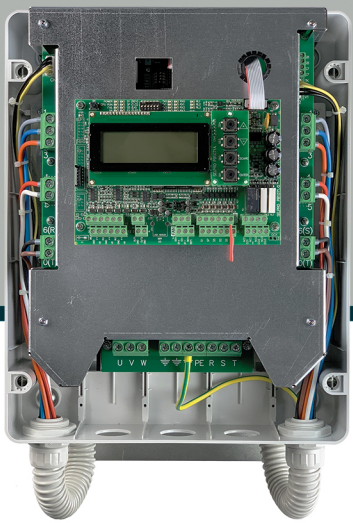




DSV

EVOLVED STEP VOLTAGE CONTROLLERS, MASTER OR SLAVE (MODBUS OPTION) FOR FANS WITH ADJUSTABLE VOLTAGE, THREE-PHASE MOTORS

Instruction manual | v. 1.1

PPDSVEN-R1.0-1

Instructions translated from the original

Carefully read every part of this manual. You will find useful information to take full advantage of the product's potential, use it safely and obtain the best results.

RECORD YOUR SYSTEM PARAMETERS!

A space is provided in each parameter table to note set values

SELPRO

Fan Speed Controllers Specialist

Copyright © 2021-2024, SELPRO Srl

All rights reserved in all countries.

Any distribution, alteration, translation or reproduction, partial or total, of this document is strictly prohibited unless with prior authorization in writing from SELPRO Srl with the exception of the following actions:

- Printing the document in its original format, totally or partially.
- Transferring the document on websites or other electronic systems.
- Copying the content without changing it and indicating SELPRO Srl as the copyright owner.

Requests for authorization, additional copies of this manual or technical information on the latter, must be addressed to:

SELPRO Srl
Via Piamarta, 5/11
25021 Bagnolo Mella (BS)
Italy
info@selpro.it
www.selpro.it
+39 (0)30 6821611

Contents

Getting started 4
Support 5

1. Safety information 6
1.1 Safety messages 6
1.2 General warnings 7
1.3 Protections 8

2. Receiving and storage 9
2.1 Handling and storage 9
2.2 Product identification 9

3. Product description 10
3.1 Description 10
3.2 Presentation 12

4. Inputs and outputs 16
4.1 Three-phase power supply and power output for motor(s) 16
4.2 Analog inputs and outputs 18
4.3 Analog outputs 20
4.4 Modbus Ports 20
4.5 On/Off inputs 22
4.6 Relay outputs 23

5. Installation 24
5.1 Wall mount 24
5.2 Electrical installation 25

6. Connections 27
6.1 Power supply wiring and power output for motor(s) 27
6.2 Analog input connections IN and IN2 in Slave mode 28
6.3 Analog input connections IN1 and IN2 in Master mode 29
6.4 Analog input IN3 wiring 30
6.5 On/Off inputs connection 32
6.6 Analog outputs OUT1 and OUT2 32
6.7 Relay output connection 35
6.8 RS485 Modbus RTU network connection 35

7. Operating mode 37
7.1 Slave proportional mode 37
7.2 Master proportional mode 41
7.3 Overload protection function 46

8. Special functions 48
8.1 Timed washing of the heat exchanger ... 48
8.2 Fan anti-locking 48
8.3 Night limits for speed using internal clock 49
8.4 Switching of setpoint following the ambient temperature from IN3 (Bank Switch) 50
8.5 Adjustment of the setpoint following the external temperature IN3 (Floating SP) 51
8.6 Adjustment of external setpoint with 0-10 V signal from IN3 52
8.7 Input Slave Safety mode from IN3 53

9. Use the controller 55
9.1 Start-up 55
9.2 Navigation structure 56
9.3 Home page 57
9.4 Parameters 57

10. Set the operating mode 60
10.1 Select a configuration 60
10.2 Editing parameters 63

11. Set the common and special functions 75
11.1 Display contrast adjustment 75
11.2 Real-time control parameters (RTC) ... 75
11.3 Timed washing of the heat exchanger . 76
11.4 Fan anti-locking 76
11.5 Night limits for speed using internal clock 77
11.6 Switching of setpoint following the ambient temperature from IN3 (Bank Switch) 78
11.7 Adjustment of external setpoint with 0-10 V signal from IN3 78
11.8 Adjustment of the setpoint following the ambient temperature from IN3 (Floating SP) 79
11.9 Input Slave Safety mode from IN3 80
11.10 Procedure for setting the special functions 80

12. Diagnostics 81
12.1 Troubleshooting 81

13. Technical specifications 84
13.1 Physical properties 84
13.2 Electrical specifications 85
13.3 Maintenance 87
13.4 Conformity 87

Getting started

Obligations with this instruction manual



This manual is an integral part of the product and must be kept for its entire working life. It must be consulted for all situations related to configuration, use, and maintenance. For this reason, it must always be accessible to the operators.

Instruction manual limits

This manual is intended for the sole device and not for the entire plant! It has been drafted carefully and the consistency between the manual and the product has been verified. Any inconsistencies, errors or omissions must be reported to SELPRO Srl who will integrate them in a new version.

Online manual availability

This instruction manual can be downloaded from the www.selpro.it website. SELPRO Srl reserves the right to keep online information updated to improve use and clarity. In the event of discrepancies between this printed document and the online version, always refer to the latter.

Instruction manual updates

Publication date	Code	Firmware version	Updates
SEP 2024	PPDSVEN-R1.0-1	2.0	Updated connection diagrams, autotransformer terminal boards, and external remote controllers Removed RL1 function as Spray off. Added notice regarding cables longer than 30 m. Corrected references to parameters.
SEP 2021	PPDSVEN-R1.0-0	2.0	First publication

Models described by the manual

This manual applies to the following models:

DSV 312
DSV 316
DSV 327
DSV 334
DSV 348

Related documents

Document	Code	Date	Format
Instruction manual (this manual)	PPDSVEN-R1.0-1	SEP 2024	hard copy
Modbus RTU SELPRO Registers v1.0 DSV 2021 09 30		SEP 2021	Hard copy PDF online

Style conventions

Following are a few style conventions used in this manual:

Path to reach the starting point of the procedure described or to enable the necessary settings to activate the described function. The ">" symbol separates the steps in the path.

Unit of measure

From version 8.0 of the DSV firmware, the temperature and pressure values can be viewed with Imperial units of measure (°F e psi). Therefore, where the text indicates the unit of measure available in °C, it is also available in °F, and where bar is indicated, psi is also available. For the conversion values, use the following formulas:

- temperature: °F = 32+ (°C x 9/5)
- pressure: psi = bar x 14.5

Support

Ask for support

In case of malfunction or fault and requests for assistance, contact SELPRO Srl or the distributor in your country.

How to return the product

If necessary, **ship the product at your own expense and in its original packaging** to the local distributor or directly to SELPRO Srl.

Zone distributor	Customer support service	
Note distributor information here:	SELPRO Srl Via Piamarta, 5/11 25021 Bagnolo Mella (BS) Italy	info@selpro.it www.selpro.it +39 (0)30 6821611

Warranty

To know the warranty terms, exclusions, warranty forfeiture, and how to apply the warranty, please refer to the enclosed sheet.

1. Safety information

1.1 SAFETY MESSAGES

Below are the warnings regarding user safety and the damage to the device provided in this document:

DANGER indicates a dangerous situation which, if not avoided, will cause death or serious injury.

WARNING indicates a dangerous situation which, if not avoided, may cause death or serious injury.

CAUTION indicates a dangerous situation which, if not avoided, may cause slight injury.

NOTICE *indicates obligations that if not met, may cause device damages.*

1.1.1 Qualified staff

This device should only be installed, started and used by qualified technical personnel who are familiar with the technical standards to be followed, in accordance with personnel safety and security standards, able to understand all signs of danger. Incorrect installation can result in damage to people and/or property.

WARNING! Live parts. Electric shock. If you have to work on the powered controller, always do it in the presence of a second person. Block remote controls and any power switches.

1.1.2 Worker skills

Below are the minimum skills required to operate the device safely:

Icon	Target	Activities	Skills
	Installer Electrician	▪ System electrical dimensioning ▪ Installation ▪ Start-up ▪ Maintenance ▪ Service calls	Has substantial knowledge in the electrical field. Can understand wiring diagrams and work on live electrical panels, shunt boxes and control devices. Has been certified to work on live parts. Suitable conditions are guaranteed by the application of current standards and regulations on occupational safety in the country of installation. Knows the safety regulations, community directives and all national, regional and corporate rules. This individual must be accompanied by expert personnel if unskilled or young.

1.1.3 Installer and electrician obligations

The installer and the electrician must:

- make sure that the device is installed in systems that comply with all safety and electrical regulations.
- always close the protective cover.

- make sure that the device is used properly and as indicated in chapter "Intended use" on page 7.
- periodically check that the device safety elements are in good condition, replace damaged cables.

1.2 GENERAL WARNINGS



This chapter contains information on your safety but does not assume to be thorough. Contact customer service SELPRO for questions or problems.

1.2.1 Intended use

The device should only be used for the purposes stated in the purchase contract. Other uses or use beyond that specified in the contract are not authorized and the manufacturer cannot be held liable for damages. Foreseen use requires the user carefully reads this instruction manual and especially the safety messages.

1.2.2 Product safety

The product is the result of SELPRO current experience. It must be installed, with any accessory modules, in good working order according to this instruction manual. Use must be within the technical limits stated on the ID plate. Otherwise, faults and damages may occur.

1.2.3 Fault management

Check faulty functions to prevent damages to people or property. For delicate or high value products, consider installing backup controllers with alarm contacts. Faults in farms could harm animals. The system design must meet current directives in the country of installation.

1.2.4 Installation



WARNING! Live parts. Electric shock. Do not work near power and load terminals with the device on.

***NOTICE**: Malfunction. Do not connect two wires to the same input terminal. Request the MEI-4 expansion module.*

Install the controller away from direct sunlight so as not to overheat the case.

DO NOT install the device in environments that could reach high temperatures, higher than the foreseen maximum room temperature.

Assemble the device vertically, with cable input at the bottom, to promote natural heat dissipation and avoid water infiltration; make sure there is sufficient air circulation and free space above and below the controller.

Only use the set holes for connection cable input, always on the bottom, power terminal board side, to avoid external agent infiltration and maintain the controller protection grade. Use the supplied cable clamps, sheath and cables with suitable quality and size.

In the event of disturbed power mains, we recommend installing supplementary anti-disturbance filters directly on the controller power supply.

Only start the controller when the machine that incorporates it is declared compliant with current legislation.

1.2.5 Start-up

WARNING! Electric shock. Risky conditions can be created in the system during start-up due to incorrect settings, defective components or incorrect electrical connections. Keep people away from the work area.

Any faulty fuses must be replaced with new fuses of the same type. Any system fault must be resolved immediately. The system can be potentially dangerous if the system works poorly.

1.2.6 Use

***NOTICE**: before turning on the device, always check that it is correct grounded according to current standards. This is also essential for correct anti-disturbance filter operations.*

If applicable, reassemble and make sure the external protection lid is fully closed.

NEVER touch electrical circuit parts when the power is on.

DO NOT alter or damage the device ID labels.

Avoid continuously turning controller power on/off. Constant power maintains the controller at working temperature and eliminates the problem of condensation forming inside the protective case.

1.2.7 Maintenance

DO NOT tamper with or remove internal controller parts. This voids the warranty and can cause damages to people and property. The controller does not contain parts that can be repaired by the user.

1.2.8 Accessories and spare parts

CAUTION! Only use accessories and spare parts manufactured or recommended by SELPRO. Changes to this device and the use of devices not authorized by SELPRO can create unforeseen and hard to evaluate risks. Contact SELPRO experts to solve your system needs.

1.3 PROTECTIONS

1.3.1 Power supply protection

The controller includes protection against transitory over voltage on the power mains and a three-phase anti-disturbance filter to meet electromagnetic compatibility standard limits.

1.3.2 Checks with overload protections

The controller checks the distributed current and blocks regulation in the event of excessive current absorption. To ensure controller operating continuity, during installation, check that the maximum current value continuously absorbed by the load is less than, or equal to, the rated controller value.

2. Receiving and storage

2.1 Handling and storage

2.1.1 Handling

***NOTICE**: device damages. Always use packaging. Avoid bumps, strong vibrations and exposure to very high temperatures.*

2.1.2 Storage warnings

***NOTICE**: device damages. Consult the manufacturer and check the warranty conditions if the device is to be stored for a long period of time. Protect against vibration, moisture and shock. Store with a well-closed lid in a dry place. Avoid exposure to very low or very high temperatures.*

2.1.3 Environmental storage conditions

See chapter "Electrical specifications" on page 85.

2.2 Product identification

2.2.1 Package contents

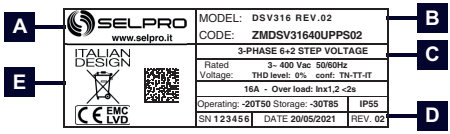
Below are the items provided in the sales package:

- one DSV
- this manual
- for models with case, four brackets for wall mounting
- for models with case, cable clamps or plugs (as per order)

Always check the integrity of the product. In case of damage, contact SELPRO technical support.

2.2.2 Identification label

Model, product code and serial number must be communicated to SELPRO technical support for service calls.



Part	Description
A	Logo and site
B	Model, code and product revision
C	Device description
D	Technical specifications
E	Matrix code to identify model and serial number, CE marking conformity with directives

3. Product description

3.1 Description

3.1.1 DSV controllers

Multifunction and multi-stepper DSV controllers regulate the speed of voltage adjustable high-speed, three-phase, asynchronous motors applied to axial or centrifugal fans. Connected to transducers or sensors can receive signals (pressures, temperatures, etc.) that, together with the set parameters, control motor speeds. This control ring can be connected to a spray unit, too, with a 1–10 V dc signal.

3.1.2 Applications

DSV controllers are suitable for HVAC/R environment applications with voltage adjustable high-speed asynchronous motors, for example, ventilated heat exchangers used in air conditioning and refrigeration systems.

3.1.3 How they work

The DSV controllers are three-phase stepper transformers that use a pair of three-phase autotransformers to regulate the voltage effectively applied to the load. Neutral conductor connection is not required.

3.1.4 Inputs

The controller has the following inputs:

- three analog inputs that can be configured to read the voltage/current signals or NTC resistance (can be amplified with expansion modules)
- if On/Off for remote activation of functions

3.1.5 Outputs

The controller has the following outputs:

- one power output for delivering voltage to the connected fans
- two analog outputs with voltages that can be configured for external units for analogue control 0–10 V dc or 1–10 V dc
- three relays, for alarm signals and other auxiliary functions that can be configured.

3.1.6 Communications port

The controller has two RS485 ports that communicate with a supervisory system and it is managed with Modbus RTU protocol.

3.1.7 Controls

Regulation may occur considering the only connected input or one of the two (the largest or the smallest). If you choose to use only one input, the other will remain visible from the display or from the Modbus protocol and can be connected, for example, to a probe.

A third input is available to read the voltage, current and NTC resistance signals that can be used to activate some special functions, see "Special functions" on page 11.

The control of the speed command transmitted to the output can be:

- **Slave proportional**: the input signals are generated by an external controller or a manually controlled potentiometer. The value of the control command can vary in proportion to the prevalent input value.

- **Master proportional**: input signals are generated by temperature sensors or transducers of other magnitudes. The control command changes the three-phase output to maintain the value of the prevalent input within the proportional band.

Proportional control can be direct, if increasing the input the control value increases, or reverse, if it decreases.

Voltage regulation at the signal output can be:

- for 0-10 V dc Slave units, proportional variable to the value of the power output
- for 0–10/10–0 V dc outdoor units or 1–10 V dc spray units with independent setpoint and proportional band

3.1.8 Setpoints and associated parameters

Two different regulation setpoints and two set of associated parameters are available. You can select one or the other setpoint, and its parameter set, using an On/Off input.

Within each set of parameters there is an additional setpoint and proportional band dedicated to signal regulation for slave units.

3.1.9 Functions that can be activated with On/Off inputs

The following controls are possible via the On/Off inputs:

- start reverse mode: the output voltage decreases as the input increases
- start according to setpoint and relative set of parameters
- enabling night limit
- stop regulation signal
- read motor overheat protection status

3.1.10 Default configurations

To facilitate installation, the DSV controller has 13 configurations that can be customized by editing a single parameter. There are configurations for Master proportional control (temperature, pressure, current and voltage) and configurations for Slave proportional control .

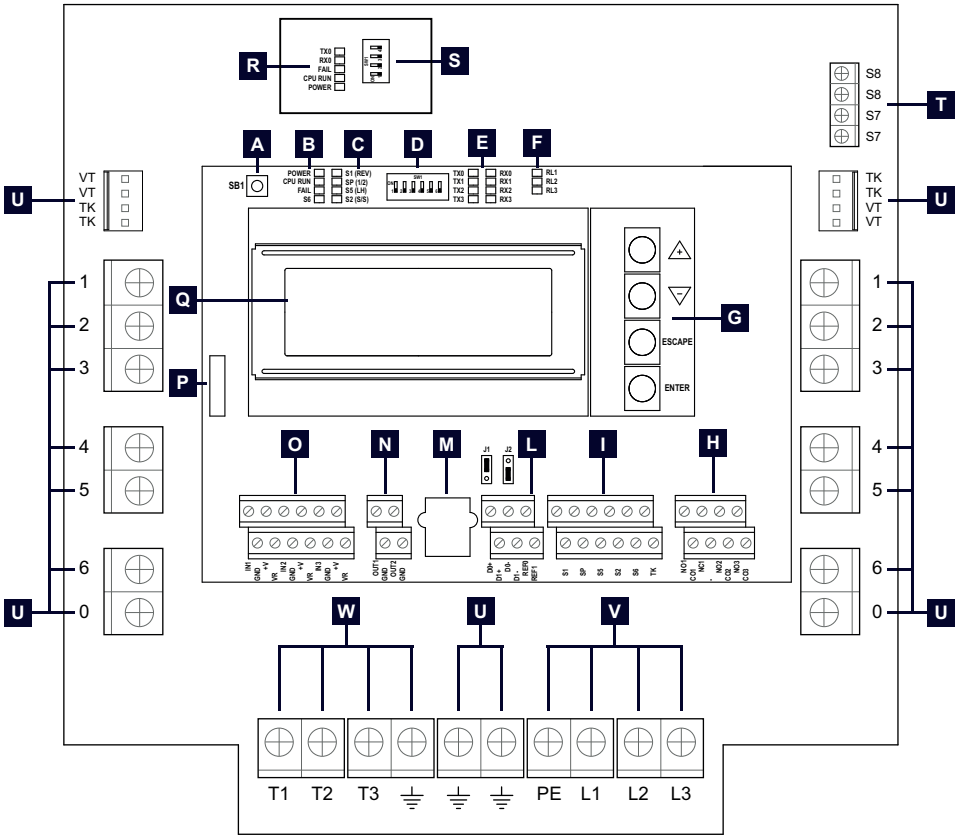
3.1.11 Special functions

The controller also manages the following special functions:

- output overload safeguarding (function always active)
- timed washing of the heat exchanger (if combined with AWS or EPS)
- fan anti-locking
- night limits for speed using internal clock and/or On/Off input
- switching of setpoint following the ambient temperature and/or On/Off input
- external setpoint control with 0-10 V signal
- adjustment of the setpoint following the ambient temperature
- Slave Safety mode

3.2 Presentation

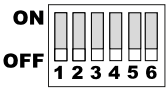
3.2.1 Main components



Part	Description	Reference in the manual
A	Reset button. Restarting the controller (for ex.: after being locked), allows one of the predefined configurations to be chosen.	"Select a configuration" on page 60
B	Device status LED.	"Status LED" on page 14
C	On/Off input LEDs active.	"On/Off inputs LED" on page 14
D	DIP switch SW1 to turn functions on/off.	"DIP switch SW1" on page 13
E	Modbus communication status LED.	"Modbus communication LED" on page 14
F	Relay status LED.	"Relay status LED" on page 15
G	Keyboard to scroll parameters and set them.	"Programming display keyboard" on page 15

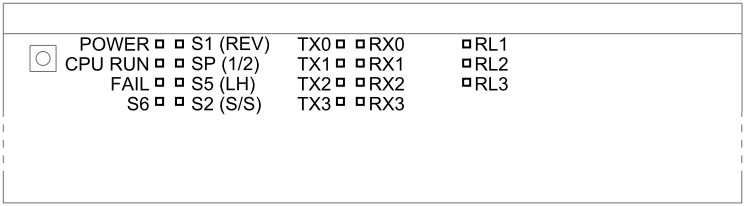
Part	Description	Reference in the manual
H	Terminal board M5 with relay output.	"Relay outputs" on page 23
I	Terminal board M4 for remote On/Off inputs or from motor overheat protections.	"On/Off inputs" on page 22
L	Terminal board M3 with serial outputs and relative serial terminal jumpers.	"Modbus Ports" on page 20
M	Reserved.	-
N	Terminal board M2 with analog regulation outputs.	"Analog outputs" on page 20
O	Terminal board M1 with analog inputs.	"Analog inputs and outputs" on page 18
P	Connector for remote key pad (ZCKEY.01.0100020)	-
Q	Back lit LCD display.	-
R	Power section status LED.	-
S	Power section pre-setting DIP switch (reserved)	-
T	Terminal boards for connection of the external auxiliary remote controllers for steps No. 7 and No. 8 ***Note**: in models DSV312 and DSV316, terminals S7 and S8 are in inverted position.*	"Terminal board for autotransformer connection" on page 17
U	Connectors for right and left autotransformer surveillance cables (only for DSV327 and DSV348) Terminal boards for the connection of the right and left autotransformer (only for DSV327, DSV334 and DSV348)	
V	Power terminals for the connection of the power supply and PE external protection conductor	"Three-phase power supply and power output for motor(s)" on page 16
W	Power terminals for the connection of the load and the protection conductor	

3.2.2 DIP switch SW1



Switch	Function
1	Enables/disables reserved parameter editing ■ On: enables editing of all parameters. ■ Off: only basic parameters can be edited.
2	Not used
3	Sets external overload protection alarm management for input **TK**. ■ On: with overload protection input **TK** = Off (contact open) the fan regulation will not stop, but **TK** input status can be read by the supervisor via RS485-Modbus (if applicable). Typical for installations with several fans. ■ Off: with overload protection **TK** = Off (contact open) puts regulation in stand-by and generates an alarm.
4	Defines the duration of non standard Modbus forcing received by the supervisor (Clima-Sinergy or third party). ■ On: the received control is kept until the next control that cancels/changes it or until the controller is turned off or reset. ■ Off: the received control is kept for no more than 10 minutes
5	Not used
6	Not used

3.2.3 LED overview



3.2.4 Status LED

Name	Description
POWER	Power supply present for output components (+5 V) from the power supply on the board
CPU RUN	■ Blinking: micro controller running ■ Steady (on or off): micro-controller fault, contact SELPRO customer service
FAIL	One or more errors, check alarm message on the display

3.2.5 On/Off inputs LED

Name	Description
S1	Reverse mode active ■ on: reverse control mode active ■ off: direct control mode active
SP	Setpoint 2 on ■ on: setpoint 2 on ■ off: setpoint 1 on
S5	Maximum night limit on ■ on: limit active ■ off: limit not active
S2	Power regulation consent status: ■ on: regulation consent on ■ off: regulation consent off
S6	Maximum spray speed limit ■ on: limit active ■ off: limit not active

3.2.6 Modbus communication LED

Name	Description
TX0	Flashing: transmitting data on serial line COM 0 (Host).
TX1	Not used
TX2	Blinking: transmitting data on serial line COM 2 (from the surveillance board to the power board).
TX3	Not used
RX0	Flashing: receiving data on serial line COM 0 (Host).
RX1	Not used
RX2	Blinking: transmitting data on serial line COM 2 (from the power board to the surveillance board).
RX3	Not used

3.2.7 Relay status LED

Name	Description
RL1	Alarm relay status. ■ on: relay energized (closed between **COM**-**NO**) ■ off: relay at rest (closed between **COM**-**NC**)
RL2	Spray unit relay on/off status ■ on: relay energized ■ off: relay at rest
RL3	Heat exchanger washing relay status. ■ on: relay energized ■ off: relay at rest

3.2.8 Programming display keyboard

Key	Function
ENTER	Confirms the selection. With the **ESCAPE** key, enters the menu or saves the new settings.
ESCAPE	Cancels the selection. With the **ENTER** key, enters the menu or saves the new settings.
+	Increases the value read, scrolls upwards through the parameter list or confirms the address manually.
-	Decreases the value read or scrolls the parameter list down.

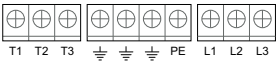
4. Inputs and outputs

4.1 Three-phase power supply and power output for motor(s)

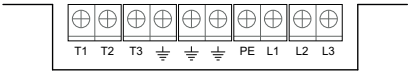
4.1.1 Power supply terminal board

Three-phase power supply and output to fan groups with total absorption within the adopted DSV model limits.

Terminal DSV312, DSV316



Terminal board DSV327, DSV334, DSV348



4.1.2 Terminal description

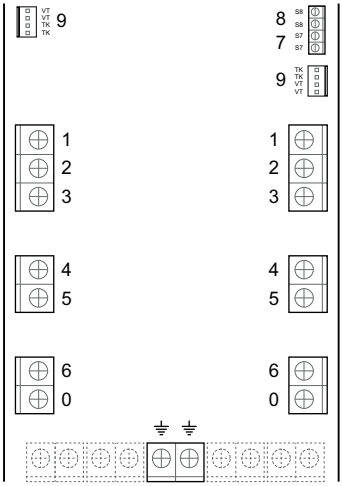
Terminal	Description
U/T1	Phase output 1 **(*)**
V/T2	Phase output 2 **(*)**
W/T3	Phase output 3 **(*)**
⏚	Auxiliary grounding to be used for the load, internally connected to PE.
PE	Protection circuit breaker connection terminal **(**)**.
L1	Phase input 1
L2	Phase input 2
L3	Phase input 3

***Note** (*): the device can be installed in TT (e.g., domestic users in Italy), IT (to ensure maximum operating continuity) and TN (users with their own transformer cabin) voltage distribution systems. Each of these systems provides different ways to ground the power source and the metal system masses.*

4.1.3 Terminal board for autotransformer connection

The speed control is performed by changing over the outputs of the two autotransformers.

***Note**: these terminals are only accessible for models DSV327, DSV334 and DSV348 and must be connected during installation. Instead, for models DSV312 and DSV316, these terminals remain inside the equipment that must be delivered with the connections already made.*



Terminal	Description
0	Voltage 0 V for autotransformer power supply
1	Step 1 in output from autotransformer
2	Step 2 in output from autotransformer
3	Step 3 in output from autotransformer
4	Step 4 in output from autotransformer
5	Step 5 in output from autotransformer
6	Autotransformer power supply voltage, step 6 (power supply direct from mains)
7	Connection terminals to external remote control for additional step 7
8	Connection terminals to external remote control for additional step 8
⏚	Grounding protection for the autotransformers

4.1.4 Terminal boards for connecting the external remote controls for steps 7 and 8

***NOTICE**: in models DSV312 and DSV316, terminals S7 and S8 are in inverted position compared to the image shown.*



Terminal	Description
S7-S7	Connection to external remote control for additional step 7
S8-S8	Connection to external remote control for additional step 8

4.1.5 Wiring diagrams

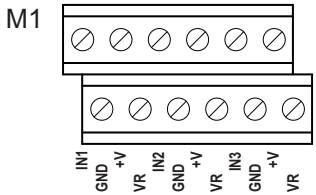
See "Power supply wiring and load" on page 27, "External autotransformer connection (only for DSV237, DSV334, and DSV348)" on page 27, "External remote control connection for additional steps 7 and 8" on page 28.

4.2 Analog inputs and outputs

4.2.1 Terminal board M1

Analog inputs for reading NTC current/voltage/resistance signals from sensors and transducers

***Note**: MEI-4 module is available to expand inputs. Contact SELPRO customer service.*



Terminal		Description	Specifications
1	**IN1**	Analog Input 1.	V dc/m A/kΩ
2	**GND**	Grounding.	-
3	**+V**	Non-stabilized power voltage output for transducers.	22 V dc 10–20% Max 20 mA
4	**VR**	Stabilized voltage output for raziometric sensors and potentiometers. Switching between 5 V and 10 V is automatic according to the set configuration.	5–10 V dc Max 10 mA
5	**IN2**	Analog Input 2.	V dc/mA/kΩ
6	**GND**	Grounding.	-

Terminal		Description	Specifications
7	**V**	Non-stabilized power voltage output for transducers.	22 V dc 10–20% Max 20 mA
8	**VR**	Stabilized voltage output for raziometric sensors and potentiometers. Switching between 5 V and 10 V is automatic according to the set configuration.	5-10 V Max 10 mA
9	**IN3**	Analog Input 3.	V dc/mA/kΩ
10	**GND**	Grounding.	-
11	**+V**	Non-stabilized power voltage output for transducers.	22 V dc 10–20% Max 20 mA
12	**VR**	Stabilized voltage output for raziometric sensors and potentiometers. Switching between 5 V and 10 V is automatic according to the set configuration.	5-10 V Max 10 mA

***NOTICE**: the same type of sensors must be connected to inputs **IN1** and **IN2**.*
***Note**: outputs **V+** and **VR** are protected against short-circuit to **IN1**, **IN2**, **IN3** and **GND**.*

4.2.2 Analog inputs IN1 and IN2

The analog inputs IN1 and IN2 are dedicated to process controls and closing the control ring. Signals can be received from different types of transducers, sensors and controllers. The number of inputs and the prevalent input selection mode are automatically set when one of the configurations is loaded. The input that is not used for control remains visible on the display and RS485 Modbus port.

***Note**: for special applications, the configuration of inputs **IN1** and **IN2** can be set using parameters **C0**, **C1**, and **C2**.*

4.2.3 Analog input IN3

Analog input **IN3** can perform the following functions:

- reading of a transducer or sensor value that is identical to those in IN1 and IN2
- setpoint control with 0–10 V dc (**SP from IN3**)
- 4-20 mA input for Slave mode operation in the absence of the automatic switch signal from Slave to the Master configuration previously defined (**Slave Safety**)
- using a transducer to read the ambient temperature:
  - switching between setpoint 1 and 2 parameters based on the ambient temperature (**Bank switch**)
  - adjustment of the setpoint following the external temperature (**Floating SP**)

***Note**: the **SP from IN3**, **Slave Safety**. and **Floating SP** functions are only available in Master mode.*
For details on the special functions, see "Switching of setpoint following the ambient temperature from IN3 (Bank Switch)" on page 50.

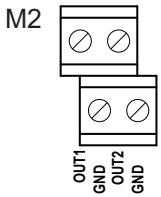
4.2.4 Wiring diagrams for analog inputs IN1, IN2, and IN3

See "Analog input connections IN and IN2 in Slave mode" on page 28, "Analog input connections IN1 and IN2 in Master mode" on page 29 and "Analog input IN3 wiring" on page 30.

4.3 Analog outputs

4.3.1 M2 terminal board

Analog outputs with 0–10 V dc voltage to control AC fans (or power slave unit, motorized actuators) and spray units.



Terminal		Description	Specifications
1	**OUT1**	Analog output for controlling AC fans or slave units. Can be configured with parameter **C8**.	0–10 V dc (default)/1–10 V dc Max 20 mA
2	**GND**	Grounding.	-
3	**OUT2**	Analog output for controlling spray units. Can be configured with parameter **C9(*)**.	0–10 V dc/1–10 V dc (default) Max 20 mA
4	**GND**	Grounding.	-

***Note** (*): in applications where only switching spray units on and off is required, use the relay output RL1 (terminal board M3).*

4.3.2 Command limits of the analog outputs.

The **OUT** analog outputs control one or power slave units, motorized actuators or via the 0-10 V/1-10 V signal. The number of slave units that can be connected is limited by the maximum current of 20 mA that can be supplied with the signal.

4.3.3 Slave unit, and spray unit wiring diagram

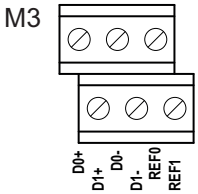
See "Analog outputs OUT1 and OUT2" on page 32.

4.4 Modbus Ports

4.4.1 Terminal board M3

RS485 serial ports managed with Modbus RTU protocol:

- **COM0**: to communicate with a supervisor, in Slave mode.
- **COM1**: reserved.



Terminal		Description
1	**D0+**	RS485 straight (non inverting) COM0
2	**D1+**	RS485 straight (non inverting) COM1 (reserved)
3	**D0-**	RS485 negative (inverting) COM0
4	**D1-**	RS485 negative (inverting) COM1 (reserved)
5	**Ref0**	Isolated transceiver reference grounding COM0
6	**Ref1**	Isolated transceiver reference grounding COM1 (reserved)

4.4.2 J1 and J2 terminal jumpers



Jumper position	Description
J1 2-3	OFF: termination serial line COM0 excluded
J1 1-2	ON: termination serial line COM0 with 120 Ω inserted
J2 2-3	OFF: termination serial line COM1 excluded (reserved)
J2 1-2	ON: termination serial line COM1 with 120 Ω inserted (reserved)

4.4.3 Forcing from a supervisor

The following can be forced from a supervisor over Modbus:

- fan speed, by selecting the active step.
- the **OUT1** analog output.
- control of the spray unit or other external units, using the **OUT2** analog output.
- the controls on the On/Off inputs, using the **TK** input.

With switch 4 = Off (DIP switch SW1) the forcing automatically terminates after 10 minutes. The lit LED indicates the presence of one or more non-standard Modbus forcing.

***Note**: forcing can be canceled by a subsequent Modbus command or by turning off the controller or resetting it.*

4.4.4 Interrogation frequency from supervisor

***NOTICE**: to avoid malfunctions, limit the interrogation frequency to 1 Hz (one interrogation per second).*

4.4.5 RS485 Modbus RTU network wiring diagram COM0

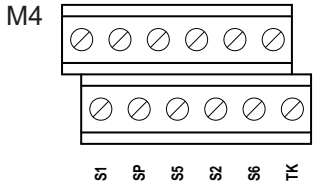
See "Correct connection steps between PC-Host and DSV (COM0 port)" on page 35.

4.5 On/Off inputs

4.5.1 Terminal board M4

Terminal board with On/Off inputs for remote commands or for reading overheat protections. Contact activity is indicated by On/Off input LEDs.

***Note**: these contacts activate some of the parameters in the default settings. They may vary for specific customer needs. Refer to the project documentation.*



Contact	Terminal	Function
S1	**1, 2**	Selects control mode ■ closed: reverse control ■ open: direct control
SP	**3, 4**	Selects the set setpoint (basic parameters **SP1** or **SP2**) ■ closed: setpoint 2 on ■ open: setpoint 1 on
S5	**5, 6**	Turns the night limit on/off (basic **LNight** parameter) ■ closed: limit active ■ open: limit not active
S2	**7, 8**	Enables/disables the controller operation. ■ closed: disables the control, sets: ○ the control command value of the fans = 0 ○ the value of analog outputs **OUT** 0/1 V dc, based on parameters **C8** and **C9** ■ open: enables control based on settings and inputs
S6	**9, 10**	Forces AC fans to work at constant speed (basic parameter **LSpray**) with spray unit operating. ■ closed: forcing active ■ open: forcing not active ***Note**: if connected, the AWS unit directly manages the input.*
TK		Normally closed contact to connect motor overheat protections of the connected fans. ■ closed: no alarm, consent to regulation ■ open: alarm, no consent to regulation ***NOTICE**: the overheat protection of one or more fans or an alarm coming from an electrical cabinet can be connected to the TK input but must be normally closed logic.* ***Note**: with switch 3 = On (DIP switch SW1) the alarm is only readable by Modbus, the regulation consent remains and the relay remains energized.*

4.5.2 Forcing via Modbus

Some of these inputs can be forced from a supervisor. See "Forcing from a supervisor" on page 21.

4.5.3 On/Off input wiring diagram

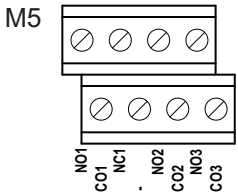
See "On/Off inputs connection" on page 32.

4.6 Relay outputs

4.6.1 M5 terminal board

On/Off relay outputs with the following functions:

- RL1: can be set with parameter **C7**, see "Configuration parameters" on page 69.
- RL2: ON/OFF command for spray unit on/off.
- RL3: enables the washing cycle for the heat exchanger, see "Timed washing of the heat exchanger" on page 48.



Terminal		Description
1	**NO1**	Contact closed with **CO1** with relay energized.
2	**CO1**	Shared.
3	**NC1**	Contact closed with **CO1** with relay de-energized.
4	**-**	Not enabled.
5	**NO2**	Contact closed with **CO2** with relay energized.
6	**CO2**	Shared.
7	**NO3**	Contact closed with **CO3** with relay energized.
8	**CO3**	Shared.

4.6.2 Alarm signal settings

Alarms can be managed differently, for example, if a controller error occurs during regulation.

4.6.3 Relay wiring diagram

See "Relay output connection" on page 35.

5. Installation

5.1 Wall mount

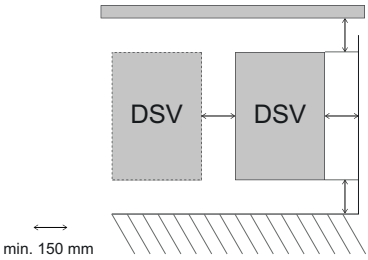
5.1.1 Important considerations for installation

DSV is a device that allows for different types of installation. Before proceeding, check:

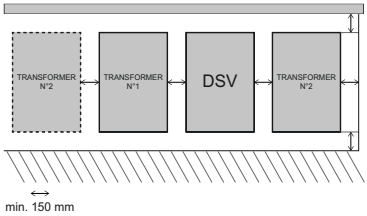
- if the fans are equipped with asynchronous motors that are voltage adjustable, meaning high speed
- if the maximum rated load current is less than or equal to the rated current of the selected DSV model

5.1.2 Guarantee cooling

DSV312, DSV316



DSV327, DSV334, DSV348



***NOTICE**: leave a free area between the device, the autotransformer, and the walls or between devices in series.*

***NOTICE**: over temperature. In the case of vertical installation of multiple controllers, always measure the air temperature to which the highest controller is subjected.*

5.1.3 Outdoor installation

The controller can withstand temperatures below zero only if it is powered. Avoid exposure to direct sunlight.

***NOTICE**: temperature changes. Defective operation. Store the controller at room temperature before installation to avoid condensation.*

5.1.4 Installation in farms

***NOTICE**: ammonia vapors. Avoid installing the controller in the stable. Install it in a separate room.*

5.1.5 Warnings

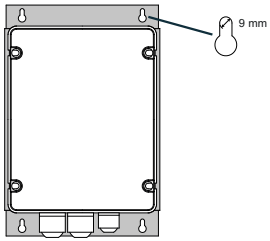
CAUTION! Heavy object. Handle with care. See "Physical properties" on page 84 for the weight of the controller and the autotransformers.

***NOTICE**: secure the device closed to prevent screws from falling and remaining inside. Always close the unused holes with the plugs. Install the controller vertically with the cable clamps at the bottom.*

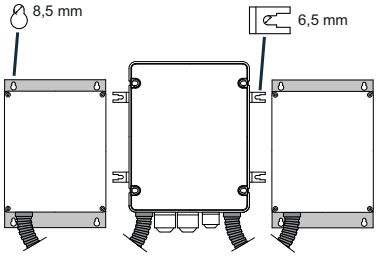
5.1.6 Secure the device to the wall

1. Insert the cable clamps or plugs.
2. Drill holes at the areas shown in the image.
3. Mount the mounting brackets
4. Secure the appliance using four screws (not supplied) suited to the wall thickness.

DSV312, DSV316



DSV327, DSV334,DSV348



5.2 Electrical installation

Operation reserved for an electrician. Has substantial knowledge in the electrical field. Can understand wiring diagrams and work on live electrical panels, shunt boxes and control devices.

5.2.1 Warnings

WARNING! Live parts. Electric shock. If you have to work on the powered controller, always do it in the presence of a second person. Block remote controls and any power switches.

5.2.2 Ground

WARNING! Electrocution. Do not power the controller if it is not grounded.

***NOTICE**: if a circuit breaker is installed on the power supply, use a device with a threshold over 60 mA and with a short delay to prevent inopportune power outages*

5.2.3 Protection for short-circuits on load

To protect the controller power modules from severe short-circuits or overloads, it is imperative to use semiconductor protection fuses with a suitable I2t < 610 A2s @ 400 V ac value fitted upstream of the controller.

For additional protection, a circuit breaker with a B-curve can be used, mounted upstream of the controller.

The installer must install these protections.

Model	Rated current (A)	Circuit breaker (A)	Fuses		
			Current (A)	Format	I2t semiconductor max (A 2s)
DSV312	12	16	20	10 x 38	140
DSV316	16	20	25	10 x 38	245
DSV327	27	32	40	14 x 51	493
DSV334	34	40	50	NHO	470
DSV348	48	63	60	NHO	630

***Note**: to use as protection for the power semiconductors used in DSVXXX, the fuse must have a melting integral I2t < 610 A2s.*

5.2.4 Power cables separate from signal cables

Install the power cables (power and load) separately from the signal cables (analog inputs and digital On/Off inputs/outputs) and keep the maximum distance possible between the cables.

In case of intersection, install with a 90° angle.

5.2.5 Connecting loads and by-passes

The controller allows you to connect three-phase loads without having to connect the neutral. This simplifies installation and allows for a load triangle configuration. Prepare a by-pass switch in order to operate the load even in the event of partializer failure (emergency by-pass).

5.2.6 Warnings for connection and by-pass use

Match phases to avoid destructive short circuits and keep the motor running.

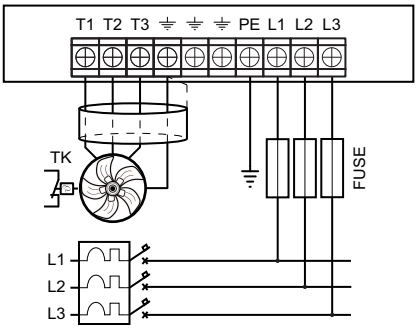
Before powering the load to the maximum voltage, disconnect the power supply to the controller, therefore:

- use a three-position manual shunt as a switching device
- if you use the automatic switch using contactors, ensure a delay of at least two seconds between turning off the controller and turning on the load.

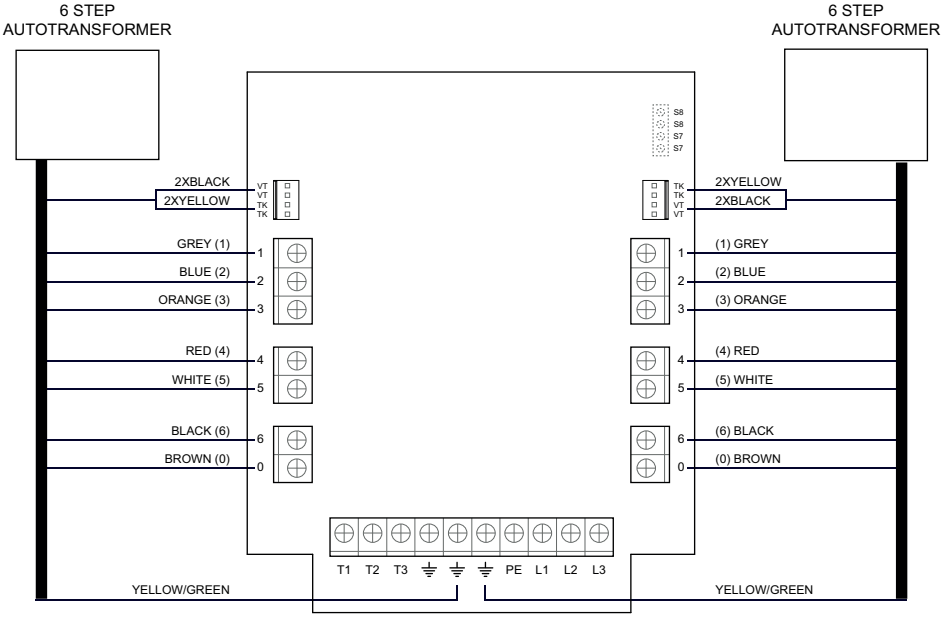
6. Connections

6.1 Power supply wiring and power output for motor(s)

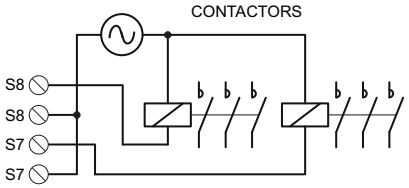
6.1.1 Power supply wiring and load



6.1.2 External autotransformer connection (only for DSV237, DSV334, and DSV348)



6.1.3 External remote control connection for additional steps 7 and 8



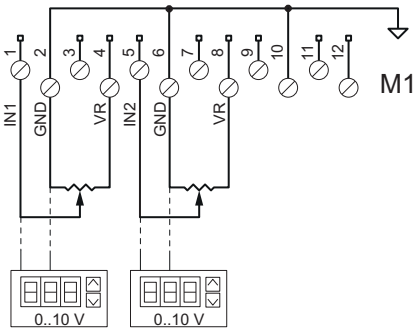
6.2 Analog input connections IN and IN2 in Slave mode

***NOTICE**: for connections longer than 30 m, use a shielded cable and connect the shield directly to ground.*

6.2.1 Connection for Slave unit with 0-10 V dc input

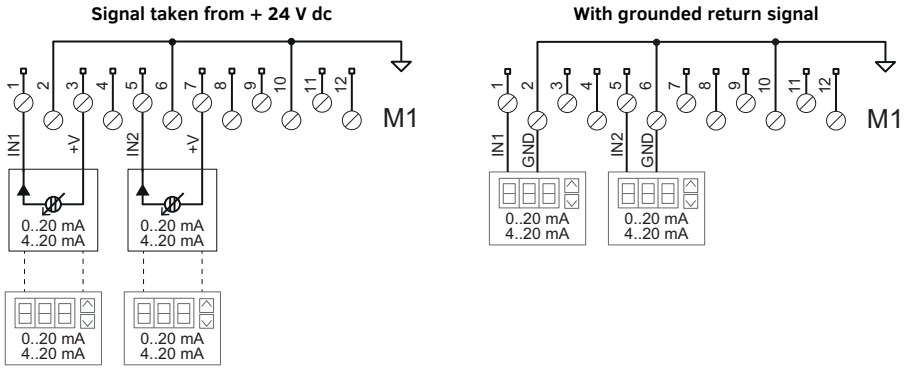
The connection of a potentiometer for manual control or, alternatively, a remote controller with 0–10 V dc output is illustrated in the diagram. If you use a shielded cable, ground the shield directly.

This connection requires the use of the configuration **rS 010**.



6.2.2 Connection for Slave unit with input 0-20 mA/4-20 mA

The diagram shows the connection to a remote controller with output 0-20 mA/4-20 mA or, as an alternative, to a 0-20 mA/4-20 mA transmitter for manual control. If the device has 0-20 mA output use the **rS 020** configuration, if it has 4-20 mA output use the **rS 420**.



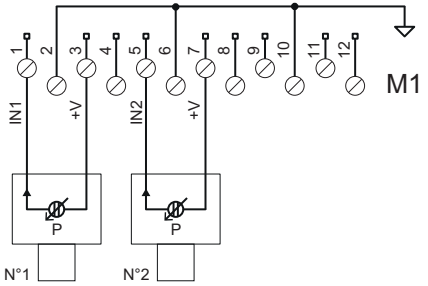
6.3 Analog input connections IN1 and IN2 in Master mode

***NOTICE**: for connections longer than 30 m, use a shielded cable and connect the shield directly to ground.*

6.3.1 Connection to two transducers with 4-20 mA output

The diagram shows the connection of two pressure transducers with 4–20 mA output. Transducers can be used to read any magnitude as long as the output is 4-20 mA and the supply +22 V dc + 10-20%. The display shows mA or bar according to the default configuration.

This connection requires the use of **rPr420** (mA measurements), **rPr015**, **rPr025**, **rPr030**, **rPr045** (bar measurements) configurations.

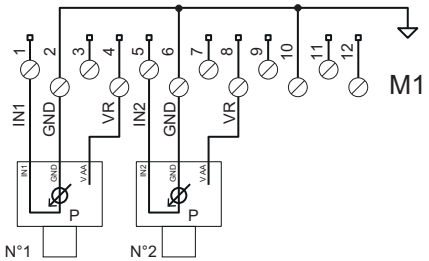


In the default configuration, the setpoint coincides with the maximum fan speed (menu **4: SETUP** > **C4** = **hi**). Two transducers are provided for (menu **4: SETUP** > **C0** = **r2**), the controller automatically selects the transducer with the strongest signal (menu **4: SETUP** > **C1** = **hi**).

6.3.2 Connection to two transducers with output 0–5/0–10 V dc

The diagram below shows the connection of two pressure transducers with output 0-5/0-10 V dc. Transducers can be used to read any magnitude as long as the output is 0–5/0–10 V dc and the power supply is 5/10 V dc. The display shows volt or bar according to the default configuration. The VR communication between +5.0 V dc and +10.0 V dc is automatic.

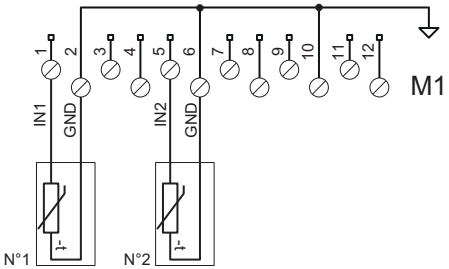
This connection requires the use of **rUu010**, **rUu-05** (V dc measurements), **rPu030** (in bar) configurations.



6.3.3 Connection to NTC probe with 10 kΩ @ 25 °C ohm value

The connection of two NTC 10K @ 25°C probes is illustrated in the diagram. Only this type of NTC probe can be used. The display is in °C.

This connection requires the use of **rtE-01** and **rtE-02** (measurements in °C) configurations.

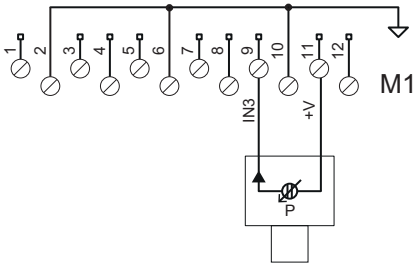


6.4 Analog input IN3 wiring

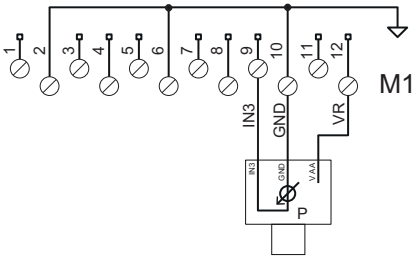
***NOTICE**: for connections longer than 30 m, use a shielded cable and connect the shield directly to ground.*

6.4.1 IN3 wiring for read-only input

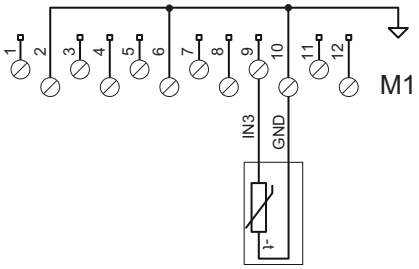
4–20 mA



0–5/0–10 V dc

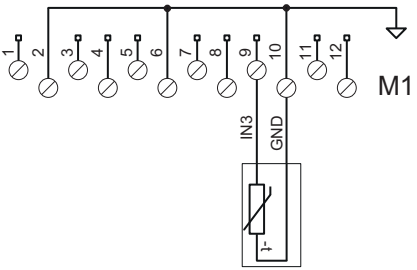


NTC 10 kΩ @ 25 °C/ 77 °F, B (25/85)= 3435 K

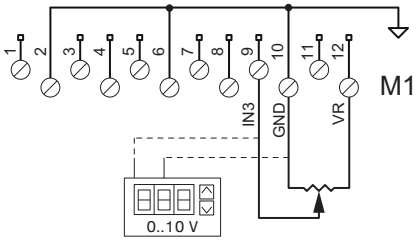


***Note**: the same type of sensor as the ones connected to inputs **IN1** and **IN2** must be connected on input **IN3**. For details on the necessary configurations and display screens, see "Analog input connections IN1 and IN2 in Master mode" on page 29.*

6.4.2 Connection IN3 for switching the setpoint (Bank Switch) or for adjustment of the setpoint (Floating SP) following the external temperature

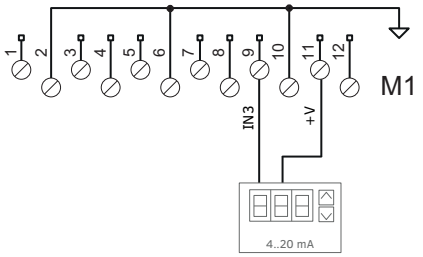


6.4.3 IN3 connection for external setpoint control with 0-10 V signal (SP from IN3)



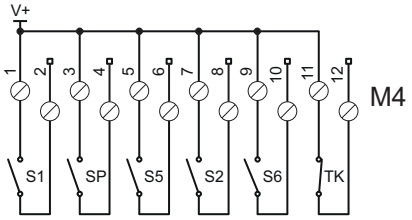
***Note**: in configurations **rUu-05** and **rPu030**, the voltage +10V must be supplied externally.*

6.4.4 Connection IN3 for operation in Slave Safety mode



6.5 On/Off inputs connection

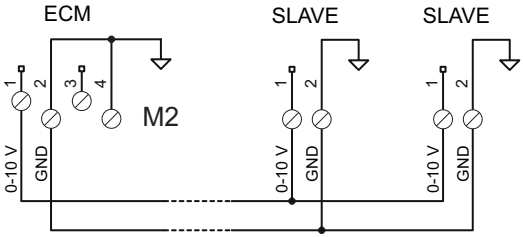
6.5.1 Diagram



6.6 Analog outputs OUT1 and OUT2

6.6.1 Slave unit connection

This connection is indicated for Slave units. By default, the output varies from 0/1–10 V to be directly proportionate to the **Step** parameter.



6.6.2 Connection to Water Spray unit

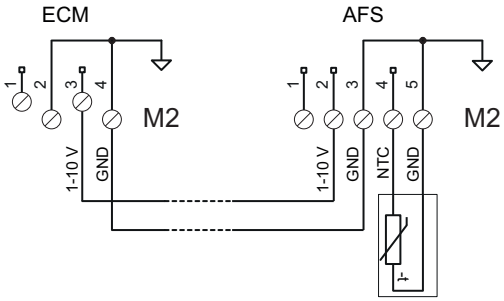
This connection is indicated to coordinate fan system and spray unit operations that increase heat exchanger heat power. You can connect three different Water Spray unit models:

- AFS: for single-spray ramp on/off control
- AWS100: for On/Off control from 1 to 3 spray ramps of 1 or 2 modulating valves.
- WS100-180: for On/Off control from 1 to 4 spray ramps (product replaced by AWS100).

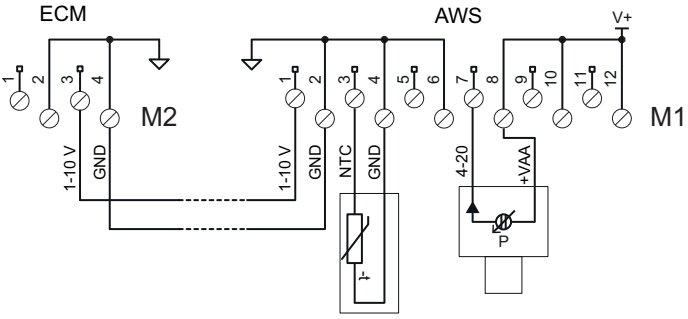
The **C8** = SPRAY 1-10 V parameter (default) enables the **OUT2** analog output to transmit the spray unit control command, making a work area defined by the **USP** setpoint and **UPb** proportional band for external units available. This work area overlaps by integrating with the fan work area.

USP is set by deviation (+/-) from the reference setpoint (**SP1** or **SP2**) for fans.

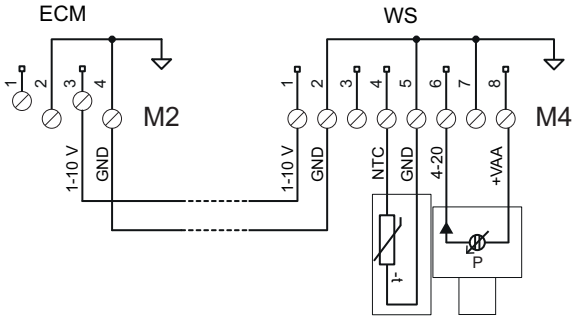
Connection diagram to AFS units



Connection diagram to AWS100 unit



Connection diagram to WS100-180 unit

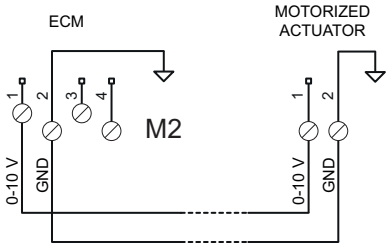


6.6.3 Motorized valve actuator connection

This connection is used to coordinate the operation of the ventilation system with a motorized actuator (valve, damper, etc.) with programmable working range.

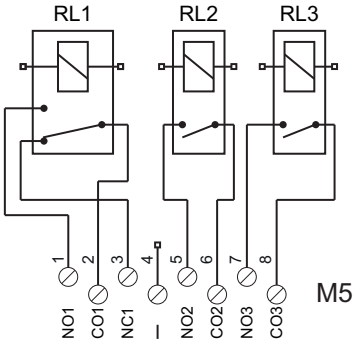
Parameters **C8**/**C9** = USP-DIR 0-10 V or USP-REV 10-0 V enable the analog outputs **OUT1**/**OUT2** to control an actuator or a motorized valve. This makes a work area available, defined by the **USP** setpoint and the **UPb** proportional band for external units, and proportional control in direct (DIR) or reverse (REV) mode. This work area interacts by overlapping and integrating in the fan work area.

USP and **UPb** are set by deviation (+/-) from the reference setpoint (**SP1** or **SP2**) for fans.



6.7 Relay output connection

6.7.1 Connection to external systems for communicating alarms, faults or operating states.



6.8 RS485 Modbus RTU network connection

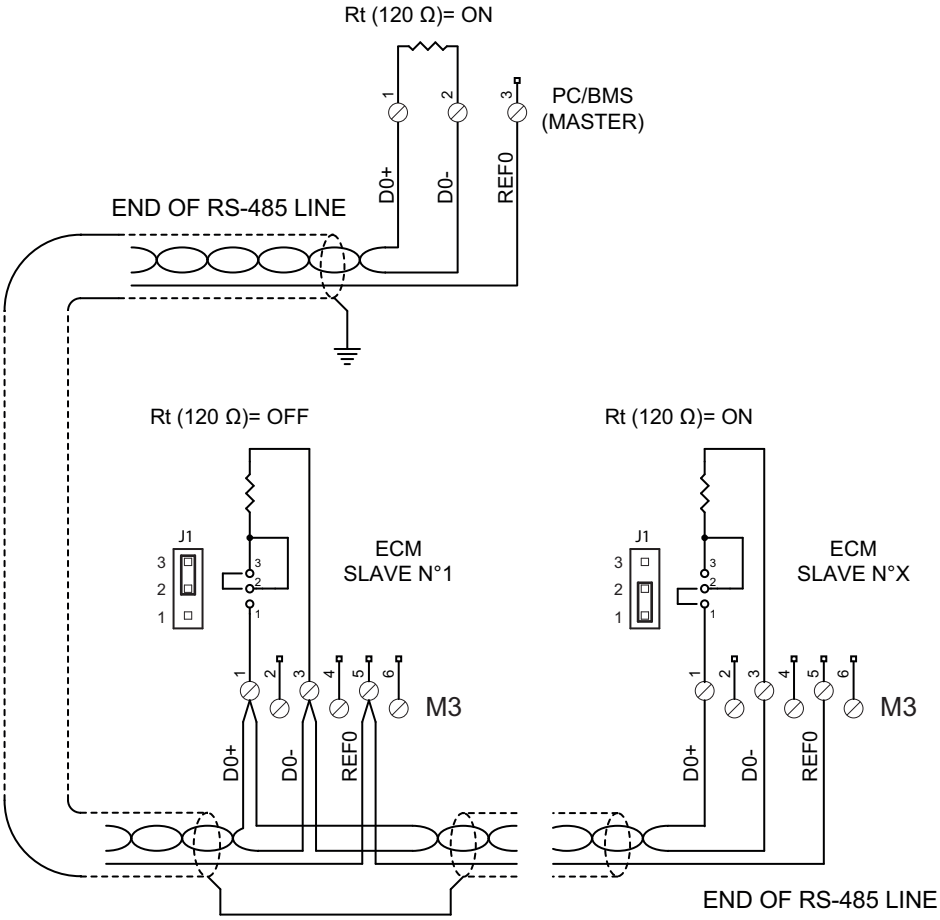
6.8.1 Correct connection steps between PC-Host and DSV (COM0 port)

***NOTICE**: follow the indicated steps for correct Modbus connection operations.*

1. Use an outdoor cable specific for outdoor applications with **length under 1000 meters**, for example, a serial cable for LAN ITC BELDEN 15S7D networks (see specifications "BELDEN cable specifications for RS485 connection" on page 86).
2. Make sure the RS-485 line is correctly connected: all network **D0+** terminals must **all be connected to the same conductor**, the same for **D0-** and **REF0** terminals.
3. Lay the data line cable (Modbus network) **from an DSV device to the next**, starting from the Master unit and ending with the last serviced device. Other wiring methods are not permitted.
4. Ensure **sufficient distance between the Modbus network cable and other system cables**, especially from mains cables.
5. **Terminate line ends** (the Master and last serviced device) **with a 120 Ω resistance** (**Rt**). Enable the 120 Ω termination on the RS-485/PC-Host adapter.
6. Ground the cable shield starting from the RS-485/PC-Host insulated adapter **only near the adapter**: the cable will be divided into sections, one for each segment. **Do not connect the REF0 shield** at any point.
7. **Connect the first segment shield to the second shield** and so on. The last segment on the last device side shield remains free.

6.8.2 Modbus network connection diagram between PC-Hoset and DSV (COM0 port)

***NOTICE**: the network cable must be connected as indicated in the diagram. Other wiring methods are NOT permitted.*



7. Operating mode

7.1 Slave proportional mode

7.1.1 Applications

Control from external controller or manually controlled potentiometer.

7.1.2 AC fan control

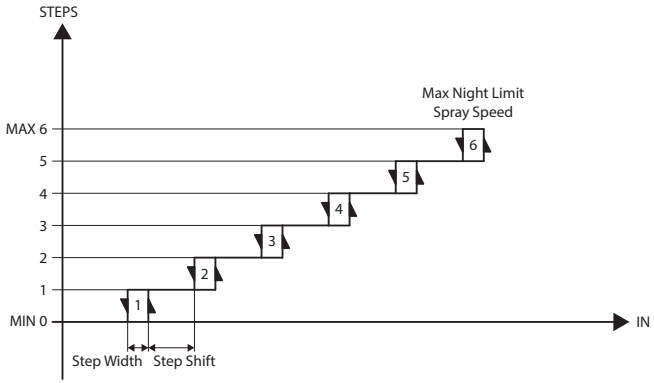
The active step value, and **OUT1** and **OUT2** output values, increases or decreases in proportion to the prevalent input **IN** based on the status of the **S1** input. The minimum speed limit Lo and the maximum speed limit **Hi** are active.

If the maximum night limit **LNight** is activated (input **S**5 = closed), **LNight** prevails over **Hi** only if the value is lower. If constant speed forcing is activated with the spray activated (input **S6** = closed), **Step** is equal to **LSpray**. If both functions are active, the lower value between **LNight** and **LSpray** prevails.

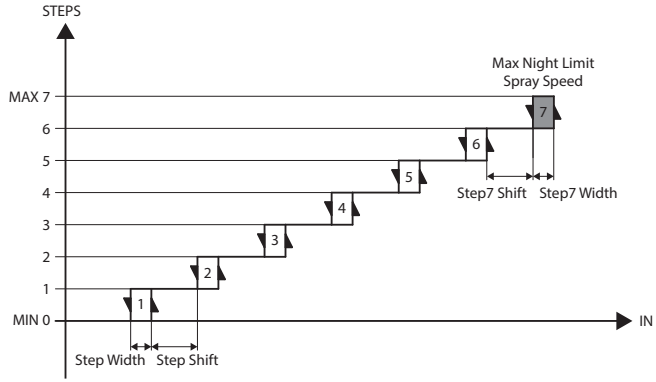
The total number of steps that can be used for control depends on the input configuration chosen, see para. 10.1. You can choose between No. 6, No. 7, or No. 8: sax in voltage plus null voltage, and two for the ON/OFF command of the external remote controls.

7.1.3 Direct Slave control for AC fans

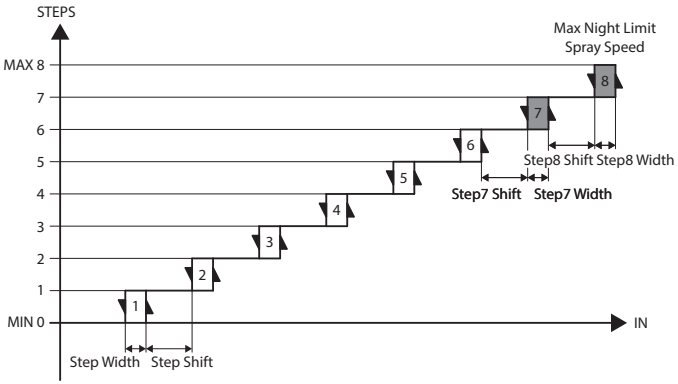
S1 contact = *open*



6 Steps - Slave Control - Default



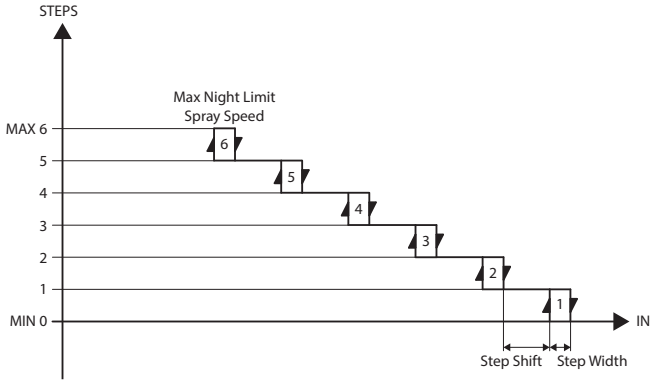
7 Steps - Slave Control



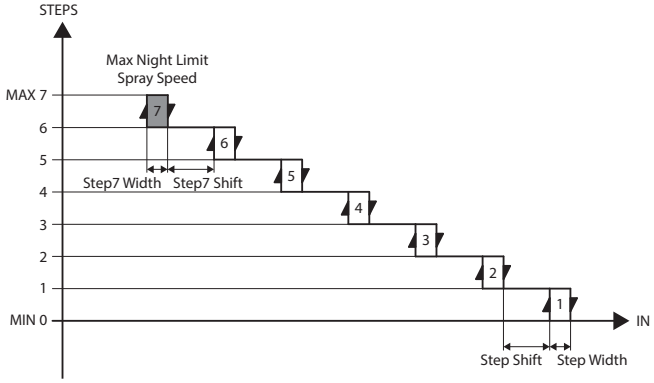
8 Steps - Slave Control

7.1.4 Reverse Slave control for AC fans

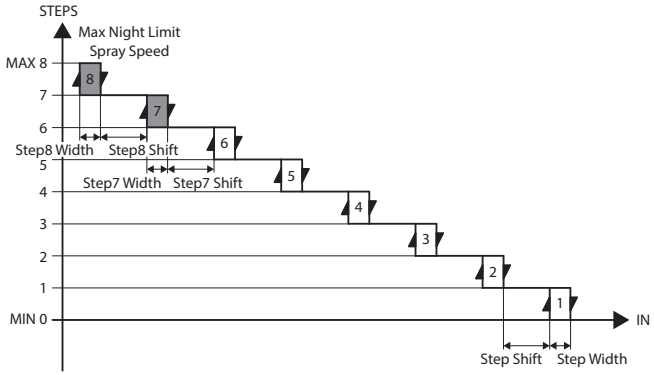
S1 contact = *closed*



6 Steps - Slave Control



7 Steps - Slave Control



8 Steps - Slave Control

7.1.5 Spray unit control

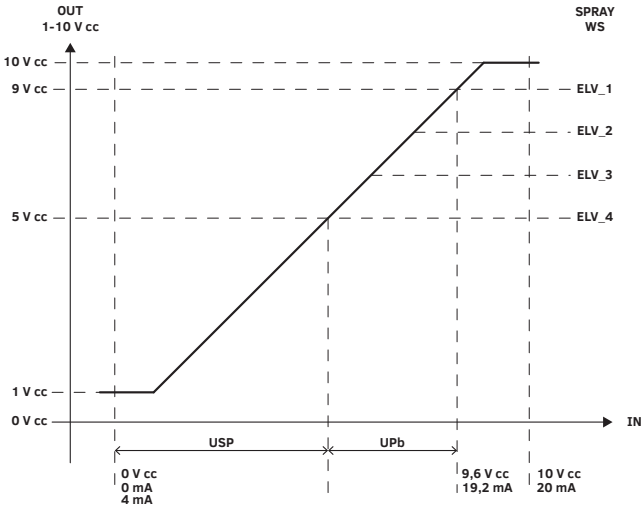
The controller enables a second work zone with independent setpoint **USP** and **UPb** proportional band. The work zone uses the same **IN** input signal and overlaps the fan work zone.

The voltage of output **OUT** varies in proportion to the prevalent input (**IN**). The signal never reaches zero but is always between 1 and 10 V.

The **RL2** relay is On when input **IN** is greater than **USP** + **UPb/2**, it is Off when input **IN** is less than **USP** - **UPb/2**.

7.1.6 Slave control for spray with OUT output

*parameter **C8/C9** = **SPRAY 1-10 V***

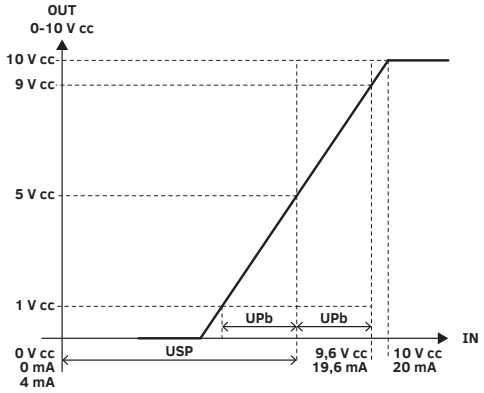


7.1.7 Slave regulation on OUT output to directly control a motorized valve actuator

*parameter **C8/C9**= **USP-DIR 0-10 V***

The controller enables a second work zone with independent setpoint **SP-USP** and proportional band **UPb**. The work zone uses the same **IN** input signal and overlaps the fan work zone.

The voltage of output **OUT** increases and decreases in direct proportion to the signal of the input **IN**.

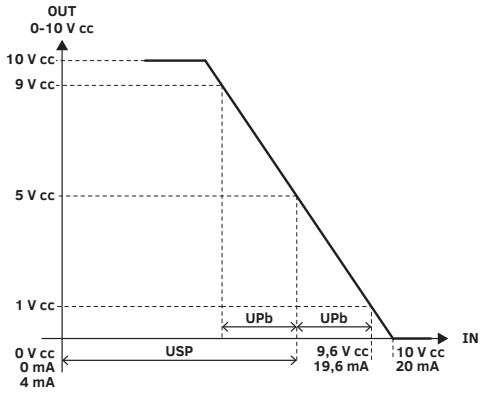


7.1.8 Slave regulation on OUT output to reversely control a motorized valve actuator

*parameter **C8/C9**= **USP-REV 10-0 V***

The controller enables a second work zone with independent setpoint **USP** and **UPb** proportional band. The work zone uses the same **IN** input signal and overlaps the fan work zone.

The voltage of output **OUT** increases and decreases in direct proportion to the signal of the input **IN**.



7.2 Master proportional mode

7.2.1 Applications

Signals from temperature sensors or transducers.

7.2.2 AC fan control

The active step value varies to keep the magnitude measured by the transducer with prevalent signal (**IN**) inside the **Pb** proportional band. Based on the status of input **S1**, the step value increases or decreases proportionally to the prevalent input. The **OUT1** and **OUT2** output voltages vary as a function of the dominant signal (**IN**) according to the specific settings, see para. 7.2.7 to para. 7.2.11.

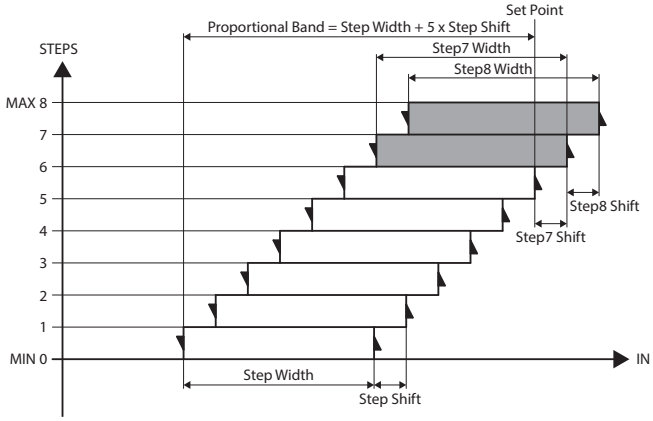
The setpoint **SP** can be at the limit of minimum (**Lo**) or maximum (**Hi**) speed for the control command value (parameter **C4** = **Lo**/**Hi**).

If the maximum night limit **LNight** is activated (input **S5** = closed), **LNight** prevails over **Hi** only if the value is lower. If constant speed forcing is activated with the spray activated (input **S6** = closed), **Step** is equal to **LSpray**. If both functions are active, the lower value between **LNight** and **LSpray** prevails.

The number of steps that can be used is always eight: six for voltage plus the null voltage, and two for the ON/OFF command of the external remote controls.

7.2.3 Direct Master control for AC fans, SP at the maximum limit (default)

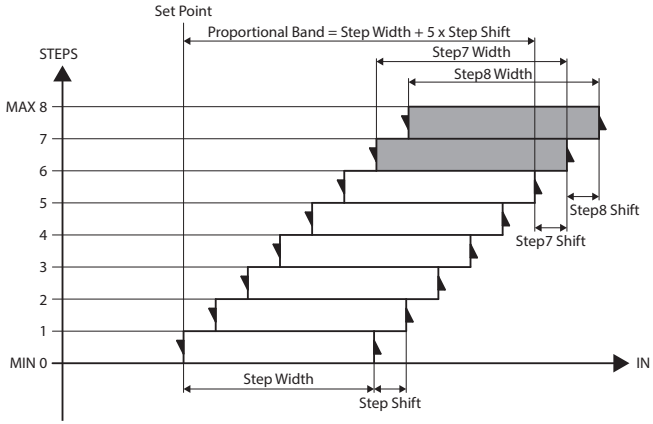
S1 contact *= open*
parameter ***C4*** *=* ***Hi***



6+2 Steps - direct Master Control - Setpoint at maximum limit

7.2.4 Direct Master control for AC fans, SP at the minimum limit

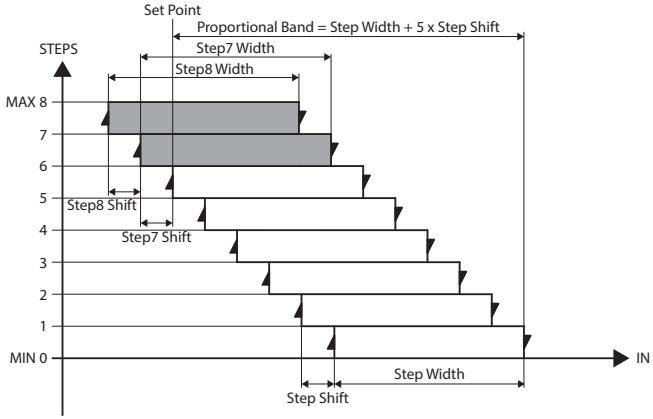
S1 contact = *open*
parameter ***C4*** = ***Lo***



6+2 Steps - direct Master Control - Setpoint at minimum limit

7.2.5 Reverse Master control for AC fans, SP at the maximum limit

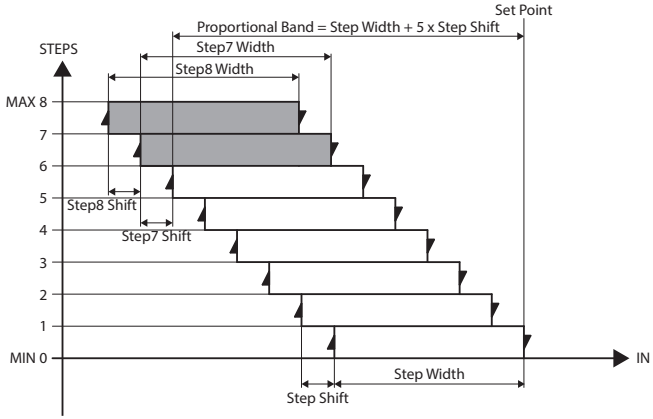
S1 contact = *closed*
parameter ***C4*** = ***Hi***



6+2 Steps - inverse Master Control - Setpoint at maximum limit

7.2.6 Reverse Master control for AC fans, SP at the minimum limit

S1 contact = *closed*
parameter ***C4***= ***Lo***



6+2 Steps - inverse Master Control - Setpoint at minimum limit

7.2.7 Spray unit control

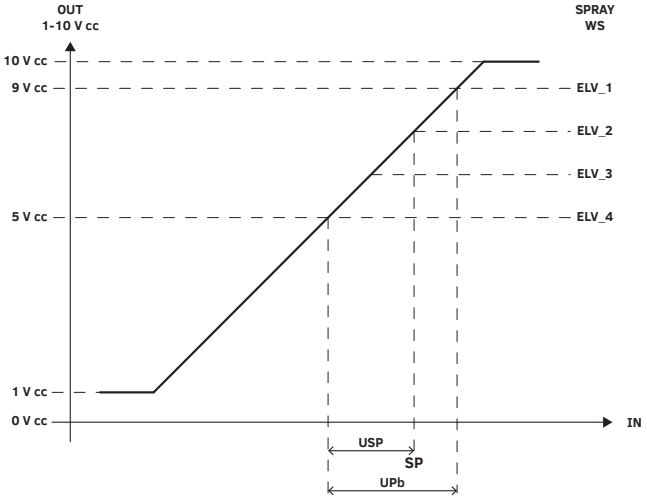
The controller enables a second work zone with independent setpoint **SP-USP** and proportional band **UPb**. The work zone uses the same **IN** input signal and overlaps the fan work zone.

The voltage of output **OUT** varies in proportion to the prevalent input (**IN**). The signal never reaches zero but is always between 1 and 10 V.

The **RL2** relay is On when input **IN** is greater than **SP**+**USP**+**UPb/2**, it is Off when input **IN** is less than **SP+USP** - **UPb/2**.

7.2.8 Master control for spray with OUT output

*parameter **C8/C9** = **SPRAY 1-10 V***

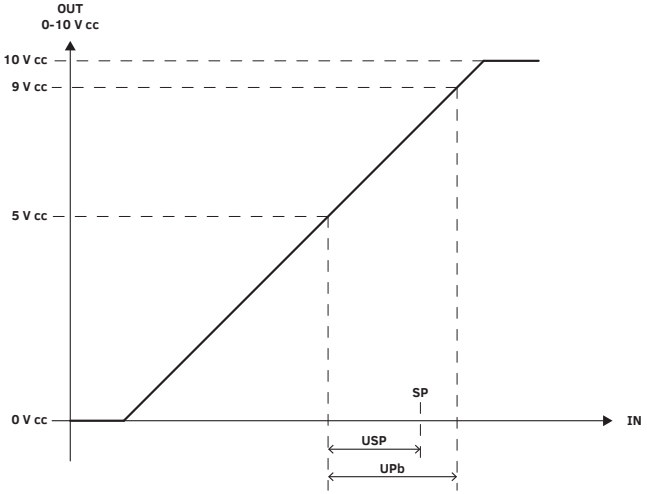


7.2.9 Master regulation on OUT output to directly control a motorized valve actuator

*parameter **C8/C9**= **USP-DIR 0-10 V***

The controller enables a second work zone with independent setpoint **SP-USP** and proportional band **UPb**. The work zone uses the same **IN** input signal and overlaps the fan work zone.

The voltage of output **OUT** increases and decreases in direct proportion to the signal of the input **IN**.

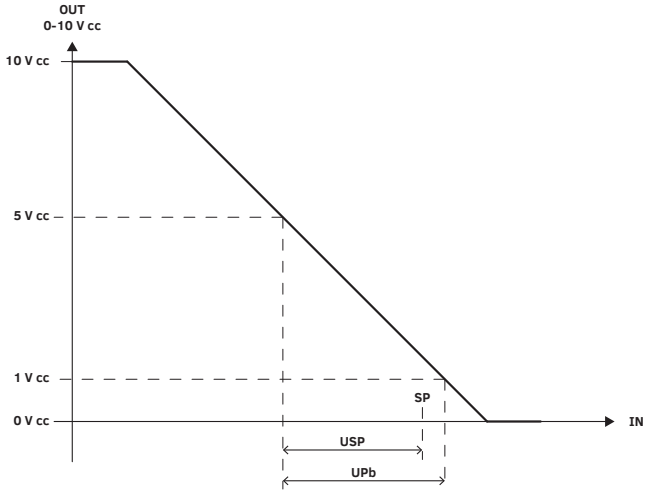


7.2.10 Master regulation on OUT output to reversely control a motorized valve actuator

*parameter **C8/C9**= **USP-REV 10-0 V***

The controller enables a second work zone with independent setpoint **SP-USP** and proportional band **UPb**. The work zone uses the same **IN** input signal and overlaps the fan work zone.

The voltage of output **OUT** increases and decreases in direct proportion to the signal of the input **IN**.



7.3 Overload protection function

7.3.1 Operation

The device reads the value of the effective output current (Ampere RMS) and compares it to two current values: the maximum working current and the maximum pickup current.

The maximum working current is 1.2 times the rated current (In*1.2). When exceeded, the maximum time within which the overcurrent value (I-In) can be distributed is calculated. The higher the overcurrent, the shorter the distribution, and vice versa. The period is the result of an algorithm that takes into account the size of the controller. The relation between the overcurrent (I-In) and time is quadratic.

The maximum pickup current is 1.4 times the rated current (In*4). When exceeded, a fixed 5.0 s timer starts. Once this time passes, it stops distributing.

7.3.2 Controller behavior

When the distributed current...	Then...
is lower than the maximum working current (In*1.2)	distribution is not limited in time. Normal messages (parameter table, etc.) appear on the display and the value of the real-time distributed current for load.
is higher than the maximum working current (In*1.2)	Distribution is not limited in time. If the distributed current remains stable above the maximum working current and exceeds the set maximum I2t value, the device alarm is triggered and the first line of the display shows the message "I2t Current" If the distributed current drops below the working current before the maximum time has been reached, then the calculated time is deducted from the accumulated value until it returns to zero.
Greater than the maximum pickup current (In*1.4)	Distribution is limited in time, it is at most 5 seconds. If the distributed current is above the maximum pickup current for more than 5 seconds, the device alarm stops distribution and the following message is displayed: "Max Current" If the distributed current drops below the threshold before 5 seconds, the residual time is reset.

8. Special functions

8.1 Timed washing of the heat exchanger

8.1.1 Applications

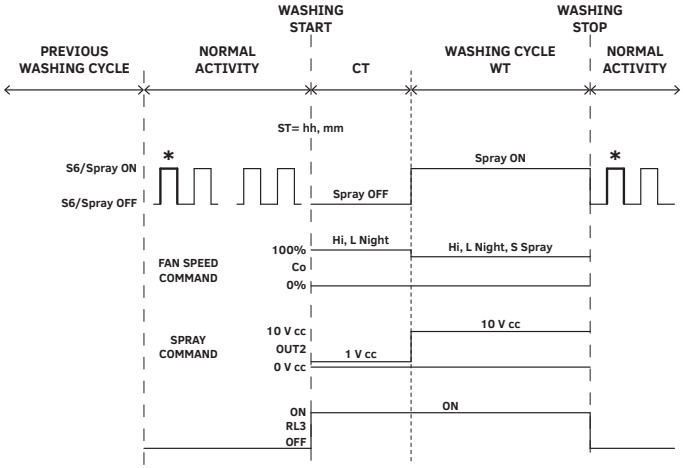
Presence of salt residues in the heat exchanger water.

***Note**: function only available AWS unit.*

8.1.2 "Washing" washing cycle

Washing is performed at most once a day, at the set time (**ST**). Following are the stages:

Step	Description
1	Stop the supply of the fluid to the heat exchanger by activation of relay **RL3**.
2	Cooling of the heat exchanger for **CT** minutes. The fans rotate at the maximum speed (lower value between **Hi** and **LNight**).
3	Washing the heat exchanger for **WT** minutes by activating the spray unit. The fans rotate at the maximum speed allowed of the settings (lower value between **LSpray**, **Hi** and **LNight**).



***Note**: when this washing cycle is running, the message "Washing" appears on the display.*

***Note**: washing is performed if, and only if, in the preceding operating period (Normal Activity) there was at least one activation of the spray (*).*

***Note**: if the controller is stopped during the washing cycle (input **S2** = closed), or if there is a power outage or water cutoff, the current cycle is considered finished.*

8.1.3 Setting Parameters

See "Timed washing of the heat exchanger" on page 76.

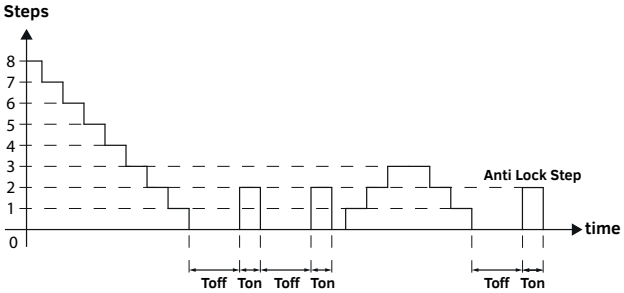
8.2 Fan anti-locking

8.2.1 Applications

Long downtimes or winters with snow and ice accumulation on the guard grid to avoid damaging the fans.

8.2.2 Operation

If the control command value **Step** is 0 for **TOff** minutes, all of the fans are activated at a constant **Anti Lock Speed** for **TOn** minutes.



8.2.3 Setting Parameters

See "Fan anti-locking" on page 76.

8.3 Night limits for speed using internal clock

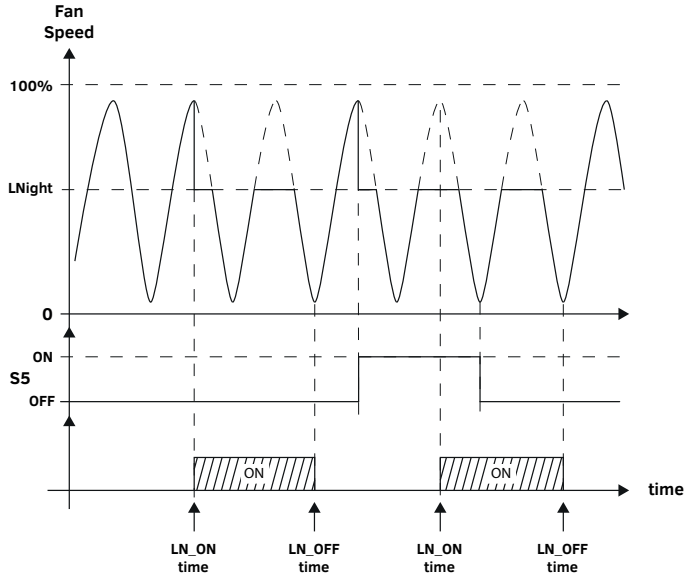
8.3.1 Applications

Activation of the night speed limit using the controller's internal clock.

8.3.2 Operation

The night maximum speed limit, **LNight**, is activated in the time interval between **LN ON Time** until **LN Off Time**.

***Note**: the function is in parallel to the command defined by input **S5**.*



8.3.3 Setting Parameters

See "Night limits for speed using internal clock" on page 77.

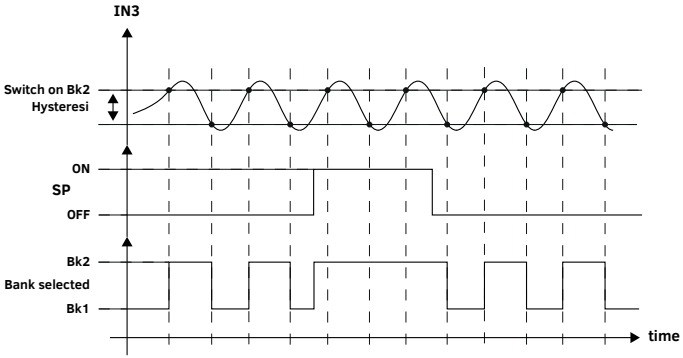
8.4 Switching of setpoint following the ambient temperature from IN3 (Bank Switch)

8.4.1 Operation

***Note**: function available only in Master mode.*
***Note**: with this function active, the other functions that use analog input **IN3** are not available.*
The active parameter set (**Bk1** or **Bk2**) is defined as the temperature value read on analog input **IN3**:

- it is **Bk2** if the temperature is greater than the **Switch on Bk2** value
- it is **Bk1** if the temperature is less than the (**Switch on Bk2 -Hysteresis)** value

If the On/Off **SP** = On, the active parameter set is always **Bk2**, regardless of the temperature value read.



8.4.2 Setting Parameters

See "Switching of setpoint following the ambient temperature from IN3 (Bank Switch)" on page 78.

8.5 Adjustment of the setpoint following the external temperature IN3 (Floating SP)

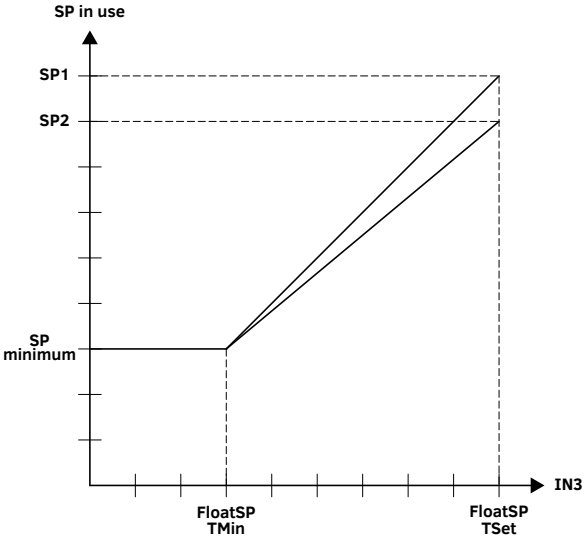
8.5.1 Operation

***Note**: function available only in Master mode.*

***Note**: with this function active, the other functions that use analog input **IN3** are not available.*

The active setpoint value, **SP**, is modified in proportion to the external temperature value of the temperature probe connected to the analogue input **IN3**.

The working zone is the range between the **FloatSP TMin** and **FloatSP TSet** temperatures. When the **FloatSP TMin** temperature is reached, the setpoint reaches the minimum set value, **SP Minimum**; when it reaches the **FloatSP TSet** temperature, the setpoint equals the setpoint entered (**SP1**/**SP2**).



8.5.2 Operating example

Following is an example of the values taken by **SP** as the temperature detected by **IN3** varies:

IN3	rPr420	rPr015	rPr025	rPr030	rPr045	rUu-05	rPu030	rUu010	rtE-01	rtE-02
0.0 °C	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2
5.0 °C (*)	10.0 mA	6.9 bar	10.8 bar	9.7 bar	14.0 bar	1.9 V	9.8 bar	4.0 V	19.6 °C	19.6 °C
10.0 °C (*)	12.0 mA	8.8 bar	14.0 bar	13.4 bar	19.6 bar	2.4 V	13.5 bar	5.0 V	32.5 °C	32.5 °C
15.0 °C (*)	14.0 mA	10.6 bar	17.0 bar	17.0 bar	25.0 bar	2.9 V	17.0 bar	6.0 V	45.0 °C	45.0 °C
20.0 °C	14.0 mA	10.6 bar	17.0 bar	17.0 bar	25.0 bar	2.9 V	17.0 bar	6.0 V	45.0 °C	45.0 °C

***Note (*)**: the area of variation of **SP** as a function of the **IN3** value with the default values.*

8.5.3 Setting Parameters

See "Adjustment of the setpoint following the ambient temperature from IN3 (Floating SP)" on page 79.

8.6 Adjustment of external setpoint with 0-10 V signal from IN3

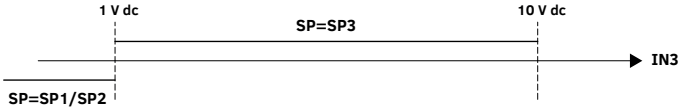
8.6.1 Operation

***Note**: function available only in Master mode.*

***Note**: with this function active, the other functions that use analog input **IN3** are not available.*

The active setpoint value **SP** depends on the 0-10 V signal connected to input **IN3**:

- it is **SP1**/**SP2** if the signal is between 0 and 1 V.
- it is the value set using input **IN3** (**SP3**) if the signal is between 1 and 10 V.



8.6.2 Operating example

Following is an example of the values taken by **SP3** as the **IN3** signal varies:

IN3	rPr420	rPr015	rPr025	rPr030	rPr045	rUu-05	rPu030	rUu010	rtE-01	rtE-02
0.0 V	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2	SP1-2
1.0 V	4.1 mA	0.1 bar	0.3 bar	0.4 bar	0.6 bar	0.5 V	0.1 bar	0.0 V	-11.6 °C	-11.6 °C
2.0 V	5.9 mA	1.8 bar	3.1 bar	3.6 bar	5.4 bar	0.8 V	2.9 bar	1.1 V	0.0 °C	0.0 °C
5.0 V	11.2 mA	6.8 bar	11.3 bar	13.6 bar	20.6 bar	2.3 V	12.9 bar	4.5 V	34.7 °C	34.7 °C
10.0 V	20.5 mA	15.5 bar	25.8 bar	30.9 bar	46.5 bar	5.2 V	30.5 bar	10.3 V	94.7 °C	94.7 °C

8.6.3 Setting Parameters

See "Adjustment of external setpoint with 0-10 V signal from IN3" on page 78.

8.7 Input Slave Safety mode from IN3

8.7.1 Operation

***Note**: it is necessary to setup a Master configuration to be used if there is no 4–20 mA signal. The controller must be connected to suitable measurement transducers for the set Master configuration. The Master configurations available and the necessary transducers/sensors are those normally defined for the controller.*

***Note**: with this function active, the other functions that use analog input **IN3** are not available.*

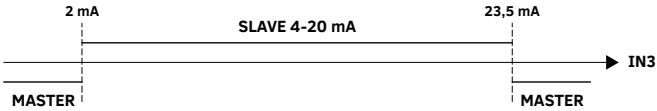
The operating mode of the controller (Slave/master) depends on the 4-20 mA signal from input **IN3**:

- Slave control with signal between 2 and 23.5 mA (normal operation)
- Master control with signal less than 2 mA and greater than 23.5 mA (emergency operation)

Emergency operation is indicated by the message "**Slave SafeKO**", see "Warning messages" on page 83.

In Slave mode, the control output is proportional to the input signal, see "Slave proportional mode" on page 37.

***Note**: the analog output OUT1 follows the Slave or Master mode active at that time if the parameter **C8** = **output SLAVE 0-10 V**. The OUT2 analog output cannot be used.*



8.7.2 Setting Parameters

See "Input Slave Safety mode from IN3" on page 80.

9. Use the controller

9.1 Start-up

9.1.1 Warnings

CAUTION! Check again that the equipment and wiring are correct as required in this manual. Make sure that the fan absorption does not exceed the maximum stated on the identification label. Keep people or things out of the work area.

9.1.2 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 25
2	Complete the input connections (i.e., transducers) and remote controls. ***NOTICE**: follow the indicated steps for correct Modbus connection operations.*	"Analog input connections IN and IN2 in Slave mode" on page 28 "Analog input connections IN1 and IN2 in Master mode" on page 29 "Analog outputs OUT1 and OUT2" on page 32 "RS485 Modbus RTU network connection" on page 35
3	Turn on power.	
4	Select the configuration suitable for the transducers used and the application	"Select a configuration" on page 60
5	If necessary, enable reserved parameter editing on DIP switch SW1 and other functions	"DIP switch SW1" on page 13
6	Set the setpoint 1 or 2 and the night limit	"Editing parameters" on page 63
7	If necessary, set proportional bandwidth and setpoints for any external units and related parameters.	
8	If necessary, edit the configuration parameters	
9	In communication with supervisor, set the communication parameters	
10	Disable reserved parameter editing on DIP switch SW1.	"DIP switch SW1" on page 13

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

9.1.3 Information displayed when powered on

When the controller is powered on (or after pressing the **Reset** key), before the home page (see "Home page" on page 57) appears, for a few seconds a page appears that has the following information:

- manufacturer's name
- firmware version
- controller description

Example

```
    SELPRO Rel. 2.0
       Soft-Ster
3PH Discrete Control
    MODBUS inside
```

9.2 Navigation structure

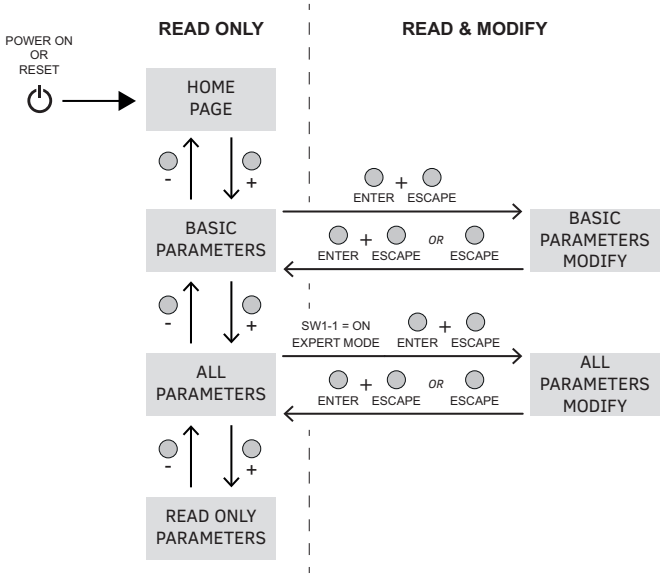
9.2.1 Getting started

When turned on, the home page is displayed (see "Home page" on page 57). From the home page, press the **+** and **-** keys to display the current values of all the parameters/measurements collected on pages (see "Parameter list" on page 57).

To edit the parameters, simultaneously press the **ENTER** + **ESCAPE** keys. Based on the position of switch 1 of DIP switch SW1, all parameters are visible (see "Parameters" on page 57) or only the base ones are (see "Basic parameters" on page 63).

9.2.2 Navigation map

When turned on, the HOME page is displayed. Press the ESCAPE key from any page to return to the HOME page.



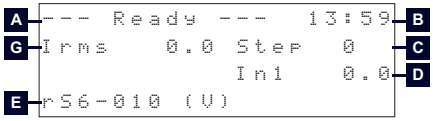
9.3 Home page

9.3.1 Getting started

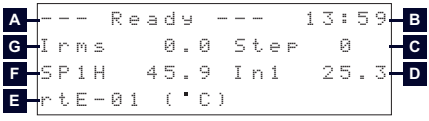
The information displayed on the home page depends on the fan control mode set: Slave or Master.

9.3.2 What it looks like

Example of Slave mode



Example of Master mode



Part	Description
A	System status or alarm/warning message. **System status** ■ **Ready**: control command value = 0 ■ **Run**: control command value > 0 ■ **Stop**: control disabled (contact **S2** = closed) ■ **Floating SP**: control command value > 0 and menu **4: SETUP** > parameter **C6** = **Floating SP** ■ **Safe Slave**: control command value > 0 and menu **4: SETUP** > parameter **C6** = **Slave safety** (with control in Slave mode). **Alarm and warning messages** See "Troubleshooting" on page 81.
B	Internal clock time
C	Voltage step engaged
D	Value of the prevalent input (**IN1** or **IN2**). The unit of measure depends on the set configuration. ***Note**: it is **Slave IN3** if the control mode is set as Slave by IN3 (menu **4: SETUP** > parameter **C6** = **Slave safety**) and the input value at **IN3** is between 2 and 23.5 mA.*
E	Current configuration
F	Only for Master configurations. Value of the selected setpoint (**SP1** or **SP2**) ***Note**: it is **SP3** if the setpoint is set using **IN3** (menu **4: SETUP** > parameter **C6** = **SP from IN3**) and the input value at **IN3** is > 1 V.*
G	Output current

9.4 Parameters

9.4.1 Parameter list

The operative parameters are collected in pages, in groups of four per page (two for the parameters "**C**"), shown below in display order.

Parameter / page	Description	Unit of measure
Home page **HOME**	See "Home page" on page 57	-
SetPoint Bk1 (*)	Setpoint set1	°C/ mA/ bar/ V dc

Parameter / page	Description	Unit of measure
SetPoint Bk 2 (*)	Setpoint set 2	°C/ mA/ bar/ V dc
Max Night Limit	Maximum step for night limit	-
Spray Speed	Set step with spray on	-
Max Limit Bk1	Maximum step limit, set 1	-
Min Limit Bk1	Minimum step limit, set 1	-
Step Width Bk1 (*)	Differential (step amplitude), set 1	°C/ mA/ bar/ V dc
Step Shift Bk1 (*)	Variance between steps, set 1	°C/ mA/ bar/ V dc
Step7 Width Bk1 (*)	Step 7 differential (step amplitude), set 1	°C/ mA/ bar/ V dc
Step7 Shift Bk1 (*)	Step 7 variance, set 1	°C/ mA/ bar/ V dc
Step8 Width Bk 1 (*)	Step 8 differential (step amplitude), set 1	°C/ mA/ bar/ V dc
Step8 Shift Bk1 (*)	Step 8 variance, set 1	°C/ mA/ bar/ V dc
Step Delay Bk1	Delay between two successive step changes, set 1	s
SoftSwicht Bk1	Step activation split time, set 1	s
Spray SetP Bk1	Setpoint (RH %) for voltage output to external unit (spray unit) OUT. , set 1	°C/ mA/ bar/ V dc
SprayBand Bk1	Proportional band (RH %) for voltage output to external unit (spray unit) OUT, set 1	°C/ mA/ bar/ V dc
Max Limit Bk2	Maximum step limit, set 2	-
Min Limit Bk2	Minimum step limit, set 2	-
Step Width Bk2 (*)	Differential (step amplitude), set 2	°C/ mA/ bar/ V dc
Step Shift Bk2 (*)	Variance between steps, set 2	°C/ mA/ bar/ V dc
Step7 Width Bk2 (*)	Step 7 differential (step amplitude), set 2	°C/ mA/ bar/ V dc
Step7 Shift Bk2 (*)	Step 7 variance, set 2	°C/ mA/ bar/ V dc
Step8 Width Bk 2 (*)	Step 8 differential (step amplitude), set 2	°C/ mA/ bar/ V dc
Step8 Shift Bk2 (*)	Step 8 variance, set 2	°C/ mA/ bar/ V dc
Step Delay Bk2	Delay between two successive step changes, set 2	s
SoftSwicht Bk2	Step activation split time, set 2	s
Spray SetP Bk2	Setpoint (RH %) for voltage output to external unit (spray unit) OUT, set 2	°C/ mA/ bar/ V dc
SprayBand Bk2	Proportional band (RH %) for voltage output to external unit (spray unit) OUT, set 2	°C/ mA/ bar/ V dc
C0	Operating modes and number of inputs used	-
C1	Input to use. The other input is still visible from the display or from Modbus port (input selection)	-
C2	IN1 and IN2 type input	-

Parameter / page	Description	Unit of measure
C3	Display value conversion	-
C4	Setpoint position	-
C5	Step switching mode	-
C6	Input IN3 function	-
C7	Relay RL1 management	-
C8	OUT_1 analog output settings	-
C9	OUT_2 analog output settings	-
Modbus page	Modbus communication parameters with PC-Host	-
Internal clock page (RTC)	Date and time	-
Heat exchanger washing page (Washing) (*)	Parameters for timed washing of the heat exchanger	-
Fan anti-locking page (Anti Lock Fan) (*)	Fan anti-locking parameters	-
Night limit page (RTC Night Limit) (*)	Parameters for night control	-
Bank Switch page (*)	Parameters for set switching parameters 1 and 2 set with the temperature probe	
Floating Set Point page	Parameters for adjusting the setpoints as a function of the external temperature	
DSV 3ph size	Three-phase stepper device, rated current value	A
Logic Temper	Electronic board real time temperature	°C
Power Temper	Power board real-time temperature	°C
Power RMS V.	Power supply RMS voltage	V
Out 1 Value	OUT1 analog output value	V dc
Out 1 Mode	OUT1 output operating mode	-
Out 2 Value	OUT2 analog output value	V dc
Out 2 Mode	OUT2 output operating mode	-
IN 1	Input value 1	mA/ V dc/ bar/ °C
IN 2	Input value 2	mA/ V dc/ bar/ °C
IN 3	Input value 3	mA/ V dc/ bar/ °C

***Note** (*): parameters only visible if the controller configuration calls for it or when the function is active.*

9.4.2 Editing parameters

To...	Then...
edit a basic parameter, Modbus communication and the internal clock	see "Edit a basic, Modbus and internal clock parameter" on page 71
edit any parameter	see "Edit any parameter" on page 73

10. Set the operating mode

10.1 Select a configuration

10.1.1 Configuration description

***Note**: in the default Master configuration, the setpoint coincides with the maximum fan speed (menu **4: SETUP** > parameter **C4** = **hi**), and the controller automatically selects the sensor with the stronger signal (menu **4: SETUP** > parameter **C1** = **hi**).*

Configuration	Signal/Transducer	Type of control	Description
rs6-20, rs7-20, rs8-20	0–20 mA	**Slave**	They receive a voltage or current signal in input and replicate it proportionally to the analog **OUT** output and Modbus **COM1**. Regulation, alarms, and value display will always be in volt (rS-010) or milliampere (rS-20).
rs6-10, rs7-10, rs8-10	0–10 V dc		
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.
rtE-01, rtE-02	probe NTC 10 kΩ @ 25 °C/77 °F	**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.*

10.1.2 Technical specifications of the configurations

Following are the specifications of each configuration:

***Note**: from version 8.0 of the DSV firmware, the temperature and pressure values can be viewed with Imperial units of measure (°F e psi). Therefore, where the text indicates the unit of measure available in °C, it is also available in °F, and where bar is indicated, psi is also available. For the conversion values, use the following formulas: °F = 32+ (°C x 9/5), psi = bar x 14.5.*

Configuration	Mode	IN1/IN2 input	No. default inputs	Signal/ Transducer/	Display	Setpoint	Proportional band
rs6-20, rs7-20, rs8-20	Slave	0–20 mA Ri= 100 Ω	1	0–20 mA	0–23.5 mA	-	-
rs6-10, rs7-10, rs8-10	Slave	0–10 V dc Ri= 10 kΩ	1	0–10 V dc	0–10 V dc	-	-
rPr420	Master	4–20 mA Ri= 100 Ω	2	4–20 mA	4–20 mA	14 mA	2.6 mA
rPr015	Master	4–20 mA Ri= 100 Ω	2	0–15 bar > 4–20 mA	0–15 bar	10.6 bar	2.4 bar
rPr025	Master	4–20 mA Ri= 100 Ω	2	0–25 bar > 4–20 mA	0–25 bar	17.0 bar	3.5 bar

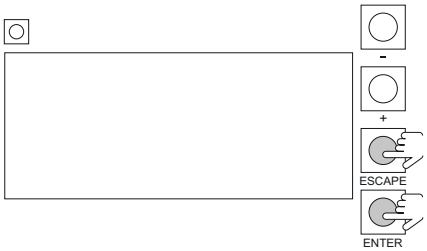
Configuration	Mode	IN1/IN2 input	No. default inputs	Signal/ Transducer/	Display	Setpoint	Proportional band
rPr030	Master	4–20 mA Ri= 100 Ω	2	0–30 bar > 4–20 mA	0–30 bar	17.0 bar	3.5 bar
rPr045	Master	4–20 mA Ri= 100 Ω	2	0–45 bar > 4–20 mA	0–45 bar	25.0 bar	5.2 bar
rUu05	Master	0–5 V dc Ri= 10 kΩ	2	0.5–4.5 V dc	0–5 V dc	2.9 V dc	0.8 V dc
rPu030	Master	0–5 V dc Ri= 10 kΩ	2	0–30 bar > 0–5 V dc	0–35 bar	17.0 bar	3.5 bar
rUu010	Master	0–10 V dc Ri= 10 kΩ	2	0–10 V dc	0–10 V dc	6 V dc	1.6 V dc
rtE-01 (default)	Master	NTC 10 kΩ @ 25°C	2	NTC 10 kΩ @ 25°C	from -30 to + 99 °C	45 °C	7.5 °C
rtE-02	Master	NTC 10 kΩ @ 25°C	2	NTC 10 kΩ @ 25°C	from 9.6 to 99 °C	45 °C	7.5 °C

10.1.3 Select a configuration

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

***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.*

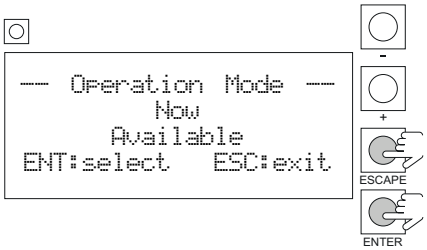
To change/restore a configuration:



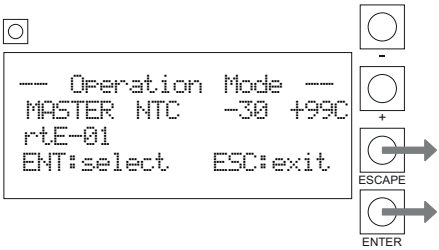
1. Simultaneously press and hold down the **ESCAPE** and **ENTER** keys.



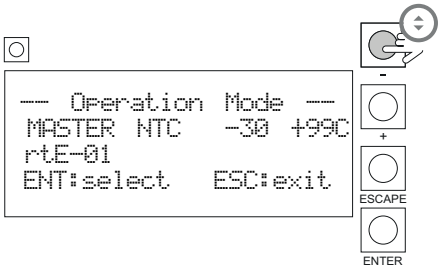
2. Press and hold down both keys, briefly press the **RESET** button (or turn the controller off and on).



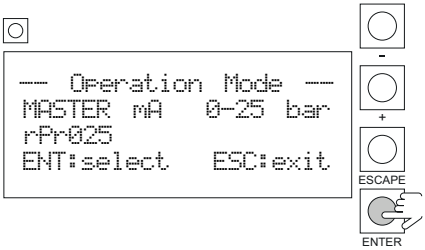
3. Holding down the two keys, wait for the "Operation mode now available" message.



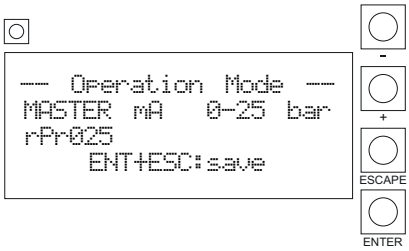
4. Simultaneously release the **ESCAPE** and **ENTER** keys: the last set configuration appears.



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



6. Press the **ENTER** key for the selected configuration.



7. Continue as follows:
   - To confirm, press the **ENTER** and **ESCAPE** keys: the "Saving new values. Please wait" message appears that confirms that it is being saved. Then, the controller restarts and displays the home page.
   - To cancel and modify the selected configuration press the **ESCAPE** key once.
   - To return to the home page, press the **ESCAPE** key twice.

10.2 Editing parameters

10.2.1 Basic parameters

SW1-1 = *Off*

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
SP1/SP2	Setpoint, set 1/ set 2	°C	-15.0	+90.0	45.0	NTC 10k@ 25 °C	rtE-01	
		°C	+20.0	+90.0	45.0	NTC 10k@ 25 °C	rtE-02	
		mA	4.0	20.0	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	

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
LNight	Maximum step for night limit	-	0	8	8	All	All	
LSpray	Set step with spray on	-	0	8	8	All	All	

10.2.2 Expert level parameters for set 1 and 2

SW1-1 = *On*

***Note**: parameters **SP1**, **SP2**, **Pb1**, and **Pb2** are only visible with the controller in Master mode.*

***Note**: in Master configurations, the dedicated setpoint for the external unit is the algebraic sum of the setpoint in use (**SP1** or **SP2**) and the setpoint for the external unit in use (**USP1** or **USP2**).*

***Note**: in Slave configurations, the dedicated setpoint for the external units is simply the setpoint for the external unit in use (**USP** or **USP2**).*

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
SP1/SP2	Setpoint, set 1/ set 2	°C	-15.0	+90.0	45.0	NTC 10k@ 25 °C	rtE-01	
		°C	+20.0	+90.0	45.0	NTC 10k@ 25 °C	rtE-02	
		mA	4.0	20.0	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	
LNight	Maximum step for night limit	-	0	8	8	All	All	
LSpray	Set step with spray on	-	0	8	8	All	All	
Hi 1/ Hi 2	Maximum step limit, set 1 / set 2	-	0	8	8	All	All	
Lo 1/ Lo 2	Minimum step limit, set 1 / set 2	-	0	8	0	All	All	

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
di 1 / di 2 (*)	Differential (step amplitude), set 1 / set 2	°C	0.3	10	4.0	NTC 10k@ 25 °C	rtE-01	
		°C	0.3	10	4.0	NTC 10k@ 25 °C	rtE-02	
		mA	0.2	2.1	1.2	4–20 mA	rPr420	
		bar	0,1	1.6	1.2	0–15 bar > 4–20 mA	rPr015	
		bar	0.1	2.6	1.7	0–25 bar > 4–20 mA	rPr025	
		bar	0.2	3.1	1.7	0–30 bar > 4–20 mA	rPr030	
		bar	0.2	4.7	3.6	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	0.5	0.4	0.5–4.5 V dc	rUu-05	
		bar	0.2	3.1	1.7	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	1.0	0.8	0–10 V dc	rUu010	
Sc1 / Sc2 (*)	Variance between steps, set 1 / set 2	°C	0.3	10	0.7	NTC 10k@ 25 °C	rtE-01	
		°C	0.3	10	0.7	NTC 10k@ 25 °C	rtE-02	
		mA	0.1	2.1	0.2	4–20 mA	rPr420	
		bar	0.1	1.6	0.2	0–15 bar > 4–20 mA	rPr015	
		bar	0.1	2.6	0.3	0–25 bar > 4–20 mA	rPr025	
		bar	0.1	3.1	0.3	0–30 bar > 4–20 mA	rPr030	
		bar	0.1	4.6	0.5	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	0.5	0.1	0.5–4.5 V dc	rUu-05	
		bar	0.1	3.1	0.3	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	1.0	0.2	0–10 V dc	rUu010	

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
do 7_1 / do 7_2 (*)	Step 7 differential (step amplitude), set 1 / set 2	°C	0.3	10	4.0	NTC 10k@ 25 °C	rtE-01	
		°C	0.3	10	4.0	NTC 10k@ 25 °C	rtE-02	
		mA	0.2	2.2	1.3	4–20 mA	rPr420	
		bar	0.1	1.6	1.2	0–15 bar > 4–20 mA	rPr015	
		bar	0.2	2.6	1.7	0–25 bar > 4–20 mA	rPr025	
		bar	0.2	3.1	1.7	0–30 bar > 4–20 mA	rPr030	
		bar	0.2	4.7	3.6	0–45 bar > 4–20 mA	rPr045	
		V dc	0.0	0.5	0.4	0.5–4.5 V dc	rUu-05	
		bar	0.2	3.1	1.7	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	1.0	0.8	0–10 V dc	rUu010	
So 7_1 / So 7_2 (*)	Step 7 variance, set 1 / set 2	°C	0.3	10	0.7	NTC 10k@ 25 °C	rtE-01	
		°C	0.3	10	0.7	NTC 10k@ 25 °C	rtE-01	
		mA	0.1	2.1	0.2	4–20 mA	rPr420	
		bar	0.1	1.6	0.2	0–15 bar > 4–20 mA	rPr015	
		bar	0.2	2.6	0.3	0–25 bar > 4–20 mA	rPr025	
		bar	0.1	3.1	0.3	0–30 bar > 4–20 mA	rPr030	
		bar	0.1	4.6	0.5	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	0.5	0.1	0.5–4.5 V dc	rUu-05	
		bar	0.1	3.1	0.3	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	1.0	0.2	0–10 V dc	rUu010	

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
do 8_1 / do 8_2 (*)	Step 8 differential (step amplitude), set 1 / set 2	°C	0.3	10	4.0	NTC 10k@ 25 °C	rtE-01	
		°C	0.3	10	4.0	NTC 10k@ 25 °C	rtE-02	
		mA	0.2	2.2	1.3	4–20 mA	rPr420	
		bar	0.1	1.6	1.2	0–15 bar > 4–20 mA	rPr015	
		bar	0.2	2.6	1.7	0–25 bar > 4–20 mA	rPr025	
		bar	0.2	3.1	1.7	0–30 bar > 4–20 mA	rPr030	
		bar	0.2	4.7	3.6	0–45 bar > 4–20 mA	rPr045	
		V dc	0.0	0.5	0.4	0.5–4.5 V dc	rUu-05	
		bar	0.2	3.1	1.7	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	1.0	0.8	0–10 V dc	rUu010	
So 8_1 / So 8_2 (*)	Step 8 variance, set 1 / set 2	°C	0.3	10	0.7	NTC 10k@ 25 °C	rtE-01	
		°C	0.3	10	0.7	NTC 10k@ 25 °C	rtE-02	
		mA	0.1	2.1	0.2	4–20 mA	rPr420	
		bar	0.1	1.6	0.2	0–15 bar > 4–20 mA	rPr015	
		bar	0.2	2.6	0.3	0–25 bar > 4–20 mA	rPr025	
		bar	0.1	3.1	0.3	0–30 bar > 4–20 mA	rPr030	
		bar	0.1	4.6	0.5	0–45 bar > 4–20 mA	rPr045	
		V dc	0.1	0.5	0.1	0.5–4.5 V dc	rUu-05	
		bar	0.1	3.1	0.3	0–30 bar > 0–5 V dc	rPu030	
		V dc	0.2	1.0	0.2	0–10 V dc	rUu010	
dE 1/ dE 2	Delay between two successive step changes, set 1 / set 2	s	0.1	60	2.0	All	All	
Ss 1 / Ss 2	Step activation split time, set 1 / set 2	s	0.4	5.0	0.5	All	All	

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration	Settings system
USP 1/ USP 2	Setpoint (RH %) for voltage output to external unit (spray unit) **OUT** , set 1 / set 2	mA	0	20.0	15.0	-	rS6-20	
							rS7-20	
							rS8-20	
		V dc	0	10	7.5	-	rS6-10	
							rS7-10	
							rS8-10	
		°C	-55.0	+55.0	-1.6	NTC 10k@ 25 °C	rtE-01	
		°C	-55.0	+55.0	-1.6	NTC 10k@ 25 °C	rtE-02	
		mA	-8.0	+8.0	-0.6	4–20 mA	rPr420	
		bar	-7.5	+7.5	-0.6	0–15 bar > 4–20 mA	rPr015	
		bar	-12.5	+12.5	-0.7	0–25 bar > 4–20 mA	rPr025	
		bar	-15	+15	-0.7	0–30 bar > 4–20 mA	rPr030	
		bar	-22.5	+22.5	-1.0	0–45 bar > 4–20 mA	rPr045	
		V dc	-2.5	+2.5	-0.2	0.5–4.5 V dc	rUu-05	
		bar	-15	+15	-1.0	0–30 bar > 0–5 V dc	rPu030	
		V dc	-5.0	+5.0	-0.5	0–10 V dc	rUu010	
UPb 1/ UPb 2	Proportional band (RH %) for voltage output to external unit (spray unit) **OUT**, set 1/ set 2	mA	0.5	20	4.2	-	rS6-20	
							rS7-20	
							rS8-20	
		V	0.2	10	2.1	-	rS6-10	
							rS7-10	
							rS8-10	
		°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	0.8	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	1.8	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	

***Note** (*): In Slave mode, the step parameters are fixed and cannot be changed. The number of steps used (6, 7, or 8) depends on the slave configuration chosen, "Select a configuration" on page 60.*

10.2.3 Configuration parameters

SW1-1 = *On*

Note*: the values of these parameters are defined automatically by the set predefined configuration (see "Select a configuration" on page 60). They can be singularly edited according to need.*

Parameter/ page	Description	Possible values	Default	Configuration	Settings system
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	
		r1: Master proportional controller that uses one input (IN1) **r2**: Master proportional controller that uses two inputs (IN1 and IN2)	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 port (input selection)	■ **oFF**: always uses input **IN1** With **C0** = **GP1, r1** ■ **hi**: always uses the input with the higher value ■ **Lo**: always uses the input with the lower value	hi	All	
C2	**IN1** and **IN2** type input	Automatic settings	-	-	
C3	Display value conversion	Automatic settings	-	-	
C4	Setpoint position	**oFF**: Slave controller	oFF	rS 010 , rS 020	
		hi: Master controller, setpoint at **Pb** high end. **Lo**: Master controller, setpoint at low end of **Pb**.	hi	rtE-01, rtE-02, rPr420, rPr015, rPr025 rPr030, rPr045, rUu-05, rPu030, rUu010	
C5	Step switching mode	**no jump**: execution in sequence of all steps **jump**: jumps directly to the optimum step for control	no jump	All	

Parameter/ page	Description	Possible values	Default	Configuration	Settings system
C6	Input **IN3** functions	**Nothing**: not connected / reading value / switching parameter set **SP from IN3**: set setpoint by external signal 0–10 V. **Floating SP**: adjust setpoint as a function of the external temperature. **Slave Safety**: control in Slave mode (Slave safety)	Nothing	rtE-01, rtE-02, rPr420, rPr015, rPr025 rPr030, rPr045, rUu-05, rPu030, rUu010	
C7	Relay **RL1** management	**RL1=off-> error**: RL1=off: relay Off when the controller is in fail status. **RL1=off-> error + S2**: RL1=off: relay Off when the controller is in fail status and contract S2 is closed. **RL1=off-> error + S2 + OFF**: RL1=off: relay Off when the controller is in fail status, contract S2 is closed, and the speed command is zero.	RL1=off-> error	All	
C8	**OUT_1** analog output settings	**SLAVE 0-10 V**: command to Slave unit with 0–10 V dc, copies the fan controller command **SPRAY 1-10 V**: command to Water-Spray unit 1–10 V dc with specific setpoint and proportional band. **USP-DIR 0-10 V**: command to motorized actuator with 0–10 V dc input with specific setpoint and proportional band. **USP-REV 10-0 V**: reverse control to motorized actuator with input 10–0 V dc with specific setpoint and proportional band **SLAVE 10-0 V**: reverse command to Slave unit with 10–0 V dc input, copies the controller command.	SLAVE 0-10 V	All	
C9	**OUT_2** analog output settings		SPRAY 1-10 V	All	

***Note**: parameters **C2** and **C3** are set automatically as a function of the predefined configuration chosen and cannot be modified.*

10.2.4 C0, C1 and C4 parameter combinations for each configuration

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

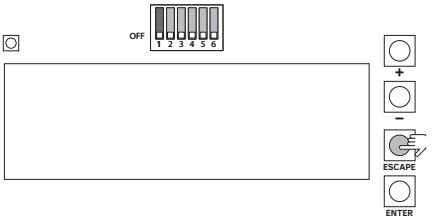
10.2.5 Parameters for Modbus communication with PC-BMS

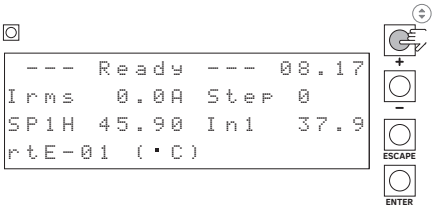
"Modbus" page

***Note**: the parameters for Modbus communication can always be edited.*

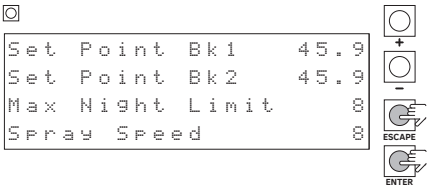
Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Settings system
MBaddr	Controller Modbus address	-	1	247	247	
MBrate	Communication speed ■ **4800** ■ **9600** ■ **19200** (default) ■ **38400**	baud	4800	38400	19200	
MBtype	Communication mode ■ **8b+1s NO p.**: 8 bit, no parity, 1 stop bit ■ **8E1+1s EVEN p.**: 8-bit, even parity, 1 stop bit (default) ■ **8b+1s ODD p.**: 8 bit, odd parity, 1 stop bit	-	-	-	8b+1s EVEN p.	

10.2.6 Edit a basic, Modbus and internal clock parameter



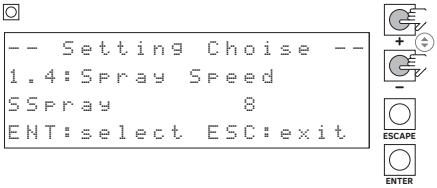


1. Leave switch 1 of DIP switch **SW1 OFF** and press the **ESCAPE** key.
2. Press **+** (or **-**) to scroll through the parameters and go to the next page.

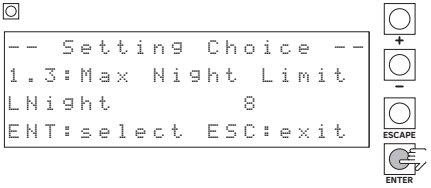


3. On the page of basic parameters, press the **ESCAPE** and **ENTER** keys at the same time: the page for editing the first parameter is displayed.

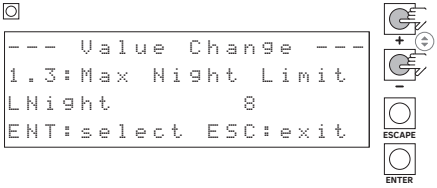
   ***Note**: if the "Function reserved to Expert mode" message is displayed, the parameters on the page can not be edited using this procedure.*



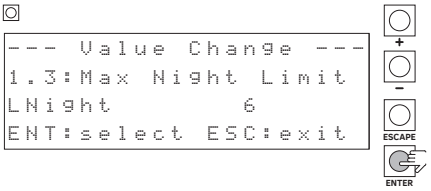
4. Press **+** (or **-**) to scroll through the parameters on the page.



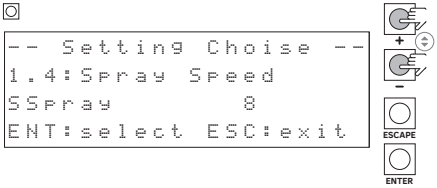
5. Press the **ENTER** key at the parameter of interest.



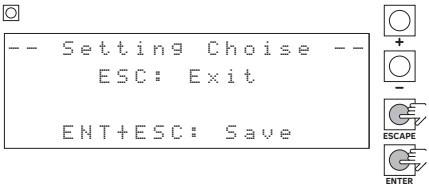
6. Press **+** (or **-**) to edit the selected parameter value.



7. Continue as follows:
   - To save the value, press the **ENTER** key: the value is saved in the volatile memory.
   - To cancel the change, press the **ESCAPE** key: it returns to step 3.

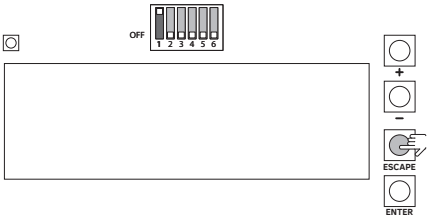


8. Continue as follows:
   - To edit the other parameters in the same submenu, repeat the procedure in step 4.
   - Otherwise, press the **ESCAPE** key.

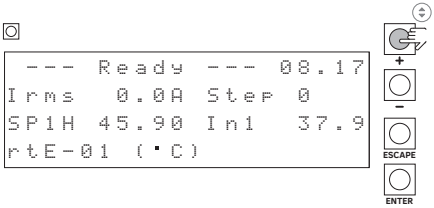


9. Continue as follows:
   - To save the changes made, press the **ENTER** and **ESCAPE** keys: the "Saving new values Pleas wait" message appears that confirms the saving is in progress. Then, the home page is displayed.
   - To cancel the changes, press the **ESCAPE** key: the "Restoring old values Change values discarded" message is displayed, informing the operator that the previous values have been restored and then the home page is displayed.

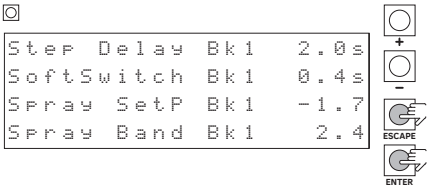
10.2.7 Edit any parameter



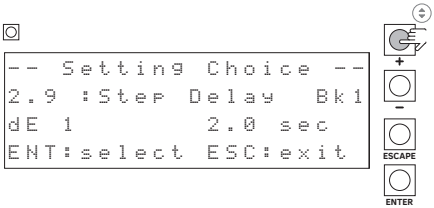
1. Leave switch 1 of DIP switch **SW1 OFF** and press the **ESCAPE** key.



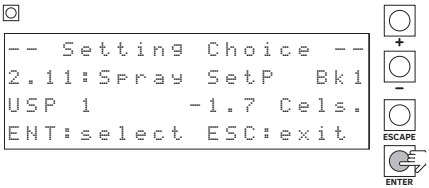
2. Press **+** (or **-**) to scroll through the parameters and go to the next page.



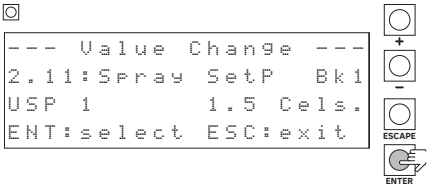
3. On the page of the parameter of interest, press the **ESCAPE** and **ENTER** keys at the same time: the page for editing the first parameter is displayed.



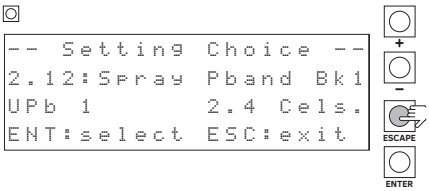
4. Press **+** (or **-**) to scroll through the parameters on the page.



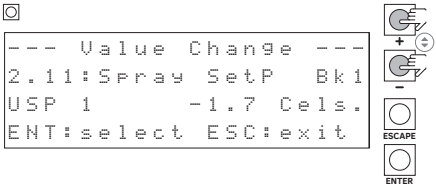
5. Press the **ENTER** key at the parameter of interest.



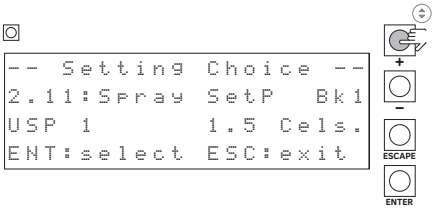
7. Continue as follows:
   - To save the value, press the **ENTER** key: the value is saved in the volatile memory.
   - To cancel the change, press the **ESCAPE** key: it returns to step 3.



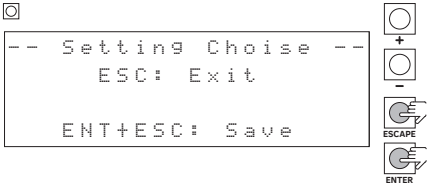
9. Press the **ESCAPE** key to exit.



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



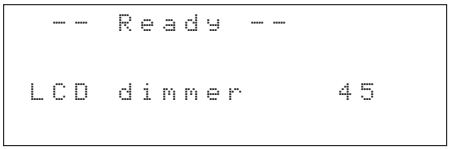
8. To edit other parameters on the same page, repeat the procedure in step 4.



10. Continue as follows:
    - To save the changes made, press the **ENTER** and **ESCAPE** keys: the "Saving new values Pleas wait" message appears that confirms the saving is in progress. Then, the home page is displayed.
    - To cancel the changes, press the **ESCAPE** key: the "Restoring old values Change values discarded" message is displayed, informing the operator that the previous values have been restored and then the home page is displayed.

11. Set the common and special functions

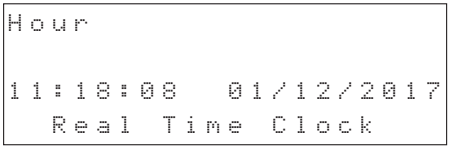
11.1 Display contrast adjustment



11.1.1 Procedure

To increase the contrast, simultaneously press and hold down the **ENTER** and **+** keys.
To decrease the contrast, simultaneously press and hold down the **ENTER** and **-** keys.

11.2 Real-time control parameters (RTC)



11.2.1 Procedure

"Real Time Clock" page

***Note**: the parameters for the internal clock can always be edited.*

1. Press **ENTER** to enter the sub-menu: the parameter **Hour** is displayed.
2. Press **+** (or **-**) to set the value.
3. Press the **ENTER** key to confirm the value and to proceed to the next parameter.
4. After the last parameter has been confirmed:

If you want to...	Then...
save the settings	simultaneously press the **ENTER** and **ESCAPE** keys: a message appears that confirms it has been saved and then the home page of the sub-menu is displayed.
edit a parameter again	press **ENTER**: the parameter Hour is displayed.
cancel setup	press the **ESCAPE** key: a message informs that the previous settings have been restored and the first page of the submenu is displayed.

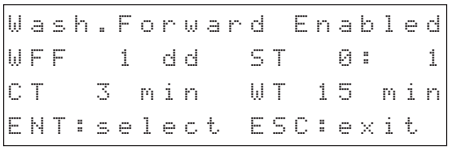
11.2.2 Parameters

Parameter/ page	Description	Unit of measure	Minimum	Maximum
Hour	Hours	h	00	23
Minute	Minutes	min	00	59
Seconds	Seconds	s	00	59

Parameter/ page	Description	Unit of measure	Minimum	Maximum
Day	Day	d	1	31
Month	Month	-	01	12
Year	Year	a	2011	2099

11.3 Timed washing of the heat exchanger

***SW1-1**=On > "Washing" page*



11.3.1 Enabling/disabling options

Options	Description
WASHING Disabled	No washing enabled.
Wash. Enabled	Washing cycle enabled.

11.3.2 Parameters

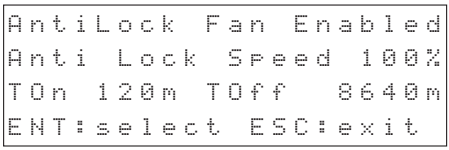
Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Settings system
WFF	"Washing" cycle start frequency	d	1	10	1	
ST	Time of the day washing starts	h:min	00:00	23:59	00:01	
CT	Duration of the heat exchanger cooling step	min	1	60	3	
WT	Duration of the washing step	min	1	60	15	

11.3.3 To learn more

Important to know	See
Operation	"Timed washing of the heat exchanger" on page 48.
Procedure	"Procedure for setting the special functions" on page 80.

11.4 Fan anti-locking

***SW1-1**=On > "Anti Lock Fan" page*



11.4.1 Enabling/disabling options

Options	Description
Anti Lock Fan Disabled	Function disabled.
Anti Lock Fan Enabled	Function enabled.

11.4.2 Parameters

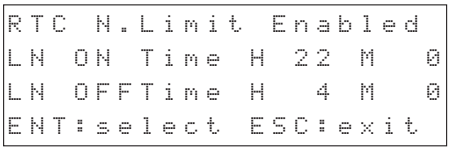
Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Settings system
Anti Lock Speed	Voltage step selected during the operating period	-	1	6	1	
TOn	Active period duration	min	1	999	120	
TOff	Rest period duration	min	1	60000	8640	

11.4.3 To learn more

Important to know	See
Operation	"Fan anti-locking" on page 48.
Procedure	"Procedure for setting the special functions" on page 80.

11.5 Night limits for speed using internal clock

SW1-1=*On > "RTC Night Limit" page*



11.5.1 Enabling/disabling options

Options	Description
RTC Night Limit Disabled	Function disabled.
RTC Night Limit Enabled	Function enabled.

11.5.2 Parameters

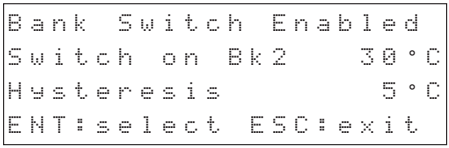
Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Settings system
LN ON Time	Time for activation of the night limit	h:min	00:01	23:59	22:00	
LN OFF Time	Time for deactivation of the night limit	h:min	00:01	23:59	04:00	

11.5.3 To learn more

Important to know	See
Operation	"Night limits for speed using internal clock" on page 49.
Procedure	"Procedure for setting the special functions" on page 80.

11.6 Switching of setpoint following the ambient temperature from IN3 (Bank Switch)

SW1-1=*On*
> ***C6*** = = ***Nothing enabled*** *(default)*
> ***Bank switch*** = ***Enabled***



11.6.1 Enabling/disabling options

Options	Description
Bank Switch Disabled	Function disabled.
Bank Switch Enabled	Function enabled.

11.6.2 Parameters

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Settings system
Switch on Bk2	Switching temperature from Set 1 to Set 2	°C	-10	80	30	
Hysteresis	Hysteresis on **Switch on Bk2** value	°C	3	20	5	

11.6.3 To learn more

Important to know	See
Operation	"Switching of setpoint following the ambient temperature from IN3 (Bank Switch)" on page 50.
Procedure	"Procedure for setting the special functions" on page 80.

11.7 Adjustment of external setpoint with 0-10 V signal from IN3

SW1-1=*On*
> ***C6*** = ***SP from IN3***

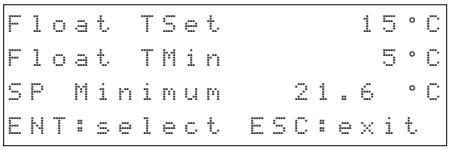
Note*: with this C6 setting, the menu item* ***Bank Switch*** *is not visible.*

11.7.1 To learn more

Important to know	See
Operation	"Switching of setpoint following the ambient temperature from IN3 (Bank Switch)" on page 50.
Procedure	"Edit any parameter" on page 73.

11.8 Adjustment of the setpoint following the ambient temperature from IN3 (Floating SP)

SW1-1=*On* > *"Floating SetPoint" page and* ***C6*** = ***Floating SP***
>***C6*** = ***Floating SP***
> ***Floating SetPoint***



11.8.1 Procedure

NOTICE*: function enabled only with parameter* ***4: SETUP*** > ***C6*** = ***Floating SP****.*

1. Scroll through the menu using the **+** or **-** buttons to the **Floating Setpoint** submenu.
2. Press **ENTER** to enter the submenu: the parameters **FloatSP Tset**, **FloatSP Tmin**, and **SPMinimum** are displayed
3. Press the **ENTER** key and then the **+** or **-** key to edit the parameter value as needed.
4. Simultaneously press the **ENTER** + **ESCAPE** keys to confirm the value and to proceed to the next parameter.
5. After the last parameter has been confirmed, it returns to the first page of the submenu.

11.8.2 Parameters

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Configuration	Settings system
FloatSP TSet	Upper temperature limit to activate the function	°C	-15.0	+40.0	15 °C	All	
FloatSP TMin	Lower temperature limit to activate the function	°C	-15.0	+40.0	5 °C	All	
SPMinimum	Minimum value that the setpoint can have	mA	3.9	19.9	10.0	rPr420	
		bar	0.0	14.9	6.9	rPr015	
		bar	0.0	24.9	10.8	rPr025	
		bar	0.0	29.8	9.7	rPr030	
		bar	0.0	44.8	14.0	rPr045	
		V	0.5	5.0	1.9	rUu-05	
		bar	0.0	33.6	9.7	rPu030	
		V	1.0	10.0	4.0	rUu010	
		°C	-17.5	+94.5	21.6	rtE-01	
		°C	-17.5	+94.5	21.6	rtE-02	

11.8.3 To learn more

Important to know	See
Operation	"Switching of setpoint following the ambient temperature from IN3 (Bank Switch)" on page 50.

11.9 Input Slave Safety mode from IN3

SW1-1=*On*
> ***C6*** = ***Slave Safety***

Note*: with this C6 setting, the menu item* ***Bank Switch*** *is not visible.*

11.9.1 To learn more

Important to know	See
Operation	"Input Slave Safety mode from IN3" on page 53.
Procedure	"Edit any parameter" on page 73.

11.10 Procedure for setting the special functions

11.10.1 Procedure

SW1-1=*On* > ***ESCAPE***+***ENTER***

1. Scroll through the menu using the **+** or **-** buttons to submenu of the desired function.
2. Press **ENTER** to select enter the submenu.
3. Press **+** (or **-**) to scroll through the enabling/disabling options.
4. Press the **ENTER** key and then the **+** or **-** key to set the first parameter.

   Note*: the parameter to be edited is described in the first row.*

5. Press the **ENTER** key to confirm the value and to proceed to the next parameter.
6. After the last parameter has been confirmed:

If you want to...	Then...
save the settings	press the **ENTER** key and then at the same time **ESCAPE** and **ENTER**: a message appears that confirms it has been saved and then the home page of the submenu is displayed.
edit a parameter again	press the **ENTER** key: the first parameter can be edited again or the function can be enabled/disabled.
cancel setup	press the **ESCAPE** key: a message informs that the previous settings have been restored and the first page of the submenu is displayed.

12. Diagnostics

12.1 Troubleshooting

12.1.1 Reset alarm

The alarms are not saved. To deactivate an alarm, the cause that generated it must be removed.



CAUTION! The controller automatically restarts as soon as the alarm condition is cleared.

12.1.2 Common problems

Following are the most common problems that are not due to faults.

Problem	Cause	Solution
The configuration cannot be changed	The **ENTER** and **ESCAPE** keys were released before the "-- Operation Mode -- Now Available" message appeared Or the **ENTER** and **ESCAPE** keys have not been pressed or released simultaneously.	Correctly perform the procedure. See "Select a configuration" on page 61.
The keys do not respond when pressed	The microprocessor is executing complex algorithms.	Wait a few seconds and retry.
	Connection between surveillance board and absent power board.	Check the connections.
TX2 LED flashes but the RX2 LED does not flash in response	Power board damaged.	Contact Selpro customer service.
TX2 LED is off	Connection between surveillance board and absent power board.	Check the connections.
	Surveillance board damaged.	Contact Selpro customer service.
The "Function not allowed" message appears	An unavailable menu/function has been accessed	Press the **ESCAPE** key.

12.1.3 Alarm messages

***Note**: the priority with which the messages are displayed is equal to the order they are shown in the table. A priority alarm is displayed before less important alarms.*

In the event of an alarm:

- The display flashes and the relative message appears in the first line.

  ***Note**: the message appears only if the controller is in working mode. If during this programming step, it only appears at the output of this step.*

- Relay **RL1** is de-energized and the **FAIL** LED turns on.

Message	Cause	Solution
Step error	Step switching error	Unrecoverable internal error, try turning off and restarting the device. If it repeats often, replace the equipment
PWR Thermal	Autotransformers thermal contact opening	Wait for the autotransformer to cool Check that the controller is installed in a ventilated room away from direct sunlight. Make sure room temperature is under 50°C.

Message	Cause	Solution
PWR Fail	No phase on the power supply	Make sure the power cables are correctly connected and that the terminal board screws are tight. If applicable, make sure the fuses in series at power supply are integral.
T.K. Alarm open	External thermal overload protection contact open **TK**	Make sure the connected circuit breakers are closed and correctly connected in series. Make sure the wires are correctly connected to the **TK** contact and that the screws are tight.
Board Overtempt	Regulation stopped due to control board exceeding the maximum working temperature (85 °C)	Check that the controller is installed in a ventilated room away from direct sunlight. Make sure room temperature is under 50°C.
Power Overtemp	Regulation stopped due to power board exceeding the maximum working temperature (85°C)	Make sure the controller is correctly installed, see "Wall mount" on page 24.
Max current	Instant current above maximum limit.	Check the load conditions of the device
I2t current	Heat current above maximum limit	
OverVoltage	Power supply voltage above maximum limit	Excessive power supply voltage, check the power supply voltage to the device. Check the autotransformer connections
UnderVoltage	Power below minimum limit	Power supply voltage insufficient, check power supply voltage to the device
Bad measure	Internal memory damaged	Unrecoverable internal error, replace the device
Restart	Internal arrangement of the parameters, outputs temporarily not available	If it stays steady, replace the device
Peripheral KO	Hardware connection between logic board and blocked power	Unrecoverable internal error, try turning off and restarting the device. If it repeats often, replace the equipment
Under Range or Open	Input signal under minimum value. See "Minimum and maximum limits for inputs IN1 and IN2" on page 82	Make sure the set configuration is suited to the control signal used. Make sure the transducer/sensor/probe is correctly connected.
Over Range or Short	Input higher than maximum value. See "Minimum and maximum limits for inputs IN1 and IN2" on page 82	Make sure the input used is foreseen by the configuration in use (parameter **Step**). Make sure the transducer/sensor/prove is in good conditions and working,

12.1.4 Minimum and maximum limits for inputs IN1 and IN2

Following are the minimum and maximum limits with a precision of ±5%.

Configuration	Minimum limit	Maximum limit	Unit of measure
rS-020	-	> 24	mA
rS-010	-	> 11	V dc
rS-420	< 2	> 24	mA
rPr420	< 2	> 24	mA
rPr015 (*)	< 2	> 24	mA
rPr025 (*)	< 2	> 24	mA
rPr030 (*)	< 2	> 24	mA
rPr045 (*)	< 2	> 24	mA
rPr050 (*)	< 2	> 24	mA
rUu-05	-	> 5.5	V dc

Configuration	Minimum limit	Maximum limit	Unit of measure
rPu030 (*)	-		V dc
rUu010	-	> 11	V dc
rtE-01		> 100	°C
rtE-02	< 11	> 100	°C

12.1.5 Warning messages

***Note**: the priority with which the messages are displayed is equal to the order they are shown in the table. A priority alarm is displayed before less important alarms.*

Possible warning messages are shown below:

Message	Cause	Solution
TK Warning	External overheat protection contact open TK (with SW1-3 = ON).	Check the cause of opening contact TK.
SlaveSafe KO	4-20 mA signal at input IN3 < 2 mA or >23 mA, see "Switching of setpoint following the ambient temperature from IN3 (Bank Switch)" on page 50.	Check the connections to IN3 Check for and check the value of the 4-20 mA signal at input IN3
Bad step	Bad step: the equipment automatically skips to the next step	Check the connections of the two autotransformers and check the voltage present at their connection terminals. If the error repeats frequently, replace the equipment and/or the autotransformers

13. Technical specifications

13.1 Physical properties

13.1.1 Controller dimensions and weight

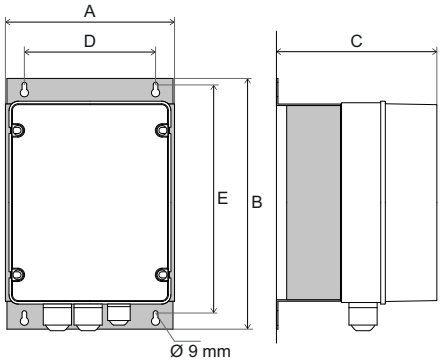
***NOTICE**: provide space around the controller as indicated in "Guarantee cooling" on page 24.*

Model	A	B	C	D	E	Weight (kg) *
DSV312	325	495	345	254	346	18.2
DSV316	325	495	445	254	346	31.6
DSV327	395	362	193	333	321	35.5
DSV334	395	362	193	333	321	11.5 **
DSV348	395	362	193	333	321	11.5 **

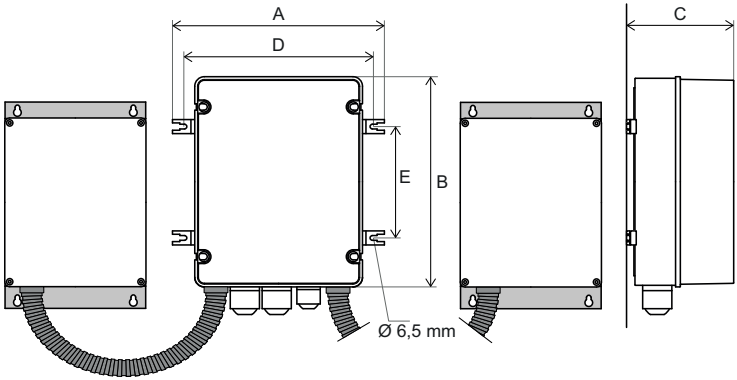
***Note ***: total weight including packaging.*

Note *: weight of the electronics, to which the weight of the two autotransformers must be added.*

DSV312, DSV316, DSV327

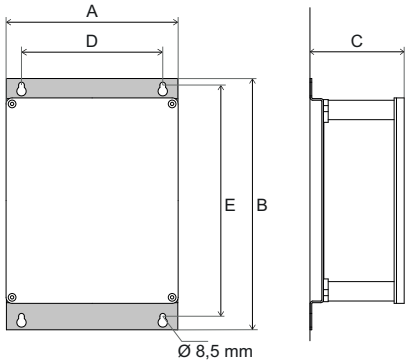


DSV334, DSV348



13.1.2 Autotransformers dimensions and weight (only DSV334 and DSV348)

Model	To be combined with	A	B	C	D	E	Weight (kg)
A134-0	DSV327, DSV334	**376**	257	141	211	346	22.5
A154-0	DSV348	**376**	257	141	211	346	28.5



13.1.3 Case and cable clamps

Materials	GW-PLAST 75 maximum temperature 60 °C (ball heat sealing 85 °C) and aluminum.
Screw plugs	TPN series with max 1.8 Nm torque (CEI 23-58)
Protection rating	IP55
Pollution	High Pollution
Fire resistance	Category D
M25 cable clamps	IP67 protection, class V2, polyamide PA6

13.1.4 Storage and installation environmental conditions

Working temperature	from -20 to +50 °C. For temperatures below -10 °C use input **S2**.
Storage temperature	from -25 to + 60 °C
Humidity	RH < 85% non condensing
Vibrations	Under 1 G (9.8 m/s2)

13.2 Electrical specifications

13.2.1 Applications

High-speed, three-phase, asynchronous motors with adjustable voltage applied to axial or centrifugal fans.

13.2.2 Specifications

Rated voltage	400 V ac ± 10% three-phase On request 230 V ac / 480 V ac
Frequency	50/60 Hz automatically recognized
Maximum pickup current (*)	I> 1.4*In, alarm trigger time is about 5 s
Maximum working current	I> 1.2*In, the trigger time is inversely proportional to I - In
Minimum current	0.2 A

Over voltage protection	Surge category II (4 KV), EN 61000-4-5
Overload protection	Optional.
Auto restart	The controller automatically restarts as soon as the alarm condition is cleared.
Maximum absorption on signal 0-10 V	20 mA (minimum load resistance 500 Ω) ***NOTICE**: always check total absorption on signal 0–10 V.*
Transducer power supply	22 Vdc -10/+20 % 60 mA, not stabilized. Protected against short circuiting.
RL1 relay	**NO**: 5 A at 250 V ac and cosfi 0.8 **NC**: 3 A at 250 V ac and cosfi 0.8
Rely RL2/RL3	**NO**: 5 A at 250 V ac and 30 V dc

13.2.3 Rated current and power

Model	RMS rated current Ampere (In)	Environmental temperature downgrade > 50 °C (A/°C)	Rated power nominal kVA @ 400 V ac	Dissipated power command circuits	Power dissipated in the area
DSV312	12	0.6	8.3 KW	15 W	20 W
DSV316	16	0.8	11 KW	15 W	23 W
DSV327	27	1.35	18.6 KW	20 W	32 W
DSV334	32	1.7	22 KW	20 W	36 W
DSV348	48	2.4	33 KW	20 W	40 W

13.2.4 Nominal current declassified due to height of installation

Installation height (m)	0	1000	1500	2000	2500	3000	3500
Rated current reduction (%)	100	95	90	85	80	75	70

13.2.5 Electric insulation

Case	Class I (use of grounded protection conductor)
Command circuits	4000 V ac between command input and mains voltage parts

13.2.6 Nominal cable sections

	Signal (min–max values)		Power output (min–max values)		Power supply (min–max values)	
Model	**mm2**	**AWG Cu**	**mm2**	**AWG Cu**	**mm2**	**AWG Cu**
DSV312	0.5–1.5	20–16	1.0–2.5	17–13	1.0–2.5	17–13
DSV316	0.5–1.5	20–16	1.5–4.0	15–11	1.5–4.0	15–11
DSV327	0.5–1.5	20–16	1.5–6.0	15–9	1.5–6.0	15–9
DSV334	0.5–1.5	20–16	2.5–10	13–7	2.5–10	13–7
DSV348	0.5–1.5	20–16	2.5–16	13–4	2.5–16	13–4

13.2.7 BELDEN cable specifications for RS485 connection

Specifications	**Value**
Conductor 1	CuSn 7x0.25 mm
Conductor 1 (resistance)	50 Ω/km
Conductor 2	CuSn 7x0.25 mm
Conductor 2 (resistance)	50 Ω/km
insulation	PEE 2.35 mm
Color code	White/Orange Blue
Plate 1	AL/pet 100%

Specifications	Value
Sheath 1	CuSn 65%
Internal sheath	Oil-resistant gray flame-retardant PVC
Internal sheath (diameter)	7.6 ± 0.1 mm
External sheath	Black UV ray resistant PE
External sheath (diameter)	9.0 ± 0.1 mm
Characteristic impedance	125 ± 15 Ω
Mutual or coaxial cable capacitance	MUTUAL 36 pF/m
Propagation speed	78%
Shielding efficiency (100–900 MHz)	>85 dB
Drain wire	CuSn 7x0.20 mm
Rated voltage	300 V
Working temperature	from -20 to + 80 °C
Sheath insulation	C-4 (U0=400V)
Test voltage	4.5 kV ac
Minimum bending radius (internal/external)	40/90 mm
Weight	8.4 Kg/100 m
Notes	Suitable for installation outdoors, under ground and damp environments

13.3 Maintenance

13.3.1 Clean Up

Clean the container with a dry rag.

13.3.2 Responsibility for disposal



As indicated in European Directive 2012/19/EU, do not dispose of the product with other unsorted urban waste.

The owner is responsible for the disposal of these products and of the other electric and electronic equipment using the specific collection organizations indicated by the government or local public agencies.

Correct disposal and recycling help to prevent potentially negative consequences to the environment and health of people.

For more detailed information about disposal, contact the responsible public authorities, the waste disposal service, or the representative from which the product was purchased.

13.4 Conformity

13.4.1 Declaration of conformity

The full text is available on the website www.selpro.it.

13.4.2 EC - Declaration of conformity

Directive	EC standard code	Version
EMC 2014/30/EU	EN IEC 61800-3	2018
	EN IEC 61000-6-2	2019
	EN 61000-6-3	2007 +A1:2011
	EN IEC 55014-1	2021
	EN IEC 55014-2	2021
Safety 2014/35/EU	EN 61800-5-1	2007 +A1:2017 +A11:2021
	EN 60335-1	2012 +A13:2017 +A2:2019
	EN 60730-1	2017
RoHS 2012/19/EU	EN 50581	2012

13.4.3 UK - Declaration of conformity

Subject	Name	Version
EMC	BS EN IEC 61800-3	2018
	BS EN IEC 61000-6-2	2019
	BS EN 61000-6-3	2007 +A1:2011
	BS EN IEC 55014-1	2021
	BS EN IEC 55014-2	2021
Safety	BS EN 61800-5-1	2007 +A1:2017 +A11:2021
	BS EN 60335-1	2012 +A13:2017 +A2:2019
	BS EN 60730-1	2017
RoHS	BS EN 50581	2012

SELPRO Srl

Via Piamarta, 5/11
25021 Bagnolo Mella (BS) Italy

+39 (0)30 6821611
info@selpro.it

SELPRO
Fan Speed Controllers Specialist

www.selpro.it