

RDM

MASTER CONTROLLERS WITH 2X16 DISPLAY FOR FANS WITH VOLTAGE-ADJUSTABLE THREE-PHASE MOTORS

Instruction manual | v. 6.02

PPRDMEN-R06.02-0

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

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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
APR 2025	PPRDMEN-R06.02-0	5.4 dated 05/8/2014	Updated "Physical properties" on page 54 Updated "Fix devices with IP55 protection ratings to walls" on page 20 Updated "Connect secondary grounding" on page 20
JAN 2022	PPRDMEN-R06.01-0	5.4 dated 05/8/2014	Updated chapter "Conformity" on page 57 Added image in "Product identification" on page 9
JUN 2019	PPRDMEN-R06.00-0	5.4 dated 05/8/2014	First publication revised in the new format

Models described by the manual

This manual applies to the following models:

RDM 308	RDM 320
RDM 312	RDM 328

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 RDM 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.*

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.

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 56.

2.2 Product identification

2.2.1 Package contents

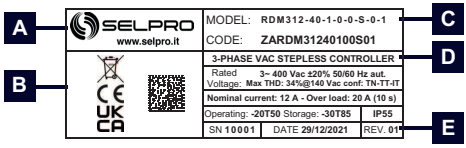
Below are the items provided in the sales package:

- one RDM
- 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	Matrix code to identify model and serial number, CE marking conformity with directives
C	Model, code and product revision
D	Device description
E	Technical specifications

3. Product description

3.1 Description

3.1.1 RDM controllers

Multifunction and multi-input RDM controllers regulate the speed of voltage adjustable high-speed, three-phase, asynchronous motors applied to axial or centrifugal fans. Connected to transducers or to sensors, they can receive signals (pressures, temperatures, etc.) that, together with the set parameters, control motor speeds.

3.1.2 Applications

RDM 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

RDM controllers are three-phase voltage transformers that use the principle of phase partialization or phase cut-off. Partialization is totally controlled on the three phases, regulating the effective voltage applied to the load. During installation, the motor cosϕ can be taken into account and manually compensated. Up to two speed zones can be excluded where greater acoustic disturbances is encountered. Neutral conductor connection is not required. The controller can operate in both Master and Slave mode.

3.1.4 Inputs

The controller has the following inputs:

- two analog inputs that can be configured to read the voltage/current signals or NTC resistance (can be amplified with expansion modules)
- one optoisolated non-polarized input for the PWM signal
- two On/Off for activation of auxiliary functions

3.1.5 Outputs

The controller has the following outputs:

- control outputs:
  - one power for three-phase motors (models 308, 312, and 320)
  - two power for three-phase motors (models 328)
  - one in analogue voltage 0–10 Vdc for power slave units:
    - ff the controller is in slave mode, the 0–10 V voltage follows the controller input (see "Operating mode" on page 29)
    - if the controller is in master mode, the 0–10 V voltage follows the controller output (see "Operating mode" on page 29)
- one relay, for alarm, fault and operating status messages

3.1.6 Controls

The control can be:

- **Slave proportional**: changes the three-phase output proportionally to the prevalent input value.
- **Master proportional**: changes the three-phase output to maintain the value of the prevalent input within the proportional band.

- **Master PID**: changes the three-phase output to keep the prevalent input value near the setpoint.

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

3.1.7 Functions that can be activated with On/Off inputs

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

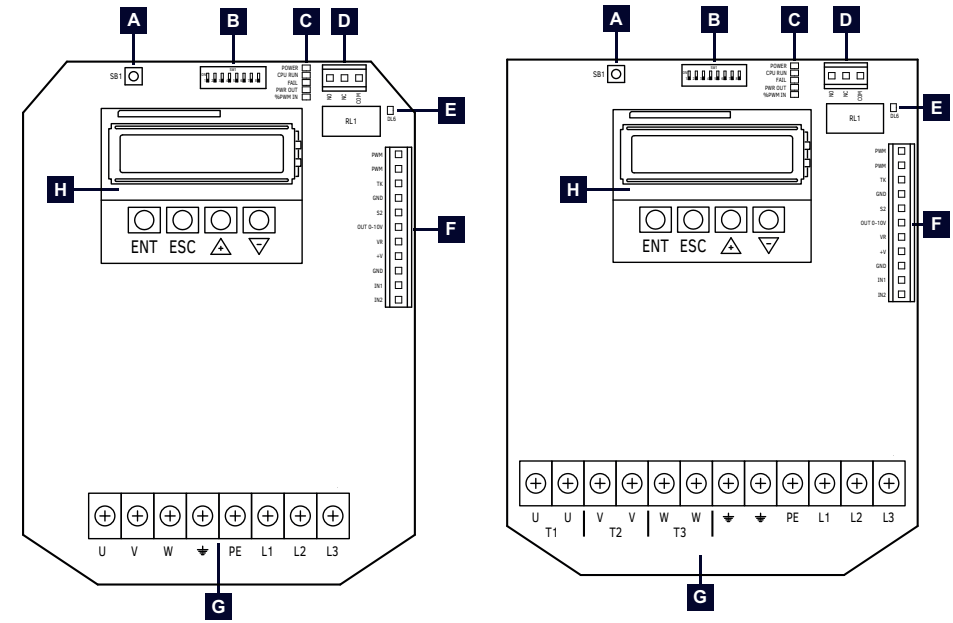
- enabling night limit
- remote enabling of start/stop
- read motor overheat protection status
- defrost and snow-free operation

3.1.8 Default configurations

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

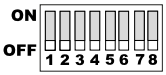
3.2 Presentation

3.2.1 Main components



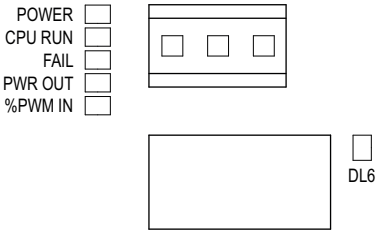
Part	Description	Reference in the manual
A	Reset button.	-
B	DIP switch SW1 to turn functions on/off.	"DIP switch SW1" on page 13
C	Device status LED.	"Status LED" on page 14
D	Terminal board M4 with relay output.	"Relay output" on page 18
E	LED **DL6** relay status.	"Relay status LED" on page 14
F	Terminal board M3 with analog inputs and analog control output.	"Analog inputs and outputs" on page 17
G	Terminal board M1 three phase voltage input and output.	"Three-phase power supply and power output for motor(s)" on page 16
H	Programming display with keypad.	"Programming display keyboard" on page 15

3.2.2 DIP switch SW1



Switch	Function
1	Sets the setpoint position: ■ On: setpoint at the minimum control voltage value ■ Off: setpoint at the maximum control voltage value
2	Sets the control mode: ■ On: inversely proportional to the command signal ■ Off: directly proportional to the command signal
3	Sets the **TK** contact operation (terminal board M3): ■ On: NO contact. Night speed limit **Lh** active when contact closes. ■ Off: NC contact. Serial connection of the motor overload protections (**TK**).
4	Sets the **START/STOP** contact operation (terminal board M3): ■ On: ○ Closed contact: start ○ Open contact and parameter **HP** equal to 0: stop ○ Open contract and parameter **HP** greater than 0: defrost operation active, the motors operate at a constant speed. See "Defrost and snow-free operation" on page 37 ■ Off: ○ Open contact: start ○ Closed contact and parameter **HP** equal to 0: stop ○ Closed contract and parameter **HP** greater than 0: defrost operation active, the motors operate at a constant speed. See "Defrost and snow-free operation" on page 37
5	Set the behavior of the relay in the various operative states and in the event of a fault. See "Behavior of relay and LED DL6 to indicate the operative and fault states" on page 14.
6	
7	Enables/disables editing parameter **cosϕ**: ■ On: enables manual editing of the parameter. See "Modify the cosϕ of the motor" on page 50 ■ Off: disables manual editing of the parameter
8	Saves the parameters set with the programming display.

3.2.3 LED overview



3.2.4 Status LED

Name	Description
PWR	Power on
CPU RUN	■ Blinking fast: micro controller running ■ Blinking slowly (on its own): manual setting of the motor cosϕ active ■ Blinking slowly (with the **PWR OUT** LED blinking): standby
FAIL	***Note**: if multiple alarms are present, the one with highest priority is indicated.* ■ 1 flash: temperature of the board greater than 85 °C ■ 2 flashes: power phase missing ■ 3 flashes: motor overload protection open ■ 4 flashes: input value out of range see "Minimum and maximum limits for inputs IN1 and IN2" on page 53. The alarm details can be consulted on the display, too. See "Alarm messages" on page 52.
PWR OUT	■ On: output voltage distribution ■ Blinking: standby, no voltage distribution but controller ready ■ Off: no output voltage distribution
%PWM IN	The varying intensity indicates the percentage of the PWM command signal

3.2.5 Relay status LED

Name	Description
DL6	Alarm relay status/external unit control. ■ on: relay energized (closed between **COM**-**NO**) ■ off: relay at rest (closed between **COM**-**NC**)

3.2.6 Behavior of relay and LED DL6 to indicate the operative and fault states

The behavior of the relay depends on the settings of switches 5 and 6 of the DIP switch.

***Note**: the relay is energized with contact COM-NA closed; the relay is at rest with contact COM-NC closed.*

Operative status	Status on display	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6 7 8
Stop	**Stop**	Relay energized	Relay de-energized	Relay de-energized	Relay energized
Standby	**STANDBY**	Relay energized	Relay energized	Relay de-energized	Relay energized

Operative status	Status on display	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6 7 8	ON OFF 1 2 3 4 5 6 7 8
Alarm	**ALARM**	Relay de-energized 	Relay de-energized 	Relay de-energized 	Relay energized 
Normal operation	**PWR %**	Relay energized 	Relay energized 	Relay energized 	Relay energized 
Defrost operation active	**HP %**	Relay energized 	Relay energized 	Relay energized 	Relay energized 
Manual setting of cosϕ	**SET CosPhi**	Relay energized 	Relay energized 	Relay energized 	Relay energized 
No power supply	**ALARM**	Relay de-energized 	Relay de-energized 	Relay de-energized 	Relay de-energized 
Insufficient power supply	**ALARM**	Relay de-energized 	Relay de-energized 	Relay de-energized 	Relay energized 
Device faulty	**ALARM**	Relay de-energized 	Relay de-energized 	Relay de-energized 	Relay energized 
No power supply phase	**ALARM**	Relay de-energized 	Relay de-energized 	Relay de-energized 	Relay energized 

3.2.7 Programming display keyboard

Key	Function
ENT	Confirms the selection. With the **ENT** key, enters the menu or saves the new settings.
ESC	Cancels the selection. With the **ESC** key, exits the menu or cancels the changes made to the settings.
	Increases the value read or scrolls the parameter list up.
	Decreases the value read or scrolls the parameter list down.

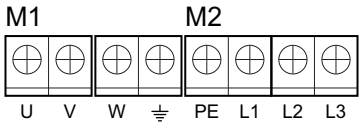
4. Inputs and outputs

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

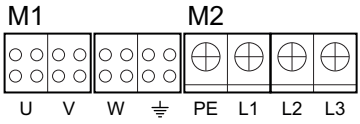
4.1.1 Terminal board M1

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

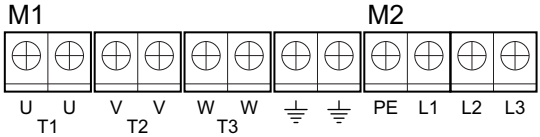
Terminal board RDM308, RDM312, RDM320 single output



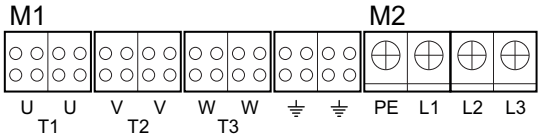
Terminal board RDM308, RDM312, RDM320 output x 4



Terminal board RDM320, RDM328 double output



Terminal board RDM320, RDM328 output x 8



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**(*): double three-phase output on models RDM328.*

***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.*

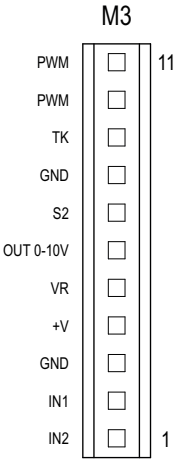
4.1.2 Power supply wiring diagram

See "Power supply wiring and power output for motor(s)" on page 22.

4.2 Analog inputs and outputs

4.2.1 Terminal board M3

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



Terminal		Description	Specifications
1	**IN2**	Analog Input 2.	V dc/mA/kΩ
2	**IN1**	Analog Input 1.	V dc/mA/kΩ
3	**GND**	Grounding.	-
4	**+V**	Non-stabilized power voltage output for transducers.	20 V dc Max 20 mA
5	**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 5 mA
6	**OUT**	Powered output used to command the auxiliary power slave unit. ***Note**: the 0-10 V output follows the trend of the input signal in a directly proportional manner. It is not affected by the position of switch 2 of the DIP switch).*	0–10/10–0 Vdc Max 30 mA
7	**START/STOP**	NO/NC contact (can be configured with the DIP switch) for the remote start/stop command. **CAUTION!** The contact does not disconnect the mains power. Do not use it as a power switch or as a safety switch.	-
8	**GND**	Grounding.	-

Terminal		Description	Specifications
9	**TK**	Normally closed (NC) contact to connect to the motor overload protections: ■ closed: no alarm, consent to regulation ■ open: alarm, no consent to regulation ***NOTICE**: the overload protection of one or more motors or an alarm coming from an electrical cabinet can be connected to the TK input but must be normally closed logic.* Can be configured as NO (with the DIP switch) to enable the **Lh** parameter for the night speed limit: ■ open: the controller works according to the set parameters, without limits. ■ closed: the **Lh** limit is activated.	-
10	**PWM**	Optoisolated input, not polarized for control signal 0–10 Vdc in PWM modulation for Slave mode operation.	3–30 Vdc/10 mA
11	**PWM**		

***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** and **GND**.*

4.2.2 Analog inputs IN1 and IN2

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.

***Note**: for special applications, the configuration or inputs **IN1** and **IN2** can be set from menu **4: SETUP** > parameters **C0**, **C1**, and **C2**.*

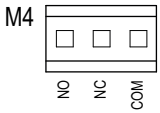
4.2.3 Wiring diagrams

See "Connecting analog inputs in Slave mode" on page 23"Analog input connections in Master mode" on page 25, "OUT analog output connections" on page 27 and "Auxiliary On/Off inputs connection" on page 27.

4.3 Relay output

4.3.1 Terminal board M4

The two-logic relay terminal board can be used to control alarm devices (i.e. sirens).



Terminal		Description
1	**NO**	Normally open output (**NO**+**COM**).
2	**NC**	Normally closed output (**NC**+**COM**).
3	**COM**	Shared.

4.3.2 Configuration for communicating operative statuses and malfunctions

It is possible to manage the operative (for example, if the regulator is in alarm) and fault (for example, insufficient power) states in different ways by setting DIP switch SW1 switches 5 and 6, see "Behavior of relay and LED DL6 to indicate the operative and fault states" on page 14.

5. Installation

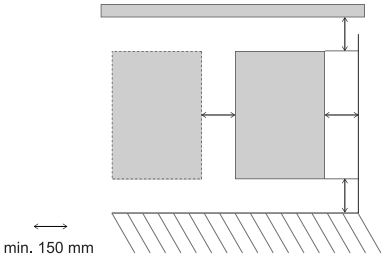
5.1 Wall mount

5.1.1 Important considerations for installation

RDM 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 RDM model

5.1.2 Guarantee cooling



***NOTICE**: the air must circulate freely in the dissipater without obstacles (below and above the dissipater). Leave a free area between the device and the walls or between several 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

Only models with IP55 protection rating can be installed in the open. 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 the electric panel

Models with protection ratings IP20 and IP00 must be installed inside an electric panel. Containers of models IP20 have holes which allow air circulation.

5.1.5 Installation in farms

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

5.1.6 Warnings

***NOTICE**: for IP55 and IP20 models, 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.*

5.1.7 Fix devices with IP55 protection ratings to walls

1. Insert the cable clamps or plugs.
2. Drill holes at the fins or fixing holes, according to these instructions:

For RDM	Hole dimensions
308	6 mm
312, 320 (1/4 outputs)	5 mm
320 (2/8 outputs), 328	5 mm

3. Secure the appliance using four screws (not supplied) suited to the wall thickness.

5.1.8 Fix devices with IP20 protection ratings in the electric panel

1. Insert the cable clamps or plugs.
2. Fix the device to the panel using four screws (not supplied).

5.1.9 Fix devices with IP00 protection ratings in the electric panel

***NOTICE**: damages to components. Defective operation. Handle with care and fix the device in a position protected from impact.*
Fix the device to the panel using four screws (not supplied).

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



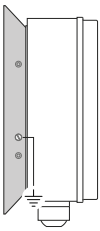
WARNING! Electrocution. Do not power the controller if it is not grounded.

***NOTICE**: if a circuit breaker is installed on the power supply, use a device with a threshold over 100 mA and with a short delay to prevent inopportune power outages*

5.2.3 Connect secondary grounding

To increase the electromagnetic compatibility of the controller, connect the secondary grounding.

For RDM320 (2/8 outputs) and RDM328, to connect the secondary grounding, connect a grounding cable to the dissipater screw.



5.2.4 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 value fitted upstream of the controller.

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

The installer must install these protections.

Model	Circuit breaker (A)	Fuses			
		A	V ac	Format	I2t semiconductor max (A 2s)
RDM308	16	12	690 V	10 x 38	145
RDM312	20	16			145
RDM320	32	25		14 x 51	470
RDM328	40	32			550

5.2.5 Power cables separate from signal cables

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

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

5.2.6 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).

5.2.7 Warnings for connection and by-pass use

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

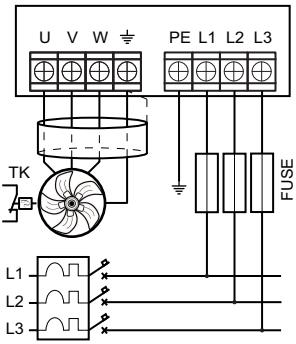
Before powering the load to the maximum voltage, disconnect the power supply to the controller, therefore:

- 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.

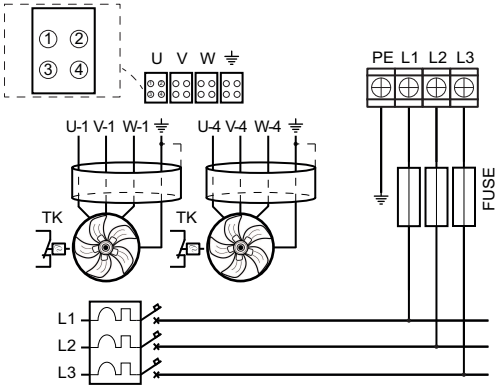
6. Connections

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

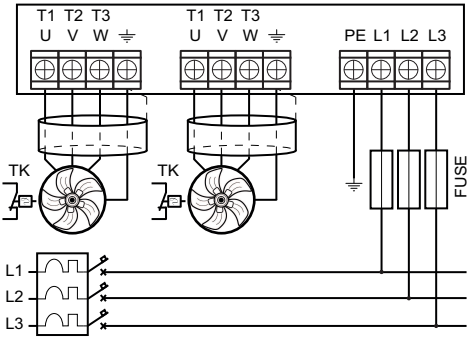
6.1.1 Power wiring diagram and single output load (RDM308, RDM312, RDM320)



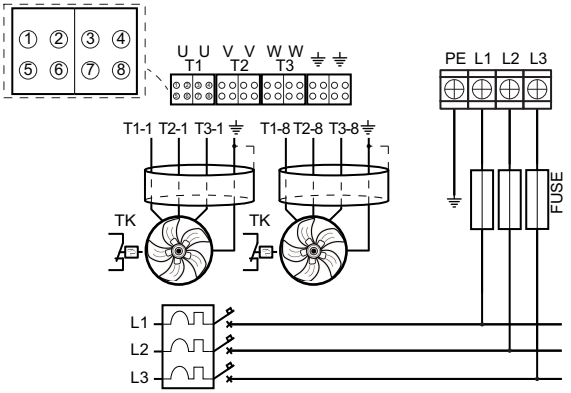
6.1.2 Power wiring diagram and output x4 load (RDM308, RDM312, RDM320)



6.1.3 Power wiring diagram and single output load (RDM320 and RDM328)



6.1.4 Power wiring diagram and output x 8 load (RDM320 and RDM328)



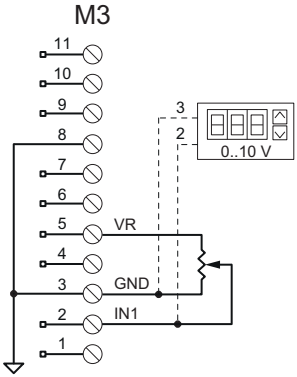
6.2 Connecting analog inputs in Slave mode

***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 0–10/10–0 Vdc 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**.

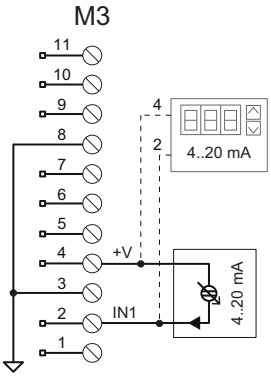


6.2.2 Connection for Slave unit with input 4–20 mA

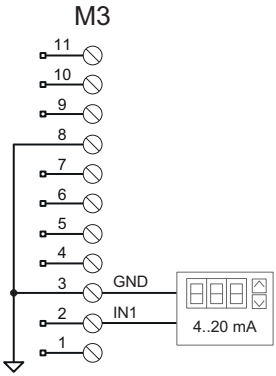
The connection of a potentiometer for manual control or, alternatively, a remote controller with 4–20/20–4 mA output is illustrated in the diagram.

This connection requires the use of the configuration **rS 420**.

Signal taken from + 24 Vdc



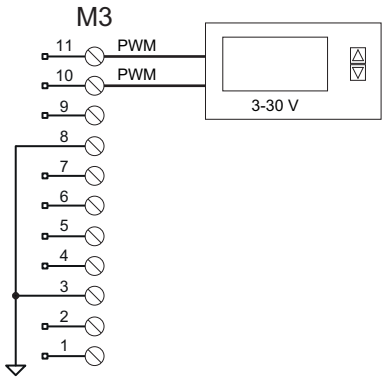
With grounded return signal



6.2.3 Connection for Slave unit with PWM input

The connection to a remote connection with PWM 3-30 V/10 mA output is illustrated in the diagram.

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



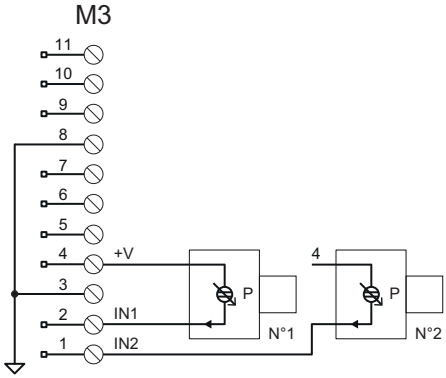
6.3 Analog input connections in Master mode

***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 +20 Vdc. The display shows mA or bar according to the default configuration.

This connection requires the use of **rPr420** (mA measurements), **rPr015**, **rPr025**, **rPr030**, **rPr045** and **rPr050** (bar measurements) configurations.



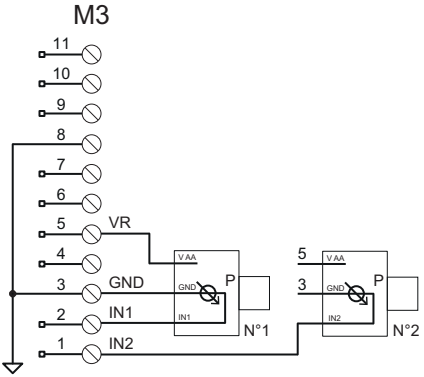
In the default configuration, the setpoint coincides with the maximum fan speed (**hi**). It calls for two transducers; the controller automatically selects the transducer with the greater signal. If only one transducer is connected, always use input **IN1**.

6.3.2 Transducer connection 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.

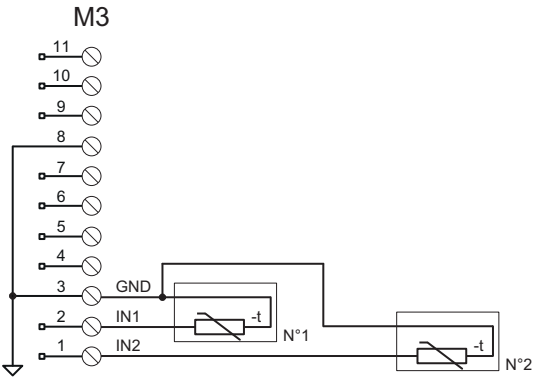


In the default configuration, the setpoint coincides with the maximum fan speed (**hi**). It calls for two transducers; the controller automatically selects the transducer with the greater signal.

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** (measurements in °C) configuration.

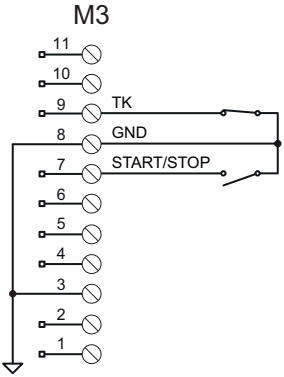


In the default configuration, the setpoint coincides with the maximum fan speed (**hi**). It calls for two probes; the controller automatically selects the probe with the greater signal. If only one sensor is connected, the system automatically selects the one present.

6.4 Auxiliary On/Off inputs connection

6.4.1 Start/stop and TK/Lh contacts connection

The figure shows the contact connections for the remote Start/Stop command or for the defrost function, see "Defrost and snow-free operation" on page 37 and the contact for the connection of the motor overload protections or for activation of the night speed limit **Lh**. The function of the contact can be configured with DIP switch SW1. See "DIP switch SW1" on page 13.



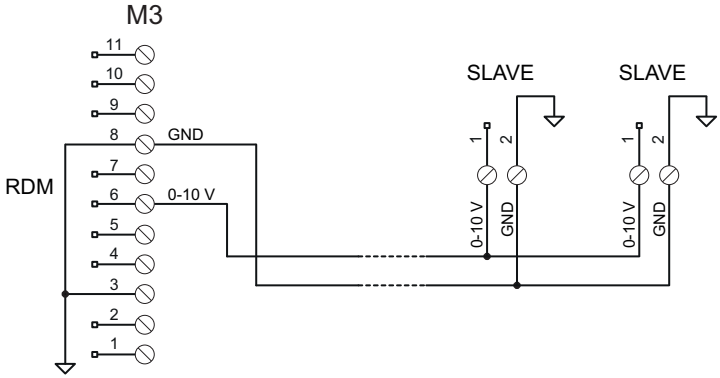
6.5 OUT analog output connections

6.5.1 Power Slave unit connection

This connection is indicated for a Master unit or one or more Slave power units.

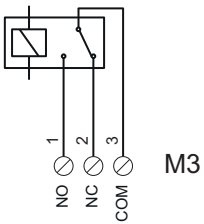
The connection enables the **OUT** analog output to transmit the direct regulation command to the connected Slave units, setting the same operating speed for all connected fan units. The signal on the OUT analog output allows the connected slave unit to receive a commanded related to the fan speed control:

- If the controller is in “Slave” mode, see "Control output OUT 0-10 V" on page 31.
- If the controller is in “Master” mode, see "Master proportional mode" on page 31



6.6 Relay output connection

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



7. Operating mode

7.1 Slave proportional mode

7.1.1 Applications

Control from external controller or manually controlled potentiometer.

7.1.2 Operation

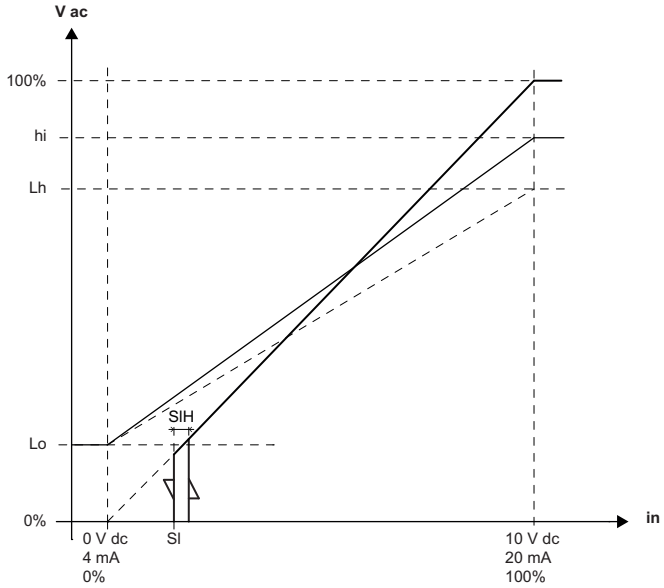
Three-phase output voltage varies in proportion to the prevalent input. The minimum speed limit, **Lo** is active and the maximum, **hi**, with forcing at 0% and relative hysteresis (**So** + **io**). Regulation jumps (**Jh + JL1**) are enabled, used to avoid particularly noisy zones.

***NOTICE**: passing from direct mode to indirect mode, the setting of parameter **So** remains unchanged. Manually change the value as suitable for the reverse mode.*

If the maximum night limit of % RPM **Lh** is active (switch 3 of DIP switch SW1 = on), **Lh** is prevalent over **Hi** only if the value is lower.

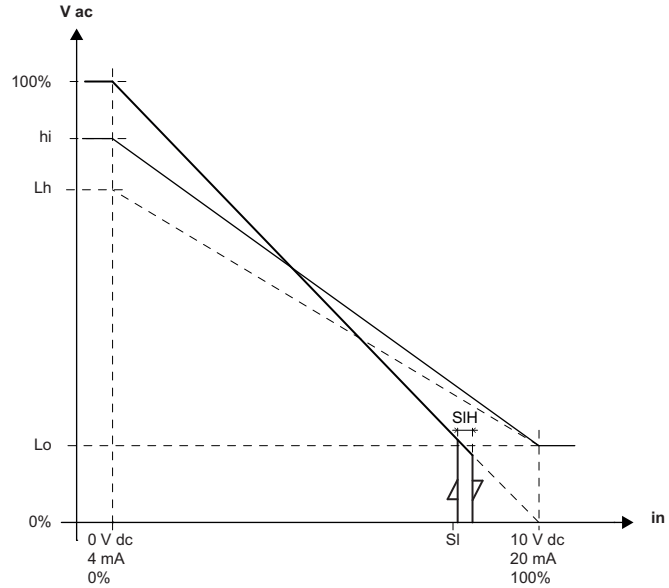
7.1.3 Direct Slave control

Switch 2 of DIP switch SW1 = off



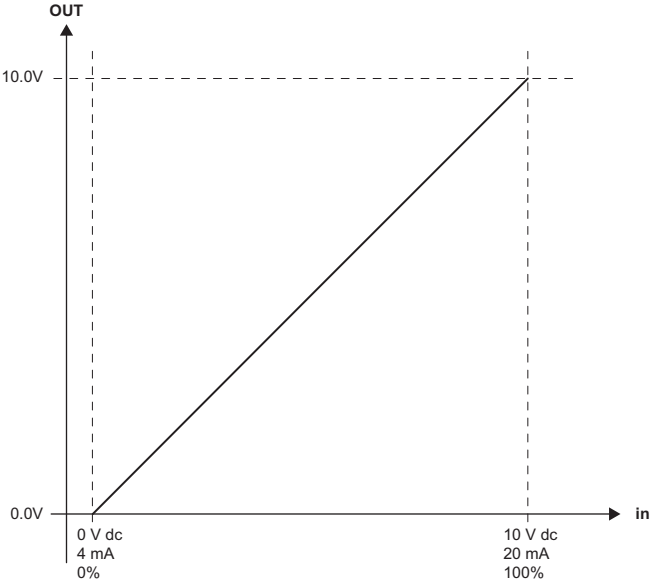
7.1.4 Inverse Slave control

Switch 2 of DIP switch SW1 = on



7.1.5 Control output OUT 0-10 V

The output signal is directly proportional to the input signal and does not depend on the position of switch 2 of DIP switch SW1 or on the limit value **Lo**, **Lh** e **hi**.



7.2 Master proportional mode

7.2.1 Applications

Signals from temperature sensors or transducers.

7.2.2 Operation

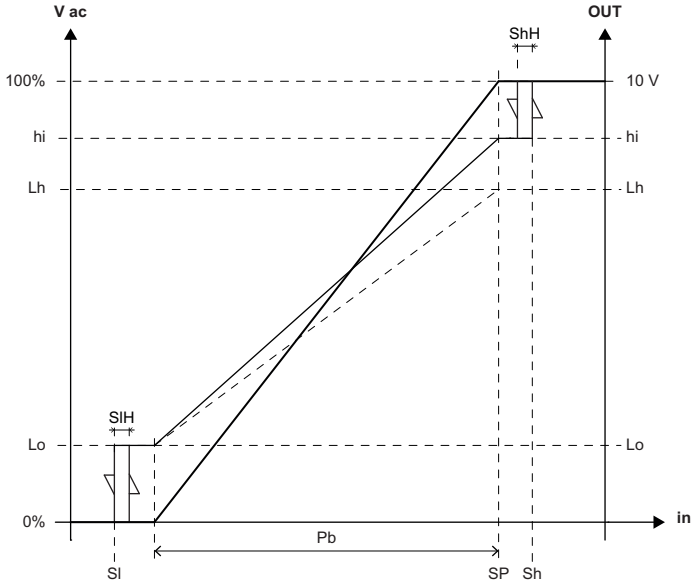
The controller manages fans with its setpoint (**SP**) and reference proportional band (**Pb**). The minimum (**Lo**) and maximum (**hi**) speed limits are enabled, with forcing and relevant hysteresis at 0% (**So** + **io**/) and 100% (**Sh** + **ih**/). The control jumps are active (**Jh + JL1**), used to avoid particularly noisy zones (see "Speed band" on page 37).

If the night limit of % RPM **Lh** is active (switch 3 of DIP switch SW1 = on), **Lh** is prevalent over **hi** only if the value is less.

The analog output **OUT** is directly proportional to the output voltage and therefore depends on the position of DIP switch SW1 and the limit values **Lo**, **Lh**, and **hi**.

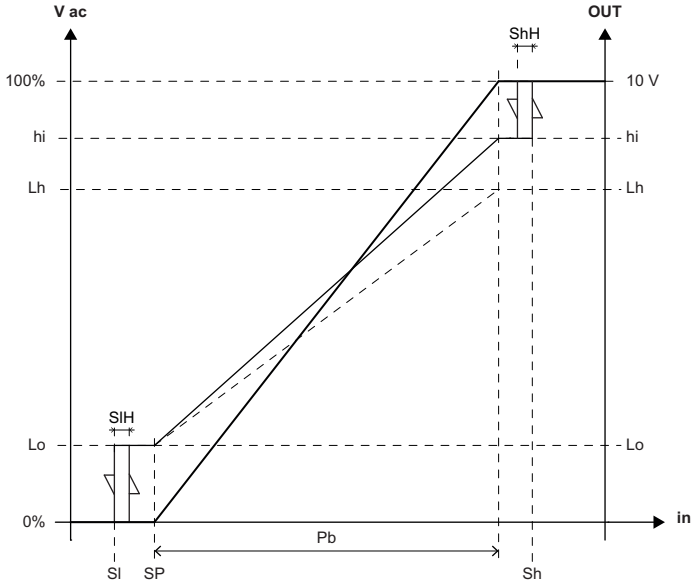
7.2.3 Direct Master control, SP at the maximum limit (default)

Switch 1 DIP switch SW1 = off, switch 2 DIP switch SW1 = off



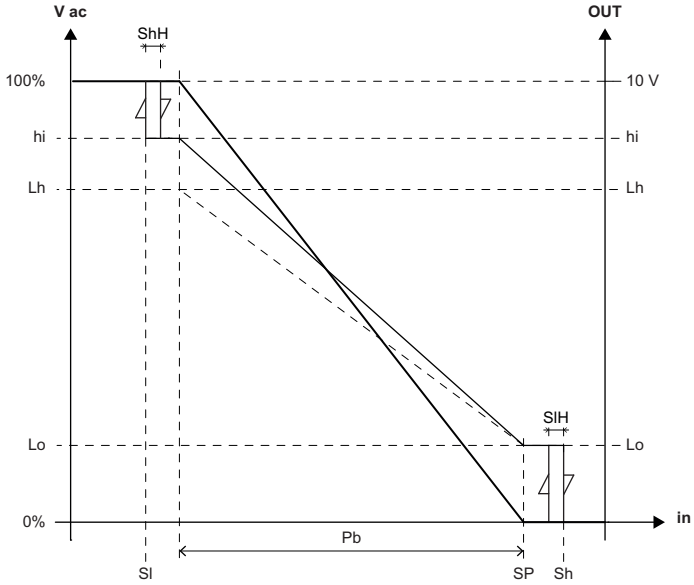
7.2.4 Direct Master control, SP at the minimum limit

Switch 1 DIP switch SW1 = on, switch 2 DIP switch SW1 = off



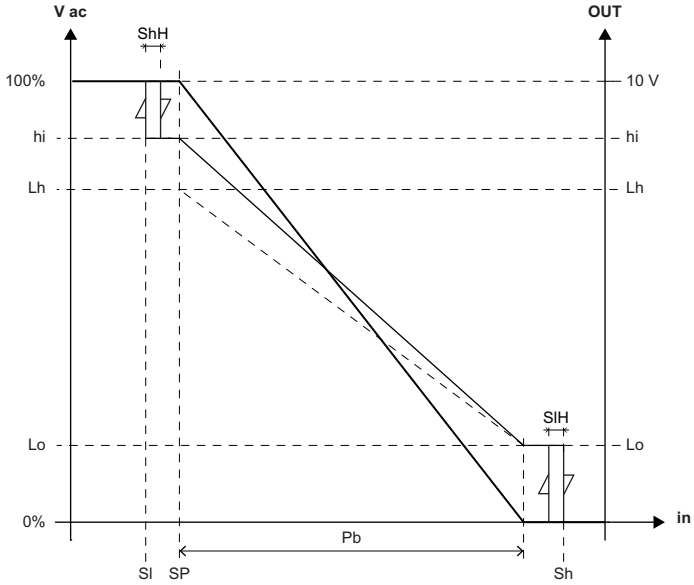
7.2.5 Reverse Master control, SP at the maximum limit

Switch 1 DIP switch SW1 = off, switch 2 DIP switch SW1 = on



7.2.6 Reverse Master control, SP at the maximum limit

Switch 1 DIP switch SW1 = on, switch 2 DIP switch SW1 = on



7.3 Master PID mode

7.3.1 Applications

Signals from temperature sensors or transducers.

7.3.2 Operation

The three-phase output voltage varies to keep the prevalent input at the setpoint value. On the other hand, the analog output uses the same **IN** input but with a specific setpoint and proportional band.

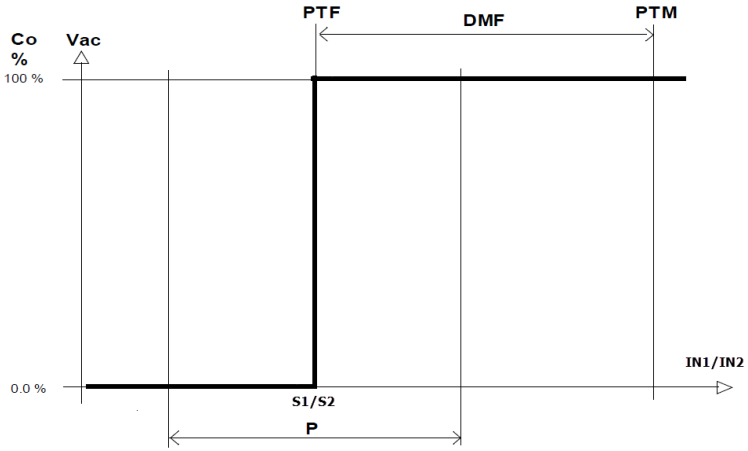
***Note**: for correct PID regulation operations, accurately set the specific parameters*

At full potential, meaning once the settlement transitions are depleted and far from the minimum (**Lo**) and maximum **(hi**) limits, the PID controller keeps at the set setpoint (**SP**) the value of the magnitude measured by the prevalent transducer (**IN1** or **IN2**). Fan control (**Co**) can have a free value that ranges from 0% to 100%, according to that required to keep the set work point.

During transitions, if the prevalent input value (**IN1** or **IN2**) moves around the setpoint (**SP**) but remains within the proportional band (**P**), fan control (**Co**) varies from 0% to 100% to return the input value (**IN1** or **IN2**) to the set setpoint (**SP**).

If, instead, the prevalent input value (**IN1** or **IN2**) exits the proportional band (**P**), fan control gradually moves to 0%, or 100%, according to that needed.

The minimum (**Lo**) and maximum (**hi**) speed limits are enabled, with forcing and relevant hysteresis at 0% (**So** + **io**/) and 100% (**Sh** + **ih**/). Regulation jumps (**Jh + JL1**) are enabled, used to avoid particularly noisy zones.



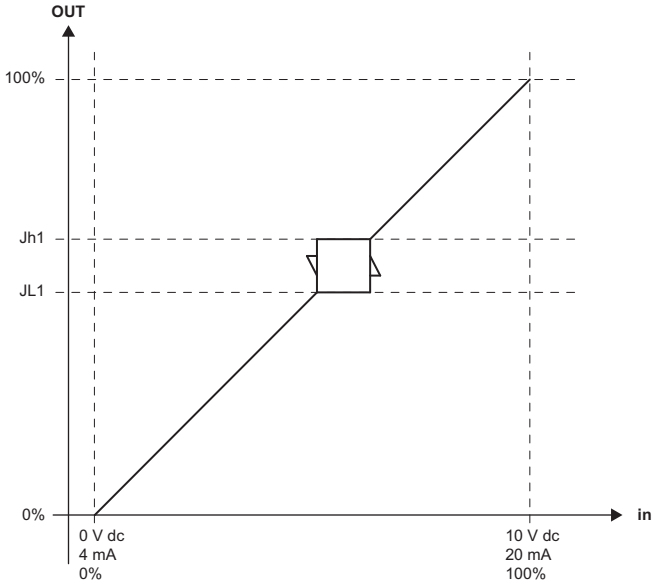
Key

Variable	Description
PTF	Minimum working temperature or pressure restricted by system conditions. Set the setpoint to the same value as PTF to obtain greater compressor energy savings
PTM	Maximum working temperature or pressure restricted by system conditions.
DMF	Temperature or pressure difference (PTM-PTF). Movement of the input from PTF to PTM occurs due to an increase in ambient temperature.

7.4 Speed band

7.4.1 Control jumps

Control jumps (**Jh1** + **JL1**) can be defined to avoid particularly noisy zones.



7.5 Defrost and snow-free operation

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

7.5.1 Applications

To defrost the unit for heat pump applications or remove snow if the fans are installed outdoors.

7.5.2 Operation

It applies a constant voltage to the motor that keeps the fan blades rotating at constant speed. The circulating current heats the motor. The amount of voltage is set using the parameter **HP**.

With **HP** = 0, no voltage is dispensed.

With **HP** greater than 0, the voltage distribution to the motor can be activated with the start/stop contact, based on the settings of switch 4 of DIP switch SW1. See "DIP switch SW1" on page 13.

Function will automatically activate in the case of a closed contact, provided there is no regulation at device output.

***Note**: if **HP** = 0 (default) the START/STOP contact is used for the remote start/stop command of the control.*

8. Use the controller

8.1 Start-up

8.1.1 Warnings

CAUTION! Check again that the equipment and wiring are correct as required in this manual. 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.

8.1.2 Start-up procedure

Follow this procedure for correct controller start-up:

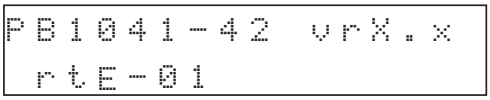
Step	Task	Reference in the manual
1	Complete all electrical power connections at mains voltage.	"Electrical installation" on page 20
2	Complete the input connections (i.e., transducers) and remote controls.	"Connecting analog inputs in Slave mode" on page 23 "Analog input connections in Master mode" on page 25 "Auxiliary On/Off inputs connection" on page 27 "OUT analog output connections" on page 27 "Relay output connection" on page 28
3	Turn on power.	-
4	Set the controller operation using DIP switch SW1.	"DIP switch SW1" on page 13
5	Select the configuration suitable for the transducers used and the application.	"Default configurations" on page 39
6	If needed, modify the base parameters and set the setpoint and night limit.	"Editing parameters" on page 45
7	If needed, in PID mode, modify the parameters.	"Editing parameters" on page 45

8.1.3 Messages displayed when turned on

When the controller is powered on (or after pressing the **RESET** key), before the home page appears, for a few seconds a page appears that shows the following information:

Message	Description
PB1041-42	Hardware type
ver. x.x	Software version
rtE-01	Active configuration at that time.

Example



8.2 Default configurations

8.2.1 Configuration description

***Note**: in the default Master configuration, the setpoint coincides with the maximum fan speed (parameter **hi** = 100%) and the controller automatically selects the probe with the greater signal .*

Configuration	Signal/Transducer	Type of control	Description
rS-010, rS-PWM, rS-420	signal 0–10 Vdc/PWM/4–20 mA	**Slave**	They receive signal in input and replicate it proportionally to the power output. Regulation, alarms, value display will always be in volt (rS-010) or milliampere (rS-420).
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, rPr050	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	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).

8.2.2 Technical specifications of the configurations

Following are the specifications of each configuration:

***Note**: from version 8.0 of the RDM 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	Signal/ Transducer/	Display	Setpoint	Proportional band
rS-010	Slave	0–10 V dc Ri= 10 kΩ	0–10 V dc	0–11 V dc	-	-
rS-420	Slave	4–20 mA Ri= 100 Ω	4–20 mA	0–24 mA	-	-
rS-PWM	Slave	3–30 Vdc/10 mA	PWM Modulator	0–100%	-	-
rPr420	Master	4–20 mA Ri= 100 Ω	4–20 mA	4–20 mA	14 mA	2.6 mA
rPr015	Master	4–20 mA Ri= 100 Ω	0–15 bar > 4–20 mA	0–15 bar	10.6 bar	2.4 bar
rPr025	Master	4–20 mA Ri= 100 Ω	0–25 bar > 4–20 mA	0–25 bar	17.0 bar	3.5 bar
rPr030	Master	4–20 mA Ri= 100 Ω	0–30 bar > 4–20 mA	0–30 bar	17.0 bar	3.5 bar
rPr045	Master	4–20 mA Ri= 100 Ω	0–45 bar > 4–20 mA	0–45 bar	25.0 bar	5.2 bar

Configuration	Mode	IN1/IN2 input	Signal/ Transducer/	Display	Setpoint	Proportional band
rPr050	Master	4–20 mA Ri= 100 Ω	0–50 bar > 4–20 mA	0–50 bar	25.0 bar	5.2 bar
rUu05	Master	0–5 V dc Ri= 10 kΩ	0–5 V dc	0–5 V dc	2.9 V dc	0.8 V dc
rPu030	Master	0–5 V dc Ri= 10 kΩ	0–30 bar > 0–5 V dc	0–30 bar	18.9 bar	3.5 bar
rUu010	Master	0–10 V dc Ri= 10 kΩ	0–10 V dc	0–10 V dc	6 V dc	1.6 V dc
rtE-01 (default)	Master	NTC 10 kΩ @ 25°C	NTC 10 kΩ @ 25°C	from -10 to + 90 °C	45 °C	7.5 °C

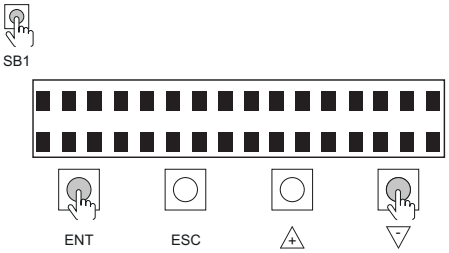
8.2.3 Select a configuration

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

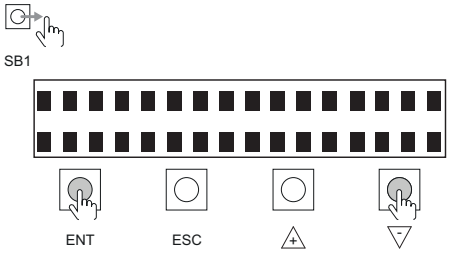
***Note**: if the microprocessor is executing complex algorithms, it may not be able to instantly recognize when keys are pressed. Wait a few seconds and retry.*

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

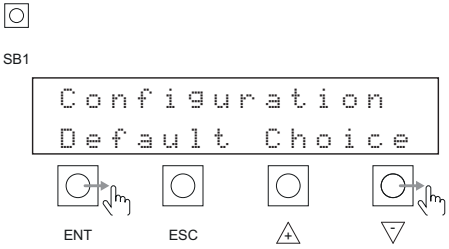
To change/restore a configuration:



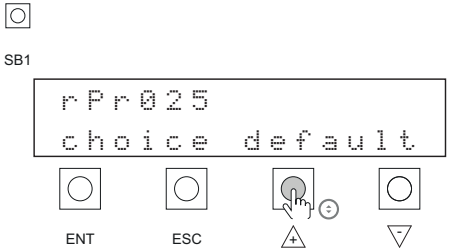
1. Simultaneously press and hold down the **Reset**, **ENT** and ▽ keys.



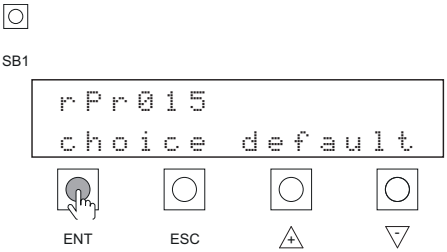
2. Release the reset key and wait for the “Configuration Choice Default” message to appear.



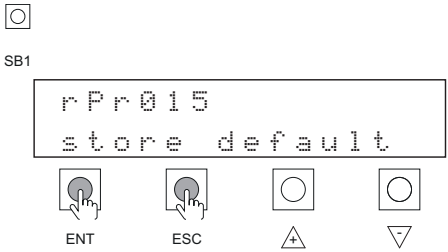
3. Simultaneously release the **ENT** and ▽ keys: the last set configuration appears.



4. Press the △ and ▽ keys to scroll through the settings.



5. Press the **ENT** key corresponding to the chosen configuration: the “Store default” message appears, flashing.



6. Continue as follows:
   - To confirm, simultaneously press the **ENT** and **ESC** keys: the "Update" message appears and then the main page is displayed.
   - To cancel and modify the selected configuration press the **ESC** key once.
   - To return to the home page, press the **ESC** key twice.

8.3 Set the DIP switch

8.3.1 Getting started

Based on the switch settings, the functions enabled change. For details on setting the switches, see "DIP switch SW1" on page 13. For detailed information on the settings of switch 7, see "Modify the cosϕ of the motor" on page 50.

8.3.2 Set the switches

1. With the controller powered on, set the switch to the desired position.
2. Press the reset button: the display turns black and the **FAIL** status LED turns on.
3. Wait for the controller to restart: the **FAIL** status LED turns off, the start screen appears on the display, and then the home page is displayed.

8.4 Parameter table

8.4.1 List of parameters/measurements

Following are all of the parameters for the controller in order of their display.

Parameter/ page	Description	Unit of measure
SP (1)	Setpoint	°C/ mA/ bar/ V dc
Mode (1)	Control mode: **P** (proportional) or **PID**	-
Pb (1,2)	Fan proportional band	°C/ mA/ bar/ V dc
Lh (1,3)	Maximum night limit speed (% RPM)	%
hi	Maximum speed limit (% RPM)	%
Lo	Minimum speed limit (% RPM)	%
dE	Execution time for changing from the minimum speed to the maximum speed, and vice versa	s
Jh	Upper speed limit for jump (% RPM)	%
JL	Lower speed limit for jump (% RPM)	%
Sh (1)	Input value that forces the fan control command to the maximum. (Bypass maximum speed limit)	°C/ mA/ bar/ V dc
ih (1)	**Sh** hysteresis	°C/ mA/ bar/ V dc
So	Input value that forces the fan control command to zero. (Bypass minimum speed limit)	°C/ mA/ bar/ V dc
io	**So** hysteresis	°C/ mA/ bar/ V dc
HP (1, 3)	Set speed (%RMP) for defrost operation	%
PID control parameters. Only with PID control mode (Mode = PID)		
Kp (4)	Proportional band	°C/ mA/ bar/ V dc
Ki (4)	Integral component weight	-
Kd (4)	Derivative component weight	-
Ti (4)	Integration time	s
Td (4)	Derivation time	s
Read-only parameters		
ti	Real-time board temperature	°C
in1/in2	Prevalent input and therefore used by the controller	°C/ mA/ bar/ V dc
i2	Current value of input IN1	°C/ mA/ bar/ V dc
i2	Current value of input IN2	°C/ mA/ bar/ V dc

(1): the parameter is visible and can only be set if the controller is operating in Master mode.

*(2): the parameter is visible if the parameter **Mode**=**P**.*

(3): set the relative switch of the DIP switch SW1. See "DIP switch SW1" on page 13.

*(4): the parameter is visible if the parameter **Mode**=**PID***

8.4.2 Display the values of all the parameters/measurements

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

1. Press ⊿ or ▽ to scroll through all the parameters/measurements: they are shown in the sequence indicated in "List of parameters/measurements" on page 42.
2. Press the **ESC** key to return to the home page.

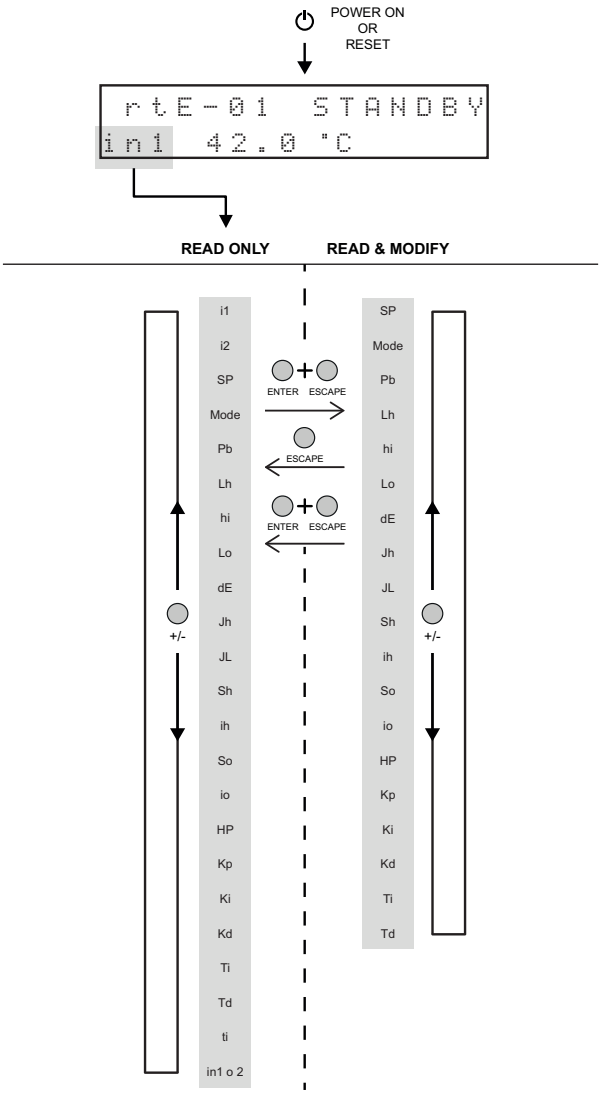
8.5 Navigation structure

8.5.1 Getting started

When turned on, after the start-up screen, the home page is displayed (see "Home page" on page 45). From the home page, press the ⊿ and ▽ keys to display the current values of all the parameters/measurements (see "List of parameters/measurements" on page 42).

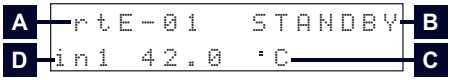
To edit the parameters, simultaneously press the **ENT** and **ESC** keys (see "Editing parameters" on page 45).

8.5.2 Menu layout



8.6 Home page

8.6.1 Page structure

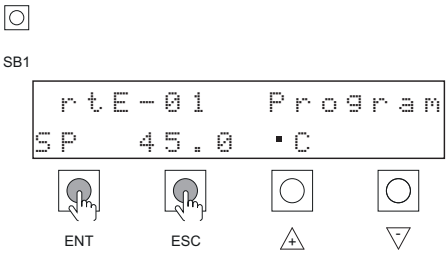


Part	Description
A	Current configuration
B	System status or alarm/warning message. **System status** ■ **STANDBY**: controller ready for operation, no power distributed. ■ **PWR XXX%**: control command value. ■ **LhPW XXX%**: control command value with night limit active. ■ **HP%**: control command value with defrost function active. ■ **SET CosPhi**: manual control of the **cosϕ** parameter enabled (switch 7 of DIP switch: ON). ■ **STOP**: control disabled (start/stop contact at rest). **Alarm messages** See "Alarm messages" on page 52.
C	Prevalent input value. The unit of measure depends on the set configuration.
D	Prevalent input (**IN1** or **IN2**)

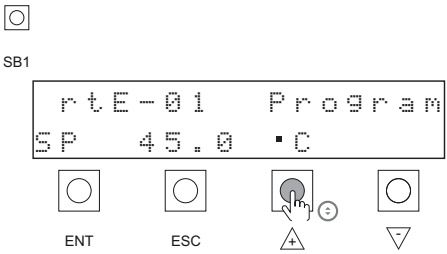
8.7 Editing parameters

8.7.1 Modify a parameter

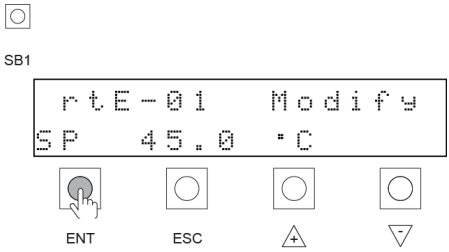
***Note**: To modify the PID parameters, set the parameter **Mode**=**PID** and then modify the individual* parameters.



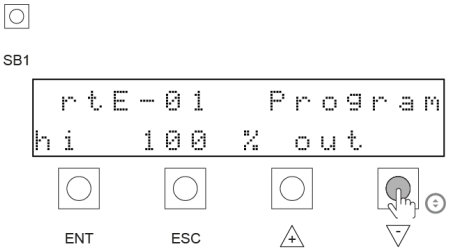
1. Press the **ENT** and **ESC** keys at the same time: when they are released, the "Program" message appears.



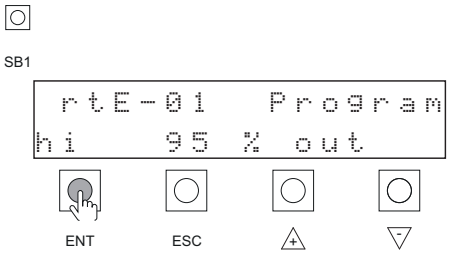
2. Press ▲ or ▼ to scroll through the parameters.



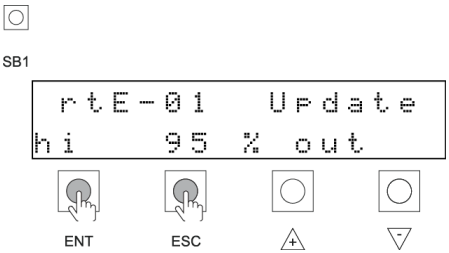
3. Press the **ENT** key for the parameter selected: when it is released, the "Modify" message appears.



4. Press ▲ or ▼ to edit the selected parameter value.



5. Press the **ENT** key to confirm the modification of the parameter: when it is released, the "Program" message appears.



6. Continue as follows:
   - To confirm, press the **ENT** and **ESC** keys at the same time to save the change: the "Update" message appears and then the home page is displayed.
   - To cancel the change, press only the **ESC** key: the "Escape" message appears and then the home pave is displayed.

8.7.2 Note for modifying parameters Lh and HP

To change the parameters **Lh** and **HP**, the relative switches must be set on DIP switch SW1, see "DIP switch SW1" on page 13 and "Set the DIP switch" on page 41.

8.7.3 Note for modifying parameters Jh and JL

When modifying the parameter, the output voltage of the controller is changed to the current value of the parameter. This allows the scale of output voltage control to be scrolled through and for the identification and definition of the noise zone emitted by the fans.

8.7.4 Parameter list

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration
SP (1)	Setpoint	°C	-10.0	+90.0	45.0	NTC 10k@ 25 °C	rtE-01
		mA	4.0	20.1	14.0	4–20 mA	rPr420
		bar	0	15.0	10.6	0–15 bar > 4–20 mA	rPr015
		bar	0	25.0	17.0	0–25 bar > 4–20 mA	rPr025
		bar	0	30.0	17.0	0–30 bar > 4–20 mA	rPr030
		bar	0	45.0	25.0	0–45 bar > 4–20 mA	rPr045
		bar	0	50.0	25.0	0–50 bar > 4–20 mA	rPr050
		V dc	0	10.0	6.0	0–10 V dc	rUu010
		V dc	0	5.0	2.9	0–5 V dc	rUu-05
		bar	0	30.0	18.9	0–30 bar > 0–5 V dc	rPu030
Mode (1)	Control mode: **P** (proportional) or **PID**	-	-	-	P	-	-
Pb (1,2)	Fan proportional band	°C	2.0	55.0	7.5	NTC 10k@ 25 °C	rtE-01
		mA	0.2	16.0	2.6	4–20 mA	rPr420
		bar	0.5	15.0	2.4	0–15 bar > 4–20 mA	rPr015
		bar	1.0	25.0	3.5	0–25 bar > 4–20 mA	rPr025
		bar	1.0	30.0	3.5	0–30 bar > 4–20 mA	rPr030
		bar	1.0	45.0	5.2	0–45 bar > 4–20 mA	rPr045
		bar	1.0	50.0	5.2	0–50 bar > 4–20 mA	rPr050
		V dc	0.2	10.0	1.6	0–10 V dc	rUu010
		V dc	0.1	5.0	0.8	0–5 V dc	rUu-05
		bar	1.0	30.0	3.5	0–30 bar > 0–5 V dc	rPu030
Lh (1,3)	Maximum night limit speed (% RPM)	%	0	100	100	All	All in Master mode
hi	Maximum speed limit (% RPM)	%	0	100	100	All	All
Lo	Minimum speed limit (% RPM)	%	0	100	0	All	All
dE	Execution time for changing from the minimum speed to the maximum speed, and vice versa	s	2	60	2	All	All
Jh	Upper speed limit for jump (% RPM)	%	0	100	100	All	All

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration
JL	Lower speed limit for jump (% RPM)	%	0	100	100	All	All
Sh (1)	Input value that forces the fan control command to the maximum. (Bypass maximum speed limit)	°C	-20.0	+90.0	90.0	NTC 10k@ 25 °C	rtE-01
		mA	4.0	20.0	20.0	4–20 mA	rPr420
		bar	0	15.0	15.0	0–15 bar > 4–20 mA	rPr015
		bar	0	25.0	25.0	0–25 bar > 4–20 mA	rPr025
		bar	0	30.0	30.0	0–30 bar > 4–20 mA	rPr030
		bar	0	45.0	45.0	0–45 bar > 4–20 mA	rPr045
		bar	0	50.0	45.0	0–50 bar > 4–20 mA	rPr050
		V dc	0	10.1	10.0	0–10 V dc	rUu010
		V dc	0	5.0	5.0	0–5 V dc	rUu-05
		bar	0	30.0	30.0	0–30 bar > 0–5 V dc	rPu030
ih (1)	**Sh** hysteresis	°C	1.0	30.0	1.0	NTC 10k@ 25 °C	rtE-01
		mA	0.1	5.0	0.1	4–20 mA	rPr420
		bar	0.1	5.0	0.1	0–15 bar > 4–20 mA	rPr015
		bar	0.1	8.0	0.1	0–25 bar > 4–20 mA	rPr025
		bar	0.1	8.0	0.1	0–30 bar > 4–20 mA	rPr030
		bar	0.1	15.0	0.1	0–45 bar > 4–20 mA	rPr045
		bar	0.1	15.0	0.1	0–50 bar > 4–20 mA	rPr050
		V dc	0.1	5.0	0.1	0–10 V dc	rUu010
		V dc	0.1	2.5	0.1	0–5 V dc	rUu-05
		bar	0.1	15.0	0.1	0–30 bar > 0–5 V dc	rPu030

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration
So	Input value that forces the fan control command to zero. (Bypass minimum speed limit)	°C	-20.0	+90.0	-20.0	NTC 10k@ 25 °C	rtE-01
		mA	4.0	20.0	4.0	4–20 mA	rPr420
		bar	0	15.0	0	0–15 bar > 4–20 mA	rPr015
		bar	0	25.0	0	0–25 bar > 4–20 mA	rPr025
		bar	0	30.0	0	0–30 bar > 4–20 mA	rPr030
		bar	0	45.0	0	0–45 bar > 4–20 mA	rPr045
		bar	0	50.0	0	0–50 bar > 4–20 mA	rPr050
		V dc	0	10.0	0	0–10 V dc	rUu010
		V dc	0	5.0	0	0–5 V dc	rUu-05
		bar	0	30.0	0	0–30 bar > 0–5 V dc	rPu030
		mA	4.0	20.0	4.0	-	rS-420
		%	0	100	0	-	rS-PWM
		V dc	0	10.0	0	-	rS-010
io	**So** hysteresis	°C	1.0	30.0	1.0	NTC 10k@ 25 °C	rtE-01
		mA	0.1	5.0	0.1	4–20 mA	rPr420
		bar	0.1	5.0	0.1	0–15 bar > 4–20 mA	rPr015
		bar	0.1	8.0	0.1	0–25 bar > 4–20 mA	rPr025
		bar	0.1	8.0	0.1	0–30 bar > 4–20 mA	rPr030
		bar	0.1	15.0	0.1	0–45 bar > 4–20 mA	rPr045
		bar	0.1	15.0	0.1	0–50 bar > 4–20 mA	rPr050
		V dc	0.1	5.0	0.1	0–10 V dc	rUu010
		V dc	0.1	2.5	0.1	0–5 V dc	rUu-05
		bar	0.1	15.0	0.1	0–30 bar > 0–5 V dc	rPu030
		mA	0.1	5.0	0.1	-	rS-420
		%	0.1	50	0.1	-	rS-PWM
		V dc	0.1	5.0	0.1	-	rS-010
HP (1, 3)	Set speed (%RMP) for defrost operation	%	0	100	0	All	All in Master mode

Parameter/ page	Description	Unit of measure	Minimum	Maximum	Default	Transducer/ sensor/signal	Configuration
Kp (4)	Proportional band	°C	2.0	55.0	7.5	NTC 10k@ 25 °C	rtE-01
		mA	0.2	16.0	2.6	4–20 mA	rPr420
		bar	0.5	15.0	2.4	0–15 bar > 4–20 mA	rPr015
		bar	1.0	25.0	3.5	0–25 bar > 4–20 mA	rPr025
		bar	1.0	30.0	3.5	0–30 bar > 4–20 mA	rPr030
		bar	1.0	45.0	5.2	0–45 bar > 4–20 mA	rPr045
		bar	1.0	50.0	5.2	0–50 bar > 4–20 mA	rPr050
		V dc	0.2	10.0	1.6	0–10 V dc	rUu010
		V dc	0.1	5.0	0.8	0–5 V dc	rUu-05
		bar	1.0	30.0	3.5	0–30 bar > 0–5 V dc	rPu030
Ki (4)	Integral component weight	-	0.0	1000	2	All	All
Kd (4)	Derivative component weight	-	0.0	1000	1	All	All
Ti (4)	Integration time	s	0	100	1	All	All
Td (4)	Derivation time	s	0	100	10	All	All

(1): the parameter is visible and can only be set if the controller is operating in Master mode.

*(2): the parameter is visible if the parameter **Mode**=**P**.*

(3): set the relative switch of the DIP switch SW1. See "DIP switch SW1" on page 13.

*(4): the parameter is visible if the parameter **Mode**=**PID***

8.8 Modify the cosϕ of the motor

8.8.1 Getting started

Setting the **cosϕ** parameter, it is possible to change the motor cosϕ factory value.

8.8.2 Set the cosϕ parameter

1. Set switch 7 of DIP switch SW1 to On. See "Set the DIP switch" on page 41: the display turns on. After the start-up screen is displayed, the **SET cosϕ** screen is displayed.
2. Proceed to modify the parameter. See "Editing parameters" on page 45. When modifying, check the wave shape of the output current of one phase using an oscilloscope and a current transducer.
3. Set switch 7 of DIP switch SW1 to Off.
4. Press the reset button and wait for the controller to restart.

8.9 Adjust the display contrast

8.9.1 Getting started

The brightness value can be varied from 60 to 100 and set in steps of 2.

8.9.2 Procedure

To increase the contrast, simultaneously press and hold down the **ENT** and  keys.
To decrease the contrast, simultaneously press and hold down the **ENT** and  keys.
On the second row of the display “LCD” appears and the current value of the dimmer.

9. Diagnostics

9.1 Troubleshooting

9.1.1 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.

9.1.2 Common problems

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

Problem	Cause	Solution
The configuration cannot be changed	The **ENT** and ▽ keys were released before the “Configuration Default Choice” message appeared.Or the **ENT** and ▽ keys were not been pressed or released simultaneously.	Correctly perform the procedure. See "Select a configuration" on page 40.
The keys do not respond when pressed	The microprocessor is executing complex algorithms.	Wait a few seconds and retry.

9.1.3 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 the red FAIL LED alarm turns on (see "Status LED" on page 14) and the following messages appear next to the writing ALARM:

Message	Cause	Solution
T board	Regulation stopped due to 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. Make sure the controller is correctly installed, see "Wall mount" on page 19.
PH loss	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.
Thermal	External overload protection contact open **TK** (with SW1-switch 3 = Off)	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.
IN under	Input signal under minimum value. See "Minimum and maximum limits for inputs IN1 and IN2" on page 53	Make sure the set configuration is suited to the control signal used. Make sure the transducer/sensor/probe is correctly connected. Make sure the transducer/sensor/prove is in good conditions and working,
IN over	Input higher than maximum value. See "Minimum and maximum limits for inputs IN1 and IN2" on page 53	

9.1.4 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-PWM	-	-	%
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
rPu030 (*)	-	> 5.5	V dc
rUu010	-	> 11	V dc
rtE-01	< -24	> 94	°C

***(*)**: the value appears in pressure (bar) on the display.*

10. Technical specifications

10.1 Physical properties

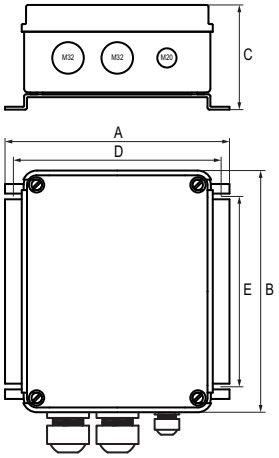
10.1.1 Dimensions and weight of IP20 and IP50 models with low bottom (code S)

***NOTICE**: provide space around the controller as indicated in "Guarantee cooling" on page 19.*

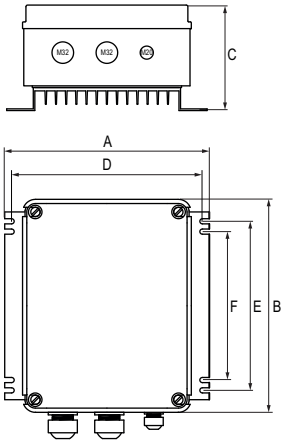
SELPRO www.selpro.it	MODEL: RDMXXX-XX-X-X-X-(S)-X-X CODE: ZARDMXXXXXXXX(S)XX

Model	A (mm)	B	C	D	E	F	Weight (kg)
RDM308	235	255	114	220	200	-	2.6
RDM312	230	255	128	220	200	170	3
RDM320 (1/4 outputs)	230	255	158	220	200	170	4
RDM320 (2/8 outputs)	236	350	203	174	320	-	5.5
RDM328	236	350	203	174	320	-	5.7

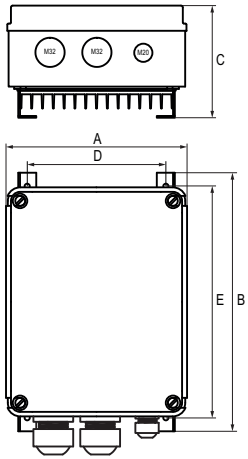
RDM 308



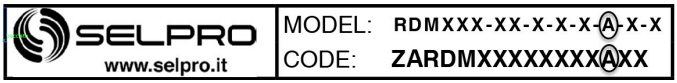
RDM 312, 320 (1/4 outputs)



RDM 320 (2/8 outputs), 328

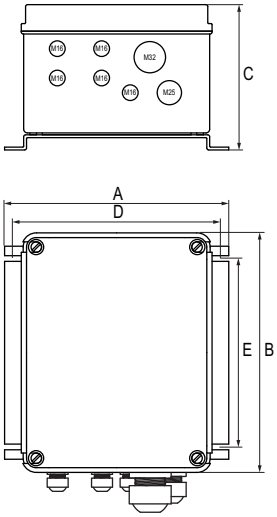


10.1.2 Dimensions and weight of IP20 and IP50 models with high bottom (code A)

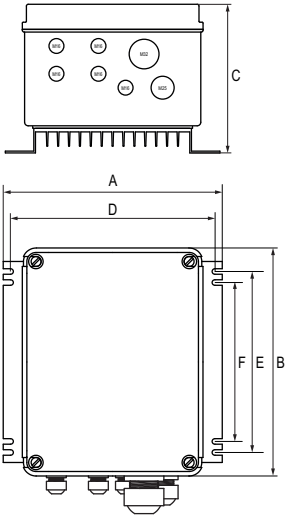


Model	A (mm)	B	C	D	E	F	Weight (kg)
RDM308	235	255	154	220	200	-	2.8
RDM312	230	255	168	220	200	170	3.2
RDM320 (1/4 outputs)	230	255	198	220	200	170	4.2
RDM320 (2/8 outputs)	236	350	253	174	320	-	5.7
RDM328	236	350	253	174	320	-	5.9

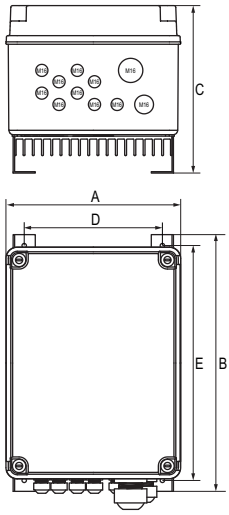
RDM308



RDM312, 320 (1/4 outputs)



RDM320 (2/8 outputs), 328



10.1.3 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 or IP20 (for model with square container)
Pollution	High Pollution
Fire resistance	Category D
M16, M20, M32 cable clamps	IP67 protection, class V2, polyamide PA6
M25 cable clamps	IP67 protection, class V2, polyamide PA6

10.1.4 Storage and installation environmental conditions

Working temperature	from -20 to +50 °C
Storage temperature	from -25 to + 60 °C
Humidity	RH < 85% non condensing
Vibrations	Under 1 G (9.8 m/s2)

10.2 Electrical specifications

10.2.1 Applications

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

10.2.2 Specifications

Rated voltage	400 V ac ± 20% three-phase On request 230 V ac / 480 V ac
Frequency	50/60 Hz automatically recognized
Minimum current	0.2 A
Over voltage protection	Surge category II (4 KV), EN 61000-4-5
Auto restart	The controller automatically restarts as soon as the alarm condition is cleared.
Transducer power supply	20 Vdc - 20 mA, not stabilized. Protected against short circuiting.
Potentiometer and sensor power supply	10 Vdc/5 Vdc (automatic switching), stabilized with protection.

10.2.3 Rated current and power

Model	RMS rated current Ampere (In)	Three-phase output	Environmental temperature downgrade > 50 °C (A/°C)	Rated power nominal kVA @ 400 V ac	Dissipated power command circuits	Power dissipated in the area
RDM308	8	Single, x4	0.6	5.5	10 W	48 W @ 12 A
RDM312	12	Single, x4	0.6	8.0	10 W	72 W @ 12 A
RDM320	20	Single, x4, double, x8	1	13.0	10 W	120 W @ 20 A
RDM328	28	Double, x8	1.4	17.0	10 W	168 W @ 28 A

10.2.4 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

10.2.5 Electric insulation

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

10.2.6 Nominal cable sections

10.3 Maintenance

10.3.1 Clean Up

Clean the container and/or dissipator with a dry rag.

10.3.2 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.

10.4 Conformity

10.4.1 Declaration of conformity

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

10.4.2 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

10.4.3 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

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