8. Use the controller

8.1 Start-up

8.1.1 Warnings

CAUTION! Check again that the equipment and wiring are correct as required in this manual. Keep people or things out of the work area.

8.1.2 Start-up procedure

Follow this procedure for correct controller start-up:

Step	Task	Reference in the manual
1	Complete all electrical power connections at mains voltage.	"Electrical installation" on page 22
2	Complete the input connections (i.e. transducers) and remote controls. ***NOTICE**: follow the indicated steps for correct Modbus connection operations.*	"Connecting analog inputs in Slave mode" on page 25 "Analog input connections in Master mode" on page 25 "OUT analog output connections" on page 27 "RS485 Modbus RTU network connection (optional)" on page 28
3	Turn on power.	
4	Select the configuration suitable for the transducers used and the application	"Default configurations" on page 36
5	If necessary, enable reserved parameter editing on DIP switch SW1 and other functions	"DIP switch SW1" on page 14
6	Set the setpoint 1 or 2 and the night limit	"Basic parameters" on page 42
7	If necessary, set proportional bandwidth and setpoints for any external units and related parameters.	"Setpoint parameters (P ArA menu)" on page 44
8	If necessary, for PID mode, enable the dead band on the DIP switch and set parameters	"PID parameters (PID menu)" on page 52
9	If necessary, edit the configuration parameters	"Configuration parameters (menu conF)" on page 52
10	In communication with supervisor, set the communication parameters	"Modbus RTU communication parameters (conn menu)" on page 50
11	Disable reserved parameter editing on DIP switch SW1.	"DIP switch SW1" on page 14

8.1.3 Messages displayed when turned on

When the controller is turned on (or the **RESET** key pressed), the following messages are displayed:

Message	Description
ECPLUS	Device type.
rel. x.x	Firmware version.
rtE-01	Active configuration at that time. ***Note**: if the acronym is separated by dots it indicates that at least one configuration parameter has been changed (i.e. "r.t.E.-.0.1").*
in xx.x	Prevalent signal value between inputs **IN1** and **IN2**.

8.2 Default configurations

8.2.1 Configuration description

***Note**: in the default Master configuration, the setpoint coincides with the maximum fan speed (menu **conF** > **C4** = **hi**), and the controller automatically selects the sensor with the higher signal (menu **conF** > **C1** = **hi**).*

Configuration	Signal/Transducer	Type of control	Description
rS-010, rS-020, rS-420	signal 0–10 Vdc/0–20 mA/4–20 mA	**Slave**	They receive a voltage or current signal in input and replicate it proportionally to the analog **OUT** output. Control, alarms, and value display are always in volt (rS-010) or milliamp (rS-020, rS-420).
rtE-01, rtE-02	NTC 10K@25 °C probe	**Master**	They read NTC sensor values and convert them to temperature values. Regulation, alarms, and value display will always be in temperature (° C). ***NOTICE**: use the rtE-02 configuration if the MEI-4 input expansion module is installed.*
rPr420	transducers with 4-20 mA output and mA reading	**Master**	It reads transducer values with current output. Regulation, alarms, and value display will always be in milliampere.
rPr015, rPr025, rPr030, rPr045,	transducers with 4-20 mA output and bar reading	**Master**	They read transducer values with current output with different scales and convert them into pressure values. Control and value display will always be in pressure (bar). While the minimum and maximum limit alarm on the inputs are in mA, regardless. ***Note**: if the signal is less than 4 mA, 0 bar will always appear on the display.*
rPu030	transducers with V dc output and bar reading	**Master**	It reads transducer values with voltage output and converts them into pressure values. Regulation and value display will always be in pressure (bar).
rUu-05, rUu-010	transducers with V dc output and V dc reading	**Master**	They read transducer values with voltage output. Regulation, alarms, and value display will always be in volt.

8.2.2 Technical specifications of the configurations

Following are the specifications of each configuration:

Configuration	Mode	IN1/IN2 input	Signal/ Transducer/	Display	Setpoint	Proportional band
rS020	Slave	0–20 mA Ri= 100 Ω	0–20 mA	0–23 mA	-	-
rS-010	Slave	0–10 V dc Ri= 18 kΩ	0–10 V dc	0–11 V dc	-	-
rS-420	Slave	4–20 mA Ri= 100 Ω	4–20 mA	2–24 mA	-	-
rtE-01 (default)	Master	NTC 10 kΩ at 25 °C	NTC 10k@ 25 °C	from -20 to + 99 °C	45 °C	7.5 °C
rtE-02	Master	NTC 10 kΩ at 25 °C	NTC 10k@ 25 °C	from 14 to 99 °C	45 °C	7.5 °C
rPr420	Master	4–20 mA Ri= 100 Ω	4–20 mA	2–24 mA	14 mA	2.6 mA
rPr015	Master	4–20 mA Ri= 100 Ω	0–15 bar > 4–20 mA	0–19 bar	10.6 bar	2.4 bar
rPr025	Master	4–20 mA Ri= 100 Ω	0–25 bar > 4–20 mA	0–30 bar	17.0 bar	3.5 bar

Configuration	Mode	IN1/IN2 input	Signal/ Transducer/	Display	Setpoint	Proportional band
rPr030	Master	4–20 mA Ri= 100 Ω	0–30 bar > 4–20 mA	0–36 bar	17.0 bar	3.5 bar
rPr045	Master	4–20 mA Ri= 100 Ω	0–45 bar > 4–20 mA	0–54 bar	25.0 bar	5.2 bar
rUu05	Master	0–5 V dc Ri= 18 kΩ	0.5–4.5 V dc	0.5–5.5 V dc	2.9 V dc	0.8 V dc
rPu030	Master	0–5 V dc Ri= 18 kΩ	0–30 bar > 0–5 V dc	0–35 bar	17.0 bar	3.5 bar
rUu010	Master	0–10 V dc Ri= 18 kΩ	0–10 V dc	0–11 V dc	6 V dc	1.6 V dc

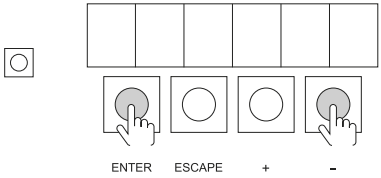
8.2.3 Select a configuration

***NOTICE**: this deletes any previous change and restores all selected configuration default values.*

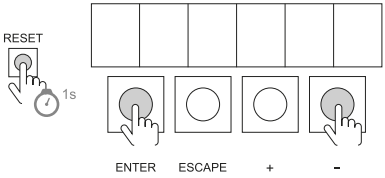
***Note**: if the microprocessor is executing complex algorithms, it may not be able to instantly recognize when keys are pressed. Wait a few seconds and retry.*

***Note**: follow this procedure also if there is a fault in displaying the parameters on the display: all selected configuration default values will be restored.*

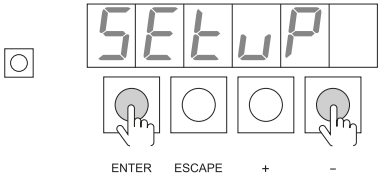
To change/restore a configuration:



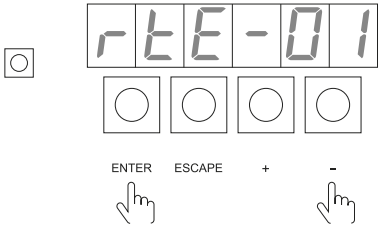
1. Simultaneously press and hold down the **ENTER** and **-** keys.



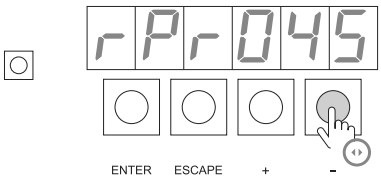
2. Press and hold down both keys, briefly press the **RESET** button (or turn the controller off and on).



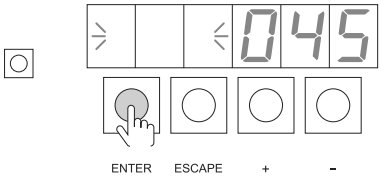
3. Wait until the "SEtuP" message appears.



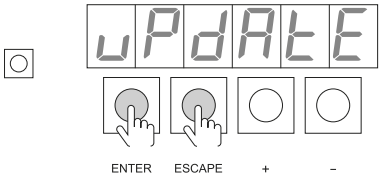
4. Simultaneously release the **ENTER** and **-** keys: the last set configuration appears.



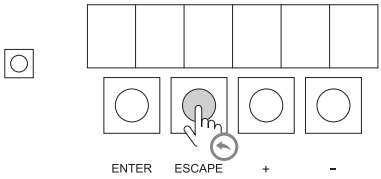
5. Press **-**(or **+**) to scroll settings.



6. Press the **ENTER** key for the selected configuration: the name of the configuration flashes.



7. To confirm, simultaneously press the **ENTER** and **ESCAPE** keys: the "uPdAtE" message appears and then the main page is displayed.



8. Or to cancel, press the **ESCAPE** key.

8.3 Parameter table

8.3.1 Organization of the table

The parameter table is made up of read-only parameters, freely editable parameters and parameters reserved to expert users. Reserved parameters are organized in menus.

Parameters are displayed in the following sequence:

Description	Menu
Measurements. Input value, setpoint value and other internal values.	**-**
Basic parameters freely editable. Values of two setpoints and night limits.	**-**
Parameters related to the two regulation setpoints **(*)**.	**PArA**
ModBus communication settings. Only enabled with Modbus card **(*)**.	**conn**
PID regulation parameters. Only visible and enabled with PID operating mode **(*)**.	**Pid**
Controller configuration parameters **(*)**.	**conF**
Controller measurements and data. Controller version, internal card temperature and output values	**-**

***Note** (*): parameters can only be edited with switch 1=On (DIP switch SW1).*

8.3.2 Display conditions for some parameters

Some parameters are only visible if the following conditions are met:

- PID on
- output current read option
- second input on
- Master proportional operating mode

8.3.3 Complete table

***Note**: setpoint 2 parameters are separated by "." (i.e. **P.b.** or **U.S.P.**).*

***Note**: parameters **S1** and **S2** and parameters **Pb** and **P.b.** are only visible with the controller in Master mode.*

Parameter	Description	Unit of measure
Input value, setpoint value and other internal value measurements		
in xx.x	Prevalent signal value between inputs **IN1** and **IN2**. displayed automatically when turned on or reset.	mA/ V dc/ bar/ °C
SP xx.x	Setpoint in use (**S1** or **S2**)	mA/ V dc/ bar/ °C
1 xx.x	Signal value at **IN1** input.	mA/ V dc/ bar/ °C
2 xx.x	Signal value at **IN2** input.	mA/ V dc/ bar/ °C
Basic parameters freely editable. Values of two setpoints and night limits		
S1	Setpoint 1	°C/ mA/ bar/ V dc
S2	Setpoint 2	°C/ mA/ bar/ V dc
Lh	Maximum night limit speed (% RPM)	
Jh1	Upper speed limit for jump 1 (% RPM)	
JL1	Lower speed limit for jump 1 (% RPM)	
Jh2	Upper speed limit for jump 2 (% RPM)	
JL2	Lower speed limit for jump 2 (% RPM)	
icE	% V ac output for motor heating. Antifreeze function.	
Parameters related to the two regulation setpoints		
Pb/ P.b.	Proportional band	°C/ mA/ bar/ V dc
hi/ h.i.	Maximum speed limit % RPM	%
Lo/ L.o.	Minimum output speed limit % RPM	%
dE/ d.E.	Acceleration/deceleration time of the starter	sec
Sh/S.h.	Value of the **IN1**/**IN2** prevalent input that forces the output to 100% ignoring the maximum speed limit % RPM (**hi**).	°C/ mA/ bar/ V dc
ih/ i.h.	**Sh** hysteresis	°C/ mA/ bar/ V dc
So/ S.o.	Value of the **IN1**/**IN2** prevalent input that forces the output to 0% ignoring the minimum speed limit % RPM (**Lo**).	°C/ mA/ bar/ V dc
io/ i.o.	**So** hysteresis	°C/ mA/ bar/ V dc
USP/ U.S.P.	Setpoint for relay control to external unit.	°C/ mA/ bar/ V dc
UPb/U.P.b.	Proportional band for relay control to external unit.	°C/ mA/ bar/ V dc
ModBus communication settings. With Modbus card only		
xxxx	Configuration symbol in use (i.e. **rtE-01**)	-
AddrES	Controller address.	-
SPEEd	Communication speed	-
tYPE	Communication mode	-
PID regulation parameters. Only with PID mode		

Parameter	Description	Unit of measure
P	Proportional band	°C/ mA/ bar/ V dc
i	Integral component weight	-
d	Derivative component weight	-
ti	Integration time	s
td	Derivation time	s
	Controller configuration parameters	
C0	Operating modes and number of inputs used.	-
C1	Input to use. The other input is still visible from the display or from Modbus protocol.	-
C2	IN1 and IN2 type input.**(*)**.	
C3	Display value conversion **(*)**	
C4	Setpoint position.	-
C5	cosϕ regulation.	-
C6	Relay output setting (terminal board M3). See "Relay output" on page 19.	-
C7	**OUT** analog output settings.	-
	Measurements and values of some magnitudes in the controller	
ECPLUS	Device type.	-
3Ph xx	Three-phase device. xx: rated current **(**)**	-
tL xx.x	Logic board real time temperature	°C
tP xx.x	Power board real-time temperature. ***Note**: only with devices equipped with output current reading.*	°C
Out xx.x	**OUT** analog output value	V dc
Co xxx	**OUT** output regulation control value	%

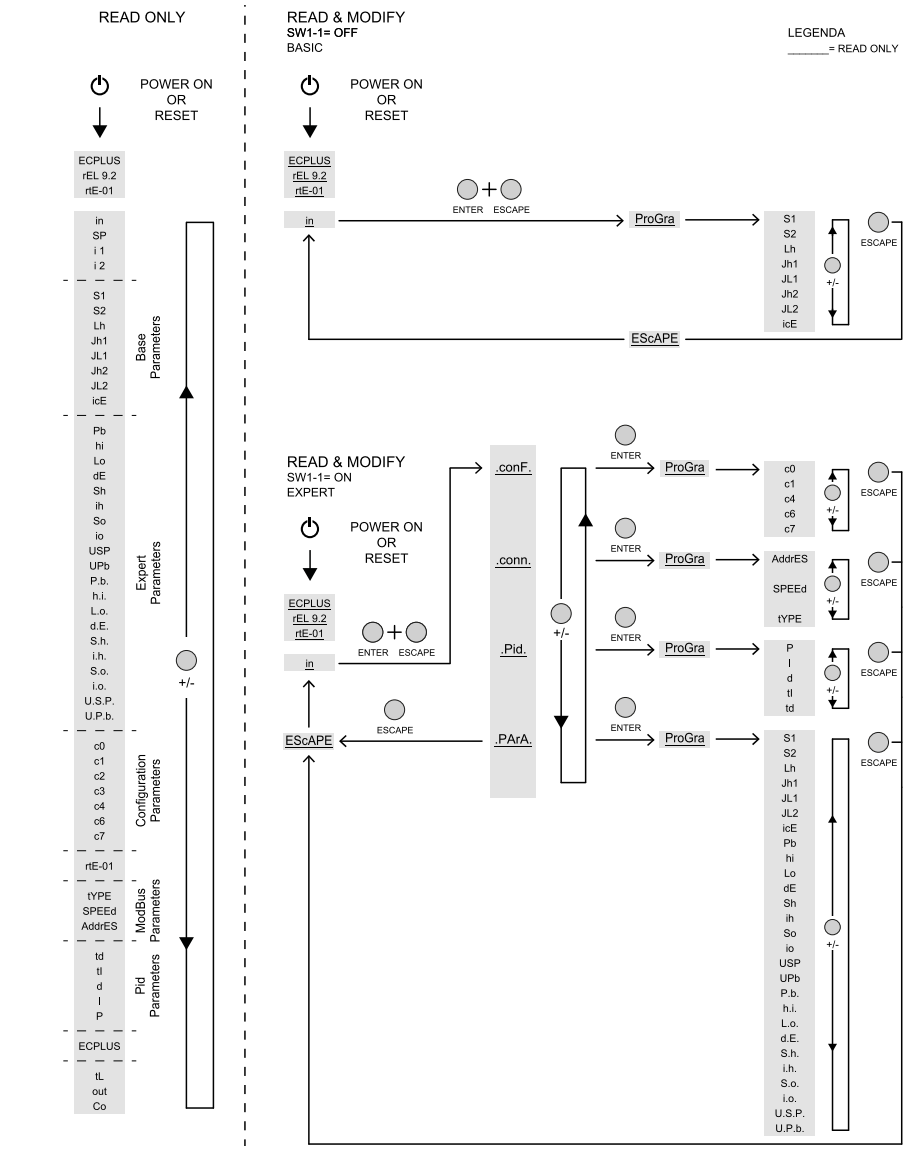
***Note** (*): read-only values. Selection is automatic according to the selected configuration.*
***Note** (**): with devices equipped with XX output current reading, it is replaced by the device rated current value.*

8.3.4 Display all parameters/measurements

***Note**: the visible parameters depend on the currently set configuration.*

1. Press **+** or **-** to scroll the entire parameter table: parameters appear in the indicated sequence.
2. Press the **ESCAPE** key to return to the measurement and value view (**in xx.x**)

8.4 Menu layout



***Note** (*): with Modbus card only.*
***Note** (**): with PID mode on only.*

8.5 Basic parameters

8.5.1 Description

The basic parameters are freely editable (DIP switch SW1 switch 1 = Off) and allow you to adjust setpoint values, night limit, speed jumps and anti-freeze function percentage.

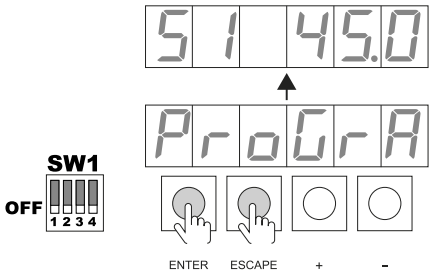
8.5.2 Parameter list

***Note**: parameters **S1** and **S2** are only visible with the controller in Master mode.*

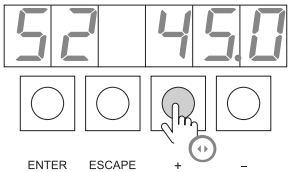
Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
S1	Setpoint 1	°C	-10.0	+90.0	45.0	NTC 10k @25 °C	rtE-01	
		°C	10.0	+90.0	45.0	NTC 10k @25 °C	rtE-02	
		mA	4.0	20.1	14.0	4–20 mA	rPr420	
		bar	0	15.0	10.6	0–15 bar > 4–20 mA	rPr015	
		bar	0	25.0	17.0	0–25 bar > 4–20 mA	rPr025	
		bar	0	30.0	17.0	0–30 bar > 4–20 mA	rPr030	
		bar	0	45.0	25.0	0–45 bar > 4–20 mA	rPr045	
		V dc	0	5.0	2.9	0.5–4.5 V dc	rUu-05	
		bar	0	30.0	17.0	0–30 bar > 0–5 V dc	rPu030	
		V dc	0	10.0	6.0	0–10 V dc	rUu010	
S2	Setpoint 2	°C	-10.0	+90.0	45.0	NTC 10k @25 °C	rtE-01	
		°C	10.0	+90.0	45.0	NTC 10k @25 °C	rtE-02	
		mA	4.0	20.1	14.0	4–20 mA	rPr420	
		bar	0	15.0	10.6	0–15 bar > 4–20 mA	rPr015	
		bar	0	25.0	17.0	0–25 bar > 4–20 mA	rPr025	
		bar	0	30.0	17.0	0–30 bar > 4–20 mA	rPr030	
		bar	0	45.0	25.0	0–45 bar > 4–20 mA	rPr045	
		V dc	0	5.0	2.9	0.5–4.5 V dc	rUu-05	
		bar	0	30.0	17.0	0–30 bar > 0–5 V dc	rPu030	
		V dc	0	10.0	6.0	0–10 V dc	rUu010	
Lh	Maximum night limit speed (% RPM)	off	0%	100%	100%	All	All configurations	
Jh1	Upper speed limit for jump 1 (% RPM)	off	0%	100%	100%	All	All configurations	

Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
JL1	Lower speed limit for jump 1 (% RPM)	off	0%	100%	100%	All	All configurations	
Jh2	Upper speed limit for jump 2 (% RPM)	off	0%	100%	100%	All	All configurations	
JL2	Lower speed limit for jump 2 (% RPM)	off	0%	100%	100%	All	All configurations	
icE	% V ac output for motor heating. Antifreeze function.	off	5%	50%	5%	All	All configurations	

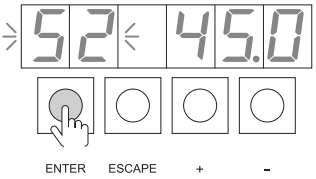
8.5.3 Edit a basic parameter



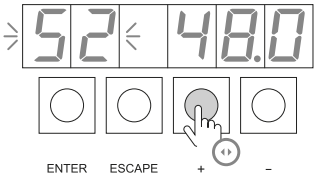
1. Leave DIP switch **SW1** switch 1 **OFF** and simultaneously press the **ENTER** and **ESCAPE** keys.



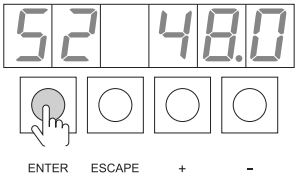
2. Press + (or -) to scroll through the parameters.



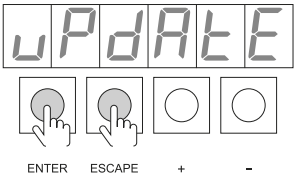
3. Press the **ENTER** key at the selected parameter: the parameter code blinks.



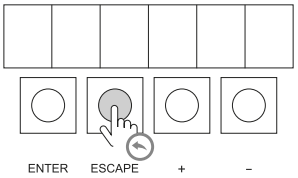
4. Press **+** (or **–**) to edit the selected parameter value.



5. Press the **ENTER** key to confirm the parameter change: the parameter code stops blinking.



6. To confirm, press the **ENTER** and **ESCAPE** keys at the same time: the message "uPdAtE" appears and then the main page is displayed.



7. Press the **ESCAPE** key to cancel changes.

8.6 Setpoint parameters (P ArA menu)

8.6.1 Description

Two parameter sets are available, one for setpoint 1 and one for setpoint 2. They are used by all Master configurations.

They appear on the display after the basic parameters.

8.6.2 Parameter list

***Note**: setpoint 2 parameters are separated by "." (i.e. **P.b.** or **U.S.P.**).*

***Note**: parameters **Pb** and **P.b.** are only visible with the controller in Master mode.*

***Note**: in Master configurations, the **OUT** output setpoint is the algebraic sum of the setpoint in use (**S1** or **S2**) and the setpoint for the external unit in use (**USP** or **U.S.P.**).*

***Note**: in Slave configurations, the **OUT** output setpoint is simply the setpoint for the external unit in use (**USP** or **U.S.P.**).*

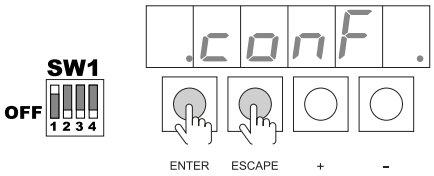
Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
Pb/ P.b.	Proportional band	°C	2.0	55.0	7.5	NTC 10k @25 °C	rtE-01	
		°C	2.0	55.0	7.5	NTC 10k @25 °C	rtE-02	
		mA	0.2	16.0	2.6	4–20 mA	rPr420	
		bar	0.5	15.0	2.4	0–15 bar > 4–20 mA	rPr015	
		bar	1.0	25.0	3.5	0–25 bar > 4–20 mA	rPr025	
		bar	1.0	30.0	3.5	0–30 bar > 4–20 mA	rPr030	
		bar	1.0	45.0	5.2	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	5.0	0.8	0.5–4.5 V dc	rUu-05	
		bar	1.0	30.0	3.5	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	10.0	1.6	0–10 V dc	rUu010	
hi/ h.i.	Maximum speed limit % RPM	%	0	100	100	All	All settings	
Lo/ L.o.	Minimum output speed limit % RPM	%	0	100	00	All	All settings	
dE/ d.E.	Acceleration/deceleration time of the starter	sec	0.1	60.0	2.0	All	All settings	
Sh/S.h.	Value of the **IN1**/**IN2** prevalent input that forces the output to 100% ignoring the maximum speed limit % RPM (**hi**).	°C	-20.0	+90.0	90.0	NTC 10k @25 °C	rtE-01	
		°C	10.0	+90.0	90.0	NTC 10k @25 °C	rtE-02	
		mA	4	20	20.0	4–20 mA	rPr420	
		bar	0	15	15.0	0–15 bar > 4–20 mA	rPr015	
		bar	0	25	25.0	0–25 bar > 4–20 mA	rPr025	
		bar	0	30	30.0	0–30 bar > 4–20 mA	rPr030	
		bar	0	45	45.0	0–45 bar > 4–20 mA	rPr045	
		V dc	0	5	5.0	0.5–4.5 V dc	rUu-05	
		bar	0	30	30.0	0–30 bar > 0–5 V dc	rPu030	
		V dc	0	10.1	10.0	0–10 V dc	rUu010	

Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
ih/ i.h.	**Sh** hysteresis	°C	1	30	1	NTC 10k @25 °C	rtE-01	
		°C	1	30	1	NTC 10k @25 °C	rtE-02	
		mA	0.1	5.0	0.1	4–20 mA	rPr420	
		bar	0.1	5.0	0.1	0–15 bar > 4–20 mA	rPr015	
		bar	0.1	8.0	0.1	0–25 bar > 4–20 mA	rPr025	
		bar	0.1	8.0	0.1	0–30 bar > 4–20 mA	rPr030	
		bar	0.1	15.0	0.1	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	2.5	0.1	0.5–4.5 V dc	rUu-05	
		bar	0.1	15.0	0.1	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.1	5.0	0.1	0–10 V dc	rUu010	
So/ S.o.	Value of the **IN1**/**IN2** prevalent input that forces the output to 0% ignoring the minimum speed limit % RPM (**Lo**).	mA	0	20.1	0	0–20 mA	rS-020	
		mA	4	20.1	4	4–20 mA	rS-420	
		V dc	0	10.1	0	0–10 V dc	rS-010	
		°C	-20.0	+90.0	-20.0	NTC 10k @25 °C	rtE-01	
		°C	10.0	+90.0	10.0	NTC 10k @25 °C	rtE-02	
		mA	4	20	4	4–20 mA	rPr420	
		bar	0	15	0	0–15 bar > 4–20 mA	rPr015	
		bar	0	25	0	0–25 bar > 4–20 mA	rPr025	
		bar	0	30	0	0–30 bar > 4–20 mA	rPr030	
		bar	0	45	0	0–45 bar > 4–20 mA	rPr045	
		V dc	0	5	0	0.5–4.5 V dc	rUu-05	
		bar	0	30	0	0–30 bar > 0–5 V dc	rPu030	
		V dc	0	10.1	0	0–10 V dc	rUu010	

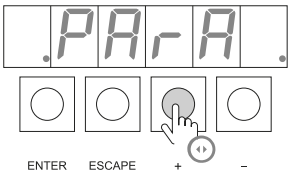
Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
io/ i.o.	**So** hysteresis	mA	0.2	10	0.2	0–20 mA	rS-020	
		mA	0.2	10	0.2	4–20 mA	rS-420	
		V dc	0.1	5.0	0.1	0–10 V dc	rS-010	
		°C	1	30	1	NTC 10k @25 °C	rtE-01	
		°C	1	30	1	NTC 10k @25 °C	rtE-02	
		mA	0.1	5.0	0.1	4–20 mA	rPr420	
		bar	0.1	5.0	0.1	0–15 bar > 4–20 mA	rPr015	
		bar	0.1	8.0	0.1	0–25 bar > 4–20 mA	rPr025	
		bar	0.1	8.0	0.1	0–30 bar > 4–20 mA	rPr030	
		bar	0.1	15.0	0.1	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	2.5	0.1	0.5–4.5 V dc	rUu-05	
		bar	0.1	15.0	0.1	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.1	5.0	0.1	0–10 V dc	rUu010	

Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
USP/ U.S.P.	Setpoint for relay control to external unit.	mA	0	20.1	15.0	0–20 mA	rS-020	
		mA	0	20.1	11.0	4–20 mA	rS-420	
		V dc	0	10	7.5	0–10 V dc	rS-010	
		°C	-54.9	+55	-1.6	NTC 10k @25 °C	rtE-01	
		°C	-54.9	+55	-1.6	NTC 10k @25 °C	rtE-02	
		mA	-8	+8	-0.6	4–20 mA	rPr420	
		bar	-7.5	+7.4	-0.4	0–15 bar > 4–20 mA	rPr015	
		bar	-12.5	+12.4	-0.8	0–25 bar > 4–20 mA	rPr025	
		bar	-15	+14.9	-0.8	0–30 bar > 4–20 mA	rPr030	
		bar	-22.5	+22.4	-1.0	0–45 bar > 4–20 mA	rPr045	
		V dc	-2.5	+2.4	-0.2	0.5–4.5 V dc	rUu-05	
		bar	-15	+15	-1.0	0–30 bar > 0–5 V dc	rPu030	
		bar	-22.5	+22.4	-1.0	0–10 V dc	rPu045	
		V dc	-5.1	+4.9	-0.5	NTC 10k @25 °C	rUu010	
UPb/U.P.b.	Proportional band for relay control to external unit.	mA	0.5	20	4.2	0–20 mA	rS-020	
		mA	0.5	20	4.2	4–20 mA	rS-420	
		V dc	0.2	10	2.1	0–10 V dc	rS-010	
		°C	2.0	55.0	2.4	NTC 10k @25 °C	rtE-01	
		°C	2.0	55.0	2.4	NTC 10k @25 °C	rtE-02	
		mA	0.5	15.0	1.0	4–20 mA	rPr420	
		bar	0.5	15.0	0.7	0–15 bar > 4–20 mA	rPr015	
		bar	1.0	25.0	1.2	0–25 bar > 4–20 mA	rPr025	
		bar	1.0	30.0	1.2	0–30 bar > 4–20 mA	rPr030	
		bar	1.0	45.0	1.5	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	5.0	0.4	0.5–4.5 V dc	rUu-05	
		bar	1.0	30.0	1.5	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	10.0	0.8	0–10 V dc	rUu010	

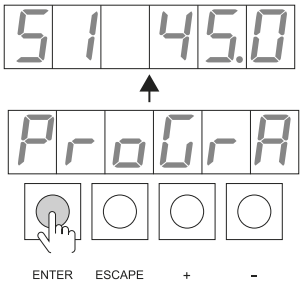
8.6.3 Edit a setpoint parameter



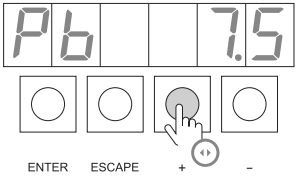
1. Turn **SW1** switch 1 **ON** and simultaneously press the **ENTER** and **ESCAPE** keys.



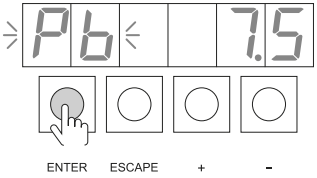
2. Press **+** (or **-**) to scroll menus.



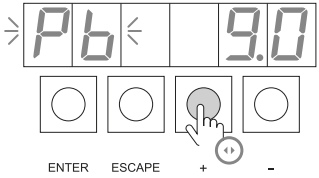
3. Press **ENTER** at the “PArA” menu: parameters appear.



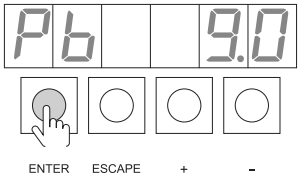
4. Press **+** (or **-**) to scroll through the parameters.



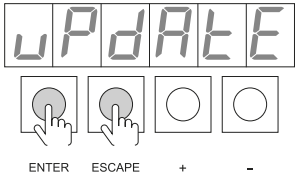
5. Press the **ENTER** key at the selected parameter: the parameter code blinks.



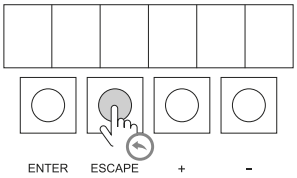
6. Press **+** (or **-**) to edit the selected parameter value.



7. Press the **ENTER** key to confirm the parameter change: the parameter code stops blinking.



8. To confirm, press the **ENTER** and **ESCAPE** keys at the same time: the message "uPdAtE" appears and then the main page is displayed.



9. Or to cancel, press the **ESCAPE** key.

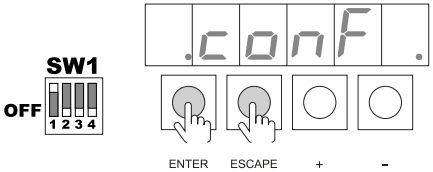
8.7 Modbus RTU communication parameters (conn menu)

8.7.1 Parameter list

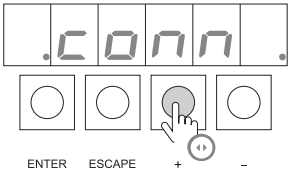
Parameter	Description	Minimum	Maximum	Default	System settings
AddrES	Controller address.	1	247	247	
SPEEd	Communication speed ■ **048**: 4800 baud ■ **096**: 9600 baud (default) ■ **192**: 19200 baud ■ **384**: 38400 baud	048	384	096	
tYPE	Communication mode ■ **8N1**: 8 bit , no parity, 1 stop bit ■ **8E1**: 8 bit, even parity, 1 stop bit (default) ■ **8O1**: 8 bit , odd parity, 1 stop bit	8N1	8O1	8E1	

8.7.2 Edit communication parameters

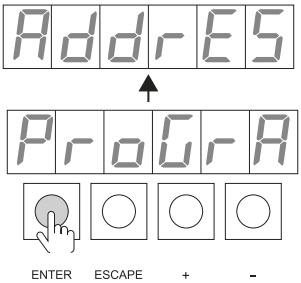
***Note**: with optional Modbus card only.*



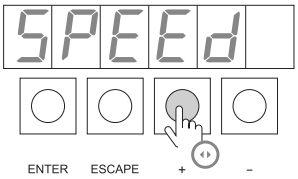
1. Turn **SW1** switch 1 **ON** and simultaneously press the **ENTER** and **ESCAPE** keys.



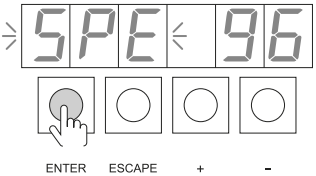
2. Press **+** (or **-**) to scroll menus.



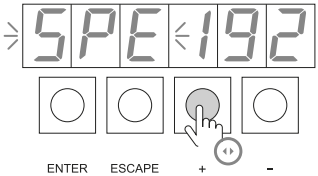
3. Press **ENTER** at the “conn” menu: parameters appear.



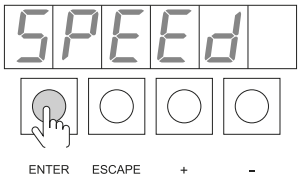
4. Press **+** (or **-**) to scroll parameters.



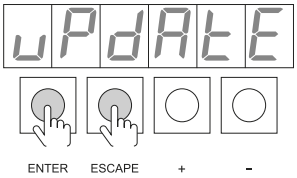
5. Press the **ENTER** key at the selected parameter: the parameter code blinks.



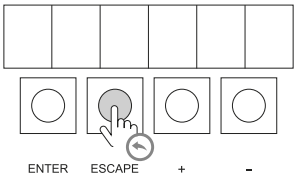
6. Press **+** (or **-**) to edit the selected parameter value.



7. Press the **ENTER** key to confirm the parameter change: the parameter code stops blinking.



8. To confirm, press the **ENTER** and **ESCAPE** keys at the same time: the message "uPdAtE" appears and then the main page is displayed.



9. Or to cancel, press the **ESCAPE** key.

8.8 PID parameters (PID menu)

8.8.1 Parameter list

Parameter	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/ signal	Configuration	System settings
P	Proportional band	°C	2.0	55.0	7.5	NTC 10k @25 °C	rtE-01	
		°C	2.0	55.0	7.5	NTC 10k @25 °C	rtE-02	
		mA	0.2	16.0	2.6	4–20 mA	rPr420	
		bar	0.5	15.0	2.4	0–15 bar > 4–20 mA	rPr015	
		bar	1.0	25.0	3.5	0–25 bar > 4–20 mA	rPr025	
		bar	1.0	30.0	3.5	0–30 bar > 4–20 mA	rPr030	
		bar	1.0	45.0	5.2	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	5.0	0.8	0.5–4.5 V dc	rUu-05	
		bar	1.0	30.0	3.5	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	10.0	1.6	0–10 V dc	rUu010	
i	Integral component weight	-	0.0	1000	2	all	all	
d	Derivative component weight	-	0.0	100	1	all	all	
ti	Integration time	s	0.0	100.0	1.0	all	all	
td	Derivation time	s	0.0	100.0	10.0	all	all	

8.8.2 Edit PID parameters

Proceed as with setpoint parameters, select the **Pid** menu. See "Setpoint parameters (P ArA menu)" on page 44

8.9 Configuration parameters (menu conF)

8.9.1 Configuration parameters (menu conF)

These parameters determine controller operations. Selecting a default configuration loads these parameters with their default values. They can be singularly edited according to need.

They define:

- the controller operating mode (Master, Slave or PID) and number of analog inputs used (**IN1** and **IN2**)
- for Master proportional mode, the position of the setpoint at the ends or at the center of the proportional band (for PID Master mode, the position is always at the center).
- the **IN1** and **IN2** analog input type (current, voltage signal, from NTC probe)
- how to manage the relay output on the terminal board M3
- how to manage the **OUT** analog output

8.9.2 Configuration parameter list (menu conF)

Parameter	Description	Values	Default	Configuration	System settings
C0	Operating modes and number of inputs used.	**GP1**: Slave controller that uses one input **GP2**: Slave controller that uses two inputs	**GP2**	rS-010, rS-020, rS-420	
		r1: Master proportional controller that uses one input **r2**: Master proportional controller that uses two inputs **rP1**: PID controller that uses one input **rP2**: PID controller that uses two inputs	**r2**	rtE-01, rtE-02, rPr420, rPr015, rPr025 rPr030, rPr045, rUu-05, rPu030, rUu010	
C1	Input to use. The other input is still visible from the display or from Modbus protocol.	Con **C0** = **GP1, r1, rP1, rAP1** ■ **oFF**: always uses input **IN1** With **C0** = **GP2, r2, rP2, rAP2** ■ **hi**: always uses the input with the higher value ■ **Lo**: always uses the input with the lower value	**hi**	rS-010, rS-020, rS-420, rtE-01, rtE-02, rPr420, rPr015, rPr025 rPr030, rPr045, rUu-05, rPu030, rUu010	
C2	IN1 and IN2 type input. **(*)**.	**020**: 0–20 mA current signal	_	rS020	
		420: 4–20 mA current signal	_	rPr420, rPr015, rPr025, rPr030, rPr045, rS-420	
		05: 0-5 V dc voltage signal	_	rUu-05, rPu030	
		010: 0-10 V dc voltage signal	_	rUu010, rS010	
		ntc: kOhm (10 kΩ @25 °C) signal	_	rtE-01, rtE-02	
C3	Display value conversion **(*)**	**oFF**: no conversion	_	rS010, rS020, rS-420, rtE-01, rtE-02, rPr420, rUu-05, rUu010	
		015: conversion 4–20 mA > 0-15 bar	-	rPr015	
		025: conversion 4–20 mA > 0-25 bar	-	rPr025	
		030: conversion 4–20 mA > 0-30 bar	-	rPr030	
		045: conversion 4–20 mA > 0-45 bar	-	rPr045	
		030: conversion 0.5-4.5 V dc> 0-30 bar	-	rPu030	

Parameter	Description	Values	Default	Configuration	System settings
C4	Setpoint position.	**oFF**: Slave controller	**oFF**	rS 010 , rS 020, rS-420	
		hi: Master controller, setpoint at **Pb** high end. **lo**: Master controller, setpoint at low end of **Pb**. **Mid**: PID controller, setpoint at **Pb** center	**hi**	rtE-01, rtE-02, rPr420, rPr015, rPr025 rPr030, rPr045, rUu-05, rPu030, rUu010	
C5	cosϕ regulation.	**8**: Motor cosϕ compensation, adjustable from 0 to 15.	**08**	all	
C6	Relay output setting (terminal board M3). See "Relay output" on page 19.	**0**: relay Off during controller alarm. **1**: relay Off during controller alarm or regulation disabled (On/Off input **S2** closed) **2**: relay Off during controller alarm or regulation disabled (On/Off input **S2** closed) or stopped **3**: the relay operates as direct On/Off control for spray unit	**0**	all	
C7	**OUT** analog output settings.	**0**: control to EC motors, with 0–10 V dc input. **1**, **2**, **3**: control to EC motors, with 0.75–10 V dc input (intrinsic safety for cable detachment)	0	all	

***Note** (*): read-only values. Selection is automatic according to the selected configuration.*

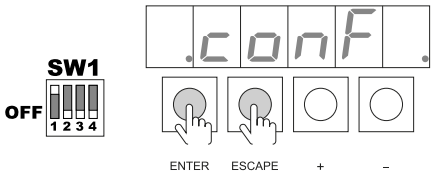
8.9.3 C0, C1 and C4 parameter combinations for each configuration

Configuration	C0	C1	C4
rS-010, rS-020, rS-420	**GP2 (*)**	**hi**	**oFF**
		Lo	**oFF**
	GP1	**oFF**	**oFF**
rtE-01, rtE-02, rPr420, rPr015, rPr025 rPr030, rPr045, rUu-05, rPu030, rUu010	**r2 (*)**	**hi**	**hi**
			Lo
		Lo	**hi**
			Lo
	r1	**oFF**	**hi**
			Lo
	rP1	**oFF**	**Mid**
	rP2	**hi**	**Mid**
		Lo	**Mid**

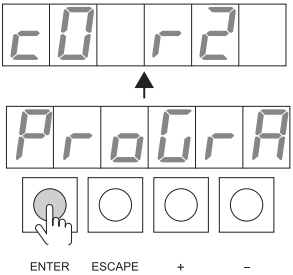
***Note** (*): default value.*

8.9.4 Edit a configuration parameter

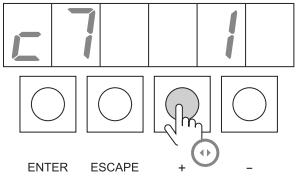
***NOTICE**: only edit these parameters if you know the effects on regulation.*



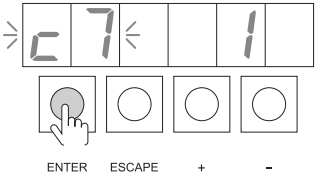
1. Turn **SW1** switch 1 **ON** and simultaneously press the **ENTER** and **ESCAPE** keys.



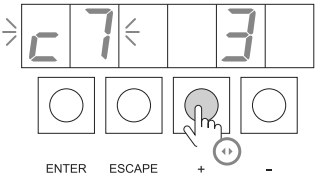
2. Press **ENTER** at the “conF” menu: parameters appear.



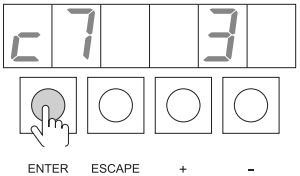
3. Press **+** (or **-**) to scroll through the parameters.



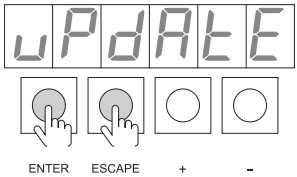
4. Press the **ENTER** key at the selected parameter: the parameter code blinks.



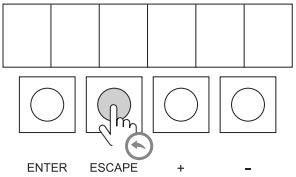
5. Press **+** (or **-**) to edit the selected parameter value.



6. Press the **ENTER** key to confirm the parameter change: the parameter code stops blinking.



7. Press the **ENTER** key and the ENTER and ESCAPE keys at the same time to save the change: the message "uPdAtE" is displayed and then the home page is displayed.



8. Or to cancel, press the **ESCAPE** key.