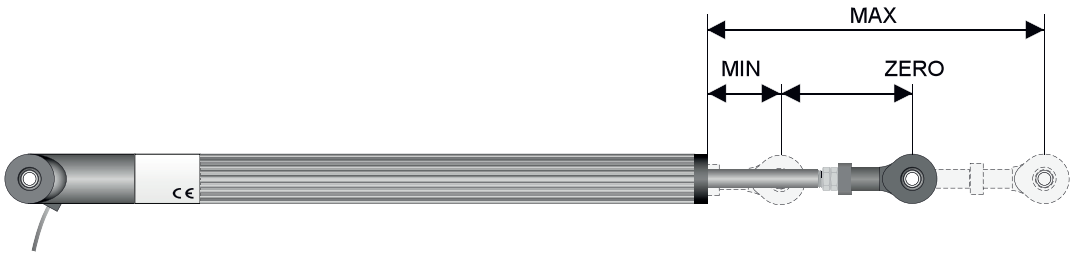
If not used as command, the analogue output can be used to retransmit process/setpoint current read by the C.T. input/output percentage.
Select on parameter 298 "rtn.1" ("Retransmission 1") or on parameter 308 "rtn.2" ("Retransmission 2") the value to be retransmitted and on parameter 299 "r.1.tY." ("Retransmission 1 Type") or on parameter 309 "r.2.tY." ("Retransmission 2 Type") the output type. It is possible also to select on parameters 300 "r.1.L.L." and 301 "r.1.u.L." or 310 "r.2.L.L." and 311 "r.2.u.L." the input value rescale limits.

8.10 LATCH ON Function

With par. 10 "Ltc.1" or par. 27 "Ltc.2" configured as "Stndr", using input "Pot." and with linear input (0÷10V, 0÷40mV, 0/4÷20mA) it is possible to associate start of scale value (par. 4 "L.L.1.1" or par. 21 "L.L.1.2") to the minimum sensor position and the end of scale value (par. 5 "u.L.1.1" or par. 22 "u.L.1.2") to the maximum sensor position.
With par. 10 "Ltc.1" or par. 27 "Ltc.2" configured as "u.0.Sto." or "u.0.t.on.", it is possible to fix the point at which the controller will display 0 (however keeping the scale range between "L.L.1.1" / "L.L.1.2" and "u.L.1.1" / "u.L.1.2") using the "virtual zero".
Selecting "u.0.t.on." the virtual zero must be reset at each switching on.
Selecting "u.0.Sto." the virtual zero will remain fixed once calibrated.

To use the LATCH ON function, configure the par. 10 "Ltc.1" or 27 "Ltc.2." Then refer to the following table for the calibration procedure:

	Press	Display	To Do
1	FNC	Exit parameters configuration. Display 2 shows "LAtc."	Place the sensor on minimum operating value (corresponding to "L.L.1.1" / "L.L.1.2")
2	◥	Store value on minimum. Display shows "LoU."	Place sensor on maximum operating value (corresponding to "u.L.1.1" / "u.L.1.2")
3	◣	Store value on max. Display shows "HIGh."	To exit standard procedure press SET. For "virtual zero" setting, place the sensor to zero point.
4	SET	Set virtual zero. Display shows "ZEro". If "Virtual zero at start" is selected, point 4 must be repeated at each starting	To exit procedure press SET

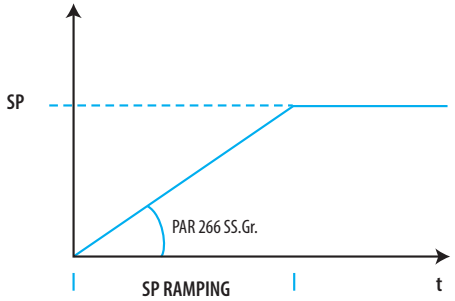


8.11 Soft Start

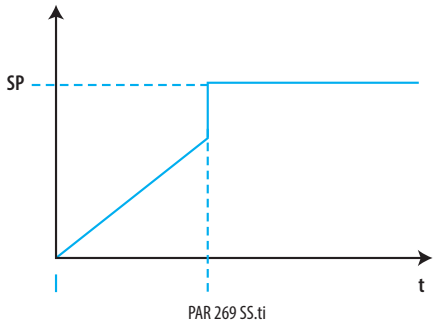
The soft-start function in the CD66 is useful to reduce the initial impact of the inrush current on the load when the system is started. This is important in order to protect the electrical components and the load and to increase their life span.
The instrument is provided with two types of soft-start selectable on parameter 264 "SS.tY." ("Soft start Type").

8.11.1 Gradient Soft-start "GrAd."

When switched on, the controller follows the rising gradient to reach the setpoint.

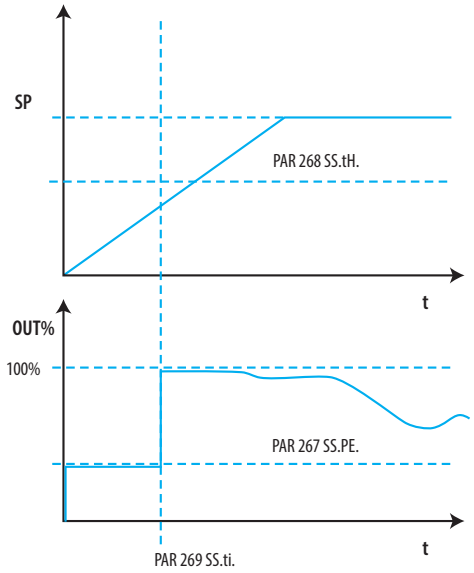


The gradient is set to parameter 266 "SS.Gr." ("Softstart Gradient") expressed in Units/hour (e.g. °C/h).
For example, if set to 100.0, the ramp will be 100°C/h



To ensure that you do not exceed a preset time, use parameter 269 "SS.ti." ("Softstart Time") soft-start time, which indicates the maximum time in which to run the ramp. If the ramp is longer than the maximum time, it will be truncated and brought to the final setpoint.
To disable this function, set the time to 0 ("SS.ti." = 0).

8.11.2 Soft-start with power output percentage limit "PErc."



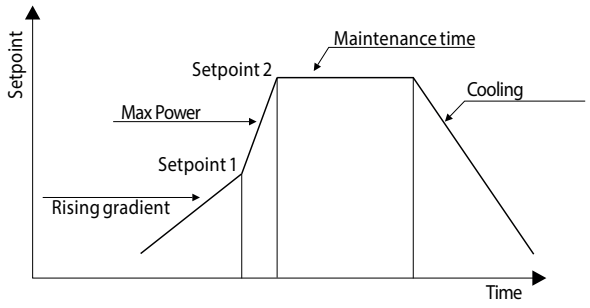
Parameter 268 "SS.tH." sets the threshold below which the soft-start function starts at switch-on.
In parameter 267 "SS.PE." ('Softstart Percentage') you set an output percentage (0 to 100).
The controller will maintain the output percentage until the process exceeds the threshold set in parameter 268 or until the time set in minutes in parameter 269 "SS.ti." expires. ("Softstart Time" word 2084).

NOTE: If the soft-start function is active the automatic/manual Tuning function cannot be activated.

8.12 Mini Cycle

This function allows you to perform a simple timed work cycle with ramps and a hold. It is activated by setting "EnAb." in parameter 263 "Pr.cY." and performs these steps:

1. controller reaches setpoint 1 according to the gradient set in parameter 266 "SS.Gr.";
2. reaches the setpoint using maximum power;
3. when the process reaches setpoint 2 (max. power), it is maintained for the time set in parameter 270 "MA.t.1.";
4. when the time expires, the process reaches ambient temperature according to the gradient set in parameter 271 "FA.Gr";
5. at the end of the cycle, the control output is disabled and the display will show "StoP".



8.13 Retransmission function on analogue output

When available, the analogue output can also be used to retransmit a process value, such as: Process values, setpoints, alarm values, values written from the serial or the current value read from the CT input.
Select on parameter 298 "rtM.1" ("Retransmission 1") or on parameter 308 "rtM.2" ("Retransmission 2") the value to be retransmitted.
Select on parameter 299 "r.1.tY." ("Retransmission 1 Type") or on parameter 309 "r.2.tY." ("Retransmission 2 Type") the output type whether 0-10V or 4-20mA.
The read value rescaling limits are set to parameters 300 "r.1.L.L." and 301 "r.1.u.L." or 310 "r.2.L.L." and 311 "r.2.u.L.".

8.14 Timer Function

The CD66 integrates two timers that can be independent, sequential or looped together.
Timer 1 is enabled on parameter 328 "tMr.1."; timer 2 on parameter 331 "tMr.2.":

ENAb. the timer starts from the keyboard or digital input (user intervention is required)

EN.StA. the timer starts counting when the controller is in RUN.

The timer time-base set in MM.SS or hh.MM by changing parameters 329 "t.b.t.1" for timer 1 and 332 "t.b.t.2" for timer 2.

In parameter 334 "tMr.S." can be define whether the timers should be independent or related to each other.

SInGL. The timers work independently of each other.

SEQuE. When timer 1 ends, timer 2 starts. The sequence is active only by starting timer 1. When timer 2 expires, the sequence is interrupted.

LooP When a timer ends, another starts: the sequence repeats itself cyclically.

To change the duration of the counting time, follow the steps below:

	Press	Display	To Do
1	SET	Press until "tMr.1." or "tMr.2." visualized on display 1.	
2	◀ ▶	Digits on display 1 changes	Increase or decrease time value for the selected timer.

To start the keyboard count follow the steps below:

	Press	Display
1	FNC	Press until "tMr.1." or "tMr.2." visualized on display 2. Display 1 shows STOP if the timer is stopped, otherwise it shows the remaining time
2	SET	The timer stops if active or starts counting if in STOP

Timers can also be activated/deactivated by digital input (see parameters 231 "d.I.1.F", 239 "d.I.2.F", 247 "d.I.3.F" and 255 "d.I.4.F.").
Alarm outputs can be associated with timers (parameters 123 "AL.1.F.", 141 "AL.2.F.", 159 "AL.3.F.", 177 "AL.4.F.", 195 "AL.5.F." and 213 "AL.6.F.").
It is possible to select the activation mode with parameters 330 "A.tM.1" and 333 "A.tM.2.". Available options are:

- StArt Alarm active during timer counting
- End Alarm active when the timer expiry
- Warn. Alarm active 5" before the timer expiry

8.15 Configuration through memory card

The device can be configured through a memory card. This one is linked to the micro-USB connector on the bottom of the device.

8.15.1 Memory card creation/update

To save a parameter configuration in the memory card, connect it to micro-USB connector and power the instrument. If the memory has never been configured, the device starts normally, but if its data are considered valid, it is possible to view on the display MEMo SKIP. Press SET in order to start the product without uploading any data from the memory card. Configure, set the parameters and exit configuration. Now, the device saves the configuration just created also in the memory card.

8.15.2 Configuration loading from memory card

To load a configuration previously created and saved in the memory card, connect it to the micro-USB connector and power the instrument. Now, if the memory is detected and its data are considered valid, it is possible to view on the display MEMo SKIP. By pressing you see MEMo LoAd and with SET you confirm the uploading of parameters from the memory card to the controller.

8.16 Factory default

This procedure allows to restore the device at factory settings.

	Press	Display	To Do
1	FNC for 3 sec.	Display 1 shows "PASS", while display 2 shows "0000" with the 1st digit flashing	
2	◀ or ▶	Modify the flashing digit and move to the next one pressing SET.	Enter password "9999".
3	FNC to confirm	The device loads default settings and restarts.	

9 Serial communication

The CD66 is equipped with an RS485 serial port. It can receive/broadcast data via MODBUS RTU protocol in Slave mode. With this type of communication it is possible to control instruments connected to a supervision/ SCADA system or a PLC.
Each instrument will only respond to a Master query if it contains the same address as the one contained in parameter 318 "SL.Ad." ("Slave Address").
The configurable addresses range is from 1 to 254.

NOTE: On the same network, there cannot be instruments with the same address.

Address 255 can be used by the Master to communicate with 1 connected device whose address is unknown. With Address 0, all devices receive the command, but no response is expected (broadcast mode).
The baud rate is set on parameter 319 "bd.rt." ("Baud Rate").

Baud rate	Set from Parameter 319 "bd.rt." 1200bit/s 2400bit/s 4800bit/s 9600bit/s 19200bit/s 28800bit/s 38400bit/s 57600bit/s 115200bit/s

The serial format is set on parameter 320 "S.P.P." (Serial Port Parameters)

Serial communication format	Set via parameter 320 "S.P.P." 8N1 8N2 8E1 8E2 8O1 8O2

The CD66 can introduce a delay (in milliseconds) in the response to the Master's request. This delay can be set on parameter 321 "SE.dE." ("Serial Delay").

Supported functions	(0x03, 0x04) WORD READING (max 50 word) (0x06) SINGLE WORD WRITING (0x10) MULTIPLE WORDS WRITING (max 50 word)

NOTE: Each time the parameters are changed, the instrument saves the value in EEPROM memory (100000 write cycles), while setpoints are saved with a 10-second delay after the last change.
CAUTION: Changes made to Word other than those listed in the table below may cause the instrument to malfunction.

Here below a list of all available addresses and supported functions:

System Parameters			
Modbus address	**Description**	**Read / Write**	**Reset value**
0	Device type	Read Only	47x
1	Software version	Read Only	Flash
2	Boot version	Read Only	Flash
3	Slave Address	Read Only	Eepr/dip
6	Baud rate	Read Only	Eepr/dip
50	Slave address automatic learning	Write Only	-
51	System code comparison for slave address automatic learning	Write Only	-
500	Loading default values (write 9999)	Read / Write	0
501	Restart Intrument (write 9999)	Read / Write	0
502	Setpoint storing delay time	Read / Write	10
503	Parameters storing delay time	Read / Write	1

Custom Message Area			
Modbus address	**Description**	**Read / Write**	**Reset value**
701	First character of the custom alarm message 1	Read / Write	"u"
...	...		
723	Last character of the custom alarm message 1	Read / Write	0
751	First character of the custom alarm message 2	Read / Write	"u"
...	...		
773	Last character of the custom alarm message 2	Read / Write	0
801	First character of the custom alarm message 3	Read / Write	"u"
...	...		
823	Last character of the custom alarm message 3	Read / Write	0
851	First character of the custom alarm message 4	Read / Write	"u"
...	...		
873	Last character of the custom alarm message 4	Read / Write	0
901	First character of the custom alarm message 5	Read / Write	"u"
...	...		
923	Last character of the custom alarm message 5	Read / Write	0
951	First character of the custom alarm message 6	Read / Write	"u"
...	...		
973	Last character of the custom alarm message 6	Read / Write	0

Read Area			
Modbus address	**Description**	**Read / Write**	**Reset value**
1000	AI1 value (degrees with tenth)	Read Only	-
1001	AI2 value (degrees with tenth)	Read Only	-
1002	Average between AI1 and AI2 [(AI1 + AI2) /2] (degrees with tenth)	Read Only	0
1003	Difference between AI1 and AI2 (AI1 - AI2) (degrees with tenth)	Read Only	0
1004	Module of the difference between AI1 and AI2 (|AI1 - AI2|) (degrees with tenth)	Read Only	0
1005	Sum of AI1 and AI2 (AI1 + AI2) (degrees with tenth)	Read Only	0
1006	Real setpoint (gradient) of the regulation loop 1	Read Only	0
1007	Real setpoint (gradient) of the regulation loop 2	Read Only	0
1008	Alarms status (0=not active, 1=active) Bit0 = Alarm 1 Bit1 = Alarm 2 Bit2 = Alarm 3 Bit3 = Alarm 4 Bit4 = Alarm 5 Bit5 = Alarm 6	Read Only	0
1009	Error flags 1 Bit0 = AI1 process error (sensor 1) Bit1 = AI2 process error (sensor 2) Bit2 = Cold junction error Bit3 = Safety error Bit4 = Generic error Bit5 = Hardware error Bit6 = Error H.B.A. (partial rupture of the load) Bit7 = Error H.B.A. (SSR in short circuit) Bit8 = Overcurrent error Bit9 = Parameters out of range error Bit10 = CPU eeprom writing error Bit11 = RFid eeprom writing error Bit12 = CPU eeprom reading error Bit13 = RFid eeprom reading error Bit14 = Eeprom calibrations bench corrupted Bit15 = Eeprom constants bench corrupted	Read Only	0
1012	Outputs status (0=off, 1=on) Bit0 = Q1 Bit1 = Q2 Bit2 = Q3 Bit3 = DO1 Bit4 = DO2	Read Only	0

1013	Led status (0=off, 1=on) Bit0 = Led UP arrow ▲ Bit1 = Led C1 Bit2 = Led C2 Bit3 = Led A1 Bit4 = Led A2 Bit5 = Led A3 Bit6 = Led TUN Bit7 = Led point time 2 Bit8 = Led MAN Bit9 = Led REM Bit10 = Led DOWN arrow ▼ Bit11 = Led point time 1	Read Only	0
1014	Key status (0=released, 1=pressed) Bit0 = Key UP arrow Bit1 = Key DOWN arrow Bit2 = Key FNC FNC Bit3 = Key SET SET	Read Only	0
1015	Cold junction temperature (degrees with tenth)	Read Only	-
1016	Current CT instantaneous (Ampere with tenth)	Read Only	0
1017	Current CT average (Ampere with tenth)	Read Only	0
1018	Current CT ON (Ampere with tenth)	Read Only	0
1019	Current CT OFF (Ampere with tenth)	Read Only	0
1100	Al1 value with decimal point selection	Read Only	-
1101	Al2 value with decimal point selection	Read Only	-
1102	Average between Al1 and Al2 [(Al1 + Al2) /2] with decimal point selection	Read Only	0
1103	Difference between Al1 and Al2 (Al1 - Al2) with decimal point selection	Read Only	0
1104	Module of the difference between Al1 and Al2 (|Al1 - Al2|) with decimal point selection	Read Only	0
1105	Sum of Al1 and Al2 (Al1 + Al2) with decimal point selection	Read Only	0
1106	Real setpoint (gradient) of the regulation loop 1 with decimal point selection	Read Only	0
1107	Real setpoint (gradient) of the regulation loop 2 with decimal point selection	Read Only	0

Read / Write Area			
Modbus address	**Description**	**Read / Write**	**Reset value**
1200	Setpoint 1 of control loop 1 (degrees with tenth)	Read / Write	EEPROM
1201	Setpoint 2 of control loop 1 (degrees with tenth)	Read / Write	EEPROM
1202	Setpoint 3 of control loop 1 (degrees with tenth)	Read / Write	EEPROM
1203	Setpoint 4 of control loop 1 (degrees with tenth)	Read / Write	EEPROM
1204	Setpoint 1 of control loop 2 (degrees with tenth)	Read / Write	EEPROM
1205	Setpoint 2 of control loop 2 (degrees with tenth)	Read / Write	EEPROM
1206	Setpoint 3 of control loop 2 (degrees with tenth)	Read / Write	EEPROM
1207	Setpoint 4 of control loop 2 (degrees with tenth)	Read / Write	EEPROM
1208	Alarm 1 setpoint (degrees with tenth) Alarm 1 upper setpoint if Par. 123 "AL.1.F." = A.bAnd	Read / Write	EEPROM
1209	Alarm 2 setpoint (degrees with tenth) Alarm 2 upper setpoint if Par. 141 "AL.2.F." = A.bAnd	Read / Write	EEPROM
1210	Alarm 3 setpoint (degrees with tenth) Alarm 3 upper setpoint if Par. 159 "AL.3.F." = A.bAnd	Read / Write	EEPROM
1211	Alarm 4 setpoint (degrees with tenth) Alarm 4 upper setpoint if Par. 177 "AL.4.F." = A.bAnd	Read / Write	EEPROM
1212	Alarm 5 setpoint (degrees with tenth) Alarm 5 upper setpoint if Par. 195 "AL.5.F." = A.bAnd	Read / Write	EEPROM
1213	Alarm 6 setpoint (degrees with tenth) Alarm 6 upper setpoint if Par. 213 "AL.6.F." = A.bAnd	Read / Write	EEPROM
1214	Start/Stop 0 = Controller in STOP 1 = Controller in START	Read / Write	0
1215	Hold conversion ON/OFF 0 = Hold conversion OFF 1 = Hold conversion ON	Read / Write	0
1216	Tune management for control loop 1		
	With automatic Tune (par. 73 "tun.1" = Auto): 0 = Autotuning function OFF 1 = Autotuning function ON	Read Only	0
	With manual Tune (par. 73 "tun.1" = MAnu or OncE: 0 = Autotuning function OFF 1 = Autotuning function ON	Read / Write	0

1217	Tune management for control loop 2		
	With automatic Tune (par. 98 "tun.2" = Auto): 0 = Autotuning function OFF 1 = Autotuning function ON	Read Only	0
	With manual Tune (par. 98 "tun.2" = MAnu or OncE: 0 = Autotuning function OFF 1 = Autotuning function ON	Read / Write	0
1218	Automatic/manual selection for control loop 1 0 = Automatic 1 = Manual	Read / Write	0
1219	Automatic/manual selection for control loop 2 0 = Automatic 1 = Manual	Read / Write	0
1220	Command output percentage for control loop 1 (0-10000) Heating output percentage with control loop 1 in double loop (0-10000)	Read / Write	0
1221	Command output percentage for control loop 1 (0-1000) Heating output percentage with control loop 1 in double loop (0-1000)	Read / Write	0
1222	Command output percentage for control loop 1 (0-100) Heating output percentage with control loop 1 in double loop (0-100)	Read / Write	0
1223	Cooling output percentage with control loop 1 in double loop (0-10000)	Read / Write	0
1224	Cooling output percentage with control loop 1 in double loop (0-1000)	Read / Write	0
1225	Cooling output percentage with control loop 1 in double loop (0-100)	Read / Write	0

1226	Command output percentage for control loop 2 (0-10000) Heating output percentage with control loop 2 in double loop (0-10000)	Read / Write	0
1227	Command output percentage for control loop 2 (0-1000) Heating output percentage with control loop 2 in double loop (0-1000)	Read / Write	0
1228	Command output percentage for control loop 2 (0-100) Heating output percentage with control loop 2 in double loop (0-100)	Read / Write	0
1229	Cooling output percentage with control loop 2 in double loop (0-10000)	Read / Write	0
1230	Cooling output percentage with control loop 2 in double loop (0-1000)	Read / Write	0
1231	Cooling output percentage with control loop 2 in double loop (0-100)	Read / Write	0
1232	Command output manual reset for control loop 1: write 0 to reset the command output In reading 0=reset not allowed, 1=reset allowed	Read / Write	0
1233	Alarms manual reset: write 0 to reset all alarms Bit0 = Alarm 1 Bit1 = Alarm 2 Bit2 = Alarm 3 Bit3 = Alarm 4 Bit4 = Alarm 5 Bit5 = Alarm 6 In reading 0=reset not allowed, 1=reset allowed	Read / Write	0
1234	Command output manual reset for regulation loop 2: write 0 to reset the command output In reading 0=reset not allowed, 1=reset allowed	Read / Write	0
1235	Alarm 1 remote stauts (0=absent, 1=present)	Read / Write	0
1236	Alarm 2 remote stauts (0=absent, 1=present)	Read / Write	0
1237	Alarm 3 remote stauts (0=absent, 1=present)	Read / Write	0
1238	Alarm 4 remote stauts (0=absent, 1=present)	Read / Write	0
1239	Alarm 5 remote stauts (0=absent, 1=present)	Read / Write	0
1240	Alarm 6 remote stauts (0=absent, 1=present)	Read / Write	0
1241	Value AO1 by serial (Par. 298 rtM.1 = md.bus)	Read / Write	0
1242	Value AO2 by serial (Par. 308 rtM.2 = md.bus)	Read / Write	0
1243	Tare of zero AI1 (1=tare; 2=reset tare)	Read / Write	0
1244	Tare of zero AI2 (1=tare; 2=reset tare)	Read / Write	0
1245	Tare of zero average between AI1 and AI2 [(AI1 + AI2) /2] (1=tare; 2=reset tare)	Read / Write	0
1246	Tare of zero difference between AI1 and AI2 (AI1 - AI2) (1=tare; 2=reset tare)	Read / Write	0

1247	Tare of zero module of the difference between AI1 and AI2 (|AI1 - AI2|) (1=tare; 2=reset tare)	Read / Write	0
1248	Tare of zero sum of AI1 and AI2 (AI1 + AI2) (1=tare; 2=reset tare)	Read / Write	0
1249	Value of remote setpoint by command 1 serial	Read / Write	0
1250	Value of remote setpoint by command 2 serial	Read / Write	0
1251	Alarm 1 lower setpoint if Par. 123 "AL.1.F." = A.bAnd (degrees with tenth)	Read / Write	EEPROM
1252	Alarm 2 lower setpoint if Par. 141 "AL.2.F." = A.bAnd (degrees with tenth)	Read / Write	EEPROM
1253	Alarm 3 lower setpoint if Par. 159 "AL.3.F." = A.bAnd (degrees with tenth)	Read / Write	EEPROM
1254	Alarm 4 lower setpoint if Par. 177 "AL.4.F." = A.bAnd (degrees with tenth)	Read / Write	EEPROM
1255	Alarm 5 lower setpoint if Par. 195 "AL.5.F." = A.bAnd (degrees with tenth)	Read / Write	EEPROM
1256	Alarm 6 lower setpoint if Par. 213 "AL.6.F." = A.bAnd (degrees with tenth)	Read / Write	EEPROM
1300	Setpoint 1 of control loop 1, with decimal point selection	Read / Write	EEPROM
1301	Setpoint 2 of control loop 1, with decimal point selection	Read / Write	EEPROM
1302	Setpoint 3 of control loop 1, with decimal point selection	Read / Write	EEPROM
1303	Setpoint 4 of control loop 1, with decimal point selection	Read / Write	EEPROM
1304	Setpoint 1 of control loop 2, with decimal point selection	Read / Write	EEPROM
1305	Setpoint 2 of control loop 2, with decimal point selection	Read / Write	EEPROM
1306	Setpoint 3 of control loop 2, with decimal point selection	Read / Write	EEPROM
1307	Setpoint 4 of control loop 2, with decimal point selection	Read / Write	EEPROM
1308	Alarm 1 setpoint, with decimal point selection Alarm 1 upper setpoint if Par. 123 "AL.1.F." = A.bAnd	Read / Write	EEPROM
1309	Alarm 2 setpoint, with decimal point selection Alarm 2 upper setpoint if Par. 141 "AL.2.F." = A.bAnd	Read / Write	EEPROM
1310	Alarm 3 setpoint, with decimal point selection Alarm 3 upper setpoint if Par. 159 "AL.3.F." = A.bAnd	Read / Write	EEPROM

1311	Alarm 4 setpoint, with decimal point selection Alarm 4 upper setpoint if Par. 177 "*AL.4.F.*" = *A.bAnd*	Read / Write	EEPROM
1312	Alarm 5 setpoint, with decimal point selection Alarm 5 upper setpoint if Par. 195 "*AL.5.F.*" = *A.bAnd*	Read / Write	EEPROM
1313	Alarm 6 setpoint, with decimal point selection Alarm 6 upper setpoint if Par. 213 "*AL.6.F.*" = *A.bAnd*	Read / Write	EEPROM
1351	Alarm 1 lower setpoint if Par. 123 "*AL.1.F.*" = *A.bAnd*, with decimal point selection	Read / Write	EEPROM
1352	Alarm 2 lower setpoint if Par. 141 "*AL.2.F.*" = *A.bAnd*, with decimal point selection	Read / Write	EEPROM
1353	Alarm 3 lower setpoint if Par. 159 "*AL.3.F.*" = *A.bAnd*, with decimal point selection	Read / Write	EEPROM
1354	Alarm 4 lower setpoint if Par. 177 "*AL.4.F.*" = *A.bAnd*, with decimal point selection	Read / Write	EEPROM
1355	Alarm 5 lower setpoint if Par. 195 "*AL.5.F.*" = *A.bAnd*, with decimal point selection	Read / Write	EEPROM
1356	Alarm 6 lower setpoint if Par. 213 "*AL.6.F.*" = *A.bAnd*, with decimal point selection	Read / Write	EEPROM
2001	Parameter 1	Read / Write	EEPROM
2002	Parameter 2	Read / Write	EEPROM
...	Parameter ...	Read / Write	EEPROM
2366	Parameter 366	Read / Write	EEPROM

10 Configuration Parameters

The CD66 is a complete instrument with many advanced features.
To facilitate configuration, settings have been divided into menus by topic and parameters are only displayed when necessary. (E.g. the Auto/manual command is only displayed if this function is enabled).
This strategy makes the menu simple and easy to consult.
To further simplify consultation, by pressing the FNC button, it is possible to switch from textual to numerical parameter display during parameter consultation.
E.g. the first parameter can be displayed as "SEn.1" (text display) or as "P.001" (numeric display).

10.1 Access configuration

	Press	Display	To Do
1	FNC for 3 sec.	Display 1 shows "PASS", while display 2 shows "0000" with the 1st digit flashing	
2	◀ or ▶	Modify the flashing digit and move to the next one pressing SET	Enter password "7000"
3	FNC to confirm	Display 1 shows the first parameters group, display 2 shows the description	
4	◀ or ▶	Scroll parameters groups	
5	SET to confirm	Display 1 shows the first parameter of the group and display 2 shows its value	Press FNC to exit configuration
6	◀ or ▶	Scroll parameters	
7	SET to confirm	Allows parameter modification (display 2 flashes)	
8	◀ or ▶	Increases or decreases visualized value ▲▼	Introduce new data
9	SET	Confirms and stores the new value. If the value is different from default values, the arrow keys light on	
10	FNC	Back to parameter groups selection (see point 3)	Press again FNC to exit configuration

10.2 Configuration parameters List

10.2.1 A.In.1 – Analogue Input 1

1	SEn.1	**Sensor AI1**	
	Analogue input configuration / sensor selection		
	tc.K	Tc-K	-260°C÷1360°C. (**Default**)
	tc.S	Tc-S	-40°C÷1760°C
	tc.R	Tc-R	-40°C÷1760°C
	tc.J	Tc-J	-200°C÷1200°C
	tc.t	Tc-T	-260°C÷400°C
	tc.E	Tc-E	-260°C÷980°C
	tc.N	Tc-N	-260°C÷1280°C
	tc.b	Tc-B	100°C÷1820°C
	Pt 100	Pt100	-100°C÷600°C
	NI 100	Ni100	-60°C÷180°C
	Ntc1	NTC10K 3435K	-40°C÷125°C
	Ptc	PTC1K	-50°C÷150°C
	Pt500	Pt500	-100°C÷600°C
	Pt 1K	Pt1000	-100°C÷600°C
	0-1	0..10V	
	0-5	0..5V	
	0-10	0.10V	
	0-20	0..20 mA	
	4-20	4..20 mA	
	0-60	0..60 mV	
	Pot	Potentiometer	(set the value on parameter 5)
	NI 120	Ni120	-60°C÷240°C
	Ntc 2	NTC 10K 3694K	-40°C÷150°C
	Ntc 3	NTC 2252 3976K	-40°C÷150°C
2	d.P.1	**Decimal point 1**	
	Select number of displayed decimal points for AI1		
	0	**Default**	
	0.0	1 decimal	
	0.00	2 decimals	
	0.000	3 decimals	
3	dEGr.	**Degree**	
	°C	Celsius (**Default**)	
	°F	Fahrenheit	
	K	Kelvin	
4	L.L.i.1	**Lower Linear Input AI1**	
	AI1 lower limit only for linear signals. Ex.: with 4÷20 mA input, this parameter takes value associated with 4 mA. **-9999..+30000** [digit] **Default**: 0		
5	u.L.i.1	**Upper Linear Input AI1**	
	AI1 upper limit only for linear signals Ex: with input 4÷20 mA this parameter takes value associated with 20 mA. **-9999..+30000** [digit] **Default**: 1000		

6 P.uR.1 **Potentiometer Value AI1**

Selects the value of the potentiometer connected on AI1
1÷150 kohm. **Default**: 10 kohm

7 i.o.L.1 **Linear Input over Limits AI1**

If AI1 is a linear input, it allows the process to exceed the limits (parameters 4 and 5)

diSAb.	Disabled (**Default**)
EnAb.	Enabled

8 o.cA.1 **Offset Calibration AI1**

AI1 Offset calibration.
Value added/subtracted to the process value (ex: usually correcting the ambient temperature value).
-9999..+9999 [digit] (degrees.tenths for temperature sensors). **Default**: 0

9 G.cA.1 **Gain Calibration AI1**

Value multiplied to the process value to calibrate the working point.
Ex: to correct the range from 0÷1000°C showing 0÷1010°C, set the parameter to -1.0
-**100.0%...+100.0%**, **Default**: 0.0.

10 LEc.1 **Latch-On AI1**

AI1 Limit option.

diSAb.	Disabled (**Default**)
StNrd	Standard
V.0.Sto.	Virtual Zero Stored
V.0.t.oN.	Virtual Zero at start

11 c.FL.1 **Conversion Filter AI1**

ADC Filter: Number of sensor readings to calculate mean that defines process value.
NB: When readings increase, control loop speed slows down. 1÷15. (**Default**: 10)

12 c.Fr.1 **Conversion Frequency AI1**

Sampling frequency of digital / analogue converter for AI1. Increasing the conversion speed will slow down reading stability (example: for fast transients, as the pressure, it is advisable to increase sampling frequency).

4.17Hz	4.17 Hz (Min. conversion speed)
6.25Hz	6.25 Hz
8.33Hz	8.33 Hz
10.0Hz	10.0 Hz
12.5Hz	12.5 Hz
16.7Hz	16.7 Hz (**Default**) Ideal for noises filtering 50 / 60 Hz
19.6Hz	19.6 Hz
33.2Hz	33.2 Hz
39.0Hz	39.0 Hz
50.0Hz	50.0 Hz
62.0Hz	62.0 Hz
123Hz	123 Hz
242Hz	242 Hz
470Hz	470 Hz (Max. speed conversion)

13 L.c.E.1 **Lower Current Error 1**

If AI1 is a 4÷20 mA input, it determines the current value below the probe error E-05 is signaled.

2.0 mA (**Default**)	2.0 mA	2.6 mA	2.6 mA	3.2 mA	3.2 mA
2.2 mA	2.2 mA	2.8 mA	2.8 mA	3.4 mA	3.4 mA
2.4 mA	2.4 mA	3.0 mA	3.0 mA	3.6 mA	3.6 mA
				3.8 mA	3.8 mA

14-17 **Reserved Parameters**

Reserved parameters

10.2.2 A.In.2 – Analogue Input 2

18 SEn.2 **Sensor AI2**

Analogue input configuration / sensor selection

tc.K	Tc-K	-260°C÷1360°C. (**Default**)
tc.S	Tc-S	-40°C÷1760°C
tc.R	Tc-R	-40°C÷1760°C
tc.J	Tc-J	-200°C÷1200°C
tc.t	Tc-T	-260°C÷400°C
tc.E	Tc-E	-260°C÷980°C
tc.N	Tc-N	-260°C÷1280°C
tc.b	Tc-B	100°C÷1820°C
Pt100	Pt100	-100°C÷600°C
Ni100	Ni100	-60°C÷180°C
Ntc1	NTC10K 3435K	-40°C÷125°C
Ptc	PTC1K	-50°C÷150°C
Pt500	Pt500	-100°C÷600°C
Pt1K	Pt1000	-100°C÷600°C
0-1	0..10V	
0-5	0..5V	
0-10	0.10V	
0-20	0..20 mA	
4-20	4..20 mA	
0-60	0..60 mV	
Pot	Potentiometer	(set the value on parameter 23)
Ni120	Ni120	-60°C÷240°C
Ntc 2	NTC 10K 3694K	-40°C÷150°C
Ntc 3	NTC 2252 3976K	-40°C÷150°C

19 d.P.2 **Decimal point 2**

Select number of displayed decimal points for AI2

0	**Default**
0.0	1 decimal
0.00	2 decimals
0.000	3 decimals

20 rES. **Reserved**

Reserved parameter

21 L.L.i.2 **Lower Linear Input AI2**

AI2 lower limit only for linear signals.
Ex.: with 4÷20 mA input, this parameter takes value associated with 4 mA.
-9999..+30000 [digit] **Default**: 0

22 u.L.i.2 **Upper Linear Input AI2**

AI2 upper limit only for linear signals
Ex: with input 4÷20 mA this parameter takes value associated with 20 mA.
-9999..+30000 [digit] **Default**: 1000

23 P.uA.2 **Potentiometer Value AI2**

Selects the value of the potentiometer connected on AI2
1÷150 kohm. **Default**: 10 kohm

24 i.o.L.2 **Linear Input over Limits AI2**

If AI2 is a linear input, it allows the process to exceed the limits (parameters 21 and 22)

diSAb.	Disabled (**Default**)
ENAb.	Enabled

25 o.cA.2 **Offset Calibration AI2**

AI2 Offset calibration.
Value added/subtracted to the process value (ex: usually correcting the ambient temperature value).
-9999÷+9999 [digit] (degrees.tenths for temperature sensors). **Default**: 0

26 G.cA.2 **Gain Calibration AI2**

Value multiplied to the process value to calibrate the working point.
Ex: to correct the range from 0÷1000°C showing 0÷1010°C, set the parameter to -1.0
-**100.0%÷+100.0%**, **Default**: 0.0.

27 LAc.2 **Latch-On AI2**

AI2 Limit option. See Par

diSAb.	Disabled (**Default**)
StNrd	Standard
V.0.Sto.	Virtual Zero Stored
V.0.t.oN.	Virtual Zero at start

28 c.FL.2 **Conversion Filter AI2**

ADC Filter: Number of sensor readings to calculate mean that defines process value.
NB: When readings increase, control loop speed slows down. 1÷15. (**Default**: 10)

29 c.Fr.2 **Conversion Frequency AI2**

Sampling frequency of digital / analogue converter for AI2. Increasing the conversion speed will slow down reading stability (example: for fast transients, as the pressure, it is advisable to increase sampling frequency).

4.17Hz 4.17 Hz (Min. conversion speed)	33.2Hz 33.2 Hz
6.25Hz 6.25 Hz	39.0Hz 39.0 Hz
8.33Hz 8.33 Hz	50.0Hz 50.0 Hz
10.0Hz 10.0 Hz	62.0Hz 62.0 Hz
12.5Hz 12.5 Hz	123Hz 123 Hz
16.7Hz 16.7 Hz (**Default**) Ideal for noises filtering 50 / 60 Hz	242Hz 242 Hz
19.6Hz 19.6 Hz	470Hz 470 Hz (Max. speed conversion)

30 L.c.E.2 **Lower Current Error 2**

If AI2 is a 4÷20 mA input, it determines the current value below the probe error E-05 is signaled.

2.0 mA (**Default**)	2.0 mA	2.6 mA	2.6 mA	3.2 mA	3.2 mA
2.2 mA	2.2 mA	2.8 mA	2.8 mA	3.4 mA	3.4 mA
2.4 mA	2.4 mA	3.0 mA	3.0 mA	3.6 mA	3.6 mA
				3.8 mA	3.8 mA

31-34 **Reserved Parameters**

Reserved parameters

10.2.3 cMd1. – Outputs and Process control 1 - Loop 1

35 c.ou.1 Command Output 1

Selects the output connected to process 1 and alarms

c. o2	Command on relay output Q2
c. o1	Command on relay output Q1 (**Default**)
c. SSR	Command on digital output
c. VAL.	Open loop servo-valve control on relays Q1 and Q2
c.0-10	0-10 V command on analogue output AO1
c.4-20	4-20 mA command on analogue output AO1
0.10.S.R.	0-10 V control on analogue output AO1 with split range function: the analogue output controls cold from 0 to 5V and hot from 5 to 10V
4.20.S.R.	4-20 mA control on analogue output AO1 with split range function: the analogue output controls cold from 4 to 12mA and hot from 12 to 20mA
c.VAL.c.	Open loop servo-valve control on relays Q2 and Q3

	Command	AL1	AL2	AL3	AL4	AL5	AL6
c. o2	Q2	Q1	Q3	DO1	DO2	AO1	AO2
c. o1	Q1	Q2	Q3	DO1	DO2	AO1	AO2
c. SSr	DO1	Q1	Q2	Q3	DO2	AO1	AO2
c. VAL.	Q1 (open) Q2 (close)	Q3	DO1	DO2	AO1	AO2	-
c.0-10 (0.10.S.R.)	AO1 (0÷10 V)	Q1	Q2	Q3	DO1	DO2	AO2
c.4-20 (4.20.S.R.)	AO1 (4÷20 mA)	Q1	Q2	Q3	DO1	DO2	AO2
c. VAL.c.	Q2 (open) Q3 (close)	Q1	DO1	DO2	AO1	AO2	-

NB: If an output is used for functions other than alarms (e.g. retransmit or command no.2), this resource will no longer be available as an alarm and the relevant group will be hidden from the parameter list. However, the correspondence of functions/outputs remains as shown in the tables above.

36 c.Pr.1 Command Process 1

Selects the value linked to process control 1

AIn.1	Value read at input AI1 (**Default**)
AIn.2	Value read at input AI2
MEAn	Arithmetic average of the values read on inputs AI1 and AI2 [(AI1+AI2)/2]
diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
Ab.diF.	Form of the difference of the values read at inputs AI1 and AI2 (|AI1-AI2|)
SuM	Sum of values read at the inputs AI1 and AI2 (AI1+AI2)

37 rES. Reserved

Reserved parameter

38 Ac.t.1 Action type 1

Type of action for process control 1

HEAt	Heating (N.O.) (**Default**)
cooL	Cooling (N.C.)

39 c.HY.1 Command Hysteresis 1

Hysteresis for process control 1 in ON/OFF operation
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) **Default** 0.2

40 L.L.S1. Lower Limit Setpoint 1

Lower limit for command setpoint 1
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) **Default** 0

41 U.L.S.1 Upper Limit Setpoint 1

Upper limit for command setpoint 1
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) **Default** 1750

42	c.rE.1	**Command Reset 1**
Control contact 1 reset type (always automatic in PID operation)		
	A. RES.	Automatic reset (**Default**)
	M. RES.	Manual reset (manual reset/reset from keypad or digital input)
	M.RES.S.	Stored manual reset (maintains output status even after power failure)
	A.RES.t.	Automatic reset with time activation. The control remains active for the time set in parameter 45 c.dE.1. even if the conditions which generated it cease to exist. In order to be able to intervene again, the conditions for activating the command must be cancelled.
43	c.S.E.1	**Command State Error 1**
Status of control output 1 in case of error (Par. 35 c.ou.1)		
If control output 1 is relay or valve:		
	oPEN	Open Contact or open valve (**Default**)
	CLoSE	Closed Contact or closed valve
If control output 1 is digital output (SSR):		
	oFF	Digital output off (**Default**)
	oN	Digital output on
If the control output 1 is 0-10V:		
	0 V	0V (**Default**)
	10 V	10V
If the control output 1 is 0÷20 mA or 4÷20 mA:		
	0 MA	0 mA (**Default**)
	4 MA	4 mA
	20 MA	20 mA
	21.5MA	21.5 mA
44	c.Ld.1	**Command Led 1**
Led C1 status. If the valve control is set, this parameter is not managed		
	o.c.	SSR Output - On with open contact or SSR off. Analogue Output AO1- On with percentage output 0%, off if 100% and flashing between 1% and 99%
	c.c.	SSR Output - On with closed contact or SSR on. Analogue Output AO1 - On with 100% output, off if 0% and flashing between 1% and 99%. (**Default**)
45	c.dE.1	**Command Delay 1**
Command delay 1 (only in ON/OFF operation) -60:00..60:00 mm:ss. **Default**: 00:00.		
	Negative value	Delay when switching off the output
	Positive value	Delay when switching on the output
46	c.S.P.1	**Command Setpoint Protection 1**
Allows or disallows changing the setpoint value for Loop 1		
	FrEE	User modifiable (**Default**)
	LocK	Protected against changes
	FR.IN.	Free Initialised. At start-up, Loop 1 setpoint 1 is initialised to the value set on parameter 51 I .SP. I (Initial Value Setpoint 1)
47	uA.t.1	**Valve Time 1**
Valve time connected to Loop 1 (declared by valve manufacturer) 1÷300 sec. **Default**: 60.		
48	A.MA.1	**Automatic / Manual 1**
Enables automatic/manual selection for Loop 1		
	diSAb.	Disabled (**Default**)
	ENAb.	Enabled
	EN.Sto.	Enabled with memory

49 *InI.S.* **Initial State**

Selects the status of the controller at switch-on. Only works in versions with RS485 or by enabling Start/Stop from digital input or SET button

StARt	Start (**Default**)
StoP	Stop
StorE.	Stored. Start/Stop status prior to shutdown

50 *S.uR.S.* **State Valve Saturation**

Selects the status of the valve when the output percentage is 100%

PERc.	The valve-opening relay is activated for 5% of the valve time
FIxEd	The valve-opening relay is always active

51 *.SP.1* **Initial Value Setpoint 1**

Determines the initial value (at start) of Loop 1 setpoint 1 when *FR.IN* is selected on parameter 46 *c.S.P.1* (Command Setpoint Protection 1)
-9999÷+30000 [digit] (degrees for temperature sensors). **Default** 0.

52-53 **Reserved parameters**

Reserved parameters

10.2.4 *cnd2.* – Outputs and Process control 2 - Loop 2

54 *c.ou.2* **Command Output 2**

Selects the output connected to process 2 and alarms.
NB: refer to the function/output table of parameter 35 *c.ou.1* to check which resources will remain available after changing this parameter (e.g.: by setting *c.ou.2* as *c.SSR*, it will no longer be possible to enable the alarm associated with output DO2)

diSAb.	Disabled
c. o3	Command on relay output Q3.
c. SSr	Command on digital output DO2.
c. VAL.	Open loop servo-valve control on DO1 (Open) and DO2 (Close) relays.
c.0-10	0-10 V command on analogue output AO2.
c.4-20	4-20 mA command on analogue output AO2.
0.10.S.R.	0-10 V control on analogue output AO2 with split range function: the analogue output controls cold from 0 to 5V and hot from 5 to 10V.
4.20.S.R.	4-20 mA control on analogue output AO2 with split range function: analogue output regulates cold from 4 to 12mA and hot from 12 to 20mA.

55 *c.Pr.2* **Command Process 2**

Selects the value linked to process control 2

A.IN.1	Value read at input AI1 (**Default**)
A.IN.2	Value read at input AI2
MEAN	Arithmetic average of the values read on inputs AI1 and AI2 [(AI1+AI2)/2]
diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
Ab.diF.	Form of the difference of the values read at inputs AI1 and AI2 (|AI1-AI2|)
SuM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2)

56 *rEM.S.* **Remote Setpoint**

Remote setpoint active. The command setpoint transmitted from another device is acquired via a second analogue input (the selections *A.IN.1* or *A.IN.2* must be set on par. *c.Pr.2*) or via serial

diSAb.	Disabled (**Default**)
ENAb.	Enables remote setpoint from process 2. Remote/local selection possible from digital input
EN.tSt.	Remote setpoint from process 2, with remote/local selection from keypad only (not possible from digital input)
EN.SEr.	Enables remote setpoint from serial input. Remote/local selection possible from digital input
EN.SE.t.	Remote setpoint from serial, with remote/local selection from keypad (not possible from digital input)
cnd.1	The reference setpoint of command 2 is the same as command 1

57 Ac.t.2 Action type 2

Type of action for process control 2

HEAt	Heating (N.O.) (**Default**)
cooL	Cooling (N.C.)

58 c.HY.2 Command Hysteresis 2

Hysteresis to control process 2 in ON/OFF operation
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) **Default** 0.2

59 L.L.S2 Lower Limit Setpoint 2

Lower limit for command setpoint 2.
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) **Default** 0

60 U.L.S.2 Upper Limit Setpoint 2

Upper limit for command setpoint 2
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) **Default** 1750

61 c.rE.2 Command reset 2

Control contact 2 reset type (always automatic in PID operation)

A. RES.	Automatic reset (Default)
M. RES.	Manual reset (manual reset/reset from keypad or digital input)
M.RES.S.	Stored manual reset (maintains output status even after power failure)
A.RES.t.	Automatic reset with time activation. The control remains active for the time set in parameter 64 c.dE.2. even if the conditions which generated it cease to exist. In order to be able to intervene again, the conditions for activating the command must be cancelled.

62 c.S.E.2 Command State Error 2

Status of control output 2 in case of error (Par. 54 c.ou.2)

If control output 2 is relay or valve:	
oPEn	Open Contact or open valve (**Default**)
CLoSE	Closed Contact or closed valve
If control output 2 is digital output (SSR):	
oFF	Digital output off (**Default**)
on	Digital output on
If the control output 2 is 0-10V:	
0 V	0V **Default**
10 V	10V
If the control output 2 is 0÷20 mA or 4÷20 mA:	
0 MA	0 mA (**Default**)
4 MA	4 mA
20 MA	20 mA
21.5MA	21.5 mA

63 c.Ld.2 Command Led 2

Led C2 status. If the valve control is set, this parameter is not managed.

o.c.	SSR Output - On with open contact or SSR off. Analogue Output AO2 - On with percentage output 0%, off if 100% and flashing between 1% and 99%
c.c.	SSR Output - On with closed contact or SSR on. Analogue Output AO2 - On with 100% output, off if 0% and flashing between 1% and 99% (**Default**)

64 c.dE.2 Command Delay 2

Command delay 2 (only in ON / OFF operation)
-60:00÷60:00 mm:ss. **Default**: 00:00.

Negative value	Delay when switching off the output
Positive value	Delay when switching on the output

65	c.S.P.2	**Command Setpoint Protection 2**
	Allows or disallows changing the setpoint value for Loop 2	
	FrEE	User modifiable (Default)
	LocK	Protected against changes
	FR.IN.	Free Initialised. At start-up, Loop 2 setpoint 1 is initialised to the value set on parameter 70 *I .SP.2* (Initial Value Setpoint 2).
66	uA.t.2	**Valve Time 2**
	Valve time connected to Loop 2 (declared by valve manufacturer) 1÷300 sec. **Default**: 60	
67	A.MA.2	**Automatic / Manual 2**
	Enables automatic/manual selection for Loop 2	
	diSAb.	Disabled (**Default**)
	ENAb.	Enabled
	EN.Sto.	Enabled with memory
68	rES.	**Reserved parameter**
	Reserved parameter	
69	rES.	**Reserved parameter**
	Reserved parameter	
70	*I* .SP.2	**Initial Value Setpoint 2**
	Determines the initial value (at start) of Loop 2 setpoint 1 when *FR.IN* is selected on parameter 65 *c.S.P.2* (Command Setpoint Protection 2) -9999÷+30000 [digit[1 p. 150]] (degrees for temperature sensors). **Default** 0.	
71-72		**Reserved parameters**
	Reserved parameters	

10.2.5 *rEG1* – Autotuning and PID 1 - Loop 1

73	tun.1	**Tune 1**
	Selecting the auto-tuning type for Loop 1	
	diSAb.	Disabled. If the proportional band and integral time parameters are set to zero, the setting is ON/OFF. (**Default**)
	Auto	Self Tune. PID with automatic parameter calculation
	MANu.	Pre Tune. PID with Manual parameter calculation (launched from keyboard or serial link)
	oNcE	PID with parameter calculation only once at power-up
74	S.d.t.1	**Setpoint Deviation Tune 1**
	Sets the deviation from command setpoint 1 as the threshold used by autotuning, for calculation of PID parameters 0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 30.0	
75	P.b. 1	**Proportional Band 1**
	Proportional band for PID control of Loop 1 (process inertia). 1÷10000 [digit] (degrees.tenths for temperature sensors). 0 = ON/OFF if *t.1* . equals 0 (**Default**)	
76	I.t. 1	**Integral Time 1**
	Integral time for PID control of Loop 1 (duration of process inertia). 0.0..2000.0 sec. (0.0 = integral disabled), **Default** 0.0	
77	d.t. 1	**Derivative Time 1**
	Derivative time for PID control of Loop 1 (normally 1/4 of integral time) 0.0÷1000.0 sec. (0.0 = derivative disabled), **Default** 0	
78	d.b. 1	**Dead Band 1**
	Dead band relative to the PID of Loop 1. 0÷10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)	

79 P.b.c.1 **Proportional Band Centered 1**

Defines whether proportional band 1 is to be centred on the setpoint or not. In double loop operation (heating/cooling) is always disabled (not centred).

diSAb.	Disabled. Band under (heating) or over (cooling) (**Default**)
ENAb.	Centered band

80 o.o.S.1 **Off Over Setpoint 1**

In PID operation it enables the switch-off of control output 1 when a certain threshold is exceeded (setpoint + Par. 81)

diSAb.	Disabled (**Default**)
ENAb.	Enabled

81 o.d.t.1 **Off Deviation Threshold 1**

Sets the deviation from command setpoint 1, for calculating the activation threshold for the "Off Over Setpoint 1" function.
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

82 c.t. 1 **Cycle Time 1**

Cycle time for PID control of Loop 1 (for PID on contactor 15s; for PID on SSR 2s). For valve refer to parameter 47 uA.t.1
1-300 seconds (**Default**: 15 seconds)

83 co.F.1 **Cooling Fluid 1**

Type of refrigerant fluid for heating/cooling PID mode for Loop 1. Enable cooling output in parameter AL.1 ... AL.6

Air	Air (**Default**)
oiL	Oil
WAtEr	Water

84 P.b.M.1 **Proportional Band Multiplier 1**

Proportional band multiplier in heating/cooling PID mode for Loop 1. The proportional band for cooling action is given by the value of parameter P.b.1 multiplied by this value
1.00÷5.00. **Default**: 1.00

85 o.d.b.1 **Overlap/Dead Band 1**

Overlap/Dead Band in heating/cooling PID mode (double action) for Loop 1
Defines the dead band combination for heating and cooling action
-20.0%÷50.0%

Negative value	Dead band
Positive value	Overlap (**Default**)

86 c.c.t.1 **Cooling Cycle Time 1**

Cycle time for cooling output in heating/cooling PID mode for Loop 1
1-300 seconds, **Default**: 10s

87 L.L.P1. **Lower Limit Output Percentage 1**

Selects the minimum value for the percentage of control output 1
0%÷100%, **Default**: 0%

88 U.L.P1. **Upper Limit Output Percentage 1**

Selects the maximum value for the percentage of control output 1
0%÷100%, **Default**: 100%

89 M.G.t.1 **Max Gap Tune 1**

Sets the maximum process-setpoint deviation beyond which the automatic tune recalculates the PID parameters of Loop 1
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 2.0

90 Mn.P.1 **Minimum Proportional Band 1**

Selects the minimum value of proportional band that can be set by the automatic tune for Loop 1 PID control
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 3.0

91 MA.P.1 **Maximum Proportional Band 1**

Selects the maximum value of proportional band that can be set by the automatic tune for Loop 1 PID control
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 80.0

92 Mn.i.1 **Minimum Integral Time 1**

Selects the minimum value of integral time that can be set by the automatic tune for Loop 1 PID adjustment
0.0÷1000.0 sec. **Default**: 30.0 sec.

93 o.c.L.1 **Overshoot Control Level 1**

The overshoot control function prevents this when the instrument is switched on or when the setpoint is changed.
By setting a value too low it is possible that the overshoot is not completely absorbed, whereas with high values the process may reach the setpoint more slowly

Disab	Lev. 3	Lev. 6	Lev. 9	
Lev. 1	Lev. 4	Lev. 7	Lev. 10	
Lev. 2	Lev. 5 (**Default**)	Lev. 8		

94-97 **Reserved Parameters**

Reserved Parameters

10.2.6 rEG2 – Autotuning and PID 2 - Loop 2

98 tun.2 **Tune 2**

Selecting the auto-tuning type for Loop 2

diSAb.	Disabled. If the proportional band and integral time parameters are set to zero, the setting is ON/OFF. (**Default**)
Auto	Self Tune. PID with automatic parameter calculation
MANu.	Pre Tune. PID with Manual parameter calculation (launched from keyboard or serial link)
oNcE	PID with parameter calculation only once at power-up

99 S.d.t.2 **Setpoint Deviation Tune 2**

Sets the deviation from command setpoint 2 as the threshold used by autotuning, for calculation of PID parameters
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 30.0

100 P.b. 2 **Proportional Band 2**

Proportional band for PID control of Loop 2 (process inertia).
1..10000 [digit] (degrees.tenths for temperature sensors).
0 = ON/OFF if t.1. equals 0 (**Default**)

101 I.t. 2 **Integral Time 2**

Integral time for PID control of Loop 2 (duration of process inertia).
0.0÷2000.0 sec. (0.0 = integral disabled), **Default** 0.0

102 d.t. 2 **Derivative Time 2**

Derivative time for PID control of Loop 2 (normally 1/4 of integral time)
0.0÷1000.0 sec. (0.0 = derivative disabled), **Default** 0

103 d.b. 2 **Dead Band 2**

Dead band relative to the PID of Loop 2.
0÷10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

104 P.b.c.2 **Proportional Band Centered 2**

Defines whether proportional band 2 is to be centred on the setpoint or not. In double loop operation (heating/cooling) is always disabled (not centred).

diSAb.	Disabled. Band under (heating) or over (cooling) (**Default**)
ENAb.	Centered band

105 o.o.S.2 **Off Over Setpoint 2**

In PID operation it enables the switch-off of control output 2 when a certain threshold is exceeded (setpoint + Par. 81)

diSAb.	Disabled (**Default**)
ENAb.	Enabled

106 o.d.t.2 **Off Deviation Threshold 2**

Sets the deviation from command setpoint 2, for calculating the activation threshold for the "Off Over Setpoint 2" function.
-9999÷+9999 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

107 c.t. 2 **Cycle Time 2**

Cycle time for PID control of Loop 2 (for PID on contactor 15s; for PID on SSR 2s). For valve refer to parameter 66 uA.t.2
1-300 seconds (**Default**: 15 seconds)

108 co.F.2 **Cooling Fluid 2**

Type of refrigerant fluid for heating/cooling PID mode for Loop 2. Enable cooling output in parameter AL.1 ... AL.6

Air	Air (**Default**)
oil	Oil
WAtEr	Water

109 P.b.M.2 **Proportional Band Multiplier 2**

Proportional band multiplier in heating/cooling PID mode for Loop 2. The proportional band for cooling action is given by the value of parameter P.b.2 multiplied by this value
1.00÷5.00. **Default**: 1.00

110 o.d.b.2 **Overlap/Dead Band 2**

Overlap/Dead Band in heating/cooling PID mode (double action) for Loop 2
Defines the dead band combination for heating and cooling action
-20.0%÷50.0%

Negative value	Dead band
Positive value	Overlap (**Default**)

111 c.c.t.2 **Cooling Cycle Time 2**

Cycle time for cooling output in heating/cooling PID mode for Loop 2

112 L.L.P2. **Lower Limit Output Percentage 2**

Selects the minimum value for the percentage of control output 2
0%÷100%, **Default**: 0%

113 U.L.P2. **Upper Limit Output Percentage 2**

Selects the maximum value for the percentage of control output 2
0%..100%, **Default**: 100%

114 M.G.t.2 **Max Gap Tune 2**

Sets the maximum process-setpoint deviation beyond which the automatic tune recalculates the PID parameters of Loop 2
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 2.0

115 Mn.P.2 **Minimum Proportional Band 2**

Selects the minimum value of proportional band that can be set by the automatic tune for Loop 2 PID control
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 3.0

116 MA.P.2 **Maximum Proportional Band 2**

Selects the maximum value of proportional band that can be set by the automatic tune for Loop 2 PID control
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 80.0

117 Mn.i.2 **Minimum Integral Time 2**

Selects the minimum value of integral time that can be set by the automatic tune for Loop 2 PID adjustment
0.0..1000.0 sec.. **Default**: 30.0 sec.

118 o.c.L.2 **Overshoot Control Level 2**

The overshoot control function prevents this when the instrument is switched on or when the setpoint is changed.
By setting a value too low it is possible that the overshoot is not completely absorbed, whereas with high values the process may reach the setpoint more slowly

Disab	Lev. 3	Lev. 6	Lev. 9	
Lev. 1	Lev. 4	Lev. 7	Lev. 10	
Lev. 2	Lev. 5 (**Default**)	Lev. 8		

119-122 **Reserved Parameters**

Reserved parameters

10.2.7 AL.1 – Alarm 1

123	AL.1.F.	**Alarm 1 Function**
	Select the alarm type	
	diSAb.	Disabled (**Default**)
	Ab.uP.A.	Absolute Upper Activation
	Ab.Lo.A.	Absolute Lower Activation
	bAnd	Band alarm (SP ± ALM Value)
	uP.dEV.	Upper Deviation
	Lo.dEV.	Lower Deviation
	Ab.c.u.A.	Absolute Command Upper Activation
	Ab.c.L.A.	Absolute Command Lower Activation
	RuN	RUN/START status
	cooL	Cooling action
	PRb.ER.	Probe error
	tMR.1	Timer 1 Status
	tMR.2	Timer 2 Status
	tMR.1.2	Timer 1/2 Status
	REM.	Remote alarm. The alarm is enabled by the word 1235
	d.I. 1	Digital Input 1 Status. Active when DI1 is on
	d.I. 2	Digital Input 2 Status. Active when DI2 is on
	d.I. 3	Digital Input 3 Status. Active when DI3 is on
	d.I. 4	Digital Input 4 Status. Active when DI4 is on
	H.b.A.	Heater Break Alarm and Overcurrent Alarm
	A.bAnd	Asymmetric band alarm (SP + ALM1 H Value, and SP - ALM1 L Value)
	c. Ru%	Auxiliary for job distribution on the command output Cyclically replaces the control output for the time set on parameter 134 A.1.dE. If A.1.dE. = 0 is activated in parallel with the control output NB: Not available in case of valve control
124	A.1.Pr.	**Alarm 1 Process**
	Selects the value connected to the alarm	
	A.iN.1	Value read on input AI1 (**Default**)
	A.iN.2	Value read on input AI2
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SuM	Sum of values read at the inputs AI1 and AI2 (AI1+AI2)
125	A.1.r.c.	**Alarm 1 Loop Reference**
	Select the Reference Loop for the alarm function	
	cMd. 1	Alarm connect to Loop 1 (**Default**)
	cMd. 2	Alarm connect to Loop 2
126	A.1.S.o.	**Alarm 1 State Output**
	Contact alarm output and intervention type	
	N.o. St.	(N.O. Start) Norm. open, operational from start (**Default**)
	N.c. St.	(N.C. Start) Norm. closed, operational from start
	N.o. tH.	(N.O. Threshold) operational when the alarm is reached
	N.c. tH.	(N.C. Threshold) operational when the alarm is reached
	N.o.tH.V.	(N.O. Threshold Variation) inhibited after command set change
	N.c.tH.V.	(N.C. Threshold Variation) inhibited after command set change

127 rES. **Reserved Parameter**

Reserved parameter

128 A.1.HY. **Alarm 1 Hysteresis**

Alarm 1 hysteresis
-9999÷+9999 [digit] (degrees for temp. sensors) **Default** 0.5.

129 A1.L.L. **Alarm 1 Lower Limit**

When Parameter 123 AL.1.F = "A.bAnd" then alarm 1 Lower limit deviation set
-9999÷+30000 [digit] (degrees for temp. sensors) **Default** 0

130 A.1.u.L. **Alarm 1 Upper Limit**

When Parameter 123 AL.1.F = "A.bAnd" then alarm 1 Upper limit deviation set
-9999÷+30000 [digit] (degrees for temp. sensors) **Default** 1750.

131 A.1.rE. **Alarm 1 Reset**

Alarm 1 contact reset type (always automatic if AL.1.F. = c. Au)

A. RES.	Automatic reset (**Default**)
M. RES.	Manual reset (manual reset by keyboard or by digital input)
M.RES.S	Stored manual reset (keeps the output status also after a power failure)
A. RES.t.	Automatic reset with time activation. The alarm remains active for the time set on the parameter 134 A.1.dE., even if the conditions generating it are missing. To be able to act again, the alarm conditions must disappear.

132 A.1.S.E. **Alarm 1 State Error**

Status of alarm output 1 on error condition

oPEn	Open contact (**Default**)
CLoSE	Closed contact

133 A.1.Ld. **Alarm 1 Led**

Defines the status of LED **A1**

o.c.	On with open contact or DO off
c.c.	Closed contact or DO on (**Default**)

134 A.1.dE. **Alarm 1 Delay**

Alarm delay
-60:00÷60:00 mm:ss (hh:mm IF AL.1.F. = c. Au). **Default**: 00:00

Negative value	Delay when exit alarm state
Positive value	Delay when enter alarm state

135 A.1.S.P. **Alarm 1 Setpoint Protection**

Allows the alarm setpoint value to be changed or not

FrEE	User modifiable (**Default**)
Lock	Locked
HIdE	Protected and not displayed

136 A.1.Lb. **Alarm 1 Label**

Set the message to be displayed when alarm is active

diSAb.	Disabled (**Default**)
Lb. 01	Message 1 (see "Alarms Label" table par. 11.2)
Lb. 20	Message 20 (see "Alarms Label" table par. 11.2)
uSER.L.	Custom message (user-modifiable via modbus)

137-140 **Reserved Parameters**

Reserved parameters

10.2.8 AL.2 – Alarm 2

141	AL.2.F.	**Alarm 2 Function**
	Select the alarm type	
	diSAb.	Disabled (**Default**)
	Ab.uP.A.	Absolute Upper Activation
	Ab.Lo.A.	Absolute Lower Activation
	bAnd	Band alarm (SP ± ALM Value)
	uP.dEV.	Upper Deviation
	Lo.dEV.	Lower Deviation
	Ab.c.u.A.	Absolute Command Upper Activation
	Ab.c.L.A.	Absolute Command Lower Activation
	RUN	RUN/START status
	cooL	Cooling action
	PRb.ER.	Probe error
	tMR.1	Timer 1 Status
	tMR.2	Timer 2 Status
	tMR.1.2	Timer 1/2 Status
	REM.	Remote alarm. The alarm is enabled by the word 1236
	d.I. 1	Digital Input 1 Status. Active when DI1 is on
	d.I. 2	Digital Input 2 Status. Active when DI2 is on
	d.I. 3	Digital Input 3 Status. Active when DI3 is on
	d.I. 4	Digital Input 4 Status. Active when DI4 is on
	H.b.A.	Heater Break Alarm and Overcurrent Alarm
	A.bAnd	Asymmetric band alarm (SP + ALM2 H Value, and SP - ALM2 L Value)
	c. AUX	Auxiliary for job distribution on the command output Cyclically replaces the control output for the time set on parameter 152 A.2.dE. If A.2.dE. = 0 is activated in parallel with the control output NB: Not available in case of valve control
142	A.2.Pr.	**Alarm 2 Process**
	Selects the value connected to the alarm	
	A.IN.1	Value read on input AI1 (**Default**)
	A.IN.2	Value read on input AI2
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.dif.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SUM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2)
143	A.2.r.c.	**Alarm 2 Loop Reference**
	Select the Reference Loop for the alarm function	
	cMd. 1	Alarm connect to Loop 1 (**Default**)
	cMd. 2	Alarm connect to Loop 2
144	A.2.S.o.	**Alarm 2 State Output**
	Contact alarm output and intervention type	
	N.o. St.	(N.O. Start) Norm. open, operational from start (**Default**)
	N.c. St.	(N.C. Start) Norm. closed, operational from start
	N.o. tH.	(N.O. Threshold) Operational when the alarm is reached
	N.c. tH.	(N.C. Threshold) Operational when the alarm is reached
	N.o.tH.V.	(N.O. Threshold Variation) Inhibited after command set change
	N.c.tH.V.	(N.C. Threshold Variation) Inhibited after command set change

145 rES. **Reserved Parameter**

Reserved parameter

146 A.2.HY. **Alarm 2 Hysteresis**

Alarm 2 hysteresis
-9999÷+9999 [digit] (degrees for temp. sensors) **Default** 0.5

147 A2.L.L. **Alarm 2 Lower Limit**

When Parameter 141 AL.2.F = "A.bAnd" then alarm 2 Lower limit deviation set
-9999÷+30000 [digit] (degrees for temp. sensors) **Default** 0

148 A.2.u.L. **Alarm 2 Upper Limit**

When Parameter 141 AL.2.F = "A.bAnd" then alarm 2 Upper limit deviation set
-9999÷+30000 [digit] (degrees for temp. sensors) **Default** 1750

149 A.2.rE. **Alarm 2 Reset**

Alarm 2 contact reset type (always automatic if AL.2.F. = c. Au)

A. RES.	Automatic reset (**Default**)
M. RES.	Manual reset (manual reset by keyboard or by digital input)
M.RES.S	Stored manual reset (keeps the output status also after a power failure)
A. RES.t.	Automatic reset with time activation. The alarm remains active for the time set on the parameter 152 A.2.dE., even if the conditions generating it are missing. To be able to act again, the alarm conditions must disappear.

150 A.2.S.E. **Alarm 2 State Error**

Status of alarm output 2 on error condition

If relay output	
oPEn	Contact or open valve (**Default**)
CLoSE	Contact or closed valve
If digital output (SSR)	
oFF	Digital output off (**Default**)
On	Digital output on

151 A.2.Ld. **Alarm 2 Led**

Defines the status of LED A2

o.c.	On with open contact or DO off
c.c.	Closed contact or DO on (**Default**)

152 A.2.dE. **Alarm 2 Delay**

Alarm delay
-60:00÷60:00 mm:ss (hh:mm if AL.1.F. = c. Au). **Default**: 00:00

Negative value	Delay when exit alarm state
Positive value	Delay when enter alarm state

153 A.2.S.P. **Alarm 2 Setpoint Protection**

Allows the alarm setpoint value to be changed or not

FrEE	User modifiable (**Default**)
Lock	Locked
HIdE	Protected and not displayed

154 A.2.Lb. **Alarm 2 Label**

Set the message to be displayed when alarm is active

diSAb.	Disabled (**Default**)
Lb. 01	Message 1 (see "Alarms Label" table par. 11.2)
Lb. 20	Message 20 (see "Alarms Label" table par. 11.2)
uSER.L.	Custom message (user-modifiable via modbus)

155-158 **Reserved Parameters**

Reserved parameters

10.2.9 AL.3 – Alarm 3

159	AL.3.F.	**Alarm 3 Function**
	Select the alarm type	
	diSAb.	Disabled (**Default**)
	Ab.uP.A.	Absolute Upper Activation
	Ab.Lo.A.	Absolute Lower Activation
	bAnd	Band alarm (SP ± ALM Value)
	uP.dEV.	Upper Deviation
	Lo.dEV.	Lower Deviation
	Ab.c.u.A.	Absolute Command Upper Activation
	Ab.c.L.A.	Absolute Command Lower Activation
	RUN	RUN/START status
	cooL	Cooling action
	PRb.ER.	Probe error
	tMR.1	Timer 1 Status
	tMR.2	Timer 2 Status
	tMR.1.2	Timer 1/2 Status
	REM.	Remote alarm. The alarm is enabled by the word 1237
	d.I. 1	Digital Input 1 Status. Active when DI1 is on
	d.I. 2	Digital Input 2 Status. Active when DI2 is on
	d.I. 3	Digital Input 3 Status. Active when DI3 is on
	d.I. 4	Digital Input 4 Status. Active when DI4 is on
	H.b.A.	Heater Break Alarm and Overcurrent Alarm
	A.bAnd	Asymmetric band alarm (SP + ALM3 H Value, and SP - ALM3 L Value)
	c. Aux	Auxiliary for job distribution on the command output Cyclically replaces the control output for the time set on parameter 170 A.3.dE. If A.3.dE. = 0 is activated in parallel with the control output NB: Not available in case of valve control
160	A.3.Pr.	**Alarm 3 Process**
	Selects the value connected to the alarm	
	A.IN.1	Value read on input AI1 (**Default**)
	A.IN.2	Value read on input AI2
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SUM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2)
161	A.3.r.c.	**Alarm 3 Loop Reference**
	Select the Reference Loop for the alarm function	
	cMd. 1	Alarm connect to Loop 1 (**Default**)
	cMd. 2	Alarm connect to Loop 2
162	A.3.S.o.	**Alarm 3 State Output**
	Contact alarm output and intervention type	
	N.o. St.	(N.O. Start) Norm. open, operational from start (**Default**)
	N.c. St.	(N.C. Start) Norm. closed, operational from start
	N.o. tH.	(N.O. Threshold) operational when the alarm is reached
	N.c. tH.	(N.C. Threshold) operational when the alarm is reached
	N.o.tH.V.	(N.O. Threshold Variation) inhibited after command set change
	N.c.tH.V.	(N.C. Threshold Variation) inhibited after command set change

163	A3.Ot.	**Alarm 3 Output Type**
Define output type, if alarm 3 is analogue		
0.0V		0÷10 V Output (**Default**)
4.20MA		4÷20 mA Output
164	A.3.HY.	**Alarm 3 Hysteresis**
Alarm 3 hysteresis -9999÷+9999 [digit] (degrees for temp. sensors) **Default** 0.5		
165	A3.L.L.	**Alarm 3 Lower Limit**
When Parameter 159 AL.3.F = "A.bAND" then alarm 3 Lower limit deviation set -9999÷+30000 [digit] (degrees for temp. sensors) **Default** 0		
166	A.3.u.L.	**Alarm 3 Upper Limit**
When Parameter 159 AL.3.F = "A.bAND" then alarm 3 Upper limit deviation set -9999÷+30000 [digit] (degrees for temp. sensors) **Default** 1750		
167	A.3.rE.	**Alarm 3 Reset**
Alarm 3 contact reset type (always automatic if AL.3.F. = c. Au)		
A. RES.		Automatic reset (**Default**)
M. RES.		Manual reset (manual reset by keyboard or by digital input)
M.RES.S		Stored manual reset (keeps the output status also after a power failure)
A. RES.t.		Automatic reset with time activation. The alarm remains active for the time set on the parameter 170 A.3.dE., even if the conditions generating it are missing. To be able to act again, the alarm conditions must disappear.
168	A.3.S.E.	**Alarm 3 State Error**
Status of alarm output 3 on error condition **If relay output**		
oPEn		Open contact or valve (**Default**)
CLoSE		Closed contact or valve
If digital output (SSR)		
oFF		Digital output off (**Default**)
on		Digital output on
If analogue output 0-10V		
0 V		0V **Default**
10 V		10V
If analogue output 0÷20 mA or 4÷20 mA		
0 MA		0 mA (**Default**)
4 MA		4 mA
20 MA		20 mA
21.5MA		21.5 mA
169	A.3.Ld.	**Alarm 3 Led**
Defines the status of LED A3		
o.c.		On with open contact or DO off
c.c.		Closed contact or DO on (**Default**)
170	A.3.dE.	**Alarm 3 Delay**
Alarm delay -60:00÷60:00 mm:ss (hh:mm if AL.3.F. = c. Au). **Default**: 00:00		
Negative value		Delay when exit alarm state
Positive value		Delay when enter alarm state

171	A.3.S.P.	Alarm 3 Setpoint Protection
Allows the alarm setpoint value to be changed or not		
	FrEE	User modifiable (**Default**)
	LocK	Locked
	HIdE	Protected and not displayed
172	**A.3.Lb.**	**Alarm 3 Label**
Set the message to be displayed when alarm is active		
	diSAb.	Disabled (**Default**)
	Lb. 01	Message 1 (see "Alarms Label" table par. 11.2)
	Lb. 20	Message 20 (see "Alarms Label" table par. 11.2)
	uSER.L.	Custom message (user-modifiable via modbus)
173-176		**Reserved Parameters**
Reserved parameters		

10.2.10 AL.4 – Alarm 4

177	AL.4.F.	Alarm 4 Function
Select the alarm type		
	diSAb.	Disabled (**Default**)
	Ab.uP.A.	Absolute Upper Activation
	Ab.Lo.A.	Absolute Lower Activation
	bAnd	Band alarm (SP ± ALM Value)
	uP.dEV.	Upper Deviation
	Lo.dEV.	Lower Deviation
	Ab.c.u.A.	Absolute Command Upper Activation
	Ab.c.L.A.	Absolute Command Lower Activation
	RUN	RUN/START status
	cooL	Cooling action
	PRb.ER.	Probe error
	tMR.1	Timer 1 Status
	tMR.2	Timer 2 Status
	tMR.1.2	Timer 1/2 Status
	REM.	Remote alarm. The alarm is enabled by the word 1238
	d.I. 1	Digital Input 1 Status. Active when DI1 is on
	d.I. 2	Digital Input 2 Status. Active when DI2 is on
	d.I. 3	Digital Input 3 Status. Active when DI3 is on
	d.I. 4	Digital Input 4 Status. Active when DI4 is on
	H.b.A.	Heater Break Alarm and Overcurrent Alarm
	A.bAnd	Asymmetric band alarm (SP + ALM4 H Value, and SP - ALM4 L Value)
	c. AUX	Auxiliary for job distribution on the command output Cyclically replaces the control output for the time set on parameter 188 A.4.dE. If A.4.dE. = 0 is activated in parallel with the control output NB: Not available in case of valve control
178	**A.4.Pr.**	**Alarm 4 Process**
Selects the value connected to the alarm		
	A.IN.1	Value read on input AI1 (**Default**)
	A.IN.2	Value read on input AI2
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SUM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2)

179	A.4.r.c.	**Alarm 4 Loop Reference**
	Select the Reference Loop for the alarm function	
	cMd. 1	Alarm connect to Loop 1 (**Default**)
	cMd. 2	Alarm connect to Loop 2
180	A.4.S.o.	**Alarm 4 State Output**
	Contact alarm output and intervention type	
	N.o. St.	(N.O. Start) Norm. open, operational from start (**Default**)
	N.c. St.	(N.C. Start) Norm. closed, operational from start
	N.o. tH.	(N.O. Threshold) Operational when the alarm is reached
	N.c. tH.	(N.C. Threshold) Operational when the alarm is reached
	N.o.tH.V.	(N.O. Threshold Variation) Inhibited after command set change
	N.c.tH.V.	(N.C. Threshold Variation) Inhibited after command set change
181	A4.O.t.	**Alarm 4 Output Type**
	Define output type, if alarm 4 is analogue	
	0.0V	0÷10 V Output (**Default**)
	4.20mA	4÷20 mA Output
182	A.4.HY.	**Alarm 4 Hysteresis**
	Alarm 4 hysteresis -9999÷+9999 [digit] (degrees for temp. sensors) **Default** 0.5	
183	A4.L.L.	**Alarm 4 Lower Limit**
	When Parameter 177 AL.4.F = "A.bAnd" then alarm 4 Lower limit deviation set -9999÷+30000 [digit] (degrees for temp. sensors) **Default** 0	
184	A.4.u.L.	**Alarm 4 Upper Limit**
	When Parameter 177 AL.4.F = "A.bAnd" then alarm 4 Upper limit deviation set -9999÷+30000 [digit] (degrees for temp. sensors) **Default** 1750	
185	A.4.rE.	**Alarm 4 Reset**
	Alarm 4 contact reset type (always automatic if AL.4.F. = c. Au)	
	A. RES.	Automatic reset (**Default**)
	M. RES.	Manual reset (manual reset by keyboard or by digital input)
	M.RES.S	Stored manual reset (keeps the output status also after a power failure)
	A. RES.t.	Automatic reset with time activation. The alarm remains active for the time set on the parameter 188 A.4.dE., even if the conditions generating it are missing. To be able to act again, the alarm conditions must disappear.
186	A.4.S.E.	**Alarm 4 State Error**
	Status of alarm output 4 on error condition	
	If digital output (SSR)	
	oFF	Digital output off (**Default**)
	on	Digital output on
	If analogue output 0-10V	
	0 V	0V (**Default**)
	10 V	10V
	If analogue output 0÷20 mA or 4÷20 mA	
	0 mA	0 mA (**Default**)
	4 mA	4 mA
	20 mA	20 mA
	21.5mA	21.5 mA
187	rES.	**Reserved parameter**
	Reserved parameter	

188 A.4.dE.	**Alarm 4 Delay**
Alarm delay -60:00÷60:00 mm:ss (hh:mm if AL.4.F. = c. Aux). **Default**: 00:00	
Negative value	Delay when exit alarm state
Positive value	Delay when enter alarm state
189 A.4.S.P.	**Alarm 4 Setpoint Protection**
Allows the alarm setpoint value to be changed or not	
FrEE	User modifiable (**Default**)
LocK	Locked
HIdE	Protected and not displayed
190 A.4.Lb.	**Alarm 4 Label**
Set the message to be displayed when alarm is active	
diSAb.	Disabled (**Default**)
Lb. 01	Message 1 (see "Alarms Label" table par. 11.2)
Lb. 20	Message 20 (see "Alarms Label" table par. 11.2)
uSER.L.	Custom message (user-modifiable via modbus)
191-194	**Reserved Parameters**
Reserved Parameters	

10.2.11 AL.5 – Alarm 5

195 AL.5.F.	**Alarm 5 Function**
Select the alarm type	
diSAb.	Disabled (**Default**)
Ab.uP.A.	Absolute Upper Activation
Ab.Lo.A.	Absolute Lower Activation
bAnd	Band alarm (SP ± ALM Value)
uP.dEV.	Upper Deviation
Lo.dEV.	Lower Deviation
Ab.c.u.A.	Absolute Command Upper Activation.
Ab.c.L.A.	Absolute Command Lower Activation.
RuN	RUN/START status
cooL	Cooling action
PRb.ER.	Probe error
tMR.1	Timer 1 Status
tMR.2	Timer 2 Status
tMR.1.2	Timer 1/2 Status
REM.	Remote alarm. The alarm is enabled by the word 1239
d.I. 1	Digital Input 1 Status. Active when DI1 is active
d.I. 2	Digital Input 2 Status. Active when DI2 is active
d.I. 3	Digital Input 3 Status. Active when DI3 is active
d.I. 4	Digital Input 4 Status. Active when DI4 is active
H.b.A.	Heater Break Alarm and Overcurrent Alarm
A.bAnd	Asymmetric band alarm (SP + ALM5 H Value, and SP - ALM5 L Value)
c. Aux	Auxiliary for job distribution on the command output Cyclically replaces the control output for the time set on parameter 206 A.5.dE. If A.5.dE. = 0 is activated in parallel with the control output NB: Not available in case of valve control

196	A.S.Pr.	**Alarm 5 Process**
	Selects the value connected to the alarm	
	A.in.1	Value read on input AI1 (**Default**)
	A.in.2	Value read on input AI2
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SuM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2)
197	A.S.r.c.	**Alarm 5 Loop Reference**
	Select the Reference Loop for the alarm function	
	cMd. 1	Alarm connect to Loop 1 (**Default**)
	cMd. 2	Alarm connect to Loop 2
198	A.S.S.o.	**Alarm 5 State Output**
	Contact alarm output and intervention type	
	N.o. St.	(N.O. Start) Norm. open, operational from start (**Default**)
	N.c. St.	(N.C. Start) Norm. closed, operational from start
	N.o. tH.	(N.O. Threshold) Operational when the alarm is reached
	N.c. tH.	(N.C. Threshold) Operational when the alarm is reached
	N.o.tH.V.	(N.O. Threshold Variation) Inhibited after command set change
	N.c.tH.V.	(N.C. Threshold Variation) Inhibited after command set change
199	AS.O.t.	**Alarm 5 Output Type**
	Define output type, if alarm 5 is analogue	
	0.0V	0÷10 V Output (**Default**)
	4.20MA	4÷20 mA Output
200	A.S.HY.	**Alarm 5 Hysteresis**
	Alarm 5 hysteresis -9999÷+9999 [digit] (degrees for temp. sensors) **Default** 0.5	
201	AS.L.L.	**Alarm 5 Lower Limit**
	When Parameter 177 AL.S.F = "A.bAnd" then alarm 5 Lower limit deviation set -9999÷+30000 [digit] (degrees for temp. sensors) **Default** 0	
202	A.S.u.L.	**Alarm 5 Upper Limit**
	When Parameter 177 AL.S.F = "A.bAnd" then alarm 5 Upper limit deviation set -9999÷+30000 [digit] (degrees for temp. sensors) **Default** 1750	
203	A.S.rE.	**Alarm 5 Reset**
	Alarm 5 contact reset type (always automatic if AL.S.F. = c. Au)	
	A. RES.	Automatic reset (**Default**)
	M. RES.	Manual reset (manual reset by keyboard or by digital input)
	M.RES.S	Stored manual reset (keeps the output status also after a power failure)
	A. RES.t.	Automatic reset with time activation. The alarm remains active for the time set on the parameter 206 A.S.dE., even if the conditions generating it are missing. To be able to act again, the alarm conditions must disappear.

204	A.S.S.E.	**Alarm 5 State Error**
Status of alarm output 5 on error condition		
If digital output (SSR)		
oFF	Digital output off (**Default**)	
on	Digital output on	
If analogue output 0-10V		
0 V	0V (**Default**)	
10 V	10V	
If analogue output 0÷20 mA or 4÷20 mA		
0 mA	0 mA (**Default**)	
4 mA	4 mA	
20 mA	20 mA	
21.5mA	21.5 mA	
205		**Reserved parameter**
Reserved parameter		
206	A.S.dE.	**Alarm 5 Delay**
Alarm delay -60:00÷60:00 mm:ss (hh:mm if AL.S.F. = c. Au). **Default**: 00:00		
Negative value	Delay when exit alarm state	
Positive value	Delay when enter alarm state	
207	A.S.S.P.	**Alarm 5 Setpoint Protection**
Allows the alarm setpoint value to be changed or not		
FrEE	User modifiable (**Default**)	
Lock	Locked	
HIdE	Protected and not displayed	
208	A.S.Lb.	**Alarm 5 Label**
Set the message to be displayed when alarm is active		
diSAb.	Disabled (**Default**)	
Lb. 01	Message 1 (see "Alarms Label" table par. 11.2)	
Lb. 20	Message 20 (see "Alarms Label" table par. 11.2)	
uSER.L.	Custom message (user-modifiable via modbus)	
209-212		**Reserved Parameters**
Reserved parameters		

10.2.12 AL.6 – Alarm 6

213	AL.6.F.	**Alarm 6 Function**
	Select the alarm type	
	dISAb.	Disabled (**Default**)
	Ab.uP.A.	Absolute Upper Activation.
	Ab.Lo.A.	Absolute Lower Activation.
	bAnd	Band alarm (SP ± ALM Value)
	uP.dEV.	Upper Deviation
	Lo.dEV.	Lower Deviation
	Ab.c.u.A.	Absolute Command Upper Activation
	Ab.c.L.A.	Absolute Command Lower Activation
	RUN	RUN/START status
	cooL	Cooling action
	PRb.ER.	Probe error
	tMR.1	Timer 1 Status
	tMR.2	Timer 2 Status
	tMR.1.2	Timer 1/2 Status
	REM.	Remote alarm. The alarm is enabled by the word 1240
	d.I. 1	Digital Input 1 Status. Active when DI1 is on
	d.I. 2	Digital Input 2 Status. Active when DI2 is on
	d.I. 3	Digital Input 3 Status. Active when DI3 is on
	d.I. 4	Digital Input 4 Status. Active when DI4 is on
	H.b.A.	Heater Break Alarm and Overcurrent Alarm
	A.bAnd	Asymmetric band alarm (SP + ALM6 H Value, and SP - ALM6 L Value)
	c. AUX	Auxiliary for job distribution on the command output Cyclically replaces the control output for the time set on parameter 224 A.6.dE. If A.6.dE. = 0 is activated in parallel with the control output NB: Not available in case of valve control
214	A.6.Pr.	**Alarm 6 Process**
	Selects the value connected to the alarm	
	AIn.1	Value read on input AI1 (**Default**)
	AIn.2	Value read on input AI2
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	dIFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.dIF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SUM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2)
215	A.6.r.c.	**Alarm 6 Loop Reference**
	Select the Reference Loop for the alarm function	
	cMd. 1	Alarm connect to Loop 1 (**Default**)
	cMd. 2	Alarm connect to Loop 2
216	A.6.S.o.	**Alarm 6 State Output**
	Contact alarm output and intervention type	
	N.o. St.	(N.O. Start) Norm. open, operational from start (**Default**)
	N.c. St.	(N.C. Start) Norm. closed, operational from start
	N.o. tH.	(N.O. Threshold) Operational when the alarm is reached
	N.c. tH.	(N.C. Threshold) Operational when the alarm is reached
	N.o.tH.V.	(N.O. Threshold Variation) Inhibited after command set change
	N.c.tH.V.	(N.C. Threshold Variation) Inhibited after command set change

217 *AL.O.t.* **Alarm 6 Output Type**

Define output type, if alarm 6 is analogue

0.10V	0÷10 V Output (**Default**)
4.20MA	4÷20 mA Output

218 *A.L.HY.* **Alarm 6 Hysteresis**

Alarm 6 hysteresis
-9999÷+9999 [digit] (degrees for temp. sensors) **Default** 0.5

219 *AL.L.L.* **Alarm 6 Lower Limit**

When Parameter 213 *AL.L.F* = "*A.bAnd*" then alarm 6 Lower limit deviation set
-9999÷+30000 [digit] (degrees for temp. sensors) **Default** 0

220 *A.L.u.L.* **Alarm 6 Upper Limit**

When Parameter 213 *AL.L.F* = "*A.bAnd*" then alarm 6 Upper limit deviation set
-9999÷+30000 [digit] (degrees for temp. sensors) **Default** 1750

221 *A.L.rE.* **Alarm 6 Reset**

Alarm 6 contact reset type (always automatic if *AL.L.F.* = *c. AuX*)

A. RES.	Automatic reset (**Default**)
M. RES.	Manual reset (manual reset by keyboard or by digital input)
M.RES.S	Stored manual reset (keeps the output status also after a power failure)
A. RES.t.	Automatic reset with time activation. The alarm remains active for the time set on the parameter 224 *A.L.dE.*, even if the conditions generating it are missing. To be able to act again, the alarm conditions must disappear.

222 *A.L.S.E.* **Alarm 6 State Error**

Status of alarm output 6 on error condition

If analogue output 0-10V

0 V	0V (**Default**)
10 V	10V

If analogue output 0÷20 mA or 4÷20 mA

0 MA	0 mA (**Default**)
4 MA	4 mA
20 MA	20 mA
21.5MA	21.5 mA

223 *rES.* **Reserved parameter**

Reserved parameter

224 *A.L.dE.* **Alarm 6 Delay**

Alarm delay
-60:00÷60:00 mm:ss (hh:mm if *AL.L.F* = *c. AuX*). **Default**: 00:00

Negative value:	Delay when exit alarm state
Positive value:	Delay when enter alarm state

225 *A.L.S.P.* **Alarm 6 Setpoint Protection**

Allows the alarm setpoint value to be changed or not

FrEE	User modifiable (**Default**)
LocK	Locked
HIdE	Protected and not displayed

226 *A.L.Lb.* **Alarm 6 Label**

Set the message to be displayed when alarm is active

diSAb.	Disabled (**Default**)
Lb. 01	Message 1 (see "Alarms Label" table par. 11.2)
Lb. 20	Message 20 (see "Alarms Label" table par. 11.2)
uSER.L.	Custom message (user-modifiable via modbus)

227-230	Reserved Parameters
Reserved Parameters	

10.2.13 d.i.1 – Digital input 1

231 d.i.1.F.	Digital Input 1 Function
Digital input functioning	
dISAb.	Disabled (**Default**)
2t. SW.	2 Setpoints Switch
2t. SW.	2 Setpoints Switch Impulsive
3t. SW.	3 Setpoints Switch Impulsive
4t. SW.	4 Setpoints Switch Impulsive
St./St.	Start / Stop
RUN	Run
HoLd	Lock conversion (stop all conversions and display values)
tUNE	Start manual tune
Au.MA.I.	Automatic / Manual Impulse (if enabled on parameter 48 or 67)
Au.MA.c	Automatic / Manual Contact (if enabled on parameter 48 or 67)
Act.tY.	Action Type. Cooling Control if D.I. is active, otherwise heating regulation
A.I. 0	Analogue Input 0. Set AI to zero
M. RES.	Manual reset. Reset the outputs if selected as manual reset
t.1.rUN	Timer 1 run. The timer 1 count with activated D.I.
t.1. S.E.	Timer 1 Start End. D.I. starts and stops the timer 1 (impulsive)
t.1.StR.	Timer 1 Start. D.I. starts the timer 1 (impulsive)
t.1.End	Timer 1 End. D.I. stops the timer 1 (impulsive)
t.2.RUN	Timer 2 run. The timer 2 count with activated D.I.
t.2. S.E.	Timer 2 Start End. D.I. starts and stops the timer 2 (impulsive)
t.2.StR.	Timer 2 Start. D.I. starts the timer 2 (impulsive)
t.2.End	Timer 2 End. D.I. stops the timer 2 (impulsive)
Lo.cFG.	Lock configuration parameters and setpoints
uP.KEY	Simulates the functioning of up key
doWN.K.	Simulates the functioning of down key
FNc. K.	Simulates the functioning of fnd key
SEt. K.	Simulates the functioning of set key
REM.S.E.	Remote setpoint enabling (remote setpoint must be enabled on parameter 56 rEM.S.) Enables Remote setpoint with activated D.I. local setpoint with deactivated D.I.
Ext.AL.	External alarm. The controller goes on STOP and the alarms will be disabled. The controller does not return to START automatically: for this operation, the user's action is required

232 d.i.1.c.	Digital Input 1 Contact
Defines the resting contact of the digital input	
n.oPEN	Normally open (**Default**)
n.cLoS.	Normally closed
233 d.i.1.P.	**Digital Input 1 Process**
Select the value connected to digital input	
A.iN.1	Value read on input AI1 (**Default**)
A.iN.2	Value read on input AI2
MEAn	Arithmetic average of the value read on inputs AI1 and AI2 [(AI1-AI2)/2]
diFF.	Difference of the values read on inputs AI1 and AI2 (AI1-AI2)
Ab.diF.	Module of the difference of the values read on inputs AI1 and AI2 (|AI1-AI2|)
SuM	Sum of values read on inputs AI1 and AI2 (AI1+AI2)
234 d.i.1.r.	**Digital Input 1 Loop Reference**
Select the reference loop for the digital input functions	
cMd. 1	Loop 1 (**Default**)
cMd. 2	Loop 2
cMd.1.2	Loop 1 and 2
235-238	**Reserved Parameters**
Reserved parameters	

10.2.14 d.i.2 – Digital input 2

239 d.i.2.F.	Digital Input 2 Function
Digital input functioning	
diSAb.	Disabled (**Default**)
2t. SW.	2 Setpoints Switch
2t. SW.	2 Setpoints Switch Impulsive
3t. SW.	3 Setpoints Switch Impulsive
4t. SW.	4 Setpoints Switch Impulsive
St./St.	Start / Stop
RuN	Run
HoLd	Lock conversion (stop all conversions and display values)
tuNE	Start manual tune
Au.MA.i.	Automatic / Manual Impulse (if enabled on parameter 48 or 67)
Au.MA.c	Automatic / Manual Contact (if enabled on parameter 48 or 67)
Act.tY.	Action Type. Cooling Control if D.I. is active, otherwise heating regulation
A.i. 0	Analogue Input 0. Set AI to zero
M. RES.	Manual reset. Reset the outputs if selected as manual reset
t.1.ruN	Timer 1 run. The timer 1 count with activated D.I.
t.1. S.E.	Timer 1 Start End. D.I. starts and stops the timer 1 (impulsive)
t.1.StA.	Timer 1 Start. D.I. starts the timer 1 (impulsive)
t.1.End	Timer 1 End. D.I. stops the timer 1 (impulsive)
t.2.RuN	Timer 2 run. The timer 2 count with activated D.I.
t.2. S.E.	Timer 2 Start End. D.I. starts and stops the timer 2 (impulsive)
t.2.StA.	Timer 2 Start. D.I. starts the timer 2 (impulsive)
t.2.End	Timer 2 End. D.I. stops the timer 2 (impulsive)
Lo.cFG.	Lock configuration parameters and setpoints
uP.KEY	Simulates the functioning of up key

doWN.K.	Simulates the functioning of down key
FNc. K.	Simulates the functioning of fnd key
SEt. K.	Simulates the functioning of set key
REM.S.E.	Remote setpoint enabling (remote setpoint must be enabled on parameter 56 rEM.S.) Enables Remote setpoint with activated D.I. local setpoint with deactivated D.I.
Ext.AL.	External alarm. The controller goes on STOP and the alarms will be disabled. The controller does not return to START automatically: for this operation, the user's action is required

240 d.i.2.c. Digital Input 2 Contact

Defines the resting contact of the digital input

n.oPEN	Normally open (**Default**)
n.cLoS.	Normally closed

241 d.i.2.P. Digital Input 2 Process

Select the value connected to digital input

A.in.1	Value read on input AI1 (**Default**)
A.in.2	Value read on input AI2
MEAn	Arithmetic average of the value read on inputs AI1 and AI2 [(AI1-AI2)/2]
diFF.	Difference of the values read on inputs AI1 and AI2 (AI1-AI2)
Ab.diF.	Module of the difference of the values read on inputs AI1 and AI2 (|AI1-AI2|)
SuM	Sum of values read on inputs AI1 and AI2 (AI1+AI2)

242 d.i.2.r. Digital Input 2 Loop Reference

Select the reference loop for the digital input functions

cMd. 1	Loop 1 (**Default**)
cMd. 2	Loop 2
cMd.1.2	Loop 1 and 2

243-246 Reserved Parameters

Reserved parameters

10.2.15 d.i.3 – Digital input 3

247 d.i.3.F. Digital Input 3 Function

Digital input functioning

diSAb.	Disabled (**Default**)
2t. SW.	2 Setpoints Switch
2t. SW.	2 Setpoints Switch Impulsive
3t. SW.	3 Setpoints Switch Impulsive
4t. SW.	4 Setpoints Switch Impulsive
St./St.	Start / Stop
RUN	Run
HoLd	Lock conversion (stop all conversions and display values)
tUNE	Start manual tune
Au.MA.1.	Automatic / Manual Impulse (if enabled on parameter 48 or 67)
Au.MA.c	Automatic / Manual Contact (if enabled on parameter 48 or 67)
Act.tY.	Action Type. Cooling Control if D.I. is active, otherwise heating regulation
A.1. 0	Analogue Input 0. Set AI to zero
M. RES.	Manual reset. Reset the outputs if selected as manual reset
t.1.run	Timer 1 run. The timer 1 count with activated D.I.
t.1. S.E.	Timer 1 Start End. D.I. starts and stops the timer 1 (impulsive)
t.1.StA.	Timer 1 Start. D.I. starts the timer 1 (impulsive)
t.1.End	Timer 1 End. D.I. stops the timer 1 (impulsive)

t.2.RUN	Timer 2 run. The timer 2 count with activated D.I.
t.2. S.E.	Timer 2 Start End. D.I. starts and stops the timer 2 (impulsive)
t.2.StR.	Timer 2 Start. D.I. starts the timer 2 (impulsive)
t.2.End	Timer 2 End. D.I. stops the timer 2 (impulsive)
Lo.cFG.	Lock configuration parameters and setpoints
uP.KEY	Simulates the functioning of up key
doWN.K.	Simulates the functioning of down key
FNc. K.	Simulates the functioning of fnd key
SEt. K.	Simulates the functioning of set key
REM.S.E.	Remote setpoint enabling (remote setpoint must be enabled on parameter 56 rEM.S.) Enables Remote setpoint with activated D.I. local setpoint with deactivated D.I.
Ext.AL.	External alarm. The controller goes on STOP and the alarms will be disabled. The controller does not return to START automatically: for this operation, the user's action is required

248 d.i.3.c. Digital Input 3 Contact

Defines the resting contact of the digital input

n.oPEN	Normally open (**Default**)
n.cLoS.	Normally closed

249 d.i.3.P. Digital Input 3 Process

Select the value connected to digital input

A.iN.1	Value read on input AI1 (**Default**)
A.iN.2	Value read on input AI2
MEAn	Arithmetic average of the value read on inputs AI1 and AI2 [(AI1-AI2)/2]
diFF.	Difference of the values read on inputs AI1 and AI2 (AI1-AI2)
Ab.diF.	Module of the difference of the values read on inputs AI1 and AI2 (|AI1-AI2|)
SUM	Sum of values read on inputs AI1 and AI2 (AI1+AI2)

250 d.i.3.r. Digital Input 3 Loop Reference

Select the reference loop for the digital input functions

cMd. 1	Loop 1 (**Default**)
cMd. 2	Loop 2
cMd.1.2	Loop 1 and 2

251-254 Reserved Parameters

Reserved parameters

10.2.16 d.i.4 – Digital input 4

255 d.i.4.F. Digital Input 4 Function

Digital input functioning

diSAb.	Disabled (**Default**)
2t. SW.	2 Setpoints Switch
2t. SW.	2 Setpoints Switch Impulsive
3t. SW.	3 Setpoints Switch Impulsive
4t. SW.	4 Setpoints Switch Impulsive
St./St.	Start / Stop
RUN	Run
HoLd	Lock conversion (stop all conversions and display values)
tUNE	Start manual tune
Au.MA.i.	Automatic / Manual Impulse (if enabled on parameter 48 or 67)
Au.MA.c	Automatic / Manual Contact (if enabled on parameter 48 or 67)
Act.tY.	Action Type. Cooling Control if D.I. is active, otherwise heating regulation
A.i. 0	Analogue Input 0. Set AI to zero

	M. RES.	Manual reset. Reset the outputs if selected as manual reset
	t.1.run	Timer 1 run. The timer 1 count with activated D.I.
	t.1. S.E.	Timer 1 Start End. D.I. starts and stops the timer 1 (impulsive)
	t.1.StR.	Timer 1 Start. D.I. starts the timer 1 (impulsive)
	t.1.End	Timer 1 End. D.I. stops the timer 1 (impulsive)
	t.2.RuN	Timer 2 run. The timer 2 count with activated D.I.
	t.2. S.E.	Timer 2 Start End. D.I. starts and stops the timer 2 (impulsive)
	t.2.StR.	Timer 2 Start. D.I. starts the timer 2 (impulsive)
	t.2.End	Timer 2 End. D.I. stops the timer 2 (impulsive)
	Lo.cFG.	Lock configuration parameters and setpoints
	uP.KEY	Simulates the functioning of up key
	doWN.K.	Simulates the functioning of down key
	FNc. K.	Simulates the functioning of fnd key
	SEt. K.	Simulates the functioning of set key
	REM.S.E.	Remote setpoint enabling (remote setpoint must be enabled on parameter 56 rEM.S.) Enables Remote setpoint with activated D.I. local setpoint with deactivated D.I.
	Ext.AL.	External alarm. The controller goes on STOP and the alarms will be disabled. The controller does not return to START automatically: for this operation, the user's action is required
256	d.i.4.c.	**Digital Input 4 Contact**
	Defines the resting contact of the digital input	
	n.oPEN	Normally open (**Default**)
	n.cLoS.	Normally closed
257	d.i.4.P.	**Digital Input 4 Process**
	Select the value connected to digital input	
	A.iN.1	Value read on input AI1 (**Default**)
	A.iN.2	Value read on input AI2
	MEAn	Arithmetic average of the value read on inputs AI1 and AI2 [(AI1-AI2)/2]
	diFF.	Difference of the values read on inputs AI1 and AI2 (AI1-AI2)
	Ab.diF.	Module of the difference of the values read on inputs AI1 and AI2 (|AI1-AI2|)
	SuM	Sum of values read on inputs AI1 and AI2 (AI1+AI2)
258	d.i.4.r.	**Digital Input 4 Loop Reference**
	Select the reference loop for the digital input functions	
	cmd. 1	Loop 1 (**Default**)
	cmd. 2	Loop 2
	cmd.1.2	Loop 1 and 2
259-262		**Reserved Parameters**
	Reserved parameters	

10.2.17 SFt.S – Soft-Start and Mini Cycle

263	Pr.cY.	**Mini Cycle Enable**
	Enables Mini Cycle functionings (see paragraph 8.13)	
	diSAb.	Disabled (**Default**)
	EnAb.	Enabled (all remote setpoint functions are inhibited)
264	SS.TY.	**Soft-Start Type**
	Enables and selects the Soft-Start type	
	diSAb.	Disabled (**Default**)
	GrAd.	Gradient
	PErc.	Percentage (only with pre-programmed cycle disabled)
265	SS.r.c.	**Soft-Start Reference Command**
	Defines the reference command for the Soft-Start and the pre-programmed cycle	
	cMd. 1	Loop 1 (**Default**)
	cMd. 2	Loop 2
	cMd.1.2	Loop 1 and 2
266	SS.Gr.	**Soft-Start Gradient**
	Rising/falling gradient for Soft-Start and Mini cycle 0÷20000 Digit/hour (degrees.tenths/hour if temperature). (**Default**: 100.0)	
267	SS.PE.	**Soft-Start Percentage**
	Output percentage during Soft-Start function 0÷100%. (Default: 50%)	
268	SS.tH.	**Soft-Start Threshold**
	Threshold under which the Soft-Start percentage function is activated, at starting -9999÷30000 [digit] (degrees.tenths for temp. sensors) (**Default**: 1000)	
269	SS.ti.	**Soft-Start Time**
	Max. Soft Start duration: if the processs will not reach the threshold selected on par. SS.tH. within the selected time, the controller starts to control on setpoint.	
	00:00	Disabled
	00:01-24:00	hh:mm (**Default**: 00:15)
270	MA.ti.	**Maintenance Time**
	Maintenance time for Mini Cycle 00:00-24:00 hh.mm (**Default**: 00:00)	
271	FA.Gr.	**Falling Gradient**
	Falling gradient for Mini Cycle 00:00-24:00 hh.mm (**Default**: 00:00)	
	0	Disabled (**Default**)
	1÷10000	Digit/hour (degrees.tenths/hour if temperature)
272	dE.St.	**Delayed Start**
	Set the initial waiting time for the delayed start of the setting or cycle, even in case of a blackout. The elapsed time is saved every 10 minutes	
	0	Initial waiting time disabled: the controller starts immediately (**Default**)
	00:01-24:00 hh.mm	Initial waiting time enabled
273-276		**Reserved Parameters**
	Reserved parameters	

10.2.18 diSP – Display and interface

277	u.FLt	**Visualization Filter**
	diSAb.	Disabled
	PtcHF	Pitchfork filter (**Default**)
	Fi.oRd.	First Order
	Fi.oR.P.	First Order with Pitchfork
	2 SA.M.	2 Samples Mean
	...	...n Samples Mean
	10.SA.M.	10 Samples Mean
278	ui.d.2	**Visualization Display 2**
	Set display 2 visualization	
	c.1.SPV	Loop 1 setpoint (**Default**)
	ou.PE.1	Loop 1 Output %
	A.1N.1	AI1 Value
	A.1n.2	AI2 Value
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2]
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2)
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|)
	SuM	Sum of values read at the inputs AI1 and AI2 (AI1+AI2)
	c.2.SPV	Setpoint Loop 2
	ou.PE.2	Loop 2 Output %
	AMPEr.	Ampere from current transformer
279	tMo.d.	**Timeout Display**
	Set the display time-out	
	diSab.	Disabled. Display always ON (**Default**)
	15 S	15 seconds
	1 MIn	1 minute
	5 MIn	5 minutes
	10MIn	10 minutes
	30MIn	30 minutes
	1 h	1 hour
280	tMo.S.	**Timeout Selection**
	Selecting which display is switched off when the Display Timeout expires	
	diSP.1	Display 1
	diSP.2	Display 2 (**Default**)
	dSP.1.2	Display 1 and 2
	d.1.2.Ld.	Display 1, 2 and led
281	u.M.P.c.	**User Menu Pre-Mini Cycle**
	Allows to change the gradient of rise, fall and hold time from the user menu, when the Mini Cycle function is enabled. To access parameter editing, press the SET button	
	diSAb.	Disabled (**Default**)
	RiS.GR.	Only rising gradient
	MA.tI.	Only retention time
	Ri.G.M.t.	Rising gradient and retention time
	FAL.GR	Only falling gradient
	Ri.FA.G.	Rising and falling gradient
	FA.G.M.t.	Falling gradient and retention time
	R.F.G.M.t.	Rising gradient, retention time and falling gradient

282	u.out	**Voltage Output**
	Selects the voltage at the supply terminals of the probes and digital outputs (SSR)	
	12V	12 volt (**Default**)
	24V	24 Volt
283	ScL.t.	**Scrolling Time**
	Selects the duration of the user menu data display, before returning to the default page display	
	3 S	3 seconds
	5 S	5 seconds (**Default**)
	10 S	10 seconds
	30 S	30 seconds
	1 MIN	1 minute
	5 MIN	5 minutes
	10MIN	10 minutes
	MAn.Sc.	Manual scroll
284	d.SP.F.	**Display Special Functions**
	diSAb.	Disabled
	SWAP	Shows setpoint on display 1 and process value on display 2 (only if Parameter 278 u1.d.2 is set to c.1.SPu)
285		**Reserved Parameter**
	Reserved Parameter	
286	S.K.S.F.	**Set Key Special Functions**
	Assign special functions to the SET button. To execute the function, the button must be pressed for 1 second.	
	diSAb.	No special function linked to the SET button. (**Default**)
	St./St.	Start/Stop. Pressing the SET button the controller switches from Start to Stop and vice-versa. Status of the controller, upon power-up, depends on parameter In1.S.

10.2.19 ct – Current transformer

287	ct. F	**Current Transformer Function**
	Enables the C.T. input and selects the line frequency	
	diSAb.	Disabled (**Default**)
	50 HZ	50 Hz
	60 HZ	60 Hz
288	ct u.	**Current Transformer Value**
	Selects the amperometric transformer full-scale 1÷200 Ampere (**Default**: 50)	
289	H.b.A.r.	**Heater Break Alarm Reference Command**
	Defines the reference command for the Heater Break alarm and the overcurrent alarm	
	cMd. 1	Loop 1 (**Default**)
	cMd. 2	Loop 2
290	H.b.A.t.	**Heater Break Alarm Reference Command**
	Heater Break Alarm activation threshold	
	0	Alarm disabled (**Default**)
	0.1-200.0	Ampere
291	ocu.t.	**Overcurrent Alarm Threshold**
	Overcurrent alarm threshold	
	0	Alarm disabled (**Default**)
	0.1-200.0	Ampere
292	H.b.A.d.	**Heater Break Alarm Delay**
	Heater Break Alarm and overcurrent alarm activation delay	
	00:00-b0:00	mm:ss (**Default**: 01:00)
293-297		**Reserved Parameters**
	Reserved parameters	

10.2.20 A.o.1 – Retransmission 1

298	rtM.1	**Retransmission 1 (AO1)**
	Select the variable to be retransmitted on the analogue output Parameters 300 and 301 define lower and upper limit	
	diSAb.	Disabled (**Default**)
	c.1.SPV	Command 1 setpoint
	AL. 1	Alarm 1 setpoint
	AL. 2	Alarm 2 setpoint
	Md.bus	Retransmits the value written on word 1241
	A.IN.1	AI1 input value
	A.In.2	AI2 input value
	MEAn	Arithmetic average of the values read on the inputs AI1 and AI2 [(AI1+AI2)/2].
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2).
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|).
	SuM	Sum of values read at the inputs AI1 ND AI2 (AI1+AI2).
	c.2.SPV	Command 2 setpoint
	AMPEr.	Ampere from current transformer
299	r.1.tY	**Retransmission 1 Type**
	Selects the retransmission type	
	0.10 V	Output 0÷10 V
	4.20MA	Output 4÷20 mA (**Default**)
300	r.1. L.L.	**Retransmission 1 Lower Limit**
	Retransmission 1 lower limit range (value related to 10V or 0/4mA) -9999÷+30000 [digit] (degrees if temperature) **Default**: 0.	
301	r.1. u.L.	**Retransmission 1 Upper Limit**
	Retransmission 1 upper limit range (value related to 10V or 20mA) -9999÷+30000 [digit] (degrees if temperature) **Default**: 1000	
302	r.1.S.E.	**Retransmission 1 State Error**
	Determines retransmission value if in error or anomaly **If the retransmission output is 0÷10V:**	
	0 V	0V (**Default**)
	10 V	10V
	If the retransmission output is 0÷20mA or 4÷20mA	
	0 MA	0 mA (**Default**)
	4 MA	4 mA
	20 MA	20 mA
	21.5MA	21.5 mA
303-307		**Reserved Parameters**
	Reserved parameters	

10.2.21 A.o.2 – Retransmission 2

308	rtM.2	**Retransmission 2 (AO2)**
	Select the variable to be retransmitted on the analogue output Parameters 310 and 311 define lower and upper limit	
	diSAb.	Disabled (**Default**)
	c.1.SPV	Command 1 setpoint
	AL. 1	Alarm 1 setpoint
	AL. 2	Alarm 2 setpoint
	Md.bus	Retransmits the value written on word 1242
	A.IN.1	AI1 input value
	A.In.2	AI2 input value
	MEAn	Arithmetic average of the values read on the inputs AI1 e AI2 [(AI1+AI2)/2].
	diFF.	Difference of read values on inputs AI1 and AI2 (AI1-AI2).
	Ab.diF.	Module of the difference of the values read at the inputs AI1 and AI2 (|AI1-AI2|).
	SuM	Sum of values read at the inputs AI1 e AI2 (AI1+AI2).
	c.2.SPV	Command 2 setpoint
	AMPEr.	Ampere from current transformer
309	r.2.tY	**Retransmission 2 Type**
	Selects the retransmission type	
	0.10 V	Output 0÷10 V
	4.20MA	Output 4÷20 mA (**Default**)
310	r.2. L.L.	**Retransmission 2 Lower Limit**
	Retransmission 2 lower limit range (value related to 10V or 0/4mA) -9999÷+30000 [digit] (degrees if temperature) **Default**: 0.	
311	r.2. u.L.	**Retransmission 2 Upper Limit**
	Retransmission 2 upper limit range (value related to 10V or 20mA) -9999÷+30000 [digit] (degrees if temperature) **Default**: 1000	
312	r.2.S.E.	**Retransmission 2 State Error**
	Determines retransmission value if in error or anomaly **If the retransmission output is 0÷10V:**	
	0 V	0V (**Default**)
	10 V	10V
	If the retransmission output is 0÷20mA or 4÷20mA	
	0 MA	0 mA (**Default**)
	4 MA	4 mA
	20 MA	20 mA
	21.5MA	21.5 mA
313-317		**Reserved Parameters**
	Reserved parameters	

10.2.22 SEr. – Serial Communication

318 SL.Ad. Slave Address

Selects slave address for serial communication
1÷254. **Default**: 247.

319 bd.rt. Baud Rate

Selects baud rate for serial communication

1.2 K	1200 bit/s
2.4 K	2400 bit/s
4.8 K	4800 bit/s
9.6 K	9600 bit/s
19.2 K	19200 bit/s (**Default**)
28.8 K	28800 bit/s
38.4 K	38400 bit/s
57.6 K	57600 bit/s
115.2K	115200 bit/s

320 S.P.P. Serial Port Parameters

Selects the Modbus RTU serial communication format

8-N-1	8 bit, no parity, 1 stop bit (**Default**)
8-E-1	8 bit, even parity, 1 stop bit
8-o-1	8 bit, odd parity, 1 stop bit
8-N-2	8 bit, no parity, 2 stop bit
8-E-2	8 bit, even parity, 2 stop bit
8-o-2	8 bit, odd parity, 2 stop bit

321 SE.dE Serial Delay

Selects serial delay
0÷100 ms. **Default**: 5 ms.

322 oFF.L. Off Line (communication watch-dog)

Selects the off-line time. If there is no serial communication during the selected time, the controller switches-off the command output

0	Offline disabled (**Default**)
0.1-600.0	Tenths of second

323-327 Reserved Parameters

Reserved parameters

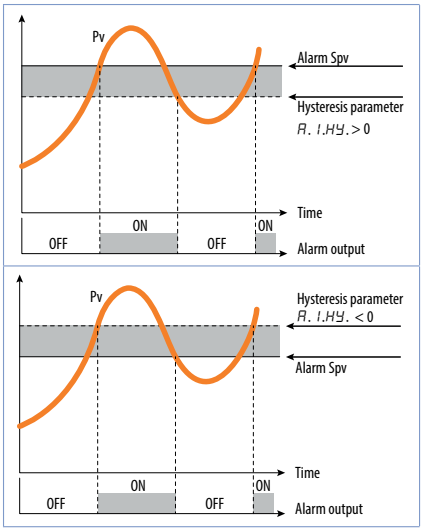
10.2.23 tiMr – Timers

328	tMr.1	**Timer 1**
	Enabling Timer 1	
	diSAb.	Disabled (**Default**)
	ENAb.	Enabled
	EN.StA	Enabled and active at instrument start
329	t.b.t.1	**Time Base Timer 1**
	Selects time base for timer 1	
	MM.SS	minutes.seconds (**Default**)
	HH.MM	hours.minutes
330	A.tM.1	**Action Timer 1**
	Select the type of the action executed by the timer 1 to be linked to an alarm	
	StArt	Start. Active during timer counting (**Default**)
	End	End. Active at timer expiry
	WArN.	Warning. Active 5" before the timer expiry
331	tMr.2	**Timer 2**
	Enabling timer 2	
	diSAb.	Disabled (**Default**)
	ENAb.	Enabled
	EN.StA	Enabled and active at instrument start
332	t.b.t.2	**Time Base Timer 2**
	Selects time base for timer 2	
	MM.SS	minutes.seconds (**Default**)
	HH.MM	hours.minutes
333	A.tM.2	**Action Timer 2**
	Select the type of the action executed by the timer 2 to be linked to an alarm	
	StArt	Start. Active during timer counting (**Default**)
	End	End. Active at timer expiry
	WArN.	Warning. Active 5" before the timer expiry
334	tMr.S	**Timer Sequence**
	Select the correlation between the two timers	
	SiNGL.	Singles. Timers work independently (**Default**)
	SEQuE.	Sequential. When timer 1 ends, timer 2 starts
	LooP	Loop. When a timer ends, another starts
335-339		**Reserved Parameters**
	Reserved parameters	

11 Alarm Features

11.1 Alarm Intervention Modes

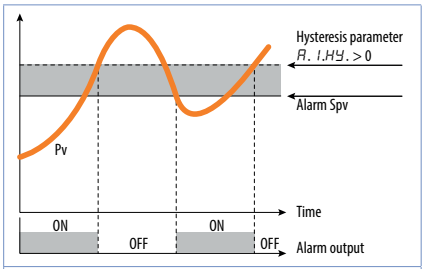
Absolute Upper Activation (Parameter 123 AL.1F = Ab.uP.A.)



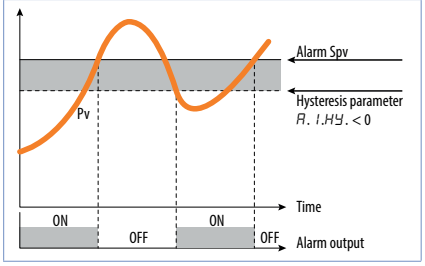
Hysteresis value greater than 0 (Par. 128 A. 1.HY >0).

Hysteresis value lower than 0 (Par. 128 A. 1.HY <0).

Absolute Lower Activation (Parameter 123 AL.1F = Ab.Lo.A.)

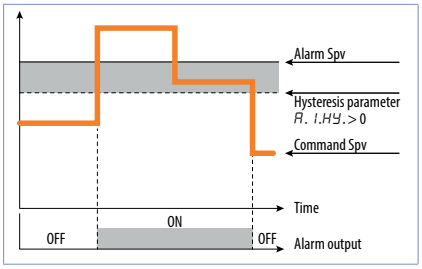


Hysteresis value greater than 0 (Par. 128 A. 1.HY >0).



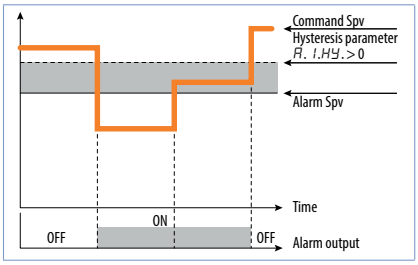
Hysteresis value lower than 0 (Par. 128 A. 1.HY <0)

Absolute Upper alarm of Loop Setpoint (Parameter 123 AL.1F = Ab.c.u.A.)



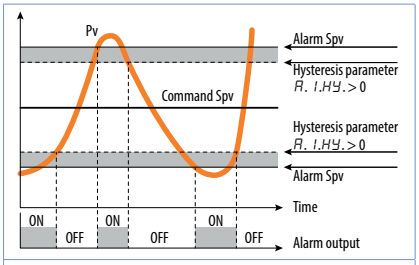
Hysteresis value greater than 0 (Par. 128 A. 1.HY >0).

Absolute Lower alarm of Loop Setpoint (Parameter 123 RL.1F = Ab.c.L.A.)

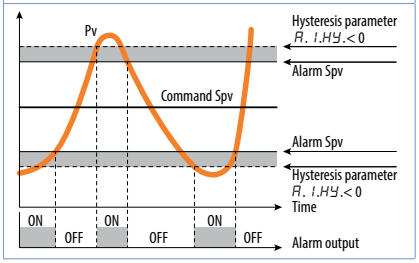


Hysteresis value greater than 0 (Par. 128 A.1.HY >0).

Band alarm (Parameter 123 RL.1F = bAnd)

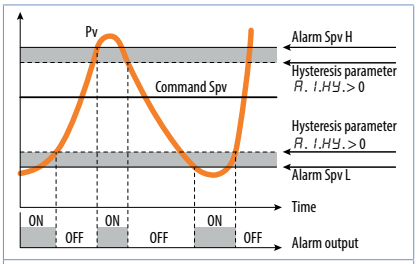


Hysteresis value greater than 0 (Par. 128 A.1.HY >0).

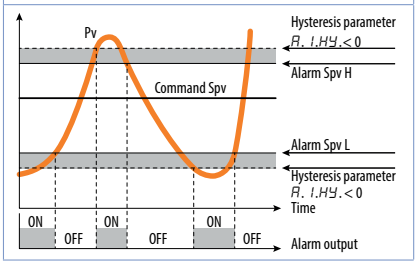


Hysteresis value lower than 0 (Par. 128 A.1.HY <0).

Asymmetric band alarm (Parameter 123 RL.1F = A.bAnd)

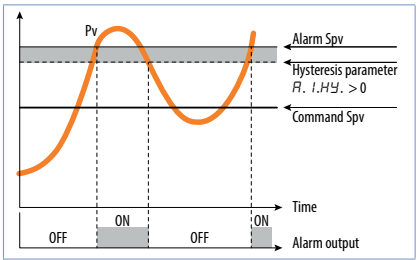


Hysteresis value greater than 0 (Par. 128 A.1.HY >0).

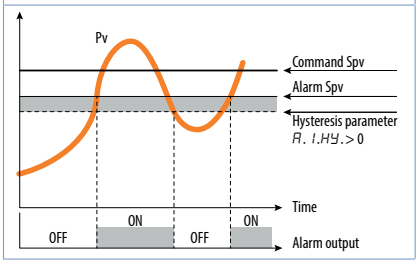


Hysteresis value lower than 0 (Par. 128 A.1.HY <0).

Upper deviation alarm (Parameter 123 *AL.1F* = *uP.dEu*.)

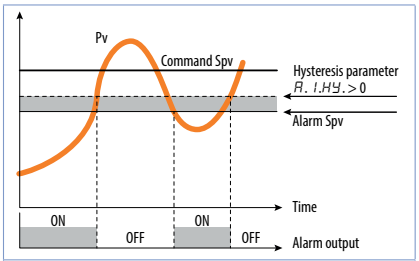


Alarm Setpoint greater than 0 and Hysteresis value greater than 0 (Par. 128 *A.1.HY* >0).
NB: with hysteresis value lower than 0 (*A.1.HY* <0) the dotted line moves above the alarm setpoint.

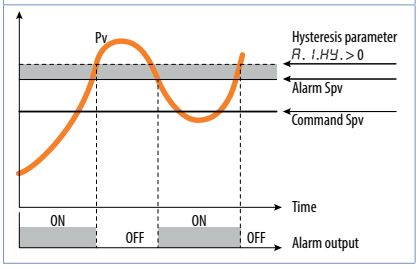


Alarm Setpoint less than 0 and Hysteresis value greater than 0 (Par. 128 *A.1.HY* >0).
NB: with hysteresis value lower than 0 (*A.1.HY* <0) the dotted line moves above the alarm setpoint.

Lower deviation alarm (Parameter 123 *AL.1F* = *Lo.dEu*.)



Alarm Setpoint greater than 0 and Hysteresis value greater than 0 (Par. 128 *A.1.HY* >0).
NB: with hysteresis value lower than 0 (*A.1.HY* <0) the dotted line moves below the alarm setpoint.



Alarm Setpoint lower than 0 and Hysteresis value greater than 0 (Par. 128 *A.1.HY* >0).
NB: with hysteresis value lower than 0 (*A.1.HY* <0) the dotted line moves below the alarm setpoint.

11.2 Alarms label

It is possible to make a text message appear in the second display by setting the parameters: 136 *A.1.Lb.*, 154 *A.2.Lb.*, 172 *A.3.Lb.*, 190 *A.4.Lb.*, 208 *A.5.Lb.* and 226 *A.6.Lb.* with values between 1 and 20, according to the following table:

Value	Message displayed in the alarm event
0	Message disabled
1	alarm 1
2	alarm 2
3	alarm 3
4	alarm 4
5	alarm 5
6	alarm 6
7	open door
8	closed door
9	light on
10	light off
11	warning
12	waiting
13	high limit
14	low limit
15	external alarm
16	temperature alarm
17	pressure alarm
18	fan command
19	cooling
20	operating
21	Custom message

By setting "0", no message will be displayed. While setting "21", the user will have up to 23 characters available to customize his message via Configurator software or via modbus.

12 Table of Anomaly Signals

If installation malfunctions, the controller switches off the outputs, signalling the anomaly with a code.
E.g.: if the instrument detects a broken thermocouple connected, the first display will flash showing code *E-05*.
Please refer to the table below for the complete list of signalling:

Error Code	Short description	Cause	What to do
E-02	*SYSTEM Error*	Cold junction temperature sensor failure or environment temperature out of range	Call technical support
E-04	*EEProm Error*	Incorrect configuration data or instrument calibration	Call technical support
E-05	*PRobE 1 Error*	Sensor connected to AI1 broken or temperature out of range	Verify connection with probes and their integrity.
E-06	*PRobE 2 Error*	Sensor connected to AI2 broken or temperature out of range	Verify connection with probes and their integrity.
E-08	*SYSTEM Error*	Missing calibration	Call technical support
E-10	*A.In.2 diSAbLEd*	Analogue input 2 disabled but used during configuration	Enable *A.In.2*
E-80	*rFid Error*	Tag rfid malfunctioning	Call technical support

13 Configuration parameter table

A.in.1 – Analogue Input 1		pagina 43
1	SEn.1	Sensor AI1
2	d.P.1	Decimal point 1
3	dEGr.	Degree
4	L.L.i.1	Lower Linear Input AI1
5	u.L.i.1	Upper Linear Input AI1
6	P.uA.1	Potentiometer Value AI1
7	i.o.L.1	Linear Input over Limits AI1
8	o.cA.1	Offset Calibration AI1
9	G.cA.1	Gain Calibration AI1
10	Ltc.1	Latch-On AI1
11	c.FL.1	Conversion Filter AI1
12	c.Fr.1	Conversion Frequency AI1
13	L.c.E.1	Lower Current Error 1
14-17		Reserved Parameters
A.in.2 – Analogue Input 2		pagina 45
18	SEn.2	Sensor AI2
19	d.P.2	Decimal point 2
20	rES.	Reserved
21	L.L.i.2	Lower Linear Input AI2
22	u.L.i.2	Upper Linear Input AI2
23	P.uA.2	Potentiometer Value AI2
24	i.o.L.2	Linear Input over Limits AI2
25	o.cA.2	Offset Calibration AI2
26	G.cA.2	Gain Calibration AI2
27	Ltc.2	Latch-On AI2
28	c.FL.2	Conversion Filter AI2
29	c.Fr.2	Conversion Frequency AI2
30	L.c.E.2	Lower Current Error 2
31-34		Reserved Parameters
cnd1. – Outputs and Process control 1		pagina 47
35	c.ou.1	Command Output 1
36	c.Pr.1	Command Process 1
37	rES.	Reserved
38	Ac.t.1	Action type 1
39	c.HY.1	Command Hysteresis 1

40	L.L.S1.	Lower Limit Setpoint 1
41	U.L.S.1	Upper Limit Setpoint 1
42	c.rE.1	Command Reset 1
43	c.S.E.1	Command State Error 1
44	c.Ld.1	Command Led 1
45	c.dE.1	Command Delay 1
46	c.S.P.1	Command Setpoint Protection 1
47	uA.t.1	Valve Time 1
48	A.MA.1	Automatic / Manual 1
49	Ini.S.	Initial State
50	S.uA.S.	State Valve Saturation
51	i.SP.1	Initial Value Setpoint 1
52-53		Reserved parameters
cMd2. – Outputs and Process control 2		pagina 49
54	c.ou.2	Command Output 2
55	c.Pr.2	Command Process 2
56	rEM.S.	Remote Setpoint
57	Ac.t.2	Action type 2
58	c.HY.2	Command Hysteresis 2
59	L.L.S2	Lower Limit Setpoint 2
60	U.L.S.2	Upper Limit Setpoint 2
61	c.rE.2	Command reset 2
62	c.S.E.2	Command State Error 2
63	c.Ld.2	Command Led 2
64	c.dE.2	Command Delay 2
65	c.S.P.2	Command Setpoint Protection 2
66	vA.t.2	Valve Time 2
67	A.MA.2	Automatic / Manual 2
68	rES.	Reserved parameter
69	rES.	Reserved parameter
70	i.SP.2	Initial Value Setpoint 2
71-72		Reserved parameters
rEG1 – Autotuning and PID 1		pagina 51
73	tun.1	Tune 1
74	S.d.t.1	Setpoint Deviation Tune 1
75	P.b. 1	Proportional Band 1
76	I.t. 1	Integral Time 1
77	d.t. 1	Derivative Time 1
78	d.b. 1	Dead Band 1

79	P.b.c.1	Proportional Band Centered 1
80	o.o.S.1	Off Over Setpoint 1
81	o.d.t.1	Off Deviation Threshold 1
82	c.t. 1	Cycle Time 1
83	co.F.1	Cooling Fluid 1
84	P.b.M.1	Proportional Band Multiplier 1
85	o.d.b.1	Overlap/Dead Band 1
86	c.c.t.1	Cooling Cycle Time 1
87	L.L.P1.	Lower Limit Output Percentage 1
88	U.L.P1.	Upper Limit Output Percentage 1
89	M.G.t.1	Max Gap Tune 1
90	Mn.P.1	Minimum Proportional Band 1
91	MA.P.1	Maximum Proportional Band 1
92	Mn.i.1	Minimum Integral Time 1
93	o.c.L.1	Overshoot Control Level 1
94-97		Reserved Parameters
rEG2 – Autotuning and PID 2		pagina 53
98	tun.2	Tune 2
99	S.d.t.2	Setpoint Deviation Tune 2
100	P.b. 2	Proportional Band 2
101	I.t. 2	Integral Time 2
102	d.t. 2	Derivative Time 2
103	d.b. 2	Dead Band 2
104	P.b.c.2	Proportional Band Centered 2
105	o.o.S.2	Off Over Setpoint 2
106	o.d.t.2	Off Deviation Threshold 2
107	c.t. 2	Cycle Time 2
108	co.F.2	Cooling Fluid 2
109	P.b.M.2	Proportional Band Multiplier 2
110	o.d.b.2	Overlap/Dead Band 2
111	c.c.t.2	Cooling Cycle Time 2
112	L.L.P2.	Lower Limit Output Percentage 2
113	U.L.P2.	Upper Limit Output Percentage 2
114	M.G.t.2	Max Gap Tune 2
115	Mn.P.2	Minimum Proportional Band 2
116	MA.P.2	Maximum Proportional Band 2
117	Mn.i.2	Minimum Integral Time 2
118	o.c.L.2	Overshoot Control Level 2
119-122		Reserved Parameters

AL.1 – Alarm 1		pagina 55
123	AL.1.F.	Alarm 1 Function
124	A.1.Pr.	Alarm 1 Process
125	A.1.r.c.	Alarm 1 Loop Reference
126	A.1.S.o.	Alarm 1 State Output
127	rES.	Reserved Parameter
128	A.1.HY.	Alarm 1 Hysteresis
129	A1.L.L.	Alarm 1 Lower Limit
130	A.1.u.L.	Alarm 1 Upper Limit
131	A.1.rE.	Alarm 1 Reset
132	A.1.S.E.	Alarm 1 State Error
133	A.1.Ld.	Alarm 1 Led
134	A.1.dE.	Alarm 1 Delay
135	A.1.S.P.	Alarm 1 Setpoint Protection
136	A.1.Lb.	Alarm 1 Label
137-140		Reserved Parameters
AL.2 – Alarm 2		pagina 57
141	AL.2.F.	Alarm 2 Function
142	A.2.Pr.	Alarm 2 Process
143	A.2.r.c.	Alarm 2 Loop Reference
144	A.2.S.o.	Alarm 2 State Output
145	rES.	Reserved Parameter
146	A.2.HY.	Alarm 2 Hysteresis
147	A2.L.L.	Alarm 2 Lower Limit
148	A.2.u.L.	Alarm 2 Upper Limit
149	A.2.rE.	Alarm 2 Reset
150	A.2.S.E.	Alarm 2 State Error
151	A.2.Ld.	Alarm 2 Led
152	A.2.dE.	Alarm 2 Delay
153	A.2.S.P.	Alarm 2 Setpoint Protection
154	A.2.Lb.	Alarm 2 Label
155-158		Reserved Parameters
AL.3 – Alarm 3		pagina 59
159	AL.3.F.	Alarm 3 Function
160	A.3.Pr.	Alarm 3 Process
161	A.3.r.c.	Alarm 3 Loop Reference
162	A.3.S.o.	Alarm 3 State Output
163	A3.O.t.	Alarm 3 Output Type
164	A.3.HY.	Alarm 3 Hysteresis

165	A3.L.L.	Alarm 3 Lower Limit
166	A.3.u.L.	Alarm 3 Upper Limit
167	A.3.rE.	Alarm 3 Reset
168	A.3.S.E.	Alarm 3 State Error
169	A.3.Ld.	Alarm 3 Led
170	A.3.dE.	Alarm 3 Delay
171	A.3.S.P.	Alarm 3 Setpoint Protection
172	A.3.Lb.	Alarm 3 Label
173-176		Reserved Parameters
AL.4 – Alarm 4		pagina 61
177	AL.4.F.	Alarm 4 Function
178	A.4.Pr.	Alarm 4 Process
179	A.4.r.c.	Alarm 4 Loop Reference
180	A.4.S.o.	Alarm 4 State Output
181	A4.O.t.	Alarm 4 Output Type
182	A.4.HY.	Alarm 4 Hysteresis
183	A4.L.L.	Alarm 4 Lower Limit
184	A.4.u.L.	Alarm 4 Upper Limit
185	A.4.rE.	Alarm 4 Reset
186	A.4.S.E.	Alarm 4 State Error
187	rES.	Reserved parameter
188	A.4.dE.	Alarm 4 Delay
189	A.4.S.P.	Alarm 4 Setpoint Protection
190	A.4.Lb.	Alarm 4 Label
191-194		Reserved Parameters
AL.5 – Alarm 5		pagina 63
195	AL.5.F.	Alarm 5 Function
196	A.5.Pr.	Alarm 5 Process
197	A.5.r.c.	Alarm 5 Loop Reference
198	A.5.S.o.	Alarm 5 State Output
199	A5.O.t.	Alarm 5 Output Type
200	A.5.HY.	Alarm 5 Hysteresis
201	A5.L.L.	Alarm 5 Lower Limit
202	A.5.u.L.	Alarm 5 Upper Limit
203	A.5.rE.	Alarm 5 Reset
204	A.5.S.E.	Alarm 5 State Error
205	rES.	Reserved parameter
206	A.5.dE.	Alarm 5 Delay
207	A.5.S.P.	Alarm 5 Setpoint Protection

208	A.5.Lb.	Alarm 5 Label
209-212		Reserved Parameters
AL.6 – Alarm 6		pagina 66
213	AL.6.F.	Alarm 5 Function
214	A.6.Pr.	Alarm 6 Process
215	A.6.r.c.	Alarm 6 Loop Reference
216	A.6.S.o.	Alarm 6 State Output
217	A6.O.t.	Alarm 6 Output Type
218	A.6.HY.	Alarm 6 Hysteresis
219	A6.L.L.	Alarm 6 Lower Limit
220	A.6.u.L.	Alarm 6 Upper Limit
221	A.6.rE.	Alarm 6 Reset
222	A.6.S.E.	Alarm 6 State Error
223	rES.	Reserved parameter
224	A.6.dE.	Alarm 6 Delay
225	A.6.S.P.	Alarm 6 Setpoint Protection
226	A.6.Lb.	Alarm 6 Label
227-230		Reserved Parameters
d.i.1 – Digital input 1		pagina 68
231	d.i.1.F.	Digital Input 1 Function
232	d.i.1.c.	Digital Input 1 Contact
233	d.i.1.P.	Digital Input 1 Process
234	d.i.1.r.	Digital Input 1 Loop Reference
235-238		Reserved Parameters
d.i.2 – Digital input 2		pagina 69
239	d.i.2.F.	Digital Input 2 Function
240	d.i.2.c.	Digital Input 2 Contact
241	d.i.2.P.	Digital Input 2 Process
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CD Automation S.r.l.
Via Picasso, 34/36 - 20025 Legnano (MI)- Italy
Tel. +39 0331 577479 - Fax +39 0331 579479
E-mail: info@cdautomation.com - Web: www.cdautomation.com