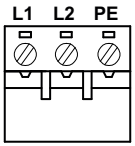
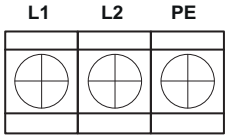
4. Inputs and outputs

4.1 Power supply

4.1.1 Power supply terminal board (230-460 V version)

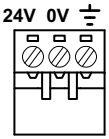


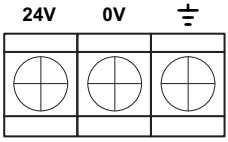


Terminal	Description
PE	Protection circuit breaker connection terminal **(*)**.
L1	Phase input 1
L2	Phase input 2

***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 terminal board (24 V version)





Terminal	Description
⏚	Protection circuit breaker connection terminal.
24 V	Phase input 24 V
0 V	Phase input 0 V

4.1.3 Power supply wiring diagram

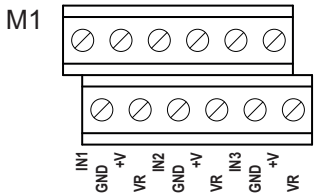
See "Power supply wiring" on page 28.

4.2 Analog inputs

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 40 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.	-
7	**V**	Non-stabilized power voltage output for transducers.	22 V dc 10–20% Max 40 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 60 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 or inputs **IN1** and **IN2** can be set from menu **4: SETUP** > 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 Vdc (**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 57.

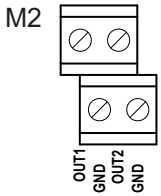
4.2.4 Wiring diagrams for analog inputs IN1, IN2, and IN3

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 31.

4.3 Analog outputs

4.3.1 M2 terminal board

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



Terminal		Description	Specifications
1	**OUT1**	Analog output for controlling EC fans or slave units. Settable with parameter **C7**.	0–10 Vdc (default)/1–10 Vdc Max 20 mA
2	**GND**	Grounding.	-
3	**OUT2**	Analog output for controlling spray units. Can be configured with parameter **C8(*)**.	0–10 Vdc/1–10 Vdc (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 more EC fans (or power slave units, motorized actuators) 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

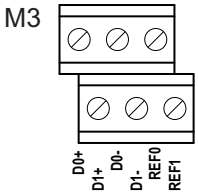
See "Analog outputs OUT1 and OUT2" on page 33.

4.4 Modbus Ports

4.4.1 Terminal board M3

RS485 serial ports managed with Modbus RTU protocol:

- **COM0**: to communicate with a PC-BMS, in Slave mode.
- **COM1**: to control up to 32 EC fans, in Master mode.



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

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
J2 1-2	ON: termination serial line COM1 with 120 Ω inserted

4.4.3 Forcing from PC-BMS

The following can be forced from PC-BMS:

- fan speed, via Modbus control or **OUT** analog output
- control of the spray unit or other external units, using the **OUT** 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 PC-BMS

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

4.4.5 RS485 Modbus RTU COM0 and COM1 network wiring diagram

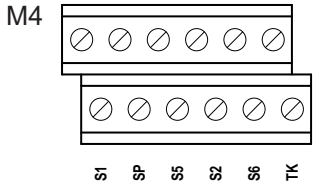
See "Correct connection steps between PC-BMS and ECM (COM0 port)" on page 35 and "Correct connection steps between ECM and EC fans (COM1 port)" on page 37.

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 % RPM 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 Vdc, based on parameters **C7** and **C8** ■ open: enables control based on settings and inputs
S6	**9, 10**	Forces EC fans to work at constant speed (basic parameter **SSpray**) with spray unit operating. ■ closed: forcing active ■ open: forcing not active ***Note**: if connected, the AWS unit directly manages the input.*
TK	**11, 12**	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 PC-BMS. See "Forcing from PC-BMS" on page 22.

4.5.3 On/Off input wiring diagram

See "On/Off inputs connection" on page 33.

4.6 Relay outputs

4.6.1 M5 terminal board

On/Off relay outputs with the following functions:

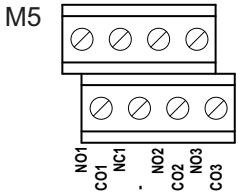
- RL1: two-logic relay for controlling alarm devices (i.e., sirens), a spray unit or other external units.

  Note**: function can be set from menu **4: SETUP** > parameter **C6

- RL2: indicates the presence of a warning message for the EC fans, see "Warning messages" on page 106.

  ***Note**: the caution messages are managed only if the regulator communicates with the EC fans by Modbus.*

- RL3: enables the washing cycle for the heat exchanger, see "Timed washing of the heat exchanger" on page 53.



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.

***Note**: if switch 3 = On (DIP switch SW1), in case of alarm relay **RL1** remains energized.*

4.6.3 Relay wiring diagram

See "Relay output connection" on page 35.