3. Product description

3.1 Description

3.1.1 ECM controllers

Multifunctional and multi-input ECM controllers simultaneously command multiple EC fans with Modbus control or 0–10 Vdc control. Connected to transducers, the 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 Vdc signal.

3.1.2 Applications

ECM controllers are suitable for applications in HVAC/R environments with EC motors; for example, ventilated heat exchangers used in air conditioning and refrigeration systems.

3.1.3 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

3.1.4 Outputs

The controller has the following outputs:

- two analog outputs with voltages that can be configured for external units for analogue control 0–10 Vdc or 1–10 Vdc
- three relays, for alarm signals and other auxiliary functions that can be configured.

3.1.5 Communications port

The controller has two RS485 ports managed with Modbus RTU protocol:

- one for control of up to 32, ebm-papst or Ziehl-Abegg EC fans
- one to communicate with a supervisor system

3.1.6 Controls

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

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

3.1.7 Setpoints and associated parameters

Two different control setpoints and two sets of associated parameters are available (**Bank 1** and **Bank 2**). 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.

3.1.8 Inputs and outputs

The controller has two expandable analog inputs with expansion module and a relay output that can be used both to activate external alarm devices and to control external units (i.e., slave units, sprays).

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.

3.1.9 Functions that can be activated with On/Off inputs

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

- enabling 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 ECM 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 and voltage) and configurations for Slave proportional control (current and voltage).

3.1.11 EC fan functions

If connected to the Modbus network, the controller manages the following functions for EC fans:

- reading of the main fan data
- setting the emergency and maximum speeds
- speed control of a single fan
- update of the address map for the fans present
- manual and automatic generation of sequential addresses for the fans
- changing the direction of rotation of the fans
- fan release
- error or malfunction messages for the fan

3.1.12 Special functions

The controller also manages the following special functions:

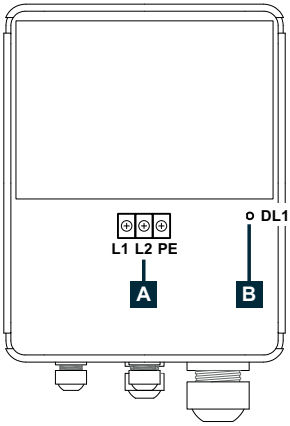
- output overload safeguarding (function always active)
- timed washing of the heat exchanger
- timed cleaning of the heat exchanger
- management of the heat exchanger power by gradually deactivating/activating fan units
- fan anti-locking
- night limits for speed using internal clock and/or On/Off input
- 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

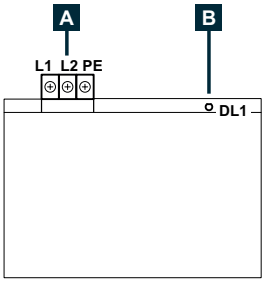
3.2.1 Power supply terminal board

The position of the power supply input terminal board depends on the model.

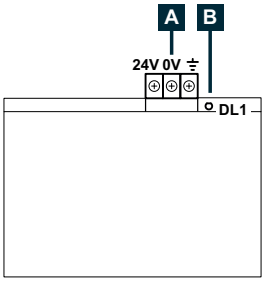
ECM 230–460 V IP55



ECM 230–460 V IP00

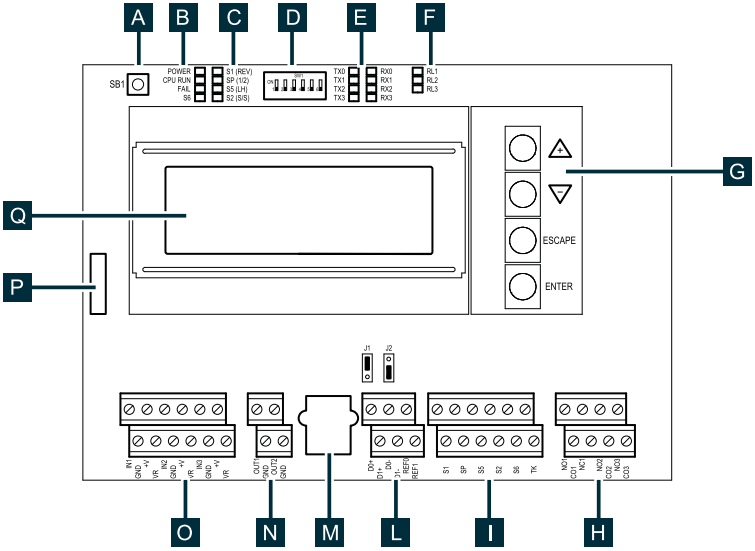


ECM 20–24 V IP00



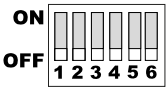
Part	Description	Reference in the manual
A	Power input terminal board.	"Power supply" on page 19
B	LED **DL1** presence of external power supply (230–460 V/20–24 V)	-

3.2.2 Main components



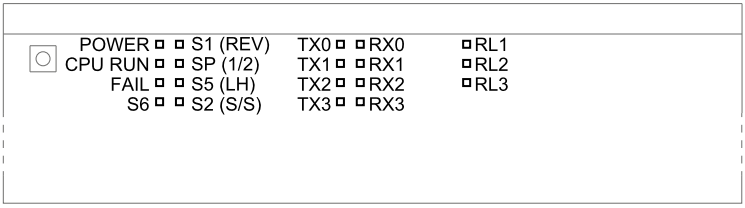
Part	Description	Reference in the manual
A	Reset button. Restarting the controller (for ex.: after being locked), allows one of the predefined configurations to be chosen.	"Select a configuration" on page 69
B	Device status LED.	"Status LED" on page 17
C	On/Off input LEDs active.	"On/Off inputs LED" on page 17
D	DIP switch SW1 to turn functions on/off.	"DIP switch SW1" on page 16
E	Modbus communication status LED.	"Modbus communication LED" on page 17
F	Relay status LED.	"Relay status LED" on page 17
G	Keyboard to scroll parameters and set them.	"Programming display keyboard" on page 18
H	Terminal board M5 with relay output.	"Relay outputs" on page 24
I	Terminal board M4 for remote On/Off inputs or from motor overheat protections.	"On/Off inputs" on page 23
L	Terminal board M3 with serial outputs (COM0 to PC-BMS, COM1 to EC motors) and relative serial terminal jumpers.	"Modbus Ports" on page 22
M	TTL serial line connector for connection with external devices.	-
N	Terminal board M2 with analog regulation outputs.	"Analog outputs" on page 21
O	Terminal board M1 with analog inputs.	"Analog inputs" on page 19
P	Back lit LCD display.	-
Q	Connector for remote key pad (ZCKEY.01.0100020)	-

3.2.3 DIP switch SW1



Switch	Function
1	Enables/disables reserved parameter editing ■ On: enables editing of all parameters. ■ Off: it is only possible to modify the basic parameters (menu **1: BASIC**), with the exception of the parameter **Working Fan Direction**.
2	Set temperature and pressure units of measure ■ On: display temperature in °F and pressure in psi ■ Off: display temperature in °C and pressure in bar
3	Sets the alarm management and EC fan behavior when the On/Off input **TK** = Off (contact open). ■ On: alarm disabled and speed of EC fans not modified, but the status of the **TK** input can be read by the PC-BMS on the Modbus present. Typical for installations with several fans. ■ Off: enables alarm and forces EC fans to the set emergency (if set).
4	Defines the duration of non standard Modbus forcing received by the PC-BMS (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	Selects the control mode for the EC fans: ■ On: control using analog output (0-10 Vdc) ■ Off: control with Modbus COM1 ***Note**: if off, select the manufacturer with switch 6.* See "Change from Modbus control to analog output control" on page 87.
6	Only for Modbus control. Selects the EC fan manufacturer: ■ On: Ziehl-Abegg ■ Off: ebm-papst ***Note**: with control over analog output, the position of the switch has no effect.*

3.2.4 LED overview



3.2.5 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
S6	Current maximum % RPM limit with spray unit on

3.2.6 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 % RPM on ■ on: limit active ■ off: limit not active
S2	Regulation consent status: ■ on: regulation consent on ■ off: regulation consent off

3.2.7 Modbus communication LED

Name	Description
TX0	Flashing: transmitting data on serial line COM 0 (Host/BMS).
TX1	Flashing: transmitting data on serial line COM 1 (EC Fan).
TX2	Flashing: transmitting data on serial line COM 2 (not used).
TX3	Flashing: transmitting data on serial line COM 3 (not used).
RX0	Flashing: receiving data on serial line COM 0 (Host/BMS).
RX1	Flashing: receiving data on serial line COM 1 (EC Fan).
RX2	Flashing: receiving data on the serial line COM 2 (not used).
RX3	Flashing: receiving data on the serial line COM 3 (not used).

***Note**: serial lines 2 and 3 are not used.*

3.2.8 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	Warning relay status. ■ on: relay energized ■ off: relay at rest
RL3	Heat exchanger washing relay status. ■ on: relay energized ■ off: relay at rest

3.2.9 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.