PEV S27

Driver for Stepper electronic expansion valve

User and maintenance manual

ENGLISH

READ AND KEEP

Rel. Software: 6

ELECTRICAL BOARDS FOR REFRIGERATING INSTALLATIONS

Pego

PEV S27

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CHAPTER 1: INTRODUCTION

GENERAL   1.1

DESCRIPTION:
The **PEV S27** is an electronic regulator for control of the bipolar motorized electronic expansion valve. It can be configured with remote display or integrated display, manages the most common motorized electronic expansion valves and integrates the management of the overheating of the evaporator.

APPLICATIONS:
- Refrigerated counters and cold rooms.

MAIN FEATURES:
- Control of the motorized electronic expansion valve (stepper).
- Facilitated programming of the valve parameters, thanks to 21 pre-configurations for the most common valves on the market. Possibility to manually define the valve parameters.
- Compatible with 26 types of refrigerant gas: R404A, R134a, R22, R407A, R407F, R407H, R410A, R450A, R507, R513A, R744 (CO_2), R449A, R290, R32, R448A, R452A, R600, R600a, R1270, R1234ze(E), R23, R717 (NH_3), R454C, R515B, R471A, R455A.
- Integrated or remote control console.
- RS485 serial connection with TeleNET or Modbus-RTU protocol, selectable by parameter.
- Two configurable digital inputs.
- Inlet temperature and evaporation pressure sensor for evaporator superheat control.
- Display, if remote, with IP65 protection on the front.
- Easy programming of parameters with 4 pre-configurations for the various applications of the electronic expansion valve.
- Alarm signalling.
- Configurable auxiliary relay with alarm/command on the solenoid valve.
- Password function.
- Led signalling of the system status and display of ample dimensions.
- User-friendly keypad.
- USB input for software update.

1.2 PRODUCT IDENTIFICATION CODES

PEVS2701   Electronic regulator for automated electronic expansion valve control. **With integrated console**, it manages the most common stepper electronic expansion valves. Evaporator super heating control.

PEVS2702   Electronic regulator for automated electronic expansion valve control. **Without console**, it manages the most common stepper electronic expansion valves. Evaporator super heating control.

200NANOTTL01   Remote Console NANO + 10cm long TTL cable

KC-TTLB-L2.5   TTL cable for remote NANO console, 2.5m length.

1.3 OVERALL DIMENSIONS

Dimensions in mm.

PEV S27

CONSOLE
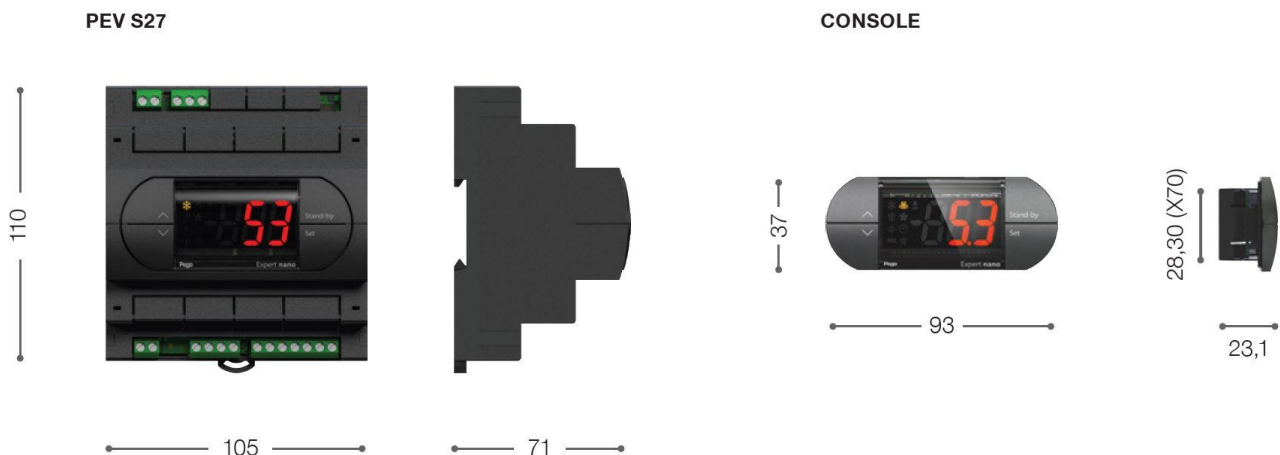
1.4 IDENTIFICATION DATA

The device described in this manual has a plate on one side bearing the identification data:

- Name of Manufacturer
- Code and model of the device
- Serial number
- Date of manufacture
- Power supply

Pego

MADE IN ITALY   CE UK CA

INTEGRATED DISPLAY
RoHS compliant

Description: PEV S27 STEPPER
Code: PEVS2701
S.N. : 22000000001
MFG Date: 17/11/2022
P. Supply: 24V~ +/-10% 50-60Hz

CHAPTER 2: INSTALLATION

GENERAL WARNINGS FOR THE INSTALLER | 2.1

1. Install the device in places that respect its degree of protection.

2. Avoid using multi-pole cables with conductors connected to inductive and power conductors and signal conductors like sensors and digital inputs.

3. Avoid putting in the same channels, power cables with signal cables (sensors and digital inputs).

4. Reduce the lengths of the connection cables as much as possible, preventing the wiring from taking the spiral shape harmful for possible inductive effects on electronics.

5. All electric cables used in wiring must be properly proportionate to support the load that must feed.

6. If it's necessary to prolong the probes cable, the use of appropriate section conductors, and in any case not less than 1mm², is necessary. The extension or shortening of the probe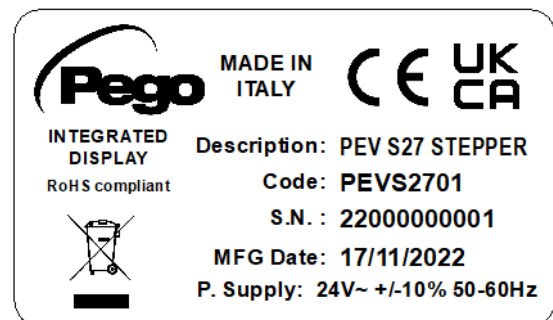s could alter the factory calibration. Then proceed with the verification and calibration by means of an external thermometer.

MECHANICAL FIXING | 2.2

Place the Module on DIN guide and close the lower hook to block it on it.

Make all electric connections according to the attached patterns for the corresponding model (see the relative tables in attachments). During the wiring it is recommended to keep the power cables away from those of the signal.

2.3	FIRST START-UP PROCEDURE
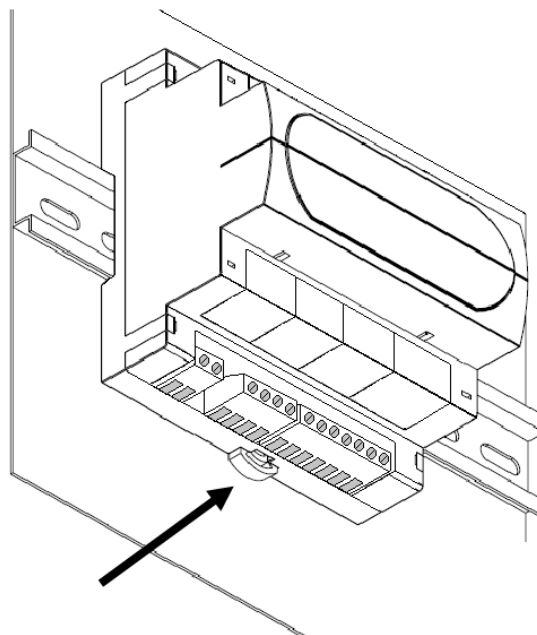
On first start-up, you must configure the third level valve parameters. The procedure on first start-up is as follows:

1) **With the valve disconnected** (terminals 3,4,5,6 free) switch on the PEV S27 control. The "**CFG**" alarm appears to report that it's necessary to configure the valve.

2) Press the UP, SET and STAND-BY keys for more than 3 seconds to enter the third programming level. Set the parameter "**tEU**" based on the type of valve connected or configure the necessary parameters (**see par. 5.12**).

3) When the setting of the configuration values is completed, exit the menu by pressing simultaneously for a few seconds the keys (▲) and (▼) until the value of the main display reappears.

4) Turn off the PEV S27 control by removing the power supply.

5) **With the PEV S27 control off, suitably connect the electronic valve (see Appendix A2 and A4).**

6) Turn on the PEV S27 control. The control starts an initialization phase (it's displayed "ini" and the valve is completely closed) then, if enabled by digital entrance, the superheating regulation begins. Then set all the necessary parameters based on the type of application (superheating setpoint, etc.).

CHAPTER 3: TECHNICAL FEATURES

TECHNICAL FEATURES   3.1

Power supply	
Main Voltage	24V~ ± 10% 50-60Hz
Max power consumption (electronic control only)	Depending on valve, maximum 25VA with ALCO EX8
Climatic conditions	
Operating temperature	-5T50°C <90% R.H. non-condensing
Storage temperature	-10T70°C <90% R.H. non-condensing
General features	
Compatible types of temperature sensor	Temperature sensors: NTC 10K 1% / PTC / PT1000
Resolution of temperature sensors	0,1 °C
Precision of temperature sensor detection	± 0,5 °C
Range of temperature sensor detection	-45 ÷ +99 °C (NTC/PTC) -90 ÷ +99 °C (PT1000)
Compatible type of pressure sensor:	Pressure sensor: 4/20mA

Output features		
Description	**Installed relay**	**Features of output board**
Alarm (voltage-free contact)	(8A AC1 Relay)	8(3)A 250V~
Stepper valve		Bipolar valve (4 wires): max 0,8 A **See valves compatibility table**

Dimensional features	
Dimensions	12.15cm x 7.1cm x 10.5cm (HxPxL)
Remote NANO console dimensions	3.7cm x 2.31cm x 9.3cm (HxPxL)
Insulation and mechanical properties	
Degree of protection of front console (if mounted on the front of the electrical panel, remote)	IP65
Material of boxes	UL94 V-0 self-extinguishing PC+ABS
Type of insulation	II Class

CHAPTER 4: WARRANTY TERMS

4.1 WARRANTY TERMS

The **PEV S27** electronic controls are covered by a 24-months warranty against all manufacturing defects as from the date indicated on the product ID code.

In case of defect the product must be appropriately packaged and sent to our production plant or to any authorized Service Center <u>with the prior request of the Return Authorization Number</u>.

Customers are entitled to have defective products repaired, spare parts and labour included. The costs and the risks of transport are at the total charge of the Customer.
Any warranty action does not extend or renew its expiration.

The Warranty does not cover:
- Damages resulting from tampering, impact or improper installation of the product and its accessories.
- Installation, use or maintenance that does not comply with the instructions provided with the product.
- Repair work carried out by unauthorized personnel.
- Damage due to natural phenomena such as lightning, natural disasters, etc.

In all these cases the costs for repair will be charged to the customer.

The intervention service in warranty can be refused when the equipment is modified or transformed.

Under no circumstances **Pego S.r.l.** will be liable for any loss of data and information, costs of goods or substitute services, damage to property, people or animals, loss of sales or earnings, business interruption, any direct, indirect, incidental, consequential, damaging, punitive, special or consequential damages, in any way whatsoever caused, whether they are contractual, extra contractual or due to negligence or other liability arising from the use of the product or its installation.

Malfunction caused by tampering, bumps, inadequate installation automatically declines the warranty. It is compulsory to observe all the instructions in this manual and the operating conditions of the product.

Pego S.r.l. disclaims any liability for possible inaccuracies contained in this manual if due to errors in printing or transcription.

Pego S.r.l. reserves the right to make changes to its products which it deems necessary or useful without affecting its essential characteristics.

Each new release of the PEGO product user manual replaces all the previous ones.

As far as not expressly indicated, is applicable the Law and in particular the art. 1512 C.C. (Italian Civil Code).

CHAPTER 5: DATA PROGRAMMING

CONTROL CONSOLE 5.1

FRONT KEYPAD 5.2

❶ | ∧ | **UP KEY**
Increases values / Scrolls up through parameters.
Turns off auditory alarm in progress / Acquires an alarm.

❷ | ∨ | **DOWN KEY**
Decreases value / Scrolls down through parameters.
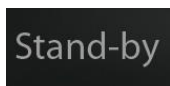
❸ | Stand-by | **STAND BY**
The PEV S27 **cannot be paused by pressing the key**, but only by removing the enable from digital input or LAN.

❹ | Set | **SET**
Shows the setpoint.
Enables configuration of the SUPERHEAT setpoint when pressed together with the Down or UP key.
Resets an auditory alarm in progress.

5.3 DISPLAY LED

❺

Shows the values / parameters

❻

DEFROSTING ICON
LED OFF = Defrosting input OFF
LED ON = Defrosting input ON

❼

EEV OUTPUT STATUS ICON Output status of the EEV electronic valve
LED OFF = EEV output OFF
LED ON = EEV output ON

❽

"PRG" ICON
Blinking LED = Programming

❾
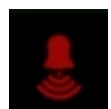
ALARM IN PROGRESS ICON
LED OFF = No alarm in progress
LED ON = Alarm triggered and then cancelled
Blinking LED = Alarm in progress

5.4 COMBINATION OF KEYS

EXIT PROGRAMMING
Pressing both keys together for over 3 seconds in any programming menu saves all changes made and exits the menu concerned.
A beep is emitted when the system closes the menu.

LEVEL 1 PROGRAMMING
Pressing both keys together for more than 3 seconds enables access to the Level 2 programming menu.
A beep is emitted when the system opens the menu.
To exit the menu, press the up and down arrow keys together (the system beeps to confirm). Alternatively, the system closes the menu automatically when the keypad is not used for 30 seconds

^ + **Stand-by**

LEVEL 2 PROGRAMMING
(EEV parameters)

If pressed simultaneously for more than 3 seconds, they allow access to the second level programming menu.
When entering the menu, a confirmation BEEP is generated.
You can exit this menu by pressing the up arrow + down arrow keys together for a few seconds (a beep confirms exit).

^ + **Set** + **Stand-by**

LEVEL 3 PROGRAMMING
(stepper valve parameters)

If pressed simultaneously for more than 3 seconds, they allow access to the third level programming menu. When entering the menu, a confirmation BEEP is generated. By entering this menu, the regulation is interrupted and the valve is closed.
This menu can be exited by pressing the up arrow + down arrow (a beep is emitted to confirm exit).

v + **Stand-by**

VARIABLE QUICK VIEW MENU
(READ-ONLY)

If pressed simultaneously for more than 3 seconds, they allow access to the quick display menu.
When entering the menu, a confirmation BEEP is generated.
Within this menu, the up and down arrows allow you to scroll through the various parameters.
Pressing the Set key alternates the display of the parameter with its value.
With the parameter value displayed, pressing the up or down arrow still leads to the display of the parameter following or preceding the current one.
You can exit this menu automatically after 2 minutes of console inactivity or by pressing the up arrow + down arrow keys together for a few seconds (an exit confirmation beep is generated).

5.5   VIEWING AND CONFIGURATION OF ESH SETPOINT

1. Press the SET key to view the current SETPOINT value (ESH).
2. Pressing and holding the SET key and pressing one of the keys (▲) or (▼) alters the value of the ESH SETPOINT.
3. Release the SET key to return to the ESH temperature. Any changes made are saved automatically. Range of the ESH SETPOINT: 0.1 – 25 °C.

5.6   LEVEL 1 PROGRAMMING (Installer level)

To access Level 1 programming, press and hold the UP key (▲), DOWN key (▼) and STAND-BY key for over 3 seconds.
When the first programming variable appears:

1. Use the (▲) key or (▼) key to select the parameter to be modified. After selecting the required parameter, it will be possible to:
   - View its configuration by pressing the SET key.
   - Edit configuration by pressing and holding the SET key and pressing either the (▲) key or the (▼) key.
2. After setting the configuration values, exit the menu by pressing and holding, for several seconds, keys (▲) and (▼) until the room temperature value appears. The system closes the menu when the keypad is not used for over 30 seconds.
3. Any changes made to the parameters are saved automatically when the system closes the configuration menu.

Valve control continues even when the menu is open.

5.7   LEVEL 1 PARAMETER LIST (Installer Level)

PAR.	MEANING	VALUES	DEFAULT
in1	**Setting of DI1 digital input and activation status**	3 = tPF % fixed opening (N.O.) 2 = Defrosting (N.O.) 1 = ON EEV Driver (N.O.) 0 = Disabled -1 = ON EEV Driver (N.C.) -2 = Defrosting (N.C.) -3 = tPF % fixed opening (N.C.)	1
in2	**Setting of DI2 digital input and activation status**	3 = tPF % fixed opening (N.O.) 2 = Defrosting (N.O.) 1 = ON EEV Driver (N.O.) 0 = Disabled -1 = ON EEV Driver (N.C.) -2 = Defrosting (N.C.) -3 = tPF % fixed opening (N.C.)	0
DO1	**Setting use of DO1 digital output.** **Configurable auxiliary relay / Alarm** Note: Solenoid valve control involves a normal solenoid valve, and the output repeats the ON input of the Driver.	2 = DO1 relay enabled with solenoid valve control. 1 = DO1 relay enabled in presence of alarm. 0 = DO1 relay disabled. -1 = DO1 relay disabled in presence of alarm. -2 = DO1 disabled with solenoid valve control.	1

PAR.	MEANING	VALUES	DEFAULT
diS	**Viewing of main page**	1 = (tS4) Viewing of Inlet temperature sensor (S4) 2 = (tS5) Viewing of Evaporation temperature sensor (S5) 3 = (PS5) Viewing of Evaporation pressure sensor (S5) 4 = (tSH) Viewing of Superheat temperature 5 = (oEV) Opening percentage of EEV valve	4
SEr	**RS-485 communication protocol**	0 = TeleNET protocol 1 = Modbus-RTU protocol	0
Ad	**Network address** for connection to the TeleNET or Modbus supervision system	0 to 31 (with SEr=0) 1 to 247 (with SEr=1)	0
Bdr	**Modbus baudrate**	0 = 300 baud 3 = 2400 baud 6 = 14400 baud 1 = 600 baud 4 = 4800 baud 7 = 19200 baud 2 = 1200 baud 5 = 9600 baud 8 = 38400 baud	5
Prt	**Modbus parity check configuration**	0 = none 1 = even 2 = odd	0
bEE	**Buzzer Enable**	0 = disabled 1 = enabled	1
P1	**Password: type of protection** (active when PA is not at 0)	0 = shows only the setpoint and permits deactivation of the alarms. 1 = shows the setpoint, permits deactivation of the alarms + access to the read-only variable menu. 2 = disables access to 1°, 2° and 3° programming levels (access permitted to all other functions). 3 = disables access to 2° and 3° programming levels (access permitted to all other functions). 4 = disables access to 3° programming level (access permitted to all other functions).	4
PA	**Password** (see P1 for the type of protection)	0 ÷ 999 0 = function disabled	0
dEF	**Setting the default parameters** Move on the dEF parameter and press all keys for 10 seconds to restore the default parameters.	---	---
reL	**Software release**	read-only	read-only

5.8	**LEVEL 2 PROGRAMMING (EEV parameters)**

To access Level 2 programming, press and hold the UP key (▲) and STANDBY key for over 3 seconds.

When the first programming parameter appears:

1. Use the (▲) key or (▼) key to select the parameter to be modified. After selecting the required parameter, it will be possible to:
   - View its configuration by pressing the SET key.
   - Edit configuration by pressing and holding the SET key and pressing either the (▲) key or the (▼) key.
2. After setting the configuration values, press and hold both the (▲) key and the (▼) key until the value of the main display reappears and exit the menu.
3. Any changes made to the parameters are saved automatically when the system closes the configuration menu.

Valve control continues even when the menu is open.

5.9	**LEVEL 2 PARAMETER LIST (EEV parameters)**

PAR.	MEANING	VALUES	DEFAULT
EEV	**Management of the EEV electronic valve** Settings 1 to 5 load the default values of the **ESH, EPb, EtI, Etd, ELS, MOP, EMO, LOP, ELO** parameters. For more details see chapter 5.10.	1 = EEV control (default 1) 2 = EEV control (default 2) 3 = EEV control (default 3) 4 = EEV control (default 4) 5 = EEV control (default 5) 6 = EEV control via Modbus (register 1536) 7 = EEV control via 0-10V input (Table at page 17)	1
ErE	**Type of refrigerant GAS used.** The setting of this parameter is essential for correct operation.	0 = R404A 13 = R32 1 = R134a 14 = R448A 2 = R22 15 = R452A 3 = R407A 16 = R600 4 = R407F 17 = R600a 5 = R407H 18 = R1270 6 = R410A 19 = R1234ze(E) 7 = R450A 20 = R23 8 = R507 21 = R717 (NH$_3$) 9 = R513A 22 = R454C 10=R744 (CO$_2$) 23 = R515B * 11 = R449A 24 = R471A * 12 = R290 25 = R455A ** * present from reL 1 ** present from reL 4	0
EPb	**Proportional band** (gain) superheat control PID.	1 ÷ 100%	15%
EtI	**Integral timer** superheat PID control algorithm.	0 ÷ 500 seconds steps of 2 seconds	100 sec
Etd	**Derivative timer** superheat PID control algorithm.	0,0 ÷ 10,0 seconds steps of 0,1 seconds	2,0 sec
EOE	**EEV valve opening percentage in event of error with S4 or S5 sensors.** This function permits (diminished) control in the event of a fault with one of the control sensors.	0 ÷ 100%	50%
ESO	During the Start-up phase, the EEV valve opens by the ESO percentage for the ESt time.	0 ÷ 100%	50%

PAR.	MEANING	VALUES	DEFAULT
ESt	Duration of the Start-up phase. The superheat alarms are disabled during this phase. **The MOP, LOP and LSH alarms are disabled during this phase.**	0 ÷ Edt seconds	6 seconds
EdO	After defrosting, the EEV valve opens by the EdO percentage for the Edt time.	0 ÷ 100%	100%
Edt	Duration of EdO valve opening phase after defrosting. The superheat alarms are disabled during this phase. **The MOP, LOP and LSH alarms are disabled during this phase.**	ESt ÷ 900 seconds	24 seconds
EHO	**Maximum opening percentage of EEV valve.** In the case of an oversized valve, this parameter allows you to limit its maximum opening to the set percentage.	0 ÷ 100%	100%
EPt	**Type of temperature transducer (S4):** it sets the type of transducer used to detect the temperature (S4)	0 = NTC 1 = PT1000 2 = PTC (-45/80°C)	0
EP4	**Pressure (bar) corresponding to 4mA.** In relation to the Evaporation pressure sensor (S5)	-1.0 ÷ EP2 bar	0.0 bar
EP2	**Pressure (bar) corresponding to 20mA.** In relation to the Evaporation pressure sensor (S5)	EP4 ÷ 90.0 bar	12.0 bar
CA4	**Calibration of the inlet temperature transducer**	-10.0 ÷ +10.0 °C	0,0 °C
CA5	**Calibration of the Evaporation pressure transducer (S5)**	-10.0 ÷ +10.0 Bar	0,0 bar
LSH	**LSH threshold (low superheat temperature)** Superheat values that are too low can cause return of the liquid to the compressor, or extreme oscillations. Below the LSH threshold, the ELS protection forces the PID control to close the valve more quickly and bring the value back up to the superheat setpoint.	0 ÷ SH set °C	2,0 °C
ELS	**Low superheat protection** When this is enabled and **SH < LSH**, the PID integration timer is set based on the selection of 1 to 7 of the ELS. Value 1 is for the quickest closing time. Enabling of this protection starts the SHd counter for activating the LSH alarm. **THE LSH PROTECTION TAKES PRIORITY OVER THE LOP PROTECTION.** THE LSH PROTECTION IS NOT ACTIVATED DURING THE START-UP PHASE (ESt TIMER) OR DURING THE DEFROSTING OR POST-DEFROSTING PHASE (Edt TIMER).	0 = disables the LSH protection and signalling of the relative LSH alarm. 1 = 5% Etl 2 = 10% Etl 3 = 15% Etl 4 = 20% Etl 5 = 25% Etl 6 = 30% Etl 7 = 35% Etl 8 = 50% Etl 9 = 100% Etl (no correction, and activation only of the LSH alarm).	2
SHd	**Activation delay of the superheat alarm:** the LSH superheat alarm is triggered only after it has remained active for the SHd time. In the event of an LSH alarm, the valve closes instantly. The alarm is automatically reset and recalled when **SH ≥ LSH.** When the alarm is active: - The LSH message blinks on the display - The buzzer is activated	0 ÷ 240 tenths of seconds	30

PAR.	MEANING	VALUES	DEFAULT
MOP	**MOP threshold (Maximum Saturated Evaporation Temperature in relation to the S5 sensor).** This represents the maximum saturated evaporation pressure above which the MOP protection is activated (EMO parameter). When MOP protection is enabled, the control closes the valve to limit evaporation temperature and to prevent the thermal protection from stopping the compressor.	(LOP+1) ÷ +99°C	+45°C
EMO	**MOP protection (enabled when tS5>MOP)** When the evaporation temperature (tS5) is higher than the MOP threshold, the calculation shuts off adjustment of overheating and the valve closes, trying to limit the temperature (and therefore the pressure) of evaporation. The closure speed of the valve depends, other than the difference between the evaporation temperature and the MOP threshold, also on the EMO integral time parameter: the lower it is, the less the time there is for valve closure. On insertion of this protection, the Mod count starts to activate the MOP alarm. THE MOP PROTECTION IS NOT ENABLED DURING THE START-UP PHASE (ESt TIMER) OR DURING THE DEFROSTING OR POST-DEFROSTING PHASE (Edt TIMER).	0 = disables the MOP protection and relative MOP alarm signal 0-500 sec steps of 2 sec.	0
MOd	**MOP alarm activation delay:** the MOP alarm is triggered only after the MOP protection has remained active for the MOd time. The alarm is automatically reset when **"Temp.S5" ≤ MOP.** When the alarm is active: - The MOP message blinks on the display. - The buzzer is activated.	0 ÷ 240 tenths of seconds	60
LOP	**LOP threshold (minimum saturated evaporation temperature in relation to the S5 sensor).** This represents the minimum saturated evaporation pressure below which the LOP protection is activated. When LOP protection is enabled, the control opens to prevent the compressor from stopping due to low pressure (mechanical pressure switch).	-90°C ÷ (MOP-1)	-45°C
ELO	**LOP protection (activated when tS5<LOP)** When the evaporation temperature (tS5) is lower than the LOP threshold, the calculation shuts off adjustment of overheating and the valve opens. The opening speed of the valve depends, other than the difference between the evaporation temperature and the LOP threshold, also on the ELO integral time parameter: the more it is, the more the opening speed of the valve. On insertion of this protection, the LOd count starts to activate the LOP alarm. THE LSH PROTECTION TAKES PRIORITY OVER THE LOP PROTECTION. THE LOP PROTECTION IS NOT ENABLED DURING THE START-UP PHASE (ESt TIMER) OR DURING THE DEFROSTING OR POST-DEFROSTING PHASE (Edt TIMER).	0 = disables the LOP protection and relative LOP alarm signal. 0-500 sec steps of 2 sec.	0
LOd	**Activation delay of the LOP alarm:** the LOP alarm is triggered only after it has remained active for the LOd time. In the event of an LOP alarm: The alarm is automatically reset when **"Temp.S5" ≥ LOP** When the alarm is active: - The LOP message blinks on the display. - The buzzer is activated.	0 ÷ 240 tenths of seconds	30
tPF	**Forced positioning of the valve** At any time, using the digital input (if the control is not in standby), you can force opening of the valve to a pre-set value.	0 ÷ 100 %	50%

NOTE: all the calculation times of the LSH, MOP and LOP are reset when the control stops, during the start phase (ESt timer) and during the defrosting or post-defrosting phase (Edt timer).

Loading of default settings based on the EEV variable:

|	EEV = 1 DEFAULT PEGO	EEV = 2 (ROOM or TN REFRIGERATED COUNTER control with on-board compressor)	EEV = 3 (ROOM or BT REFRIGERATED COUNTER control with on-board compressor)	EEV = 4 (ROOM or DUCTED TN REFRIGERATED COUNTER control)	EEV = 5 (ROOM or DUCTED BT REFRIGERATED COUNTER control)
ESH	6°C	6°C	6°C	11°C	11°C
EPb	15%	15%	15%	15%	15%
Etl	100s	100s	100s	150s	150s
Etd	2,0s	2,0s	2,0s	5,0s	5,0s
LSH	2°C	2°C	2°C	5°C	5°C
ELS	2	2	2	2	2
MOP	+45°C	5°C	-15°C	+5°C	-15°C
EMO	0	5	5	5	5
LOP	-45°C	-25°C	-45°C	0	0
ELO	0	15	15	0	0

VALVE MANAGEMENT (EEV parameter) — 5.10

Setting the EEV parameter from 1 to 5 loads the default values in the variables **ESH, EPb, Etl, Etd, LSH, ELS, MOP, EMO, LOP, ELO**. In this case **the controller acts as a superheat regulator**, based on the value read by the connected pressure/temperature probes.

Setting value 6 enables the valve position command via Modbus (register 1536): the control sets the valve opening value received via Modbus and **no superheat control is performed**. In this case it is not necessary to connect the probes and the alarms E4, E5 LSH, MOP, LOP are disabled. The position must be communicated within 60 seconds to avoid closing the valve.

Setting value 7 enables the valve position command via 0-10V input: the control sets the valve opening value calculated based on the input and **no superheat control is performed**. In this case it is not necessary to connect the probes and the alarms E4, E5 LSH, MOP, LOP are disabled. Connect the 0-10V input to terminals 11 (GND) -12 (+V) of the PEV S27, as indicated in attachment A.2.
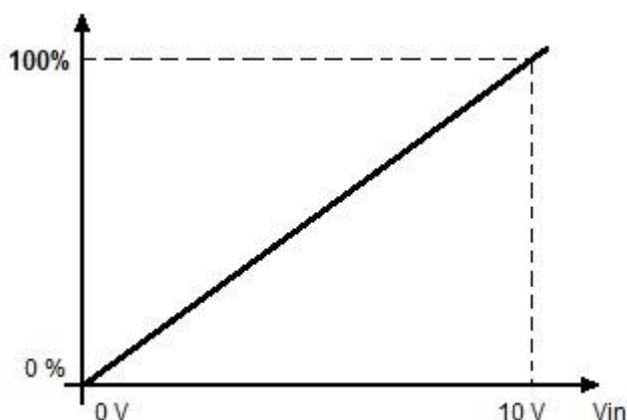
5.11   **LEVEL 3 PROGRAMMING (Stepper valve parameters)**

To access Level 3 programming, press and hold the UP key, SET key and STANDBY key for over 3 seconds. When the first programming parameter appears:

1. Use the (▲) key or (▼) key to select the parameter to be modified. After selecting the required parameter, it will be possible to:
   - View its configuration by pressing the SET key.
   - Edit configuration by pressing and holding the SET key and pressing either the (▲) key or the (▼) key.
2. After setting the configuration values, press and hold both the (▲) key and the (▼) key until the value of the main display reappears and exit the menu.
3. Any changes made to the parameters are saved automatically when the system closes the configuration menu.

Entering this menu, adjustment is interrupted and the valve is closed.

Possible electrical damage! => make changes in this programming level with the valve disconnected. On exiting, the valve is completely closed. On first start-up, the type of valve must be set (parameter "tEU"). It's not possible to modify the parameters relating to the coded valves (tEU >=1).

5.12   **LEVEL 3 PARAMETER LIST (stepper valve parameters)**

PAR.	MEANING	VALUES	DEFAULT
tEU	**Type of connected stepper valve** The settings from 1 to 7 load the default values in the LSP, HSP, CSP, SPD, ICF, ICM, SYN, TYP parameters. It's however possible to edit the default values set automatically by selecting tEU other than 0. Pressing the Set key only to see the current tEU value does not load the defaults.	-2 = Valve disabled -1 = valve not configured 0 = Customized (set the valve parameters) 1 = Carel EXV 2 = Danfoss ETS 25-50 3 = Danfoss ETS 100 4 = Danfoss ETS 250/400 5 = NOT USED 6 = Alco EX4 7 = Alco EX5 8 = Alco EX6 9 = Alco EX7 10 = Alco EX8 500 11 = Sporlan SEI 0.5-11 12 = Sporlan SER 1.5-20 13 = Sporlan SER(I) G, J, K 14 = Sporlan SEI 30 15 = Sporlan SEI 50 16 = Sporlan SEH 100 17 = Sporlan SEH 175 18 = Castel 261 / 271 Eliwell SXVB261 19 = Castel 262 / 263 Eliwell SXVB262 / SXVB263 20 = Castel 272 / 273 21 = Castel 264 / 274 Eliwell SXVB264	-1

PAR.	MEANING	VALUES	DEFAULT
LSP	**Minimum number of steps** Allows selection of the minimum number of steps of the valve to which the valve should be considered completely closed. The manufacturer's manual of the valve must be read to correctly set this parameter. It's the minimum number of steps to remain within the operating range recommended by the manufacturer.	0 ÷ HSP-1 (10*steps)	0
HSP	**Maximum number of steps** Allows you to select the maximum number of steps which can be executed by the valve. At this number of steps, the valve should be completely open. The manufacturer's manual of the valve must be read to correctly set this parameter. It's the maximum number of steps to stay within the operating range recommended by the manufacturer.	LSP+1 ÷ CSP (10* steps)	41
CSP	**Closure steps** Number of additional steps to take to complete closure of the valve, used to re-align the valve in the physical fully closed position. Driver and valve are therefore ready for adjustment and alignment both on 0 (zero). On switching on the controller and periodically, forced closure is therefore carried out, to re-align the valve at the position calculated by the driver.	HSP ÷ 999 (10* steps)	51
Spd	**Nominal speed** Maximum movement speed of the motor without losing steps and therefore without loss of precision. It's necessary to stay under the maximum speed available for the valve.	1 ÷ 999 step/sec	35
ICF	**Nominal peak current per phase (bipolar valves).** It's the current per phase used by the valve during adjustment. Consult the manufacturer's manual.	ICM+1 ÷ 800 mA	200
ICM	**Stationary current (bipolar valves).** It's the current per phase when the valve is stopped for at least 5 minutes.	0 ÷ ICF-1 mA	50
dut	**Valve duty cycle** Fraction of time during which the valve is controlled.	0 ÷ 100 %	100
SYN	**Active synchronisation** Each time the valve must be completely opened or closed, a certain number of steps more is executed to achieve complete opening/closure of the valve	0 = disabled 1 = enabled in opening 2 = enabled in closure 3 = enabled in opening and closure	2
CTr	**Types of adjustment** Sets the type of current adjustment of the stepper motor. A microstep or half-step control ensures smoother movement (with current modulation), however this causes torque reduction. With the full-step control, the windings are always piloted to the maximum current, but movement is not as smooth.	0 = Microstep 1 = Full – step 2 = Half - step	0

Loading of default settings based on the tEU parameter:

tEU	LSP (x10) step	HSP (x10) step	CSP (x10) step	Spd (step/s)	ICF (mA)	ICM (mA)	dut	SYN	Ctr
-1 = Valve not configured	---	---	---	---	---	---	---	---	---
0 = Customized	0	41	51	35	200	50	100	2	0
1 = Carel EXV	0	48	50	50	450	100	100	2	0
2 = Danfoss ETS 25-50	7	262	262	300	100	100	100	2	0
3 = Danfoss ETS 100	10	353	353	300	100	100	100	2	0
4 = Danfoss ETS 250/400	11	381	381	300	100	100	100	2	0
5 = Not used	-	-	-	-	-	-	-	-	-
6 = Alco EX4	10	75	75	500	500	100	100	2	0
7 = Alco EX5	10	75	75	500	500	100	100	2	0
8 = Alco EX6	10	75	75	500	500	100	100	2	0
9 = Alco EX7	10	160	160	500	750	250	100	2	1
10 = Alco EX8 500	10	260	260	500	800	500	100	2	1
11 = Sporlan SEI 0.5-11	10	160	360	200	200	50	100	2	0
12 = Sporlan SER 1.5-20	10	160	360	200	200	50	100	2	0
13 = Sporlan SER(I) G, J, K	10	250	350	200	200	50	100	2	0
14 = Sporlan SEI 30	20	319	360	200	200	50	100	2	0
15 = Sporlan SEI 50	40	639	750	200	200	50	100	2	0
16 = Sporlan SEH 100	40	639	750	200	200	50	100	2	0
17 = Sporlan SEH 175	40	639	750	200	200	50	100	2	0
18 = Castel 261 / 271 Eliwell SXVB261	0	41	51	35	200	50	100	2	0
19 = Castel 262 / 263 Eliwell SXVB262 / SXVB263	0	20	25	20	200	50	100	2	0
20 = Castel 272 / 273	0	41	51	35	300	50	100	2	0
21 = Castel 264 / 274 Eliwell SXVB264	0	99	113	70	560	50	100	2	0

QUICK VIEW MENU (READ-ONLY) | 5.13

During the start-up of the system, it may be useful to simply check the reading of the various probes or of some values to verify or optimize the process. To access the quick view menu, press and hold down the DOWN (▼) and STAND-BY keys for more than 3 seconds. Within this menu, the up or down arrows allow you to scroll through the different parameters.

Pressing the Set key alternates the display of the parameter with its value (to facilitate reading, pressing the SET key switches between parameter and value: it is not necessary to keep it pressed). With the value of the parameter displayed, pressing the up or down arrow keys in any case displays the parameter following or preceding the current one (therefore it automatically exits from displaying the value). This menu is exited automatically after 2 minutes of console inactivity or by pressing the up arrow (▲) + down arrow (▼) keys simultaneously for a few seconds.

QUICK VIEW MENU PARAMETER LIST (READ-ONLY) | 5.14

PAR.	MEANING	VALUES
tS4	**View Inlet Temperature sensor (S4)**	(read-only) °C
tS5	**View Evaporation Temperature sensor (S5)**	(read-only) °C
PS5	**View Evaporation Pressure sensor (S5)**	(read-only) Bar
tSH	**View superheat temperature**	(read-only) °C
oEV	**EEV valve opening percentage**	(read-only) %
PAS	**EEV Valve opening position**	(read-only) steps/10

TEMPERATURE TABLE FOR REFRIGERANT FLUIDS | 5.15

The following table shows the evaporation temperature limits (tS5, see chapter 5.13) according to the type of refrigerant fluid (ErE parameter).

Parameter ErE	Code	Temperature range	Parameter ErE	Code	Temperature range
0	R404A	-90 ÷ 70 °C	13	R32	-70 ÷ 70 °C
1	R134a	-90 ÷ 70 °C	14	R448A	-70 ÷ 70 °C
2	R22	-90 ÷ 70 °C	15	R452A	-70 ÷ 70 °C
3	R407A	-90 ÷ 70 °C	16	R600	-45 ÷ 70 °C
4	R407F	-90 ÷ 70 °C	17	R600a	-50 ÷ 70 °C
5	R407H	-55 ÷ 70 °C	18	R1270	-70 ÷ 70 °C
6	R410A	-90 ÷ 70 °C	19	R1234ze(E)	-50 ÷ 70 °C
7	R450A	-80 ÷ 70 °C	20	R23	-90 ÷ 25 °C
8	R507	-90 ÷ 70 °C	21	R717 (NH$_3$)	60 ÷ 70 °C
9	R513A	-45 ÷ 70 °C	22	R454C	-60 ÷ 70 °C
10	R744 (CO$_2$)	-60 ÷ 40 °C	23	R515B	-50 ÷ 70 °C
11	R449A	-60 ÷ 70 °C	24	R471A	-50 ÷ 60 °C
12	R290	-90 ÷ 70 °C	25	R455A	-60÷ 70 °C

5.16   PASSWORD FUNCTION

The password function is enabled by setting a value other than 0 in the PA parameter. See parameter P1 for the various levels of protection. Protection is enabled automatically when the keypad is not used for 30 seconds. The digits 000 appear on the display. Use the up/down arrow keys to edit the number and press the SET key to confirm. The 000 password window disappears if the keypad is not used for 30 seconds.
Note: If you forget the password, use the universal number **100**.

5.17   SOFTWARE UPDATE

Contact Pego to perform the software update.

5.18   NEW SOFTWARE FEATURES

Rel. 1:   Added refrigerants R515B and R471A.
Rel. 4:   Added refrigerant R455A.
Rel. 5a: Extended operation down to -90°C
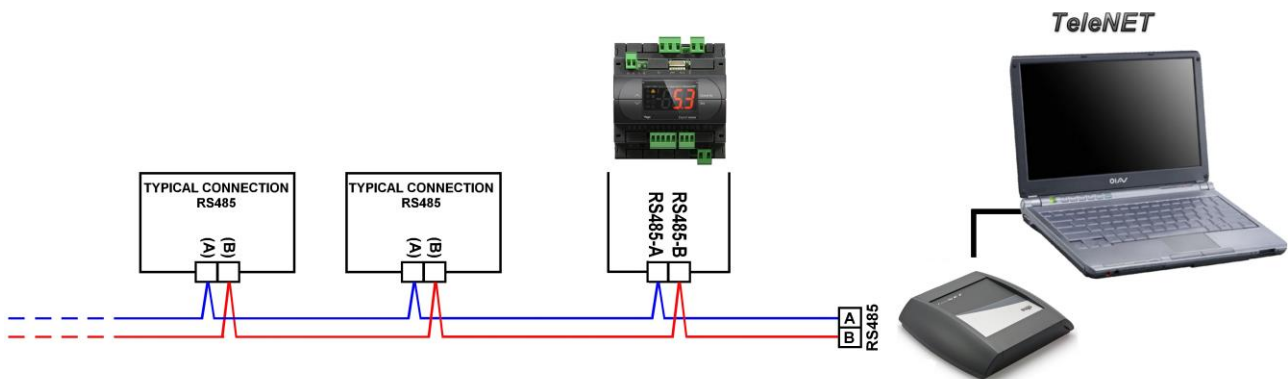**Rel. 6:**   Added Telenet PEV-STEPPER protocol.

CHAPTER 6: OPTIONS

TELENET MONITORING/SUPERVISION SYSTEM

6.1

To connect the electrical panel to a **TeleNET** network, follow the diagram below.
Refer to the **TeleNET** user manual for instrument configuration.
**IMPORTANT:** During the configuration, under "Module" select "PEV-STEPPER Instrument".

CONFIGURATION OF NETWORK WITH MODBUS-RTU PROTOCOL

6.2

Connect the board to a RS485 network with **Modbus-RTU** protocol with reference to the diagram below.
Refer to the **MODBUS-RTU_PEVS27** manual (available on our website) for the specifications of the MODBUS-RTU communication protocol.
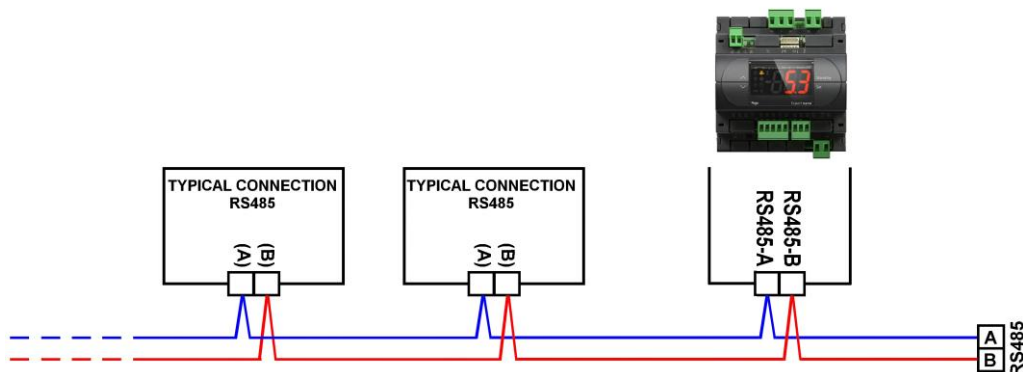
CHAPTER 7: DIAGNOSTICS

7.1 DIAGNOSTICS

In the event of any anomalies, the **PEV S27** controller warns the operator through alarm codes shown on the display and an acoustic signal emitted by a buzzer.

The audible alarm can be silenced by pressing the UP key (the error code remains) and is reactivated by pressing the SET key. If an alarm condition occurs, one of the following messages will appear on the display:

ALARM CODE	POSSIBLE CAUSE	OPERATION TO BE PERFORMED
E4	**Functional fault of the Inlet temperature sensor (S4).**	• Check the condition of the sensor and its connections. • If problem persists, replace the sensor.
E5	**Functional fault of the Evaporation pressure sensor (S5).**	• Check the condition of the sensor and its connections. • If problem persists, replace the sensor.
LSH	**Low superheat alarm.**	• Check the status of the refrigerating system. • Edit the PID parameters. • If the problem persists, contact the technical support service.
MOP	**Alarm for maximum saturated evaporation temperature exceeded, in relation to sensor S5.**	• Check the status of the refrigerating system. • Edit the PID parameters. • If the problem persists, contact the technical support service.
LOP	**Alarm for minimum saturated evaporation temperature exceeded, in relation to sensor S5.**	• Check the status of the refrigerating system. • Edit the PID parameters. • If the problem persists, contact the technical support service.
VAL	**Valve Alarm.** An overcurrent or overheating alarm was detected of the valve. Management of the valve is disabled. On re-entering the alarm, the valve re-initializes in the total closure position.	• Check configuration and the connections of the valve. • Switch off and back on the equipment. • If the problem persists, contact the technical support service.
CFG	**Valve not configured.** On first start-up, configuration is requested of the type of valve connected.	• Configure the type of valve connected by setting the third level parameter "tEU".
ini	**Initialization in progress (closure complete).**	• Wait for the initialization procedure to complete.
E0 E0i E0E	**Eeprom alarm.** An EEPROM memory fault has been detected.	• Switch unit off and then back on. • Restore the default values (see dEF parameter).

ANNEXES

DICHIARAZIONE DI CONFORMITÀ UE / *EU CONFORMITY*　　A.1

LA PRESENTE DICHIARAZIONE DI CONFORMITA' È RILASCIATA SOTTO LA RESPONSABILITA' ESCLUSIVA DEL FABBRICANTE:
THIS DECLARATION OF CONFORMITY IS ISSUED UNDER THE EXCLUSIVE RESPONSIBILITY OF THE MANUFACTURER:

PEGO S.r.l. a socio unico - Via Piacentina 6/b, 45030 Occhiobello (RO) – Italy – Società soggetta all'attività di direzione e coordinamento di Castel S.r.l.

DENOMINAZIONE DEL PRODOTTO IN OGGETTO / *DENOMINATION OF THE PRODUCT IN OBJECT*

MOD.:　**PEVS2701 / PEVS2702**

IL PRODOTTO DI CUI SOPRA È CONFORME ALLA PERTINENTE NORMATIVA DI ARMONIZZAZIONE DELL'UNIONE EUROPEA:
THE PRODUCT IS IN CONFORMITY WITH THE RELEVANT EUROPEAN HARMONIZATION LEGISLATION:

Direttiva Bassa Tensione (LVD):　　**2014/35/UE**
Low voltage directive (LVD):　　**2014/35/EU**

Direttiva EMC:　　**2014/30/UE**
Electromagnetic compatibility (EMC):　　**2014/30/EU**

LA CONFORMITA' PRESCRITTA DALLA DIRETTIVA È GARANTITA DALL'ADEMPIMENTO A TUTTI GLI EFFETTI DELLE SEGUENTI NORME:
THE CONFORMITY REQUIRED BY THE DIRECTIVE IS GUARANTEED BY THE FULFILLMENT TO THE FOLLOWING STANDARDS:
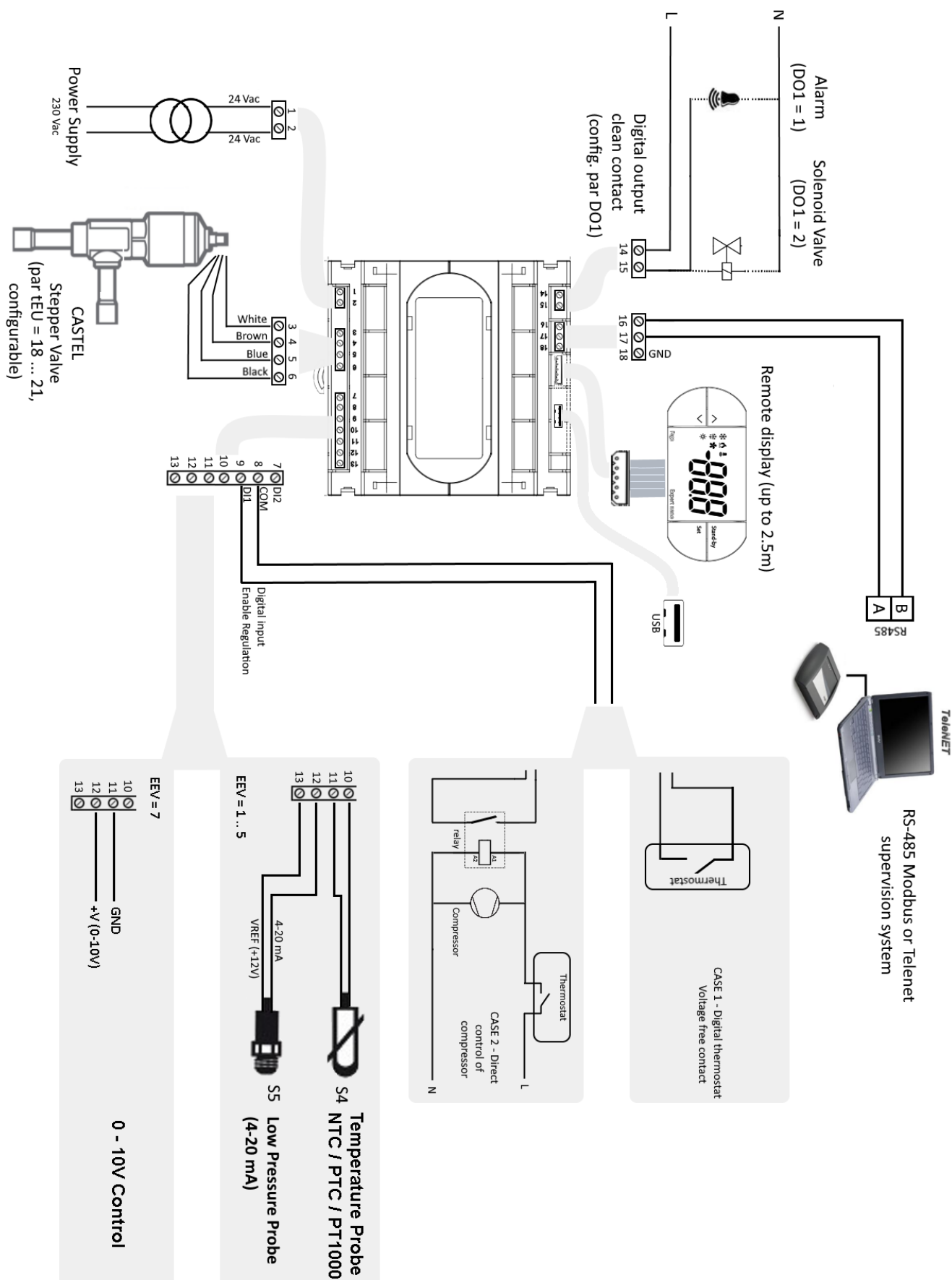
Norme armonizzate:　　**EN 61010-1:2010, EN 61000-6–2:2019, EN 61000-6–4:2019**
European standards:　　**EN 61010-1:2010, EN 61000-6–2:2019, EN 61000-6–4:2019**

Firmato per nome e per conto di:
Signed for and on behalf of:

Pego S.r.l.
Martino Villa
Presidente

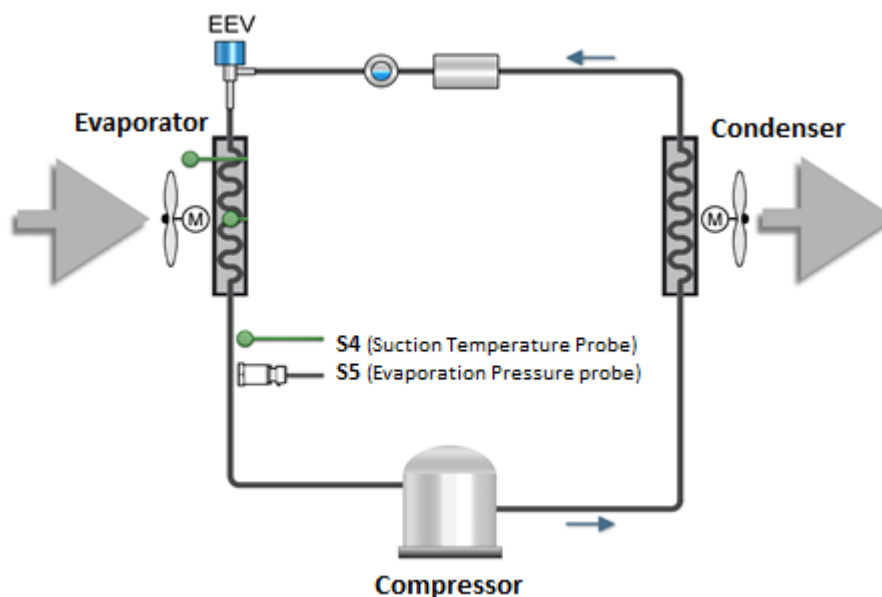Luogo e Data del rilascio:
Place and Date of Release:

Occhiobello (RO), 01/01/2023

A.2   **CONNECTION DIAGRAM**

Power Supply
230 Vac

24 Vac
24 Vac
1 2

CASTEL
Stepper Valve
(par tEU = 18 … 21,
configurable)

White
Brown
Blue
Black
3 4 5 6

Alarm
(DO1 = 1)

Solenoid Valve
(DO1 = 2)

Digital output
clean contact
(config. par DO1)
14 15

16 17 18
GND

Remote display (up to 2.5m)

USB

A
B
RS485

TeleNET

RS-485 Modbus or Telenet
supervision system

DI2
COM
DI1
7 8 9 10 11 12 13

Digital input
Enable Regulation

EEV = 7
10 11 12 13
+V (0-10V)
GND

0 - 10V Control

EEV = 1 … 5
10 11 12 13
VREF (+12V)
4-20 mA

S5 Low Pressure Probe
(4-20 mA)

S4 Temperature Probe
NTC / PTC / PT1000

CASE 2 - Direct
control of
compressor

relay
Compressor
Thermostat
N
L

CASE 1 - Digital thermostat
Voltage free contact

Thermostat

LAYOUT AND DESCRIPTION OF THE SENSORS — A.3

VALVES CONNECTION — A.4

Valve (par. tEU)	PIN 3	PIN 4	PIN 5	PIN 6
1 = Carel EXV	GREEN	BROWN	YELLOW	WHITE
2 = Danfoss ETS 25-50	GREEN	RED	WHITE	BLACK
3 = Danfoss ETS 100	GREEN	RED	WHITE	BLACK
4 = Danfoss ETS 250/400	GREEN	RED	WHITE	BLACK
5 = Not used	-	-	-	-
6 = Alco EX4	BLUE	BROWN	WHITE	BLACK
7 = Alco EX5	BLUE	BROWN	WHITE	BLACK
8 = Alco EX6	BLUE	BROWN	WHITE	BLACK
9 = Alco EX7	BLUE	BROWN	WHITE	BLACK
10 = Alco EX8 500	BLUE	BROWN	WHITE	BLACK
11 = Sporlan SEI 0.5-11	GREEN	RED	BLACK	WHITE
12 = Sporlan SER 1.5-20	GREEN	RED	BLACK	WHITE
13 = Sporlan SER(I) G,J,K	GREEN	RED	BLACK	WHITE
14 = Sporlan SEI 30	GREEN	RED	BLACK	WHITE
15 = Sporlan SEI 50	GREEN	RED	BLACK	WHITE
16 = Sporlan SEH 100	GREEN	RED	BLACK	WHITE
17 = Sporlan SEH 175	GREEN	RED	BLACK	WHITE
18 = Castel 261-271 / Eliwell SXVB261	WHITE (2)	BROWN (1)	BLUE (3)	BLACK (4)
19 = Castel 262-263 /Eli. SXVB262-263	WHITE (2)	BROWN (1)	BLUE (3)	BLACK (4)
20 = Castel 272-273	WHITE (2)	BROWN (1)	BLUE (3)	BLACK (4)
21 = Castel 264 -274 / Eliwell SXVB264	WHITE (2)	BROWN (1)	BLUE (3)	BLACK (4)

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