EVCO
Advanced Controllers

EVDRIVE07

Driver for unipolar and bipolar motorised stepper electronic expansion valves

⚠ WARNING

Make sure you read and fully understand the manual before using this device.

Non-observance of these instructions may result in death or serious injury.

Operating manual

114EVD07E4.00 - 11/2024

CONTENTS

CONTENTS

CONTENTS

IMPORTANT LEGAL INFORMATION

LIABILITY AND RESIDUAL RISKS

EVCO assumes no liability for any damage caused by the following (by way of example; this is not an exhaustive list):

- Installation/use for purposes other than those specified and, in particular, not adhering to the safety provisions set out by current regulations in the country in which the product is installed and/or contained in this manual;
- Use in appliances that do not guarantee sufficient protection against electric shocks, water and dust within the installation conditions created;
- Use in appliances that allow access to hazardous parts without the use of a keyed or tooled locking mechanism when accessing the instrument;
- Tampering and/or modifying the product;
- Installation/use in appliances which do not comply with current regulations in the country in which the product is installed.

The customer/manufacturer is responsible for ensuring their machine complies with these regulations.
EVCO's responsibility is limited to the correct and professional use of the product in accordance with regulations and the instructions contained in this manual and other product support documents.

To comply with EMC standards, observe all the electrical connection instructions. As it depends on the wiring configuration as well as the load and the installation type, compliance must be verified for the final machine as specified by the relevant product standard.

DISCLAIMER

This document is the exclusive property of EVCO. It contains a general description and/or a description of the technical specifications for the services offered by the products listed herein. This document should not be used to determine the suitability or reliability of these products in relation to specific user applications. Each user or integration specialist should conduct their own complete and appropriate risk analysis, in addition to carrying out a product evaluation and test in relation to its specific application or use. Users can send us comments and suggestions on how to improve or correct this publication.

Neither EVCO nor any of its associates or subsidiaries shall be held responsible or liable for improper use of the information contained herein.

EVCO has a policy of continuous development; therefore, EVCO reserves the right to make changes and improvements to any product described in this document without prior notice.

The images in this document and other documentation supplied with the product are provided for illustrative purposes only and may differ from the product itself.

The technical data in this manual is subject to change without prior notice.

TERMS AND CONDITIONS OF USE

Permitted use

The device must be installed and used in accordance with the instructions provided and, in particular, hazardous live parts must not be accessible under normal conditions.

The device must be suitably protected from water and dust with regard to its application and must also only be accessible with the aid of a tool (with the exception of the front panel).
Only qualified personnel may install the product or perform technical support procedures on it.

The customer must only use the product as described in the documentation relating to that product.

Prohibited use

Any use other than those described in the "**Permitted use**" section and in the product support documentation is prohibited.

DISPOSAL

The device must be disposed of in accordance with local regulations regarding the collection of electrical and electronic appliances.

CONSIDER THE ENVIRONMENT

The company works towards protecting the environment, while taking account of customer requirements, technological innovations in materials and the expectations of the community to which we belong. EVCO places great importance on respecting the environment, encouraging all associates to become involved with company values and guaranteeing safe, healthy and functional working conditions and workplaces.
Please consider the environment before printing this document.

IMPORTANT SAFETY INFORMATION

Please read this document carefully before installation; study all the warnings before using the device. Only use the device in accordance with the methods described in this document. The following safety messages may be repeated several times in the document, to provide information regarding potential hazards or to attract attention to information which may be useful in explaining or clarifying a procedure.

SYMBOLS USED IN THIS MANUAL

This symbol is used to indicate a risk of electric shock.
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.

This symbol is used to indicate a risk of serious personal injury.
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.

SAFETY MESSAGES

⚠ ⚠ DANGER

DANGER indicates a situation of imminent danger which, if not avoided, **will lead to death or serious injury**.

⚠ WARNING

WARNING indicates a situation of imminent danger which, if not avoided, **may lead to death or serious injury**.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **could cause minor or moderate injury.**

NOTICE

NOTICE indicates a situation not related to physical injuries but which, if not avoided, could damage the equipment**.**

NOTE: the maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.

QUALIFIED PERSONNEL

Only suitably trained and experienced personnel capable of understanding the content of this manual and all documentation regarding the product are authorised to work on and with this equipment. Furthermore, the personnel must have completed courses in safety and must be able to recognise and prevent the implied dangers. The personnel must have suitable training, knowledge and experience at a technical level, and be capable of anticipating and detecting potential risks caused by using the product, as well as changing the settings and modifying the mechanical, electric and electronic equipment for the entire system in which the product is used. All personnel working on and with the product must be entirely familiar with the relevant standards and directives, as well as safety regulations.

UNAUTHORISED PERSONNEL

The device must **not** be used by persons (including children) with reduced physical, sensory or mental capabilities or persons with no experience or knowledge.

SAFETY PRECAUTIONS CONCERNING THE PRODUCT AND ITS USE

Before carrying out any work on the equipment, read these instructions carefully, making sure you understand everything.

⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling the device.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- All 12...24 Vac/dc models must be powered individually.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

⚠ DANGER

RISK OF ELECTRIC SHOCK AND FIRE

- Do not use the device with loads greater than those indicated in the technical data section.
- Do not exceed the temperature and humidity ranges indicated in the technical data section.
- Use the required safety interlocks (fuses and/or magnetothermal switches) of a suitable size.

⚠ DANGER

RISK OF ELECTRIC SHOCK OR MALFUNCTIONING OF THE EQUIPMENT

Do not use damaged products or accessories.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility requirements.
- Make sure the wiring is correct for its application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital and analogue inputs, communication and corresponding power supplies) and power cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the necessary safety interlocks wherever the risk of injury to personnel and/or equipment damage exists.
- Install and use this device in a cabinet of a suitable class for the intended environment, protected by a keyed locking mechanism or other suitable instruments.
- In terms of connection and the fuses used in the circuits for the power supply and output lines, observe local and national regulatory requirements relating to the nominal current and voltage for the equipment in use.
- Do not use this equipment for machine functions that are critical to safety.
- Do not disassemble, repair or modify the equipment.
- Do not connect wires to unused terminals and/or terminals marked with the text “No connection” (“N.C.”).

This device was designed to operate in non-hazardous environments, excluding applications that generate, or could potentially generate, hazardous atmospheres. Only install this device in areas and for applications which are reliably free from hazardous atmospheres.

⚠ DANGER

RISK OF EXPLOSION

- Only install and use this device in sites that are not at risk.
- Do not install or use this device in applications which are capable of generating hazardous atmospheres, such as applications that use flammable refrigerants.

INFORMATION CONCERNING THE DOCUMENT

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

Make sure you read and fully understand the manual before using this device.

Non-observance of these instructions may result in death or serious injury.

PURPOSE OF THE DOCUMENT

This document describes the driver for **EVDRIVE07** bipolar electronic expansion valves (it can also be used with unipolar valves) and the corresponding accessories. The information provided includes:

- Safety;
- Installation;
- Wiring;
- Commissioning;
- Usage;
- Configuration.

NOTE: read this document - and all related documents - carefully before installing, operating or servicing the controller.

INTENDED READERS

This manual is intended for readers in different countries. Both metric and imperial units of measurement are used in the manual.

APPLICATION AND VALIDITY

This manual refers only to the **EVDRIVE07** driver.

RELATED TECHNICAL DOCUMENTS

Document	Code (p/n)	Language
EVDRIVE07 operating manual, IT	**114EVD07I4**	ITALIAN
EVDRIVE07 series instruction sheet, EN-IT	**104EVD07A4**	MULTILINGUAL (EN-IT)

1. INTRODUCTION

1.1 DESCRIPTION

The **EVDRIVE07** series driver is a comprehensive solution by EVCO, suitable for managing up to 2 bipolar motorised stepper valves (it can also be used with unipolar valves), which meets the requirements of the HVAC/R market.

1.2 AVAILABLE MODELS

The **EVDRIVE07** series consists of various models, including:

- **EVDRIVE07 Mono** for an individual valve:
  - Blank **EVDRIVE07 Mono** (without display);
  - **EVDRIVE07 Mono** with built-in LCD graphic display;
- **EVDRIVE07 Double** for managing two valves at once;
  - Blank **EVDRIVE07 Double** (without display);
  - **EVDRIVE07 Double** with built-in LCD graphic display.

The EVCO range of drivers also includes, as an accessory, a user interface with 16-colour LCD graphic display and 6 capacitive keys, which can be panel- or wall-mounted (see ***"1.4 ACCESSORIES" ON PAGE 10***).

1.3 FEATURES

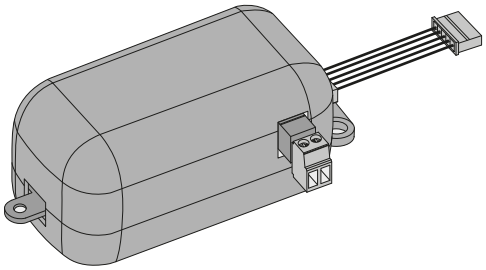
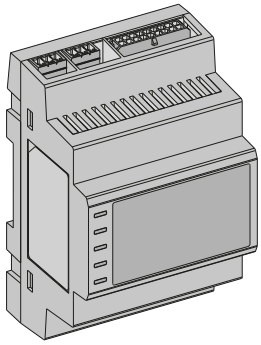
The main features of the **EVDRIVE07** series are:

- Up to 8 multifunctional analogue inputs, including:
  - Up to 4 analogue inputs for:
    - 4...20 mA sensors;
    - 0...20 mA sensors;
    - 0...5 V sensors;
    - NTC probes;
    - Pt1000 probes;
  - Up to 4 analogue inputs for:
    - NTC probes;
    - Pt1000 probes;
- Up to 6 volt-free digital inputs;
- 2 non-sealed relay outputs (also available in sealed version on request);
- 1 USB port;
  - Compatibility for connection to Parameter Manager;
- 1 CAN serial port;
  - Compatibility for connection to EVCO programmable controllers and display devices;
- 1 Intrabus serial port;
  - Compatibility for connection to EVCO parametric and programmable controllers;
- 1 RS-485 serial port;
  - Compatibility for connection to third-party controls;
  - Compatible with BMS interfacing via Modbus protocol;
- 1 TTL port;
  - Compatibility for connection to Wi-Fi EVLining;
- Built-in display.

NOTE: for further information regarding input/output specifications, please refer to paragraph ***"2.1 TECHNICAL SPECIFICATIONS" ON PAGE 11***.

1.4 ACCESSORIES

The accessories available for the **EVDRIVE07** are:

Type	P/n	Description
	**EVTPN530F202**	NTC FAST temperature probes (intake temperature)
	**EVTPN815S201**	NTC temperature probes up to 150 °C (discharge temperature)
	**EVTPMC15V200**	Pt1000 temperature probes 0...350 °C with fibreglass cable
	**EVIF25TWX**	EVlinking Wi-Fi TTL module
	**EPS4B02**	Backup module
---	**EVIF20SUXI**	EVIF20SUXI RS-485/USB serial interface
	**EPJG900X4**	Remote user interface with LCD graphic display, resolution 320x240 pixel, 16 colours

2. TECHNICAL SPECIFICATIONS

All the system components of **EVDRIVE07** drivers satisfy European Community (EC) requirements for open systems. They must be installed in casing or another location designated on the basis of specific environmental conditions and in order to minimise the risk of involuntary contact with hazardous voltage. Use metal casing to improve **EVDRIVE07** system immunity to electromagnetic fields. This equipment satisfies the EC requirements as indicated in the tables below.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

Do not exceed any of the nominal values specified in this section.

2.1 TECHNICAL SPECIFICATIONS

2.1.1 EVDRIVE07 Mono

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Incorporated electronic device
Device purpose:	Operational control Driver for expansion valve (not safety)
Type of action:	1.C
Pollution category:	2
Overvoltage category:	III
Nominal pulse voltage:	4000 V
Power supply:	24 Vac, +10 % -15 %, 50/60 Hz not isolated 24 Vdc, not isolated, powered by class 2 circuit
Consumption:	27 VA maximum 13 W maximum
Ambient operating conditions:	Display models: -10 ... 55 °C (14 ... 131 °F) 10 ... 90 % RH non-condensing Blank models: -20 ... 60 °C (-4 ... 140 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-20 ... 70 °C (-4 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Protection degree provided by the casing:	IP20, IP40 (front panel)

2.1.2 EVDRIVE07 Double

Type	Description
The product complies with the following harmonised standards:	EN60730-1 and EN60730-2-9
Device construction:	Incorporated electronic device
Device purpose:	Operational control Driver for expansion valve (not safety)
Type of action:	1.C
Pollution category:	2
Overvoltage category:	III
Nominal pulse voltage:	4000 V
Power supply:	24 Vac, +10 % -15 %, 50/60 Hz not isolated 24 Vdc, not isolated, powered by class 2 circuit
Consumption:	50 VA maximum 23 W maximum
Ambient operating conditions:	Display models: -10 ... 55 °C (14 ... 131 °F) 10 ... 90 % RH non-condensing Blank models: -20 ... 60 °C (-4 ... 140 °F) 10 ... 90 % RH non-condensing
Transportation and storage conditions:	-20 ... 70 °C (-4 ... 158 °F) 10 ... 90 % RH non-condensing
Software class:	A
Protection degree provided by the casing:	IP20, IP40 (front panel)

2.2 I/O SPECIFICATIONS

2.2.1 EVDRIVE07 Mono

Type	Description
Digital inputs	3 voltage-free digital inputs (3.3 Vdc, 1 mA)
Analogue inputs	2 analogue inputs for NTC, Pt1000, 0...5 V, 0...20 mA or 4...20 mA 2 analogue inputs for NTC or Pt1000 probes
Low voltage (SELV) digital output	1 SPDT digital output 5 A at 250 Vac
Serial port	1 RS-485 serial port 1 Intrabus serial port 1 CAN serial port 1 TTL port 1 USB port

EVDRIVE07 Mono analogue input specifications

	NTC 10 kΩ at 25 °C BETA 3435	Pt1000 1 kΩ at 0 °C	Current 0...20 mA 4...20 mA	Voltage 0...5 V	Voltage 0...10 V	Digital input
AI1	•	•	•	•	•	•
AI2	•	•	---	---	---	•
AI2	•	•	•	•	•	•
AI4	•	•	---	---	---	•
Range	-50...120 °C (-58...248 °F)	-100...400 °C (-148...752 °F)	-	-	-	-
Solution	0.1 °C (1 °F)		0.01 mA	0.01 V	0.01 V	-
Input impedance	10 kΩ	1 kΩ	≤ 200 Ω	≤ 10 kΩ	≤ 200 Ω	-

Digital output specifications

Relay output	Description	Load (at 250 Vac)	Load type
Out1	SPDT	5 A	Resistive

2.2.2 EVDRIVE07 Double

Type	Description
Digital inputs	6 voltage-free digital inputs (3.3 Vdc, 1 mA)
Analogue inputs	4 analogue inputs for NTC, Pt1000, 0...5 V, 0...20 mA or 4...20 mA 4 analogue inputs for NTC or Pt1000 probes
Low voltage (SELV) digital output	2 SPDT digital outputs 5 A at 250 Vac
Serial port	1 RS-485 serial port 1 Intrabus serial port 1 CAN serial port 1 TTL port 1 USB port

EVDRIVE07 Double analogue input specifications

	NTC 10 kΩ at 25 °C BETA 3435	Pt1000 1 kΩ at 0 °C	Current 0...20 mA 4...20 mA	Voltage 0...5 V	Voltage 0...10 V	Digital input
AI1	•	•	•	•	•	•
AI2	•	•	•	•	•	•
AI3	•	•	---	---	---	•
AI4	•	•	---	---	---	•
AI5	•	•	•	•	•	•
AI6	•	•	•	•	•	•
AI7	•	•	---	---	---	•
AI8	•	•	---	---	---	•
Range	-50...120 °C (-58...248 °F)	-100...400 °C (-148...752 °F)	-	-	-	-
Solution	0.1 °C (1 °F)		0.01 mA	0.01 V	0.01 V	-
Input impedance	10 kΩ	1 kΩ	≤ 200 Ω	≤ 10 kΩ	≤ 200 Ω	-

Digital output specifications

Relay output	Description	Load (at 250 Vac)	Load type
Out1	SPDT	5 A	Resistive
Out2	SPDT	5 A	Resistive

3. MECHANICAL ASSEMBLY

3.1 BEFORE YOU START

Read this manual carefully before installing the system.
In particular, the safety instructions, electrical requirements and current regulations for the machine or the process in which this device is involved must be observed. The use and application of the information contained herein requires experience in the design and programming of automated control systems. Only the user, integrator or manufacturer of the machine can be familiar with all the conditions and factors which arise during installation and configuration, operation and maintenance of the machine or the process, and as such can identify the relevant automation equipment and the corresponding interlocks and safety systems which can be used effectively and appropriately. When selecting automation and control equipment and other connected equipment and software, for a particular application, you must consider all applicable local, regional and national standards and/or regulations.

⚠ WARNING

REGULATORY INCOMPATIBILITY

Make sure all the equipment used and the systems conform to all applicable local, regional and national regulations and standards.

3.2 INFORMATION CONCERNING INSTALLATION AND THE SURROUNDING ENVIRONMENT

Before carrying out any work on the equipment, read these instructions carefully, making sure you understand everything.

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling the device.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

This device was designed to operate in non-hazardous environments, excluding applications that generate, or could potentially generate, hazardous atmospheres. Only install this device in areas and for applications which are reliably free from hazardous atmospheres.

⚠ DANGER

RISK OF EXPLOSION

- Only install and use this device in sites that are not at risk.
- Do not install or use this device in applications which are capable of generating hazardous atmospheres, such as applications that use flammable refrigerants.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Make sure the wiring is correct for its application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital and analogue inputs, communication and corresponding power supplies) and power cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the necessary safety interlocks wherever the risk of injury to personnel and/or equipment damage exists.
- Install and use this device in a cabinet of a suitable class for the intended environment, protected by a keyed locking mechanism or other suitable instruments.
- In terms of connection and the fuses used in the circuits for the power supply and output lines, observe local and national regulatory requirements relating to the nominal current and voltage for the equipment in use.
- Do not use this equipment for machine functions that are critical to safety.
- Do not disassemble, repair or modify the equipment.
- Do not connect wires to unused terminals and/or terminals marked with the text “No connection” (“N.C.”).

3.3 DIMENSIONS

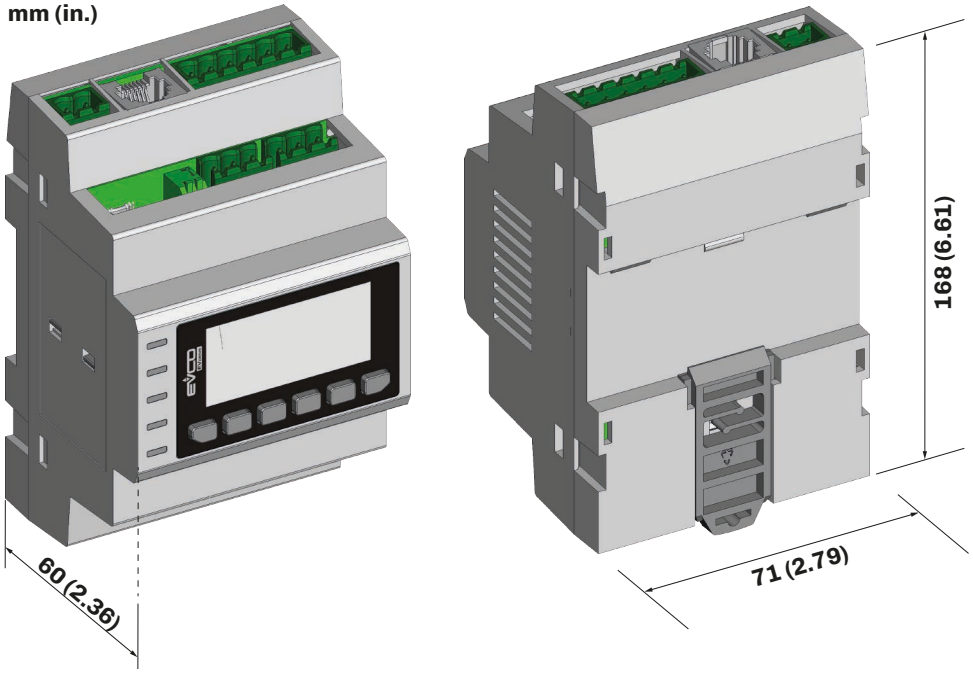


FIG. 1. ***EVDRIVE07*** *dimensions*

3.4 INSTALLATION

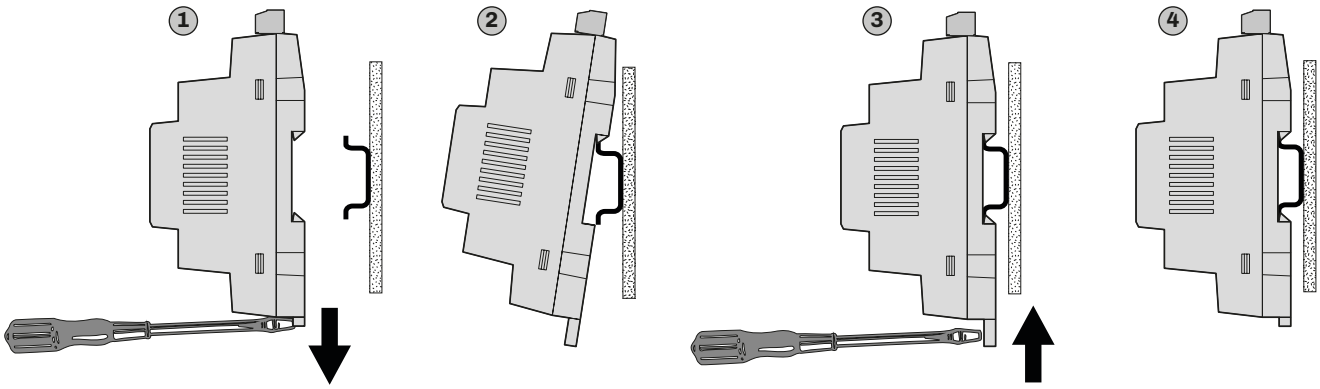


FIG. 2. ***EVDRIVE07*** *installation*

4. ELECTRICAL CONNECTIONS

4.1 WIRING BEST PRACTICES

The following information describes the wiring guidelines and best practices which should be observed when using the equipment described in this user manual.

⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling the device.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- All 12...24 Vac/dc models must be powered individually.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

4.1.1 Wiring guidelines

When wiring the controllers, observe the following standards:

- The I/O and communication wiring must be kept separate from the power supply wiring. These two types of wiring must be routed in separate ducts.
- Make sure the operating environment and conditions fall within the specified values.
- Use wires with the correct diameter, suited to the voltage and current requirements.
- Use copper conductors (compulsory).
- Use shielded twisted pair cables for analogue/digital I/O connections.

Use correctly earthed shielded cables for all inputs or analogue outputs and for communication connections. If shielded cables are not used for these connections, electromagnetic interference may cause signal degradation. Degraded signals can result in unpredictable operation of the controller or the modules and connected equipment.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Make sure the wiring is correct for its application.
- Use shielded cables for all I/O signal and communication cables.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- The signal (digital and analogue inputs, communication and corresponding power supplies) and power cables for the device must be routed separately.
- Before applying the power supply, check all the wiring connections.
- Use the necessary safety interlocks wherever the risk of injury to personnel and/or equipment damage exists.
- Install and use this device in a cabinet of a suitable class for the intended environment, protected by a keyed locking mechanism or other suitable instruments.
- In terms of connection and the fuses used in the circuits for the power supply and output lines, observe local and national regulatory requirements relating to the nominal current and voltage for the equipment in use.
- Do not use this equipment for machine functions that are critical to safety.
- Do not disassemble, repair or modify the equipment.
- Do not connect wires to unused terminals and/or terminals marked with the text “No connection” (“N.C.”).

4.1.2 Guidelines for screw terminals

Suitable wiring for the power supply

Step 5.08 mm (0.199 in.)

mm / in. 7 / 0.28								
mm^2	0.2…2.5	0.2…2.5	0.25…2.5	0.25…2.5	2 x 0.2…1	2 x 0.2…1.5	2 x 0.25…1	2 x 0.5...1.5
AWG	*24…14*	*24…14*	*22...14*	*22...14*	*2 x 24…18*	*2 x 24…16*	*2 x 22…18*	*2 x 20...16*

Ø 3.5 mm (*0.14 in.*)	C	N•m	0.5...0.6
		lb-in	*4.42...5.31*

FIG. 3. *Suitable wiring for the power supply*

Suitable wiring for I/O SELV

Step 3.5 mm (0.137 in.)

mm / in. 7 / 0.28								
mm^2	0.14…1.5	0.14…1.5	0.25…1.5	0.25…0.5	2 x 0.08…0.5	2 x 0.08…0.5	2 x 0.25…0.34	2 x 0.5...0.5
AWG	*25…15*	*25…15*	*22...15*	*22...20*	*2 x 28…20*	*2 x 28…20*	*2 x 23…21*	*2 x 20...20*

Ø 3.5 mm (*0.14 in.*)	C	N•m	0.5...0.6
		lb-in	*4.42...5.31*

FIG. 4. *Suitable wiring for I/O SELV*

4.1.3 Permitted cable lengths

NOTICE

INOPERABLE EQUIPMENT

- When connecting the power supply, use cables that are no longer than 10 m (32.80 ft).
- When connecting the probes, digital inputs and the Intrabus serial line, use cables that are no longer than 10 m (32.80 ft).
- When connecting the RS-485 serial line, use cables that are no longer than 1000 m (3280 ft).
- When connecting the digital outputs, use cables that are no longer than 10 m (32.80 ft).

4.2 WIRING DIAGRAM

4.2.1 EVDRIVE07 Mono

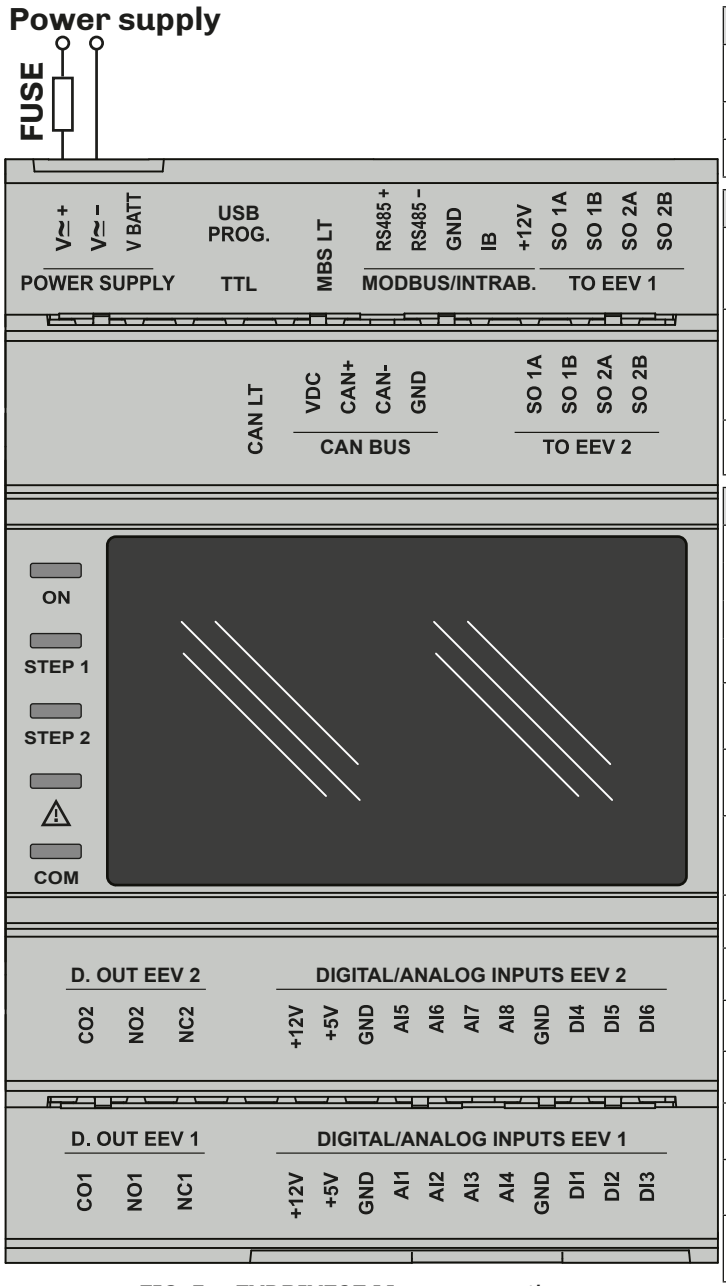


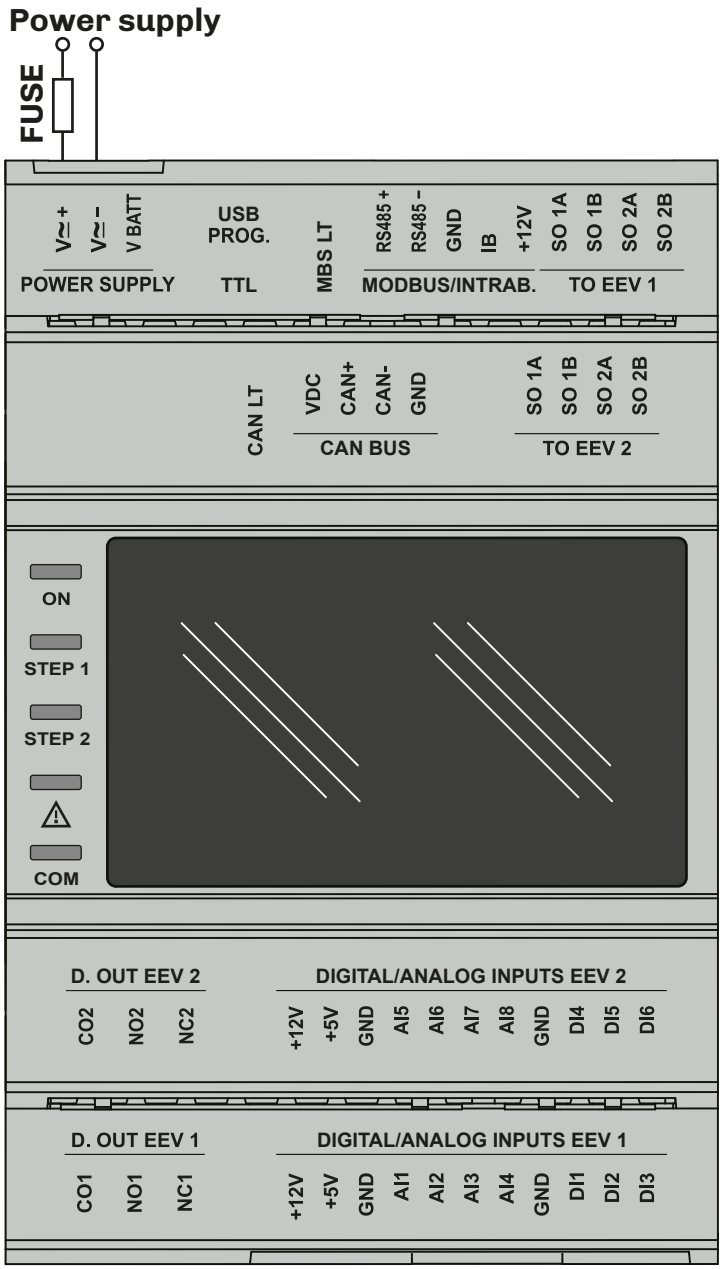
***FIG. 5. EVDRIVE07 Mono** connections*

POWER SUPPLY CONNECTION TERMINALS	
V≃ + V≃ –	**EVDRIVE07** power supply input
V BATT	Backup power supply input
FUSE	2 A T 250 V fuse

SERIAL LINE CONNECTION TERMINALS	
RS485 + RS485 – GND	RS-485 serial line connection
VDC CAN+ CAN- GND	CANBUS serial line connection
IB GND	Intrabus serial line connection

VALVE CONNECTION TERMINALS			
TO EEV 1 SO 1A TO EEV 1 SO 1B TO EEV 1 SO 2A TO EEV 1 SO 2B	Valve bipolar stepper motor output	1A 1B 2A 2B	Coil 1 Coil 1 Coil 2 Coil 2
+12V GND	Transducer power supply 0...20 mA/4...20 mA/0...10 V (12 Vdc ±10 %, 60 mA maximum)		
+5V GND	Ratiometric transducer power supply 0...5 V (5 VDC ±5 %, 40 mA maximum)		
CO1 NO1 NC1	Valve digital output		
GND AI1	**AI1** analogue input		
GND AI2	**AI2** analogue input		
GND AI3	**AI3** analogue input		
GND AI4	**AI4** analogue input		
GND DI1	**DI1** digital input (Valve enable)		
GND DI2	**DI2** digital input (Valve re-sync)		
GND DI3	**DI3** digital input (set valve parameters selection)		

4.2.2 EVDRIVE07 Double



POWER SUPPLY CONNECTION TERMINALS	
V≃ + V≃ –	**EVDRIVE07** power supply input
V BATT	Backup power supply input
FUSE	3.15 A T 250 V fuse

SERIAL LINE CONNECTION TERMINALS	
RS485 + RS485 – GND	RS-485 serial line connection
VDC CAN+ CAN- GND	CANBUS serial line connection
IB GND	Intrabus serial line connection

VALVE A CONNECTION TERMINALS			
TO EEV 1 SO 1A SO 1B SO 2A SO 2B	Valve A bipolar stepper motor output	1A 1B 2A 2B	Coil 1 Coil 1 Coil 2 Coil 2
+12V GND	Transducer power supply 0...20 mA/4...20 mA/0...10 V (12 Vdc ±10 %, 60 mA maximum)		
+5V GND	Ratiometric transducer power supply 0...5 V (5 VDC ±5 %, 40 mA maximum)		
CO1 NO1 NC1	Valve A digital output		
GND AI1	**AI1** analogue input		
GND AI2	**AI2** analogue input		
GND AI3	**AI3** analogue input		
GND AI4	**AI4** analogue input		
GND DI1	**DI1** digital input (Valve A enable)		
GND DI2	**DI2** digital input (Valve A re-sync)		
GND DI3	**DI3** digital input (valve A set parameters selection)		

***FIG. 6. EVDRIVE07** connections*

VALVE B TERMINALS					
TO EEV 2 SO 1A SO 1B SO 2A SO 2B	Valve B bipolar stepper motor output	1A 1B 2A 2B	Coil 1 Coil 1 Coil 2 Coil 2	GND AI5 GND AI6 GND AI7 GND AI8	**AI5** analogue input **AI6** analogue input **AI7** analogue input **AI8** analogue input
+12V GND	Power supply 0...20 mA/4...20 mA/0...10 V transducers (12 Vdc ±10 %, 60 mA maximum)			GND DI4	**DI4** digital input (Valve B enable)
+5V GND	Power supply 0...5 V ratiometric transducers (5 VDC ±5 %, 40 mA maximum)			GND DI5	**DI5** digital input (Valve B re-sync)
CO2 NO2 NC2	Valve B digital output			GND DI6	**DI6** digital input (valve B set parameters selection)

5. VALVE CONNECTIONS

The connections with bipolar valves compatible with **EVDRIVE07** is illustrated below.

The connections listed below are presented in compliance with the technical documentation from the corresponding manufacturers. EVCO is not responsible for any changes made to the values by the manufacturers. Always refer to the latest available version of the manufacturer's technical documentation.

5.1 VALVE CONNECTIONS WITH EVDRIVE07

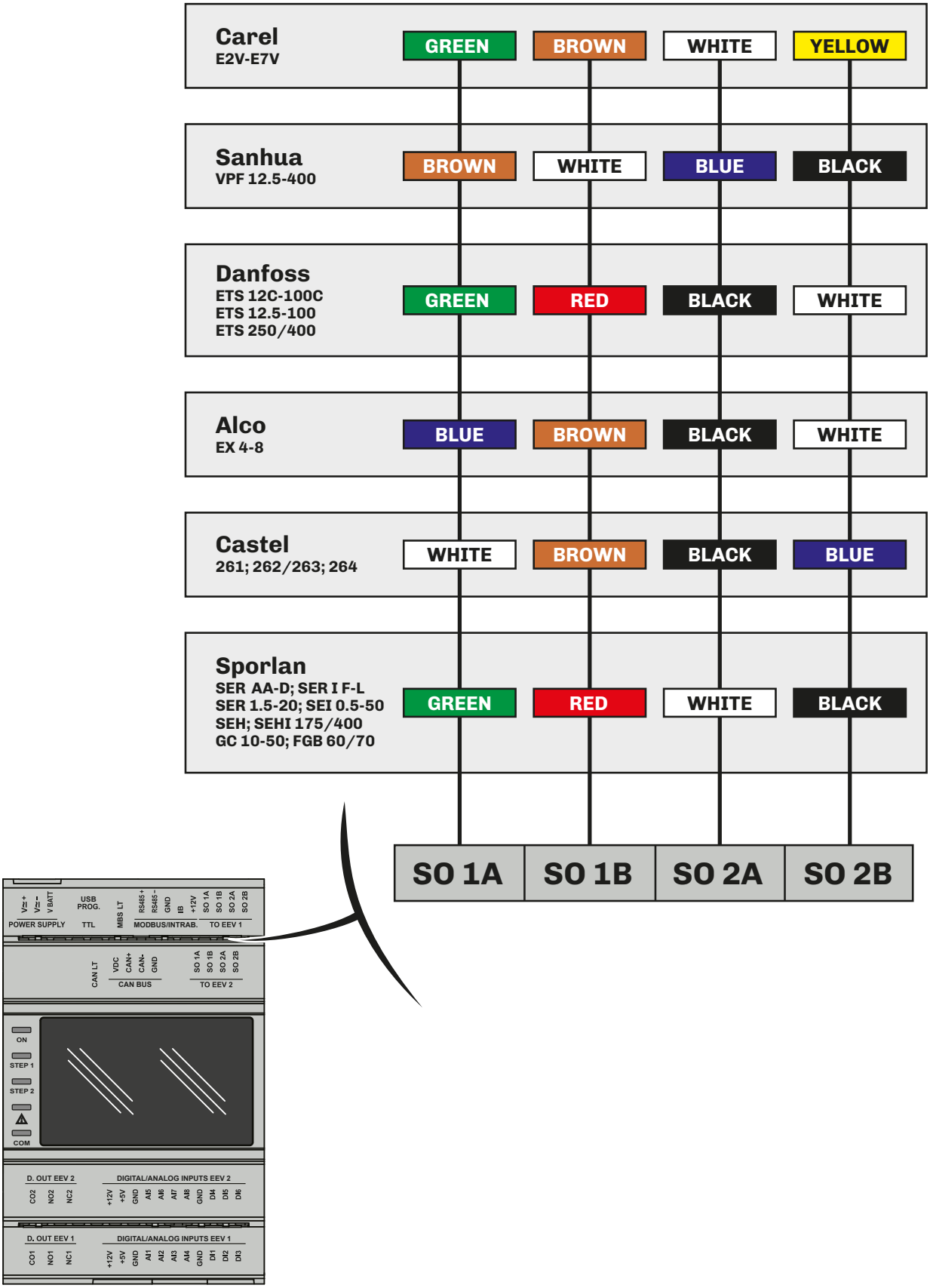


FIG. 7. *Valve connections with* ***EVDRIVE07***

6. USER INTERFACE

6.1 HOMEPAGE

6.1.1 Built-in interface

Single-valve models

Two-valve models

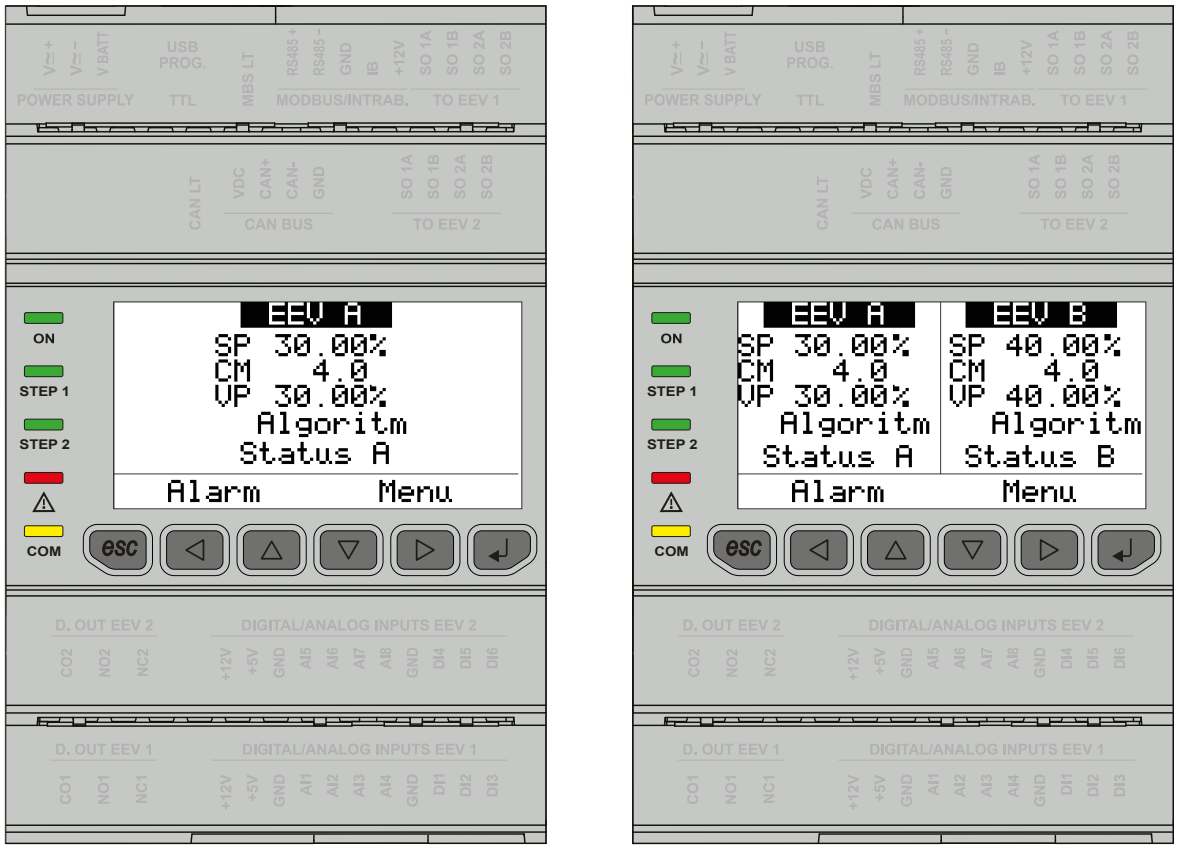


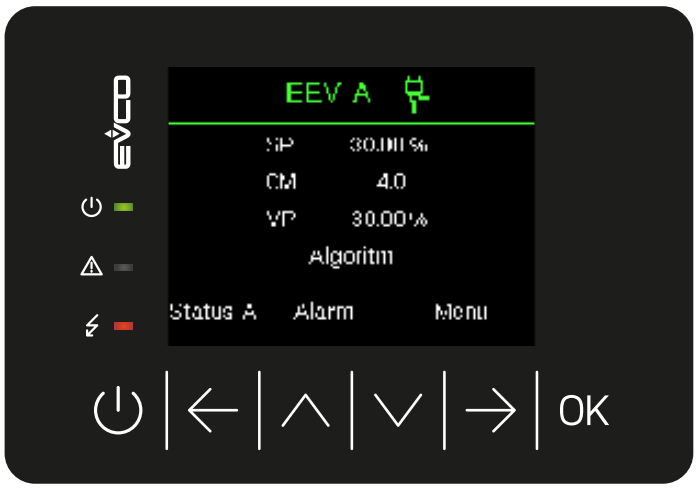
FIG. 8. *Homepage | Built-in interface*

Homepage display

Message	Description
SP	Valve positioning setpoint
CM	Control measurement
VP	Current valve position
Current EVDrive status	EVDrive status See ***"7.2 MACHINE REGULATION STATUSES" ON PAGE 31***

6.1.2 Remote interface

Single-valve models



Two-valve models

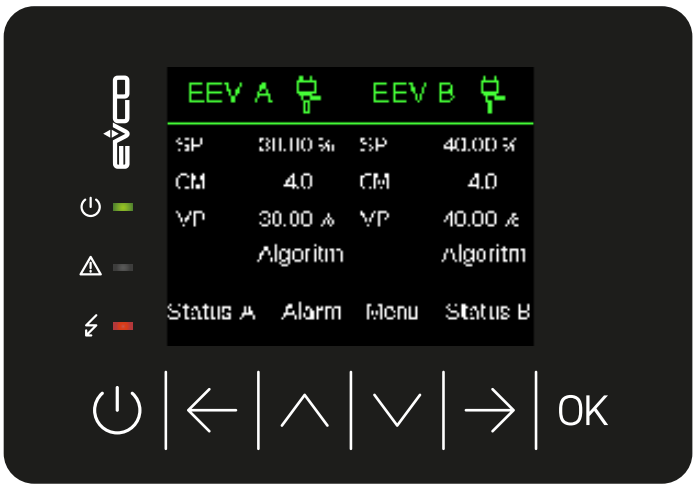


FIG. 9. *Homepage | Remote interface*

Homepage display

Message	Description
SP	Valve positioning setpoint
CM	Control measurement
VP	Current valve position
Current EVDrive status	EVDrive status See ***"7.2 MACHINE REGULATION STATUSES" ON PAGE 31***

6.2 TOUCH KEYS

The touch key functions are described below:

Built-in interface keys	Remote interface keys	Tap and release to...	Tap and hold for at least 3 seconds to...
esc	⏻	• Go back a level • Exit a function	No function specified
△	∧	• Increase a value • Navigate within the menus	
▽	∨	• Decrease a value • Navigate within the menus	
↵	OK	Confirm selection	
▷	→	Navigate to the right within the menus	
◁	←	Navigate to the left within the menus	

6.3 ICONS

Built-in I. icon	Lit steadily	Flashing rapidly	Flashing slowly	OFF
ON	EVDrive powered	---	---	EVDrive not powered
STEP 1	Positioning completed (EEV A position <5 %)	EEV A positioning in progress	Positioning completed (EEV A position >95 %)	Positioning completed (5 % < EEV A position <95 %)
STEP 2	Positioning completed (EEV B position <5 %)	EEV B positioning in progress	Positioning completed (EEV B position >95 %)	Positioning completed (5 % < EEV B position <95 %)
⚠	Alarm with manual reset ON	---	Alarm with automatic reset ON	In all other cases
COM	CAN ON without communication	Normal operation	Non-optimalcommunication	In all other cases

6.4 CHANGING THE SETPOINT

6.4.1 Working setpoint

Working SET	Parameter	PW level	Description
SET 1	R22A		Valve A regulation setpoint
	R22B		Valve B regulation setpoint
SET 2	R42A		Valve A regulation setpoint
	R42B		Valve B regulation setpoint
SET 1	A05A		Valve A low regulation temperature alarm setpoint
	A05B		Valve B low regulation temperature alarm setpoint
SET 2	A35A		Valve A low regulation temperature alarm setpoint
	A35B		Valve B low regulation temperature alarm setpoint
SET 1	A08A		Valve A high regulation temperature alarm setpoint
	A08B		Valve B high regulation temperature alarm setpoint
SET 2	A38A		Valve A high regulation temperature alarm setpoint
	A38B		Valve B high regulation temperature alarm setpoint
SET 1	A11A		Valve A LOP low pressure alarm setpoint
	A11B		Valve B LOP low pressure alarm setpoint
SET 2	A41A		Valve A LOP low pressure alarm setpoint
	A41B		Valve B LOP low pressure alarm setpoint
SET 1	A14A		Valve A MOP high pressure alarm setpoint
	A14B		Valve B MOP high pressure alarm setpoint
SET 2	A44A		Valve A MOP high pressure alarm setpoint
	A44B		Valve B MOP high pressure alarm setpoint

6.4.2 Setpoint change instructions

Built-in user interface

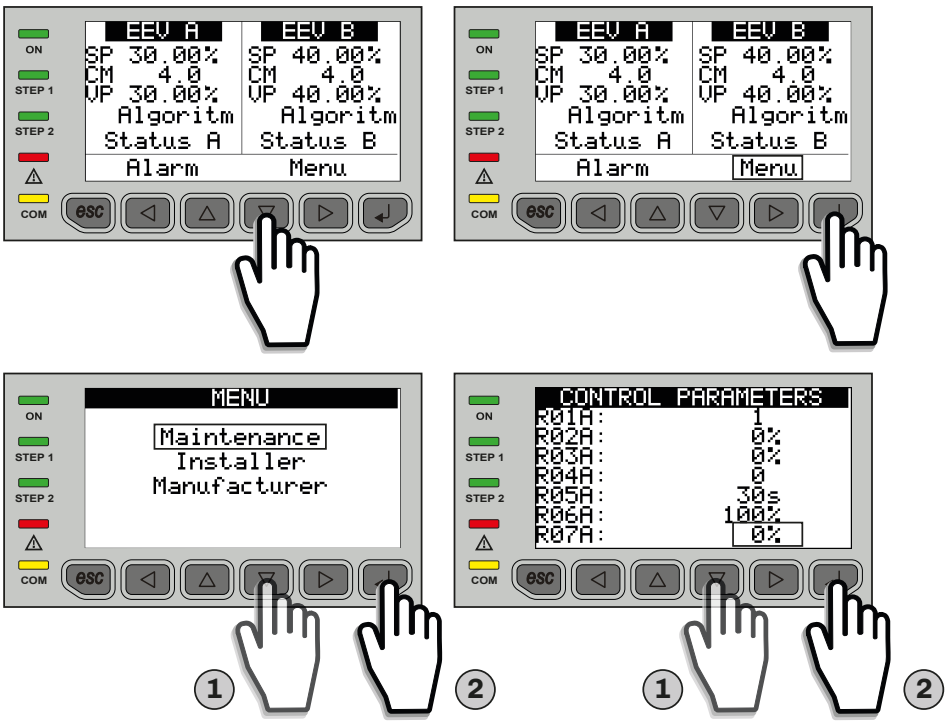


FIG. 10. *Changing the setpoint | Built-in interface*

Remote user interface

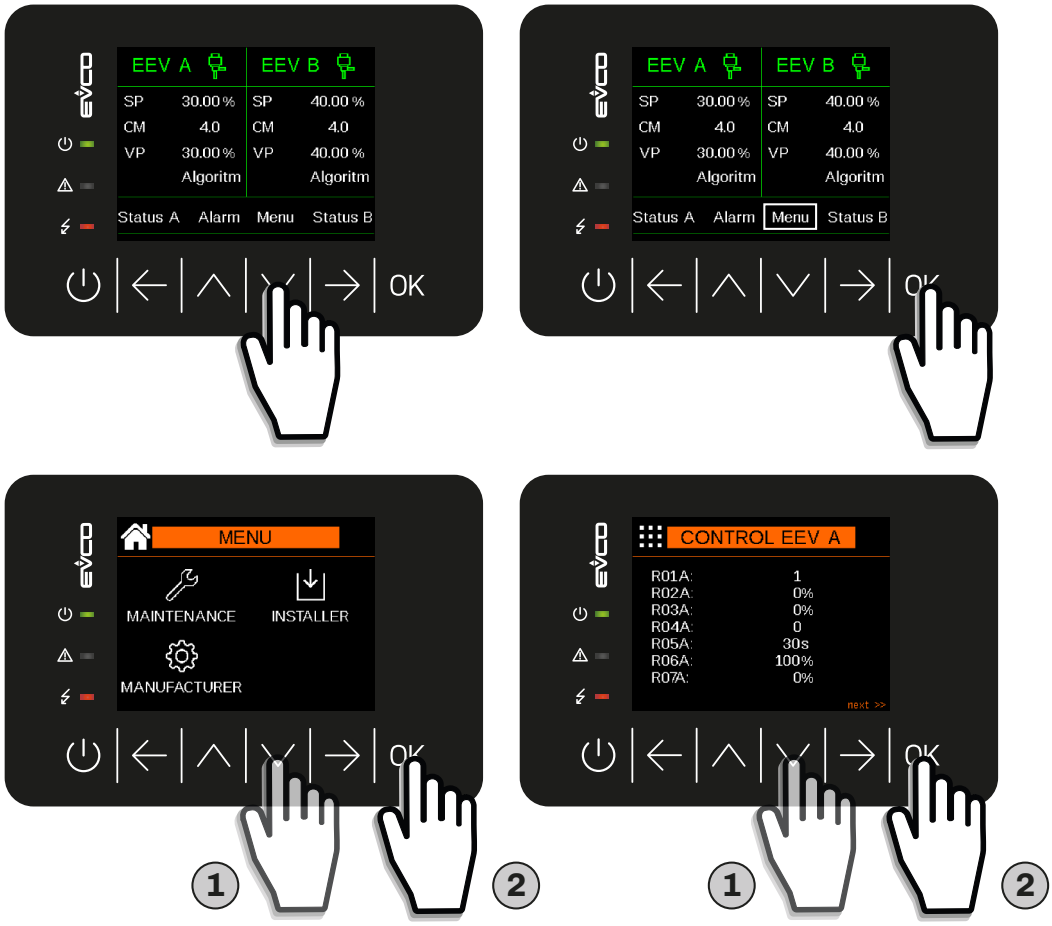


FIG. 11. *Changing the setpoint | Remote interface*

6.5 EDIT PARAMETERS

Built-in user interface

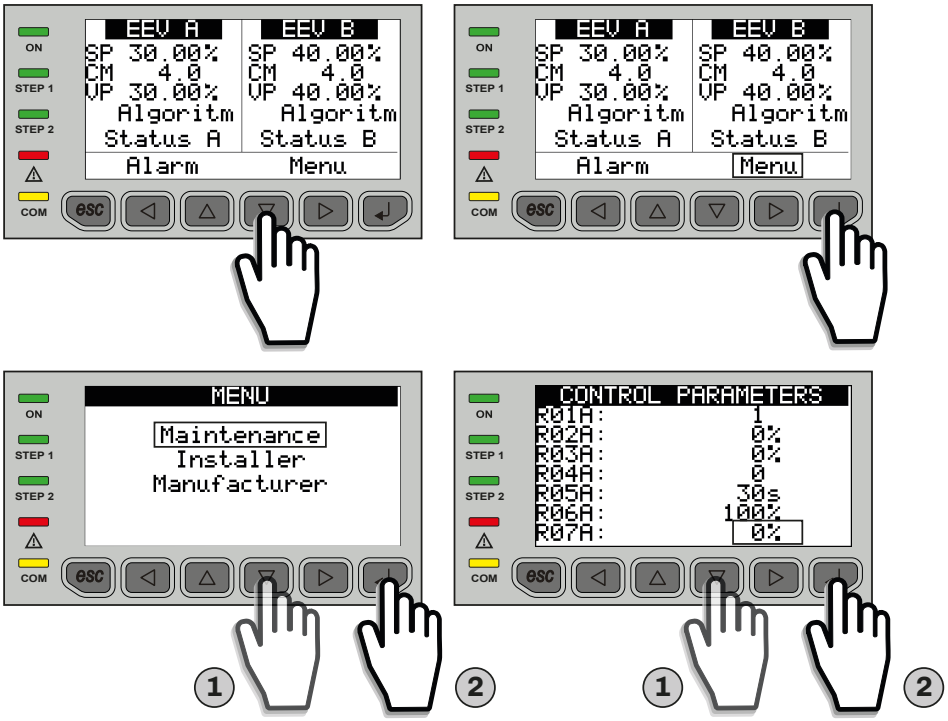


FIG. 12. *Changing the parameters | Built-in interface*

Remote user interface

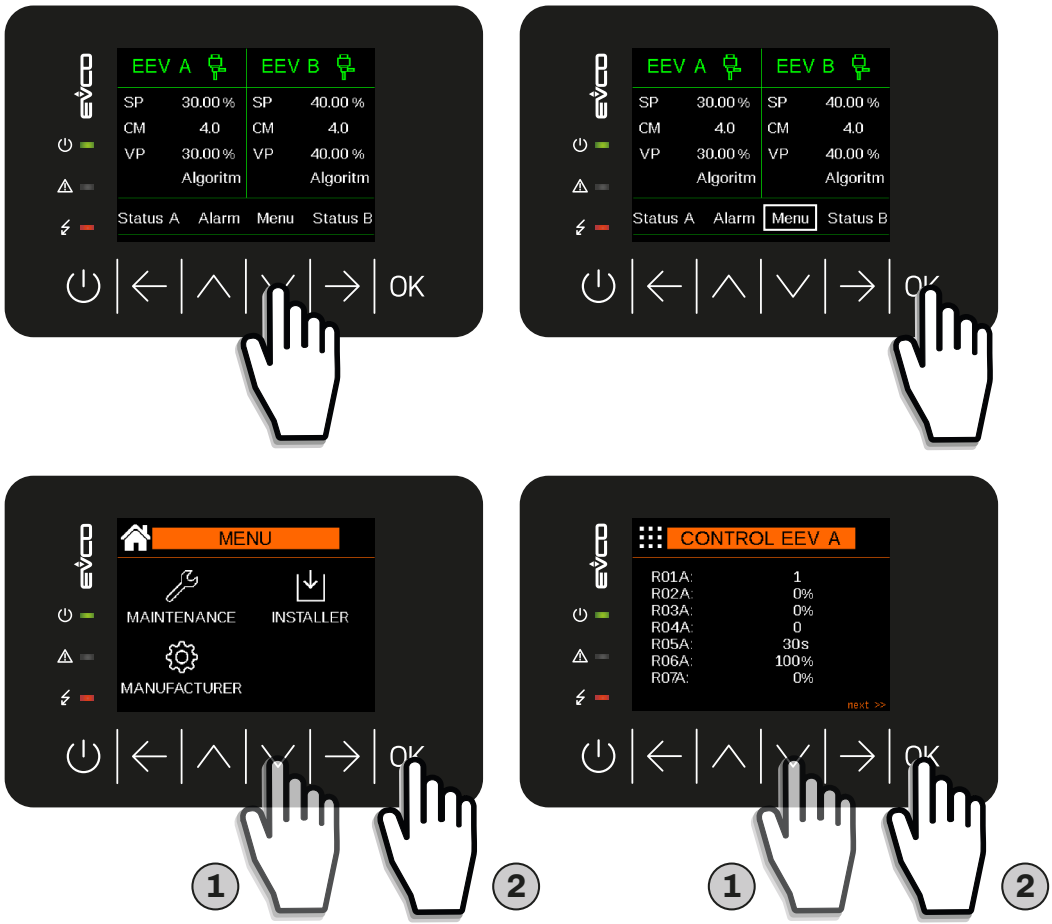


FIG. 13. *Changing the parameters| Remote interface*

6.6 ALARMS

Built-in user interface

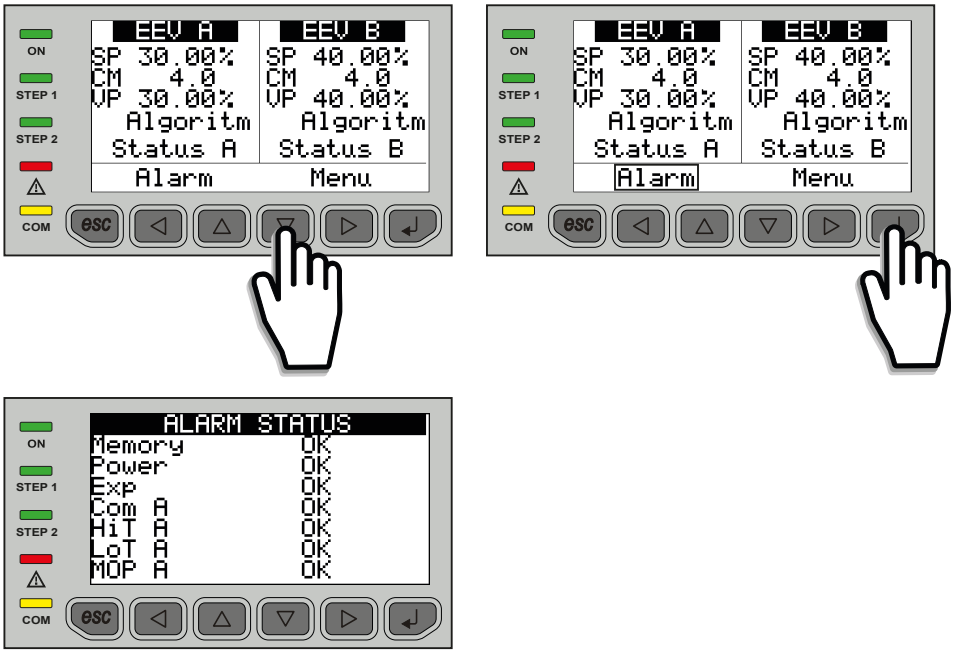


FIG. 14. *Alarms | Built-in user interface*

Remote user interface

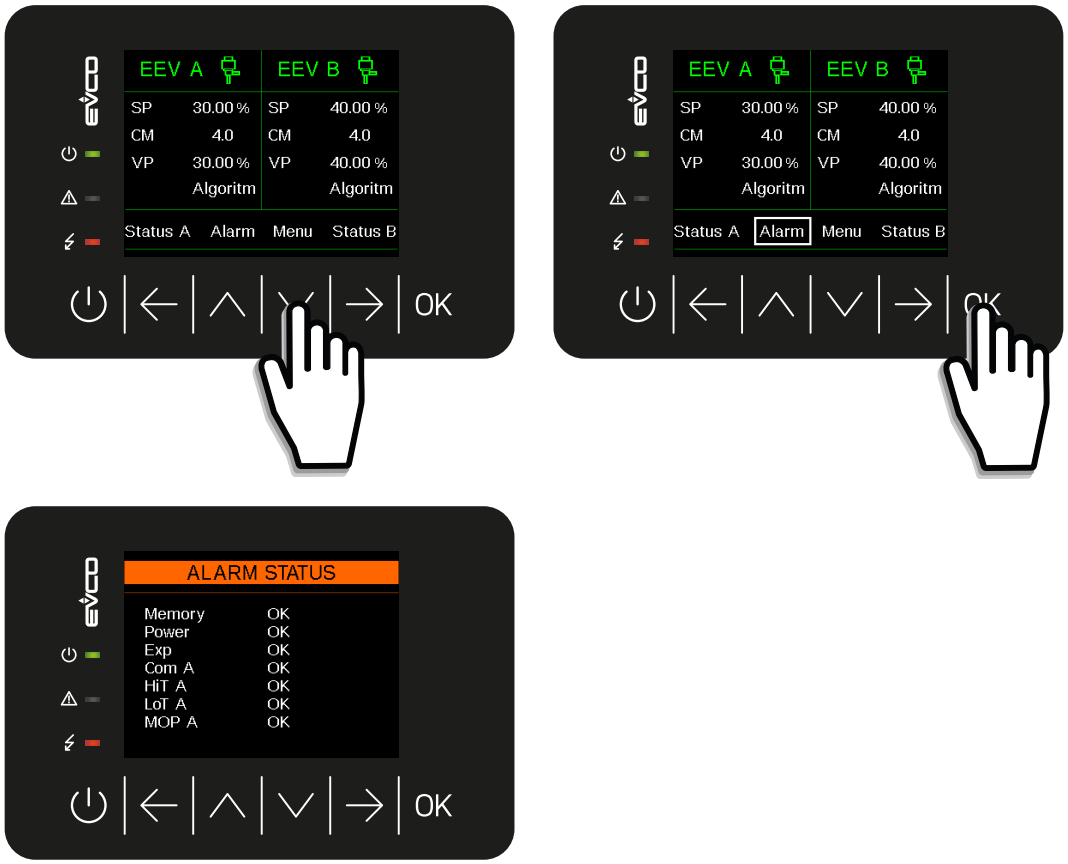


FIG. 15. *Alarms | Remote interface*

6.7 STATUS OF VALVES AND CORRESPONDING INPUTS

Built-in user interface

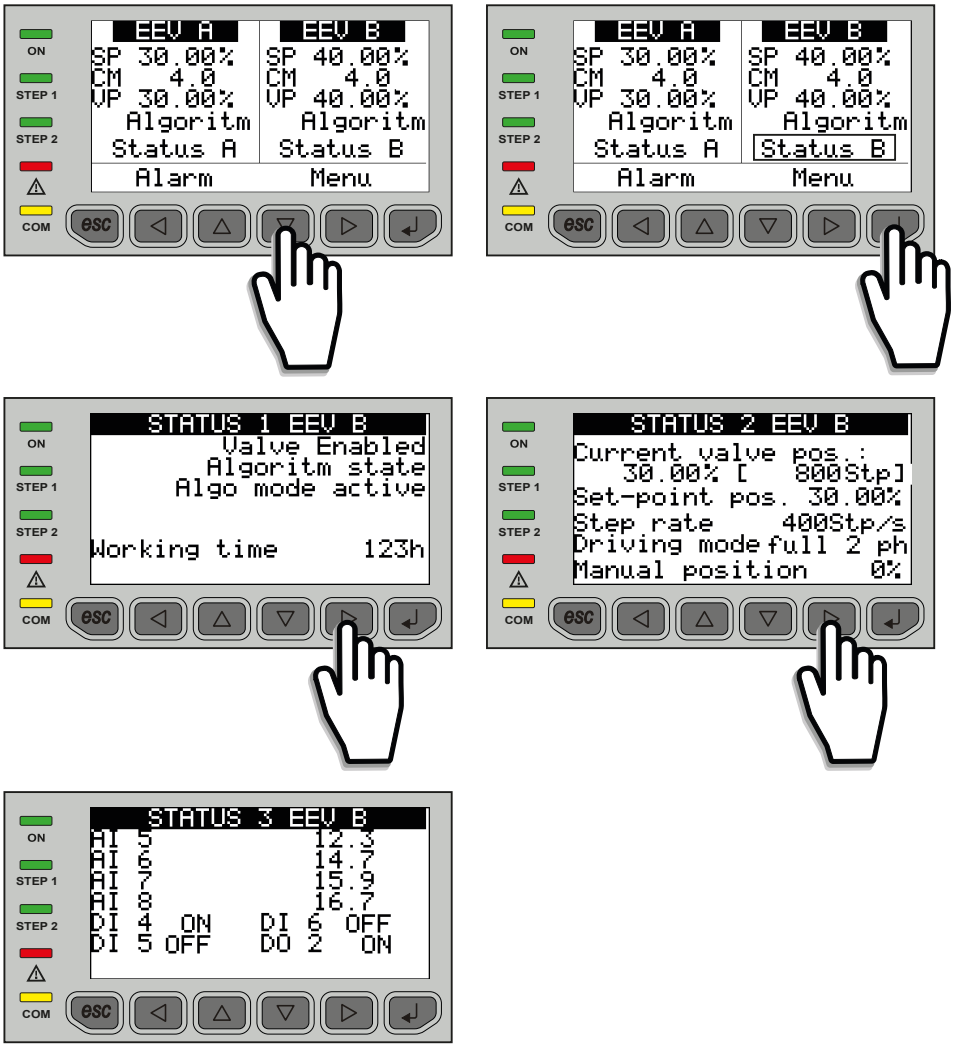


FIG. 16. *Status of valves and corresponding inputs | Built-in user interface*

Remote user interface

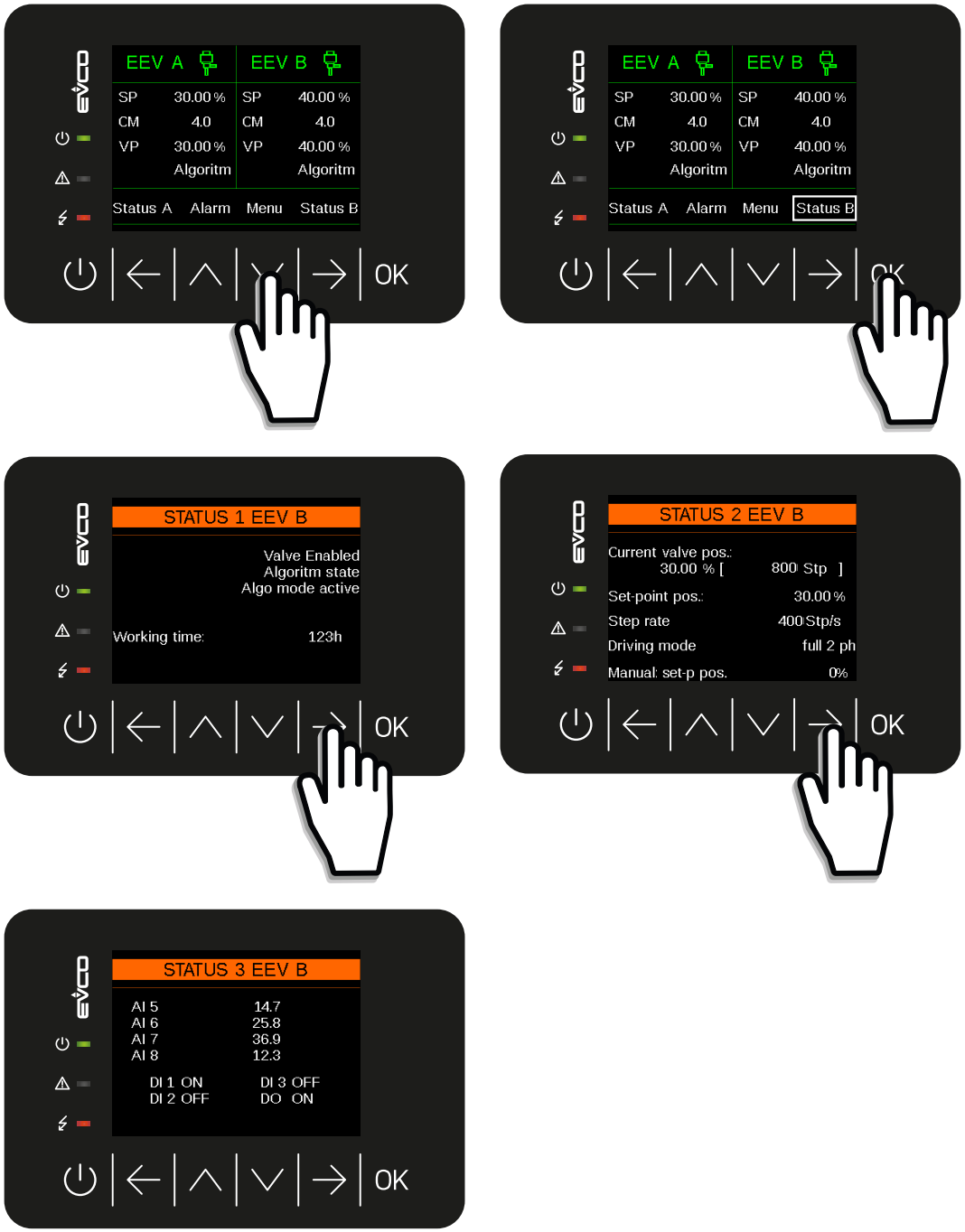


FIG. 17. *Status of valves and corresponding inputs | Remote interface*

6.8 CONFIGURING ANALOGUE INPUTS

Built-in user interface

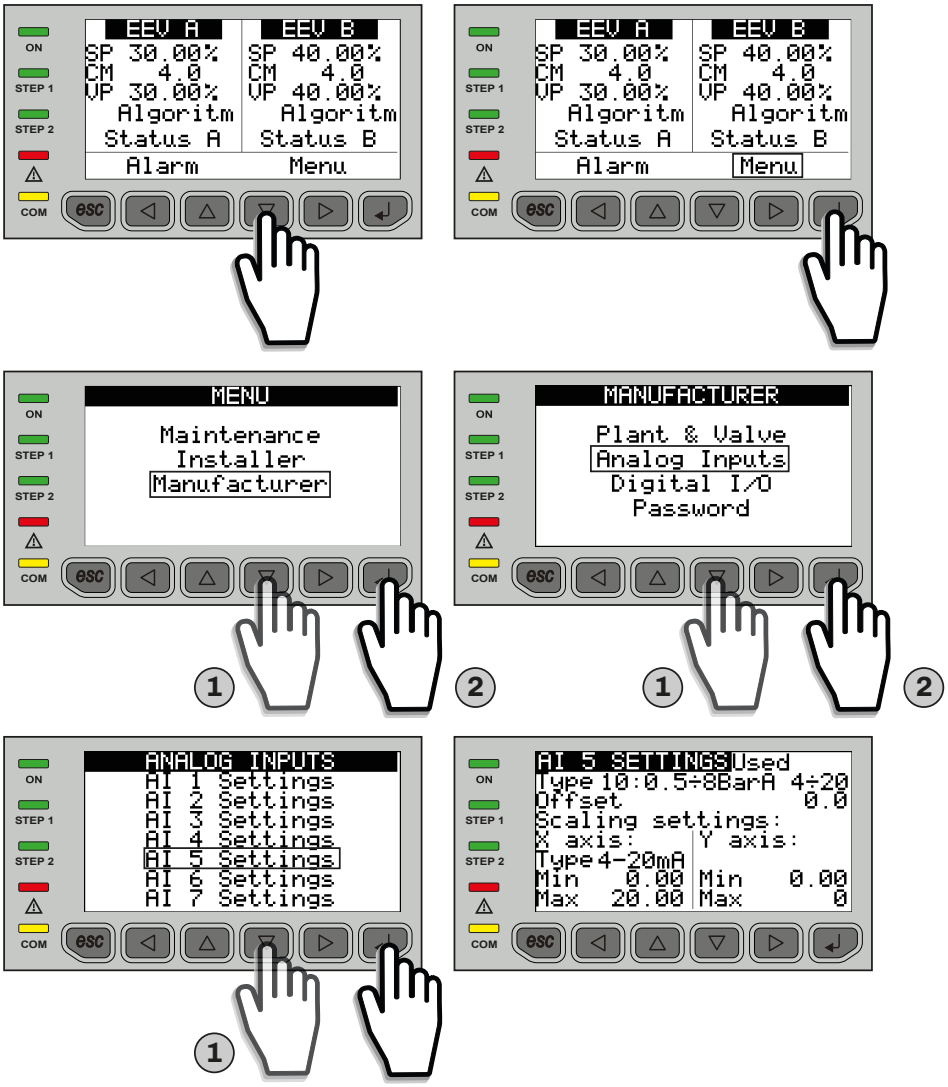


FIG. 18. *Configuring analogue inputs | Built-in user interface*

Remote user interface

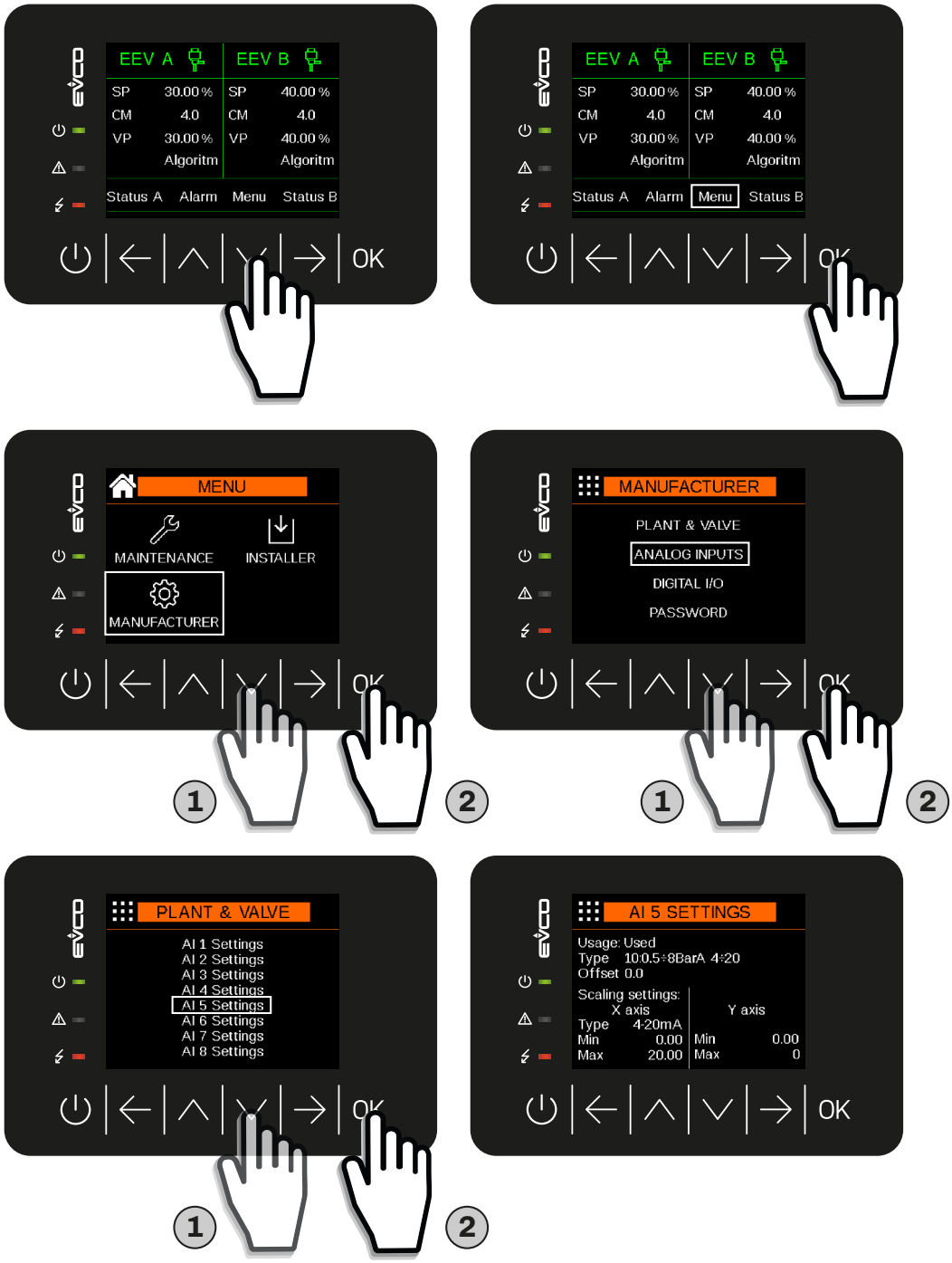


FIG. 19. *Configuring analogue inputs | Remote interface*

7. MACHINE STATUSES

7.1 INTRODUCTION

This chapter describes the regulation status of the machine as shown on the Homepage.

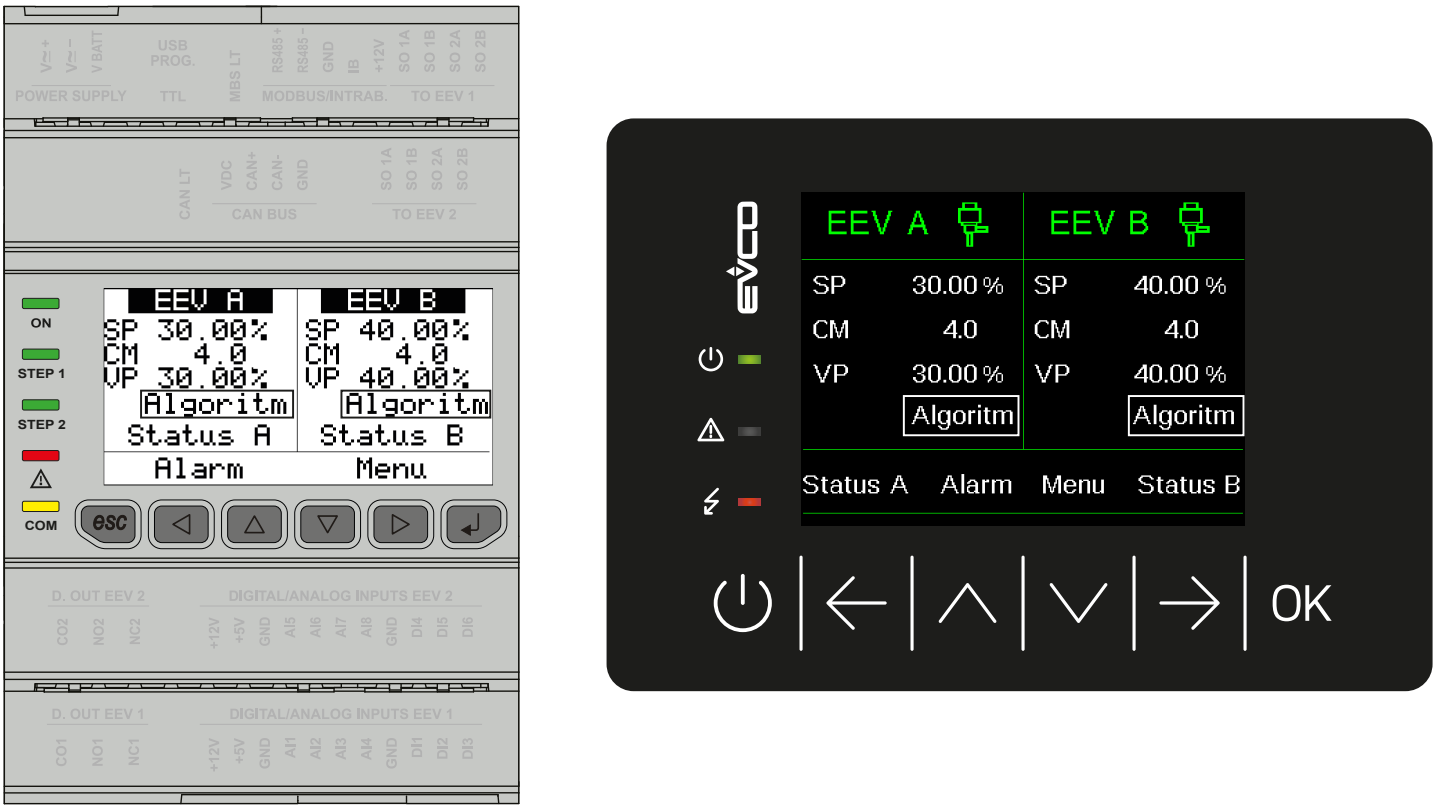


FIG. 20. *Machine statuses*

7.2 MACHINE REGULATION STATUSES

Status	Description
Initialising	Acquiring EEV parameters
Awaiting sync completion	Waiting for re-sync to complete
Awaiting positioning end	Waiting for current positioning process to end
Alarm	Valve in alarm status
Standby	Waiting for EEV enabling
Positioning device	Analogue positioning device control
Manual	Manual control
Equalising	Equalising phase in progress
Start-up	Start-up phase in progress
Algorithm	Regulation algorithm enabling Control algorithm in progress

7.2.1 Initialising

Initial status used to carry out the initial synchronisation phase for unipolar valves only.

7.2.2 Awaiting sync completion

EVDRIVE07 waits for valve synchronisation to be completed and moves on to the next status.

7.2.3 Awaiting positioning end

EVDRIVE07 waits for valve positioning to be completed at 0 absolute steps and moves on to the next status.

7.2.4 Standby

When the valve is disabled and has completed positioning it stops in this status.

If the probe value measurements have been acquired correctly and valve enabling is active, it moves on to the positioning device status, or to the equalising status depending on the regulation algorithm selected.

7.2.5 Positioning device/Analogue

EVDRIVE07 uses the value of the multifunctional probe linearised between its minimum and maximum, according to its configuration, to move the valve between 0 % and 100 %.

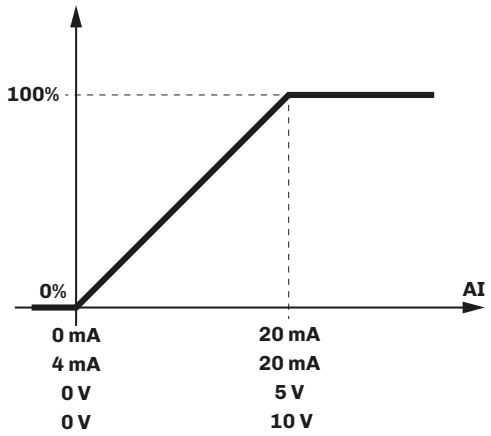


FIG. 21. *Positioning device/Analogue status operation*

7.2.6 Equalising (phase 1) / Stabilising (phase 2)

Before starting regulation, two phases must be carried out, the first being Equalising and the second Start-up.

The equalising phase is intended to equalise pressure in the circuit before the compressor is switched on, while the stabilising phase is used to start regulation to a specific valve opening value.

If the delay is at zero, move on to the next phase without carrying out the current phase.

The machine only moves from Equalising status to Stabilising status once the phase is complete.

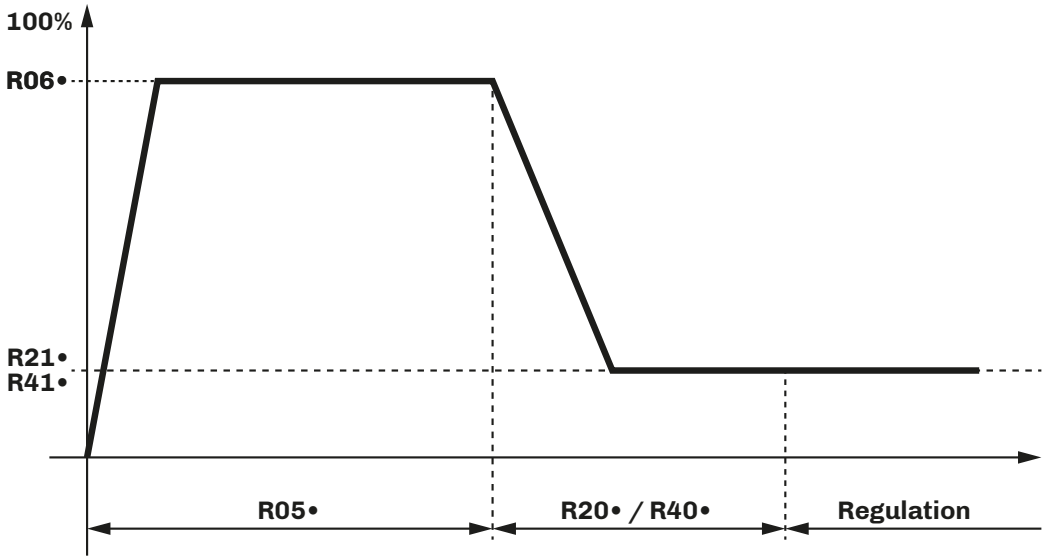


FIG. 22. *Equalising/stabilising status operation*

7.3 MANUAL

The valve position can be adjusted by setting the value in the parameter *Percentage position of the valve in manual mode* **R07A** (for valve A), **R07B** (for valve B) to maintain this value when the board restarts, otherwise set the parameters **S16A** (for valve A), **S16B** (for valve B) manual positioning setpoint.

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
In case of continuous writing in R07A, R07B, the memory may become damaged and cause the device to not work properly.

7.4 ALGORITHM

EVDRIVE07 is working properly in the selected algorithm

8. FUNCTIONS

8.1 VALVE ENABLING

To allow regulation with **EVDrive**, regulation must be enabled for the valve.
Enabling can take place in two ways:

- Via digital input configured as EEV enabling:
  - Valve A: **I01A** = ±1;
  - Valve B: **I01B** = ±1;
- Via Modbus command (if digital inputs **I01A** and **I01B** = 0), writing 1 in the register:
  - **S21A** (Command to enable valve A remotely);
  - **S21B** (Command to enable valve B remotely).

8.2 RE-SYNCING

Re-syncing is used to align the relevant valve at 0 % opening (zero steps), so that no steps are missed during regulation.
Re-sync activation takes place:

- At each power-on (power-on via power supply connection) of the **EVDRIVE07** (full sync);
- If set, at every **P07A** interval (Valve A), **P07B** (Valve B) (partial sync);
- Via digital input configured as Re-syncing:
  - Valve A: **I02A** = ±1;
  - Valve B: **I02B** = ±1;
- Via Modbus command
  - **S22A** (Command to re-sync valve A remotely);
  - **S22B** (Command to re-sync valve B remotely).

8.2.1 Full sync

At each power-on **EVDrive** closes the valve with the **Absolute steps** value (see chapter ***"11. VALVE CONFIGURATION" ON PAGE 53***).

8.2.2 Partial sync

Partial syncing only takes place when the valve is disabled. **EVDrive** closes the valve at 0 steps and then with a further 10 % of its maximum steps, but no greater than the **Absolute steps** value (see chapter ***"11. VALVE CONFIGURATION" ON PAGE 53***).

8.3 LIMITING VALVE OPENING

EVDRIVE07 manages the overheating value at the evaporator outlet by limiting valve opening.
The configuration parameters are:

Par.	Description	MU	Range
P05A	Maximum valve opening limit.	%	50...100
P05B	Maximum valve opening limit.	%	50...100
P06A	Minimum valve opening limit.	%	0...50
P06B	Minimum valve opening limit.	%	0...50

The EEV should be linearised between 0 % and the value of parameter **P05A** (Valve A)/**P05B** (Valve B).
If the driver controls an output below **P06A** (Valve A)/**P06B** (Valve B), the output assumes the value which is limited to the minimum valve opening **P06A** (Valve A)/**P06B** (Valve B).

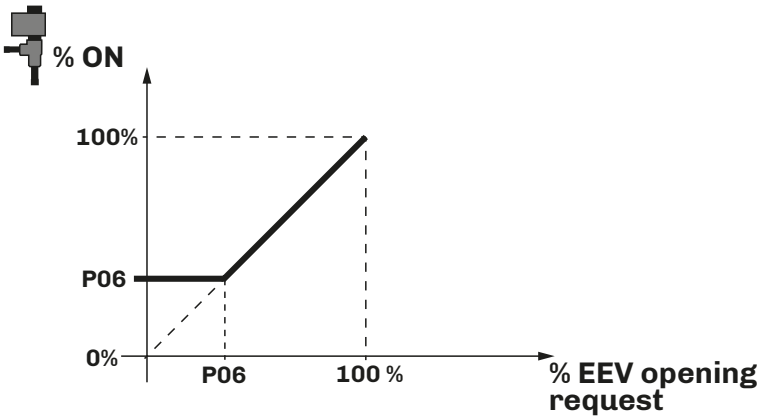


FIG. 23. *Minimum valve opening limit operation*

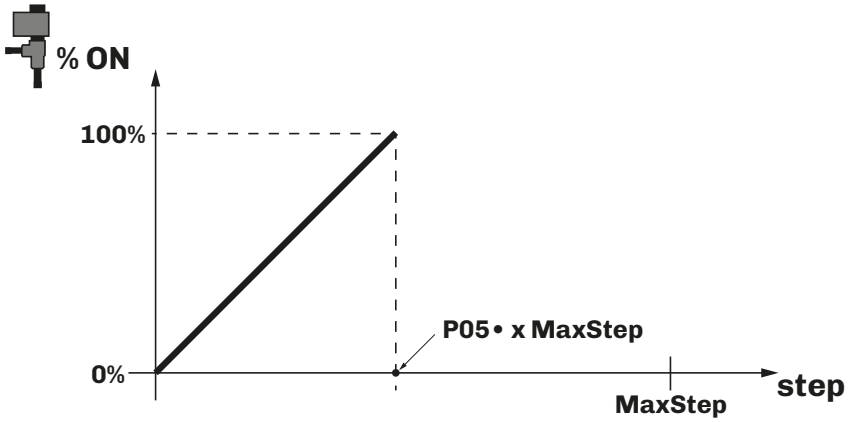


FIG. 24. *Maximum valve opening limit operation*

8.4 OPERATION WITH SHARED PRESSURE PROBE

If the application anticipates the use of two or more **EVDRIVE07** devices, the value detected by the pressure probe for one of the drivers (in which the pressure probe is installed) can be shared with all the others.

The configuration parameters are:

Par.	Description	MU	Range
R01A	Valve A operating mode. **-3** = EPR with shared pressure probe; **-2** = Economizer with shared pressure probe; **-1** = SH mode with shared pressure probe. **...**	-	-3...6
R01B	Valve B operating mode. Same as **R01A.**	-	-3...6

8.5 VALVE OPERATION IN DUTY CYCLE

EVDRIVE07 can be used to manage motorised electronic expansion valves which need to run in duty cycle mode, so as to protect that valve from overheating.

The configuration parameters are:

Par.	Description	MU	Range
P08A	Valve A duty cycle.	%	30...100
P08B	Valve B duty cycle.	%	30...100

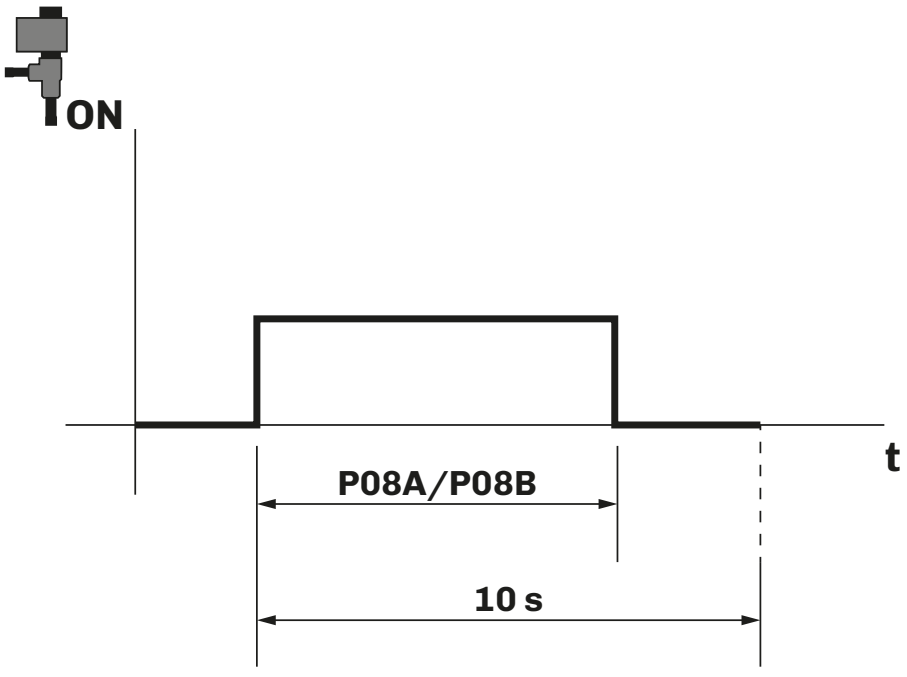


FIG. 25. *Valve operation in duty cycle*

8.6 SIMULATOR FUNCTION

To simulate **EVDRIVE07** operation in a test setting, without physically connecting the driver to the system, the **simulator** function can be enabled using parameter **I90•** (**I90•** = 1).

The following can be simulated:

- Digital inputs, using parameters **I91•**... **I93•**;
- Analogue inputs, using parameters **I94•**... **I97•.**

9. REGULATION

9.1 INTRODUCTION

EVDRIVE07 can be used to set two regulation types independently for valves A and B.

The configuration parameters are:

Par.	Description	MU	Range
R01A	Valve A operating mode. **-3** = EPR with shared pressure probe; **-2** = Economizer with shared pressure probe; **-1** = SH mode with shared pressure probe; **0** = No control; **1** = SH mode; **2** = Economizer; **3** = EPR; **4** = HotGasBypass; **5** = Positioning device; **6** = Manual.	-	-3...6
R01B	Valve B operating mode. Same as **R01A.**	-	-3...6

9.2 CONNECTING INPUTS ACCORDING TO REGULATION TYPE

Regulation algorithm	Valve A		Valve B	
	AI1 input	**AI3 input**	**AI5 input**	**AI7 input**
---	Not used	Not used	Not used	Not used
SH	**Used for regulation**	**Used for regulation**	**Used for regulation**	**Used for regulation**
Economizer	**Used for regulation**	**Used for regulation**	**Used for regulation**	**Used for regulation**
Pressure/Temperature	**Used for regulation**	Not used	**Used for regulation**	Not used
HotGasBypass	Not used	**Used for regulation**	Not used	**Used for regulation**
Positioner	**Used for regulation**	Not used	**Used for regulation**	Not used
Manual	Not used	Not used	Not used	Not used
Debugger	Not used	Not used	Not used	Not used
Remote control	Not used	**Used for regulation**	Not used	**Used for regulation**

9.3 SH/ECONOMIZER OVERHEATING REGULATION

9.3.1 SH

SH regulation can be used to keep the overheating temperature at a selected value.

EVDRIVE07 calculates the overheating value for the process using the two analogue inputs **AI1** (evaporation pressure/temperature sensor) and **AI3** (intake temperature probe).

Through a PID regulator, it modulates valve opening so that overheating reaches the setpoint:

- Valve A: **R22A, R42A**;
- Valve B: **R22B, R42B**;

9.3.2 Economizer

The economizer is an auxiliary exchanger which makes part of the liquid evaporate and uses the steam generated to cool the compressor head.

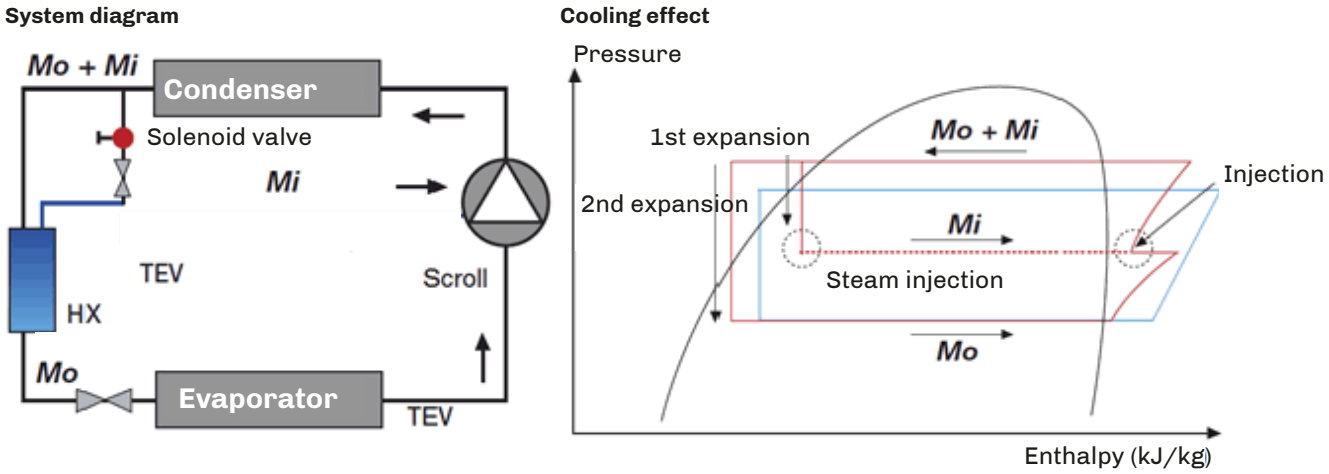


FIG. 26. *Economizer operation*

The configuration parameters are:

Par.	Description	MU	Range
R01A	Valve A operating mode. **-3** = EPR with shared pressure probe; **-2** = Economizer with shared pressure probe; **-1** = SH mode with shared pressure probe; **0** = No control; **1** = SH mode; **2** = Economizer; **3** = EPR; **4** = HotGasBypass; **5** = Positioning device; **6** = Manual.	-	-3...6
R20A	Valve A start-up time.	s	0...255
R20B	Valve B start-up time.	s	0...255
R21A	Valve A start-up position.	%	0...100
R21B	Valve B start-up position.	%	0...100
R22A	Valve A regulation setpoint.	K/°C	**R10A** ...**R11A**
R22B	Valve B regulation setpoint.	K/°C	**R10B** ...**R11B**
R23A	Valve A PID proportional band.	K	1.0...99.9
R23B	Valve B PID proportional band.	K	1.0...99.9
R24A	Valve A PID integral time.	s	0...999
R24B	Valve B PID integral time.	s	0...999
R25A	Valve A PID derivative time.	s	0...999
R25B	Valve B PID derivative time.	s	0...999
R26A	Valve A neutral zone threshold.	K	0.0...**R27A**
R26B	Valve B neutral zone threshold.	K	0.0...**R27B**
R27A	Valve A proportional band threshold constant.	K	**R26A** ... 25.0
R27B	Valve B proportional band threshold constant.	K	**R26B** ... 25.0
R28A	Valve A fast action level.	%	1...100
R28B	Valve B fast action level.	%	1...100

Operation

The algorithm uses various regulation parameters, depending on the area of operation:

- If SH is in the *Neutral zone*, no regulation takes place;
- If SH is in the *Smart band*, a smart regulator is used (P constant);
- If SH is in the *Normal Control band*, a PID regulator is used;
- If SH is in the *Fast Action band*, a fast action PID regulator algorithm is used.

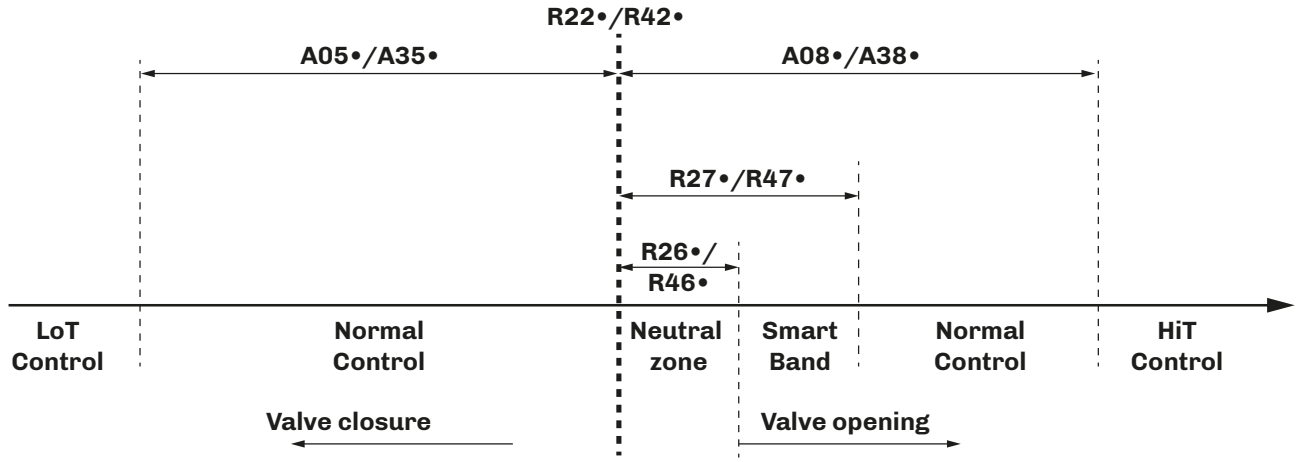


FIG. 27. *Operation*

9.3.3 Stable SH minimum

If the SH value remains stable (within the neutral zone for regulation) for a time period **R50A** (for valve A), **R50B** (for valve B), **EVDRIVE07** reduces the SH setpoint by 0.1 K.

The procedure may be repeated until the SH setpoint reaches value **R10A** (for valve A), **R10B** (for valve B).

In the event of unstable regulation due to the maximum number of movements into and out of the neutral zone **R49A** (for valve A), **R49B** (for valve B) being exceeded, or a maximum time period **R51A** (for valve A), **R51B** (for valve B) being exceeded, the SH setpoint can be increased by 0.5 K until the original SH setpoint parameter is reached.

Movements into and out of the neutral zone that take place at a lower frequency than the time spent in this band **R50A** (for valve A), **R50B** (for valve B) are not counted.

The configuration parameters are:

Par.	Description	MU	Range
R10A	Minimum value that can be assigned to the regulation setpoint.	---	-99.9...99.9
R10B	Minimum value that can be assigned to the regulation setpoint.	---	-99.9...99.9
R05A	Equalising time.	s	0...255
R05B	Equalising time.	s	0...255
R51A	Maximum time spent outside minSH band.	min	0...250
R51B	Maximum time spent outside minSH band.	min	0...250
R49A	Number of oscillations per minSH.	---	0...10
R49B	Number of oscillations per minSH.	---	0...10

9.3.4 Adaptive SH control algorithm

To use the adaptive SH control, the high pressure sensor and the compressor discharge temperature probe should be connected.

In a machine that is working properly, the difference between the compressor discharge temperature and the flow overheating condensation temperature (dSH) should be between 20 and 30 K.

- If dSH is too low, it may return to liquid form at the compressor – to combat this phenomenon, it is useful to increase the SH setpoint.
- If the differential is too high, there is no risk of a liquid return – considering the “favourable” conditions relating to compressor safety the SH setpoint can be reduced to increase system efficiency (reduction in condensation pressure and increase in evaporation pressure).

These variations will have a minimum and a maximum, neutral zone regulation is used on the dSH to increase or decrease the SH setpoint, each variation has a time period condition so as to allow the system to stabilise.

The configuration parameters are:

Par.	Description	MU	Range
R12A	dSH minimum setpoint.	K	0,0...**R13A**
R12B	dSH minimum setpoint.	K	0,0...**R13B**
R13A	dSH maximum setpoint.	K	**R12A** = 50.0

Par.	Description	MU	Range
R13B	dSH maximum setpoint.	K	**R12B** = 50.0
R14A	dSH minimum delay.	min	1...10000
R14B	dSH minimum delay.	min	1...10000
R15A	dSH maximum delay.	min	0...10000
R15B	dSH maximum delay.	min	0...10000
R16A	dSH minimum SH variation.	K	0.1...2.0
R16B	dSH minimum SH variation.	K	0.1...2.0
R17A	dSH maximum SH variation.	K	0.1...2.0
R17B	dSH maximum SH variation.	K	0.1...2.0
R18A	dSH neutral zone minimum band.	K	0.0...50.0
R18B	dSH neutral zone minimum band.	K	0.0...50.0
R19A	dSH neutral zone maximum band.	K	0.0...50.0
R19B	dSH neutral zone maximum band.	K	0.0...50.0

Operation

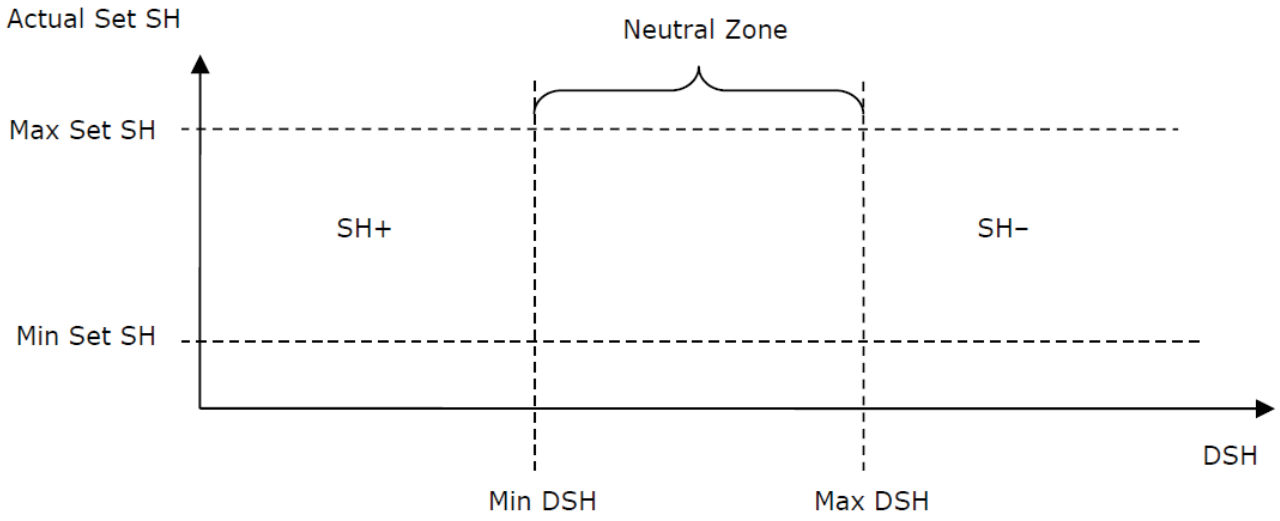


FIG. 28. *Operation*

9.4 HOTGASBYPASS ALGORITHM

The HotGasBypass algorithm can be used to keep the regulation temperature at a setpoint value **R22A** (for valve A), **R22B** (for valve B).

The configuration parameters are:

Par.	Description	MU	Range
R22A	Valve A regulation setpoint.	K/°C	**R10A** ...**R11A**
R22B	Valve B regulation setpoint.	K/°C	**R10B** ...**R11B**
R23A	Valve A PID proportional band.	K	1.0...99.9
R23B	Valve B PID proportional band.	K	1.0...99.9
R24A	Valve A PID integral time.	s	0...999
R24B	Valve B PID integral time.	s	0...999
R25A	Valve A PID derivative time.	s	0...999
R25B	Valve B PID derivative time.	s	0...999
R26A	Valve A neutral zone threshold.	K	0.0...**R27A**
R26B	Valve B neutral zone threshold.	K	0.0...**R27B**
R27A	Valve A proportional band threshold constant.	K	**R26A** ... 25.0
R27B	Valve B proportional band threshold constant.	K	**R26B** ... 25.0

9.4.1 Operation

The algorithm uses various regulation parameters, depending on the area of operation:

- If SH is in the *Neutral zone*, no regulation takes place;
- If SH is in the *Smart band*, a smart regulator is used (P constant);
- If SH is in the *Normal Control band*, a PID regulator is used;
- If SH is in the *Fast Action band*, a fast action PID regulator algorithm is used.

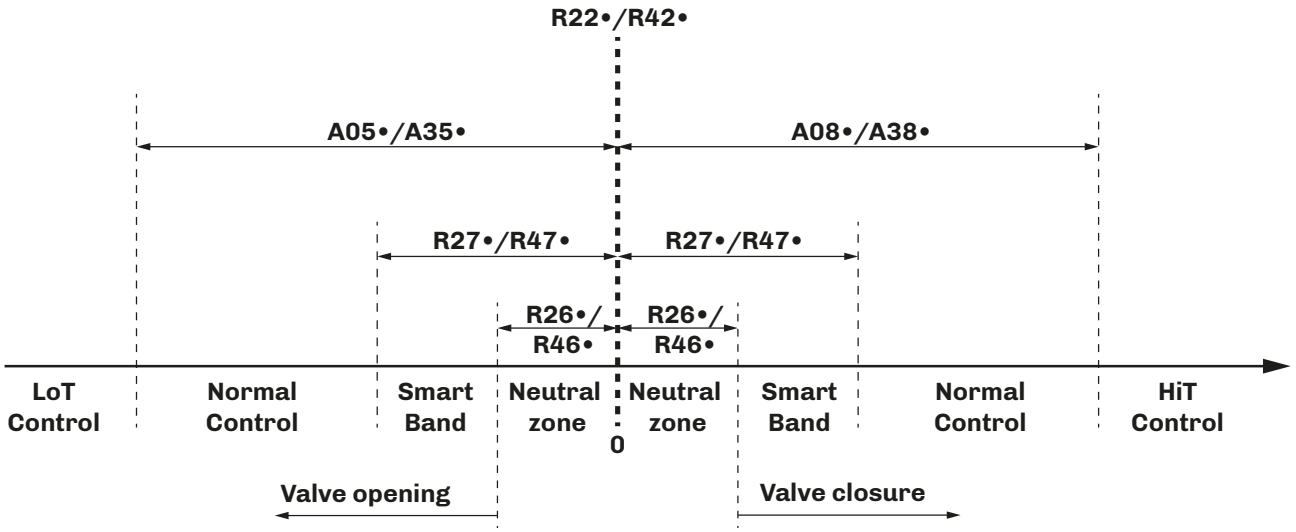


FIG. 29. *Operation*

9.5 EVAPORATOR PRESSURE REGULATOR (EPR)

To use the evaporator pressure regulator (EPR), you need to connect the pressure/temperature probe.

The algorithm keeps the temperature - and therefore the pressure reading - steady.

The regulator reading is provided by the multifunctional probe, which can be configured as both a pressure probe and a temperature probe. If the probe is configured in terms of pressure, a conversion into the corresponding temperature is carried out in accordance with the selected gas.

9.5.1 Operation

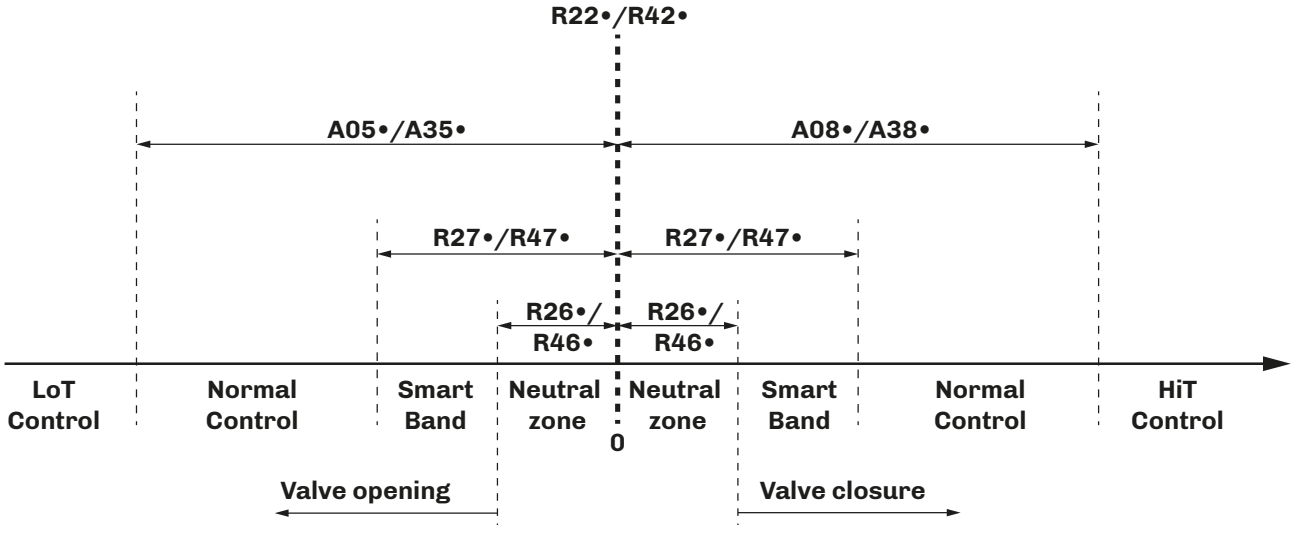


FIG. 30. *EPR operation*

9.6 AHIT | HIGH REGULATION TEMPERATURE ALARM

This alarm is only managed if the High Temperature Alarm Delay parameter (**A07•**) ≠ 0. The alarm resets automatically.

In SH, HGB, Economizer or Constant temperature control, the alarm is activated when:

- Regulation temperature > High regulation temperature threshold (**A38•**)
- High temperature alarm delay elapsed (**A07•**)

The alarm resets when:

- Regulation temperature > High regulation temperature threshold (**A38•**) - High Temperature Alarm Hysteresis (**A09•**)

Fast action is triggered when:

- Regulation temperature > High regulation temperature threshold (**A38•**)

Fast action is not active when:

- Regulation temperature < High regulation temperature threshold (**A38•**).

9.7 ALOT | LOW REGULATION TEMPERATURE ALARM

This alarm is only managed if the Low Temperature Alarm Delay parameter (**A04•**) ≠ 0. The alarm resets automatically.

In SH, HGB, Economizer or Constant temperature control, the alarm is activated when:

- Regulation temperature < Low regulation temperature threshold (**A35•**)
- Low temperature alarm delay elapsed (**A04•**)

The alarm resets when:

- Regulation temperature > Low regulation temperature threshold (**A35•**) - Low temperature alarm hysteresis (**A06•**)

Fast action is activated when:

- Regulation temperature < Low regulation temperature threshold (**A35•**)

Fast action is not active when:

- Regulation temperature > Low regulation temperature threshold (**A35•**).

9.8 MOP | HIGH PRESSURE ALARM

This alarm is only managed if the MOP Alarm Delay parameter (**A13•**) ≠ 0. The alarm resets automatically.

In SH and Economizer control, the alarm is activated when the MOP bypass time (**A19•**) from PID activation has elapsed and:

- Evaporation temperature > MOP temperature (**A14•**)
- MOP alarm delay elapsed (**A13•**)

The alarm resets when:

- Evaporation temperature < MOP temperature (**A14•**) - MOP Alarm Hysteresis (**A15•**)

MOP regulation active with:

- Evaporation temperature > MOP temperature (**A14•**);

MOP regulation not active if:

- Evaporation temperature < MOP temperature (**A14•**).

As soon as the threshold is passed once the bypass time has elapsed, the following occurs:

- **EVDRIVE07** changes the SH Setpoint. The parameters of this algorithm are MOP band (**A17•**), dSH maximum applicable MOP (**A16•**). This algorithm is only active if the MOP Alarm Band parameter (**A17•**) ≠ 0;
- **EVDRIVE07** closes the MOP Alarm Forced Decrease (**A20•**) every MOP Alarm Forced Decrease Time (**A21•**). This algorithm is only active if the MOP Alarm Forced Decrease parameter (**A20•**) ≠ 0.

The alarm is indicated if the MOP Alarm Delay time elapses (**A13•**).

9.9 LOP | LOW PRESSURE ALARM

This alarm is only managed if the LOP Alarm Delay parameter (**A13•**) is not 0. The alarm resets automatically.
In SH and Economizer control, the alarm is activated when the bypass time from PID activation has elapsed and:

- Evaporation temperature < LOP temperature (**A11•**)
- LOP alarm delay elapsed (**A13•**)

The alarm resets when:

- Evaporation temperature > LOP temperature (**A11•**) + LOP Alarm Hysteresis (**A12•**).

Regulation is active if the alarm is triggered.

As soon as the threshold is passed, a control algorithm is also activated and the alarm is indicated if the LOP Alarm Delay time (**A13•**) elapses.

If the LOP alarm occurs during the algorithm phase, regulation stops the valve when:

- The LOP alarm is triggered;
- The overheating value is greater than 0.5 K;
- The algorithm wants to close the valve.

If the LOP alarm occurs during the start-up phase (when the evaporation temperature is effectively low), the algorithm forces valve opening.

If the LOP alarm is reset, **EVDRIVE07** stops the valve. This phase can be optimised by configuring a correct valve opening value in the start-up parameters (Equalising position (**A06•**), Equalising time (**A05•**), Start-up position (**A21•** for SET1 or **A41•** for SET2), Start-up time (**A20•** for SET1 or **A40•** for SET2).

9.10 THERMOSTAT

The thermostat function is used to enable valve movement when the reference temperature **AI4** (valve A)/**AI8** (valve B) increases or drops below a specific setpoint value.

To enable this function, simply set parameter **R60•** (**R60•** = 1).

9.10.1 Operation

- In cooling (**R61•** = 0):
  - EEV enabled when the temperature read on **AI4** (valve A) /**AI8** (valve B) > **R62•** + **R63•**
  - EEV disabled when the temperature read on **AI4** (valve A) /**AI8** (valve B) < **R62•**
- In heating (**R61•** = 1):
  - EEV enabled when temperature **AI4** (valve A) /**AI8** (valve B) < **R62•**/ **R63•**
  - EEV disabled when temperature **AI4** (valve A) /**AI8** (valve B) > **R62•**

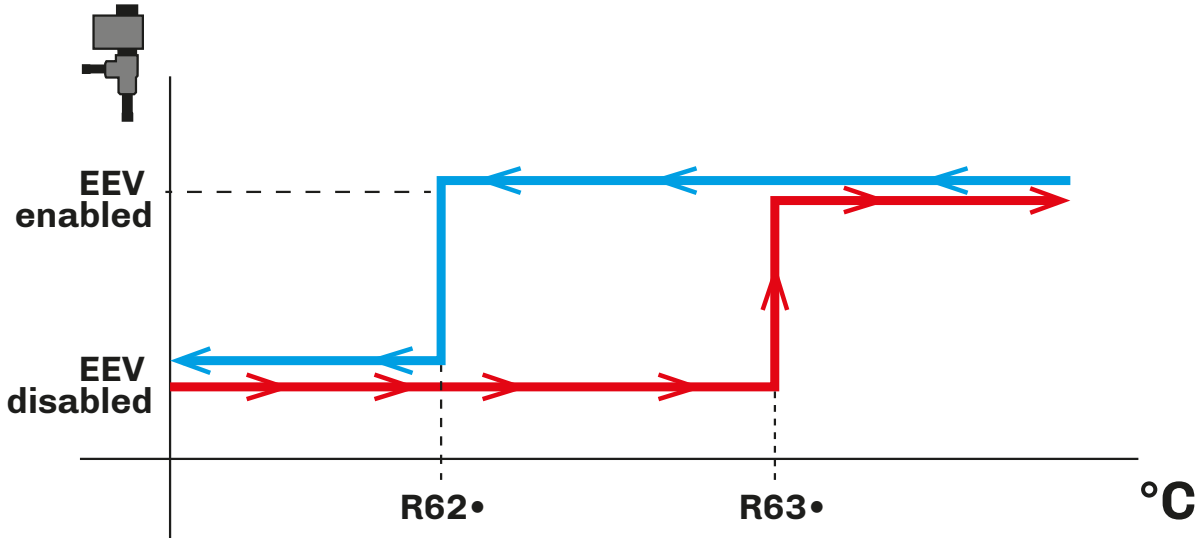


FIG. 31. *Thermostat operation | Cooling*

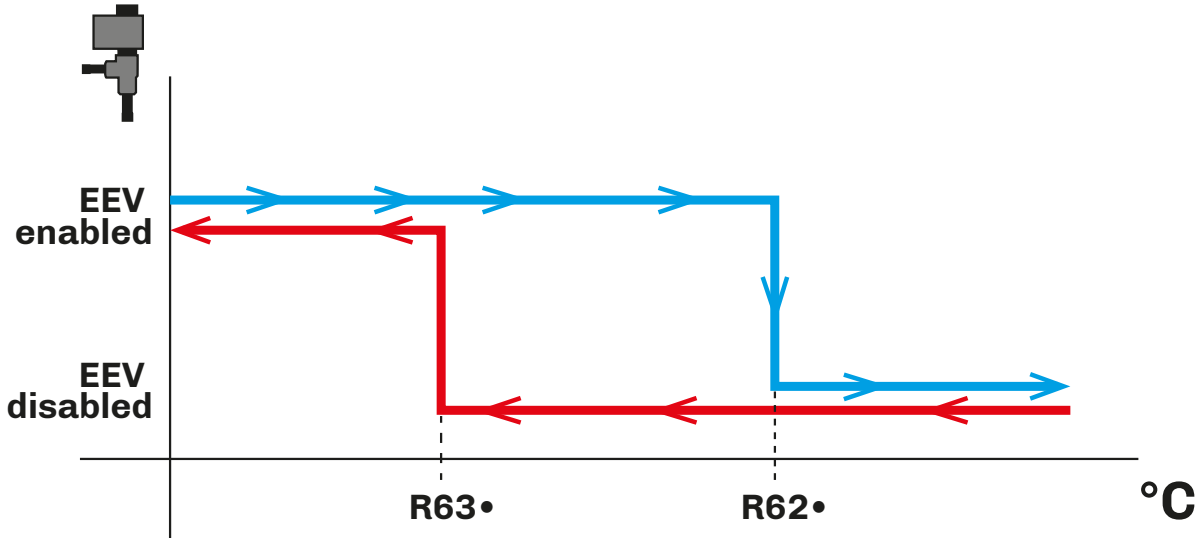


FIG. 32. *Thermostat operation | Heating*

10. PARAMETERS

10.1 DESCRIPTION OF COLUMNS IN THE TABLE OF PARAMETERS

- **Par**.: list of configurable device parameters;
- **Description**: indicates parameter operation and any possible selections;
- **MU**: measurement unit relating to the parameter;
- **Range**: describes the interval of values that the parameter can assume. This can be correlated with other instrument parameters (indicated with the parameter code).
  NOTE: *if the actual value is outside the permitted limits for that parameter (for example, because other parameters defining the aforementioned limits have been altered), the value of the violated limit is displayed instead of the actual value;*
- **Default**: indicates the pre-set factory configuration;
- **PW**: indicates the access level for the parameter:
  - **U** = User parameters;
  - **I** = Installer parameters;
  - **M** = Maintenance parameters;
  - **C** = Construction parameters.

10.1.1 Key to parameters

- **•••A** (for example **R01A**) = Parameters referring to valve A;
- **•••B** (for example **R01B**) = Parameters referring to valve B;
- **•••** (for example **P01**) = Parameters referring to both valves.

10.2 TABLE OF CONFIGURATION PARAMETERS

Par.	PW	Description	MU	Range	Default
		REGULATION group			
R01A	M	Valve A operating mode. **-3** = EPR with shared pressure probe; **-2** = Economizer with shared pressure probe; **-1** = SH mode with shared pressure probe; **0** = No control; **1** = SH mode; **2** = Economizer; **3** = EPR; **4** = HotGasBypass; **5** = Positioning device; **6** = Manual.	---	-3...6	1
R01B	M	Valve B operating mode. Same as **R01A.**	---	-3...6	1
R02A	M	Standby position.	%	0...100	0
R02B	M	Standby position.	%	0...100	0
R03A	M	Position in error.	%	-1...100	0
R03B	M	Position in error.	%	-1...100	0
R04A	M	Enable adaptive SH. **0** = Disabled; **1** = Enabled.	K	0/1	0
R04B	M	Enable adaptive SH. Same as **R04A**.	K	0/1	0
R05A	M	Equalising time.	s	0...255	30
R05B	M	Equalising time.	s	0...255	30
R06A	M	Equalising position.	%	0...100	100
R06B	M	Equalising position.	%	0...100	100
R07A	M	Manual valve percentage position.	%	0...100	0
R07B	M	Manual valve percentage position.	%	0...100	0
R08A	M	Parameter set selection. **0** = SET 1 parameters (**R20•**...**R34•**); **1** = SET 2 parameters (**R40•**...**R54•**).	---	0/1	0
R08B	M	Parameter set selection. Same as **R08A**.	---	0/1	0
R10A	M	Minimum value that can be assigned to the regulation setpoint.	---	-99.9...99.9	3.0
R10B	M	Minimum value that can be assigned to the regulation setpoint.	---	-99.9...99.9	3.0
R11A	M	Maximum value that can be assigned to the regulation setpoint.	---	-99.9...99.9	10.0

Par.	PW	Description	MU	Range	Default
R11B	M	Maximum value that can be assigned to the regulation setpoint.	---	99.9...99.9	10.0
R12A	M	dSH minimum setpoint.	K	0,0...**R13A**	20.0
R12B	M	dSH minimum setpoint.	K	0,0...**R13B**	20.0
R13A	M	dSH maximum setpoint.	K	**R12A** = 50.0	30.0
R13B	M	dSH maximum setpoint.	K	**R12B** = 50.0	30.0
R14A	M	dSH minimum delay.	min	1...10000	60
R14B	M	dSH minimum delay.	min	1...10000	60
R15A	M	dSH maximum delay.	min	0...10000	300
R15B	M	dSH maximum delay.	min	0...10000	300
R16A	M	dSH minimum SH variation.	K	0.1...2.0	1.0
R16B	M	dSH minimum SH variation.	K	0.1...2.0	1.0
R17A	M	dSH maximum SH variation.	K	0.1...2.0	0.2
R17B	M	dSH maximum SH variation.	K	0.1...2.0	0.2
R18A	M	dSH neutral zone minimum band.	K	0.0...50.0	4.0
R18B	M	dSH neutral zone minimum band.	K	0.0...50.0	4.0
R19A	M	dSH neutral zone maximum band.	K	0.0...50.0	4.0
R19B	M	dSH neutral zone maximum band.	K	0.0...50.0	4.0
	SET 1 REGULATION group				
R20A	M	Start-up time.	s	0...255	60
R20B	M	Start-up time.	s	0...255	60
R21A	M	Start-up position.	%	0...100	50
R21B	M	Start-up position.	%	0...100	50
R22A	M	Regulation setpoint.	K/°C	**R10A**...**R11A**	6.0
R22B	M	Regulation setpoint.	K/°C	**R10B**...**R11B**	6.0
R23A	M	PID proportional band.	K	1.0...99.9	40.0
R23B	M	PID proportional band.	K	1.0...99.9	40.0
R24A	M	PID integral time.	s	0...999	120
R24B	M	PID integral time.	s	0...999	120
R25A	M	PID derivative time.	s	0...999	30
R25B	M	PID derivative time.	s	0...999	30
R26A	M	Neutral zone threshold.	K	0,0...**R27A**	1.0
R26B	M	Neutral zone threshold.	K	0,0...**R27B**	1.0
R27A	M	Proportional band threshold constant.	K	**R26A** = 99.9	3.0
R27B	M	Proportional band threshold constant.	K	**R26B** = 99.9	3.0
R28A	M	Fast action level.	%	1...100	70
R28B	M	Fast action level.	%	1...100	70
R29A	M	Number of oscillations per minSH.	---	0...10	5
R29B	M	Number of oscillations per minSH.	---	0...10	5
R30A	M	Maximum time for minSH oscillations.	min	0...250	5
R30B	M	Maximum time for minSH oscillations.	min	0...250	5
R31A	M	Maximum time spent outside minSH band.	min	0...250	5
R31B	M	Maximum time spent outside minSH band.	min	0...250	5
R32A	M	LOP PID proportional band.	K	0.0...100.0	10.0
R32B	M	LOP PID proportional band.	K	0.0...100.0	10.0
R33A	M	LOP PID integral time.	s	0...1000	10
R33B	M	LOP PID integral time.	s	0...1000	10
R34A	M	LOP PID derivative time.	s	0...1000	0
R34B	M	LOP PID derivative time.	s	0...1000	0
	SET 2 REGULATION group				
R40A	M	Start-up time.	s	0...255	60
R40B	M	Start-up time.	s	0...255	60
R41A	M	Start-up position.	%	0...100	50
R41B	M	Start-up position.	%	0...100	50

Par.	PW	Description	MU	Range	Default
R42A	M	Regulation setpoint.	K	**R10A**...**R11A**	6.0
R42B	M	Regulation setpoint.	K	**R10B**...**R11B**	6.0
R43A	M	PID proportional band.	K	1.0...99.9	40.0
R43B	M	PID proportional band.	K	1.0...99.9	40.0
R44A	M	PID integral time.	s	0...999	120
R44B	M	PID integral time.	s	0...999	120
R45A	M	PID derivative time.	s	0...999	30
R45B	M	PID derivative time.	s	0...999	30
R46A	M	Neutral zone threshold.	K	0,0...**R47A**	1.0
R46B	M	Neutral zone threshold.	K	0,0...**R47B**	1.0
R47A	M	Proportional band threshold constant.	K	0.0...99.9	3.0
R47B	M	Proportional band threshold constant.	K	0.0...99.9	3.0
R48A	M	Fast action level.	%	1...100	70
R48B	M	Fast action level.	%	1...100	70
R49A	M	Number of oscillations per minSH.	---	0...10	5
R49B	M	Number of oscillations per minSH.	---	0...10	5
R50A	M	Maximum time for minSH oscillations.	min	0...250	5
R50B	M	Maximum time for minSH oscillations.	min	0...250	5
R51A	M	Maximum time spent outside minSH band.	min	0...250	5
R51B	M	Maximum time spent outside minSH band.	min	0...250	5
R52A	M	LOP PID proportional band.	K	0.0...100.0	10.0
R52B	M	LOP PID proportional band.	K	0.0...100.0	10.0
R53A	M	LOP PID integral time.	s	0...1000	10
R53B	M	LOP PID integral time.	s	0...1000	10
R54A	M	LOP PID derivative time.	s	0...1000	0
R54B	M	LOP PID derivative time.	s	0...1000	0
	THERMOSTAT REGULATION group				
R60A	M	Thermostat enabling. **0** = Thermostat disabled; **1** = Thermostat enabled.	---	0/1	0
R60B	M	Thermostat enabling. Same as **R60A**.	---	0/1	0
R61A	M	Thermostat season. **0** = Cooling; **1** = Heating.	---	0/1	0
R61B	M	Thermostat season. Same as **R61A**.	---	0/1	0
R62A	M	Thermostat setpoint.	°C	-100.0...100.0	0

Par.	PW	Description	MU	Range	Default
R62B	M	Thermostat setpoint.	°C	-100.0...100.0	0
R63A	M	Thermostat hysteresis.	K	0.0...10.0	0
R63B	M	Thermostat hysteresis.	K	0.0...10.0	0
	SYSTEM CONFIGURATION group				
P01	C	Refrigerant gas type. **0** = R22; **1** = r134a; **2** = r402a; **3** = r404a3; **4** = r407a; **5** = r407c; **6** = r410a; **7** = r417a; **8** = r422a; **9** = r422d; **10** = r507a; **11** = r744; **12** = r438a; **13** = r401b; **14** = r290; **15** = r717; **16** = r1270; **17** = r32; **18** = r407f; **19** = r1234ze; **20** = r1234yf; **21** = r723; **22** = r452a; **23** = r513a; **24** = r454b; **25** = r448a; **26** = r449a; **27** = r23.	---	0...27	1
P02	C	Pressure unit of measure. **0** = Bar; **1** = Psi.	---	0/1	0
P03	C	Temperature unit of measure. **0** = °C/K; **1** = °F/R.	---	0/1	0

Par.	PW	Description	MU	Range	Default
P04A	C	Valve A selection. **0** = Generic valve; **1** = Sporlan CO2; **2** = Sporlan SER AA-D; **3** = Sporlan SERI F-L; **4** = Sporlan SER 1.5-20; **5** = Sporlan SEI 0.5-11; **6** = Sporlan SEI 30; **7** = Sporlan SEI 50; **8** = Sporlan SEH 100; **9** = Sporlan SEHI 175/400; **10** = Sporlan SDR-3; **11** = Sporlan SDR-4; **12** = Sporlan ESX UNI; **13** = Sporlan EDEV B/C UNI; **20** = Castel 261; **21** = Castel 262/263; **22** = Castel 264; **30** = Alco EXM/L UNI; **31** = Alco EX4-6; **32** = Alco EX7; **33** = Alco EX8; **40** = Danfoss ETS 12-100c; **41** = Danfoss ETS 12.5-50; **42** = Danfoss ETS 100; **43** = Danfoss ETS 250/400; **44** = Danfoss ETS 6 UNI; **50** = Sanhua VPF 12.5-50; **51** = Sanhua VPF 100; **52** = Sanhua VPF 150-400; **55** = Carel EXV.	---	0...60	0
P04B	C	Valve B selection. Same as **P04A.**	---	0...60	0
P05A	C	Maximum valve opening limit.	%	50...100	100
P05B	C	Maximum valve opening limit.	%	50...100	100
P06A	C	Minimum valve opening limit.	%	0...50	0
P06B	C	Minimum valve opening limit.	%	0...50	0
P07A	C	Re-sync interval.	hours	0...10000	24
P07B	C	Re-sync interval.	hours	0...10000	24
P08A	C	Valve duty cycle.	%	30...100	100
P08B	C	Valve duty cycle.	%	30...100	100
P10A	C	Stepping mode for generic valve.	---	0...5	1
P10B	C	Stepping mode for generic valve.	---	0...5	1
P11A	C	Generic valve minimum steps.	steps	0...**P12A**	0
P11B	C	Generic valve minimum steps.	steps	0...**P12B**	0
P12A	C	Generic valve maximum steps.	steps	**P11A**...9999	1600
P12B	C	Generic valve maximum steps.	steps	**P11B**...9999	1600
P13A	C	Extra steps for full generic valve closure.	steps	**P12A**...9999	1600
P13B	C	Extra steps for full generic valve closure.	steps	**P12B**...9999	1600
P14A	C	Generic valve step rate.	step/s	0...1000	200
P14B	C	Generic valve step rate.	step/s	0...1000	200
P15A	C	Generic valve maximum step rate.	step/s	**P14A**...1000	200
P15B	C	Generic valve maximum step rate.	step/s	**P14B**...1000	200
P16A	C	Generic valve operating current.	mA	0...1000	120
P16B	C	Generic valve operating current.	mA	0...1000	120
P17A	C	Generic valve maintenance current.	mA	0...1000	0
P17B	C	Generic valve maintenance current.	mA	0...1000	0
	ALARM CONFIGURATION group				
A01	I	Backup battery enabling.	---	0/1	0
A02A	I	Valve alarm bypass.	s	1...120	1
A02B	I	Valve alarm bypass.	s	1...120	1

Par.	PW	Description	MU	Range	Default
A03A	I	Communication alarm delay.	s	0...120	30
A03B	I	Communication alarm delay.	s	0...120	30
A04A	I	Low temperature alarm delay.	s	0...250	30
A04B	I	Low temperature alarm delay.	s	0...250	30
A05A	I	Low regulation temperature alarm setpoint.	K	-40.0...0	-1.0
A05B	I	Low regulation temperature alarm setpoint.	K	-40.0...0	-1.0
A06A	I	Low temperature alarm hysteresis.	K	0.0...25.0	0.5
A06B	I	Low temperature alarm hysteresis.	K	0.0...25.0	0.5
A07A	I	High temperature alarm delay.	K	0...250	30
A07B	I	High temperature alarm delay.	K	0...250	30
A08A	I	High regulation temperature alarm setpoint.	K	**R23A**...**R27A**	15.0
A08B	I	High regulation temperature alarm setpoint.	K	**R23B**...**R27B**	15.0
A09A	I	High temperature alarm hysteresis.	K	0.0...25.0	0.5
A09B	I	High temperature alarm hysteresis.	K	0.0...25.0	0.5
A10A	I	LOP delay.	s	0...250	30
A10B	I	LOP delay.	s	0...250	30
A11A	I	Low pressure alarm setpoint.	°C	-350.0...105.0	-40.0
A11B	I	Low pressure alarm setpoint.	°C	-350.0...105.0	-40.0
A12A	I	LOP hysteresis.	K	0.0...10.0	1.0
A12B	I	LOP hysteresis.	K	0.0...10.0	1.0
A13A	I	MOP delay.	s	0...250	30
A13B	I	MOP delay.	s	0...250	30
A14A	I	High pressure alarm setpoint.	°C	-40.0...105.0	40.0
A14B	I	High pressure alarm setpoint.	°C	-40.0...105.0	40.0
A15A	I	MOP hysteresis.	K	0.0...10.0	1.0
A15B	I	MOP hysteresis.	K	0.0...10.0	1.0
A16A	I	dSH maximum applicable MOP.	K	0.0...25.0	7.0
A16B	I	dSH maximum applicable MOP.	K	0.0...25.0	7.0
A17A	I	MOP algorithm band.	K	0.0...25.0	8.0
A17B	I	MOP algorithm band.	K	0.0...25.0	8.0
A19A	I	MOP bypass.	s	0...255	30
A19B	I	MOP bypass.	s	0...255	30
A20A	I	MOP alarm forced decrease.	%	0...100	0
A20B	I	MOP alarm forced decrease.	%	0...100	0
A21A	I	MOP alarm forced decrease time.	s	0...120	0
A21B	I	MOP alarm forced decrease time.	s	0...120	0
A35A	I	Low regulation temperature alarm setpoint.	K	-40.0...0	-1.0
A35B	I	Low regulation temperature alarm setpoint.	K	-40.0...0	-1.0
A38A	I	High regulation temperature alarm setpoint.	K	**R43A**...**R47A**	15.0
A38B	I	High regulation temperature alarm setpoint.	K	**R43B**...**R47B**	15.0
A41A	I	Low pressure alarm setpoint.	°C	-350.0...105.0	-40.0
A41B	I	Low pressure alarm setpoint.	°C	-350.0...105.0	-40.0
A44A	I	High pressure alarm setpoint.	°C	-40.0...105.0	40.0
A44B	I	High pressure alarm setpoint.	°C	-40.0...105.0	40.0
	I/O CONFIGURATION group				
I01A	C	Function **DI1**. **0** = Disabled; **±1** = Enable valve A EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	---	-1...1	1

Par.	PW	Description	MU	Range	Default
I01B	C	Function **DI4**. **0** = Disabled; **±1** = Enable valve B EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	---	-1...1	1
I02A	C	Function **DI2**. **0** = Disabled; **±1** = Re-sync valve A EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	---	-1...1	1
I02B	C	Function **DI5**. **0** = Disabled; **±1** = Re-sync valve B EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	---	-1...1	1
I03A	C	Function **DI3**. **0** = Disabled; **±1** = Valve A parameter set selection. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	---	-1...1	1
I03B	C	Function **DI6**. **0** = Disabled; **±1** = Valve B parameter set selection. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	---	-1...1	1
I04A	C	Function **DO1** (Valve A). **0** = No function; **±1** = Alarm; **±2** = Solenoid valve activation; **±3** = Re-sync request; **±4** = Remote; **±5** = Thermostat; **±6** = Remote via CAN. **NOTE**: **"+"** indicates that the output is active if the contact is closed. **"-"** indicates that the output is active if the contact is open.	---	-6...6	0
I04B	C	Function **DO2** (Valve B). Same as **I04A**.	---	-6...6	0
I05A	C	Sensor type **AI3**. **0** = Digital input; **1** = NTC probe; **6** = Pt1000 probe.	---	1...6	1
I05B	C	Sensor type **AI7**. Same as **I05A.**	---	1...6	1
I06A	C	Sensor type **AI4**. Same as **I05A.**	---	1...6	1
I06B	C	Sensor type **AI8**. Same as **I05A.**	---	1...6	1
I07A	C	Sensor type **AI1**. **0** = Digital input; **1** = NTC probe; **6** = Pt1000 probe; **10** = Transducer 4...20 mA (0...10 barg); **11** = Transducer 4...20 mA (0...16 barg); **12** = Transducer 4...20 mA (0...30 barg); **13** = Transducer 4...20 mA (0...50 barg); **20** = Ratiometric transducer 0...5 V (0...7 barg); **21** = Ratiometric transducer 0...5 V (0...25 barg); **22** = Ratiometric transducer 0...5 V (0...60 barg); **30** = Custom transducer (probe_Scaling).	---	0...30	10
I07B	C	Sensor type **AI5**. Same as **I07A**.	---	0...30	10
I08A	C	Sensor type **AI2**. Same as **I07A**.	---	0...30	10
I08B	C	Sensor type **AI6**. Same as **I07A**.	---	0...30	10

Par.	PW	Description	MU	Range	Default
	CUSTOM INPUT CONFIGURATION group				
I09A	C	Probe type x-axis **AI1**. **0** = 0...20 mA; **1** = 4...20 mA; **2** = 0...5 V; **3** = 0...10 V; **4** = 4...20 mA repeater; **5** = NTC.	---	0...5	1
I09B	C	Probe type x-axis **AI5**. Same as **I09A**.	---	0...5	1
I10A	C	Probe type x-axis **AI2**. Same as **I09A**.	---	0...5	1
I10B	C	Probe type x-axis **AI6**. Same as **I09A**.	---	0...5	1
I11A	C	Minimum value x-axis **AI1**.	---	0.00...20.00	0.00
I11B	C	Minimum value x-axis **AI5**.	---	0.00...20.00	0.00
I12A	C	Minimum value x-axis **AI2**.	---	0.00...20.00	0.00
I12B	C	Minimum value x-axis **AI6**.	---	0.00...20.00	0.00
I13A	C	Maximum value x-axis **AI1**.	---	0.00...20.00	20.00
I13B	C	Maximum value x-axis **AI5**.	---	0.00...20.00	20.00
I14A	C	Maximum value x-axis **AI2**.	---	0.00...20.00	20.00
I14B	C	Maximum value x-axis **AI6**.	---	0.00...20.00	20.00
I15A	C	Minimum value y-axis **AI1**.	---	-327.68...327.67	0.00
I15B	C	Minimum value y-axis **AI5**.	---	-327.68...327.67	0.00
I16A	C	Minimum value y-axis **AI2**.	---	-327.68...327.67	0.00
I16B	C	Minimum value y-axis **AI6**.	---	-327.68...327.67	0.00
I17A	C	Maximum value y-axis **AI1**.	---	-32768...32767	0
I17B	C	Maximum value y-axis **AI5**.	---	-32768...32767	0
I18A	C	Maximum value y-axis **AI2**.	---	-32768...32767	0
I18B	C	Maximum value y-axis **AI6**.	---	-32768...32767	0
I19A	C	Temperature offset **AI1**.	°C/°F	-10.0...10.0	0.0
I20A	C	Temperature offset **AI2**.	°C/°F	-10.0...10.0	0.0
I21A	C	Temperature offset **AI3**.	°C/°F	-10.0...10.0	0.0
I22A	C	Temperature offset **AI4**.	°C/°F	-10.0...10.0	0.0
I19B	C	Temperature offset **AI5**.	°C/°F	-10.0...10.0	0.0
I20B	C	Temperature offset **AI6**.	°C/°F	-10.0...10.0	0.0
I21B	C	Temperature offset **AI7**.	°C/°F	-10.0...10.0	0.0
I22B	C	Temperature offset **AI8**.	°C/°F	-10.0...10.0	0.0
I24A	C	Probe configuration **AI1**. **0** = Reserved; **1** = PTC; **2** = NTC; **3** = 0...20 mA; **4** = 4...20 mA; **5** = 0...5 V; **6** = 0...10 V; **7** = Pt1000; **8** = Reserved; **9** = Reserved; **10** = NTC10K2; **11** = NTC10K3; **12** = Resistive; **13** = 4...20 mA repeater.	---	0...13	4
I25A	C	Probe configuration **AI2**. Same as **I24A**.	---	0...13	4
I26A	C	Probe configuration **AI3**. Same as **I24A**.	---	0...13	2
I27A	C	Probe configuration **AI4**. Same as **I24A**.	---	0...13	2
I24B	C	Probe configuration **AI5**. Same as **I24A**.	---	0...13	4
I25B	C	Probe configuration **AI6**. Same as **I24A**.	---	0...13	4
I26B	C	Probe configuration **AI7**. Same as **I24A**.	---	0...13	2
I27B	C	Probe configuration **AI8**. Same as **I24A**.	---	0...13	2

Par.	PW	Description	MU	Range	Default
	SIMULATOR group				
I90	C	Enable simulator. **0** = Disabled; **1** = Enabled.	---	0/1	0
I91A	C	Simulator **DI1**. **0** = Not active; **1** = Active.	---	0/1	0
I92A	C	Simulator **DI2**. **0** = Not active; **1** = Active.	---	0/1	0
I93A	C	Simulator **DI3**. **0** = Not active; **1** = Active.	---	0/1	0
I91B	C	Simulator **DI4**. **0** = Not active; **1** = Active.	---	0/1	0
I92B	C	Simulator **DI5**. **0** = Not active; **1** = Active.	---	0/1	0
I93B	C	Simulator **DI6**. **0** = Not active; **1** = Active.	---	0/1	0
I94A	C	Simulator **AI1**.	---	-3276.8...3276.7	-3276.7
I95A	C	Simulator **AI2**.	---	-3276.8...3276.7	-3276.7
I96A	C	Simulator **AI3**.	---	-3276.8...3276.7	-3276.7
I97A	C	Simulator **AI4**.	---	-3276.8...3276.7	-3276.7
I94B	C	Simulator **AI5**.	---	-3276.8...3276.7	-3276.7
I95B	C	Simulator **AI6**.	---	-3276.8...3276.7	-3276.7
I96B	C	Simulator **AI7**.	---	-3276.8...3276.7	-3276.7
I97B	C	Simulator **AI8**.	---	-3276.8...3276.7	-3276.7
	SERIAL COMMUNICATION PORT CONFIGURATION group				
C01	I	Modbus serial address.	---	1...247	11
C02	I	Modbus baud rate. **0** = 1200; **1** = 2400; **2** = 4800; **3** = 9600; **4** = 19200.	---	0...4	4
C03	I	Modbus parity. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2
C04	I	Modbus stop bits. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0
C05	I	Ib serial address.	---	1...247	5
C06	I	TTL serial address.	---	1...247	247
C07	I	TTL baud rate. **0** = 1200; **1** = 2400; **2** = 4800; **3** = 9600; **4** = 19200.	---	0...4	4
C08	I	TTL parity. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2
C09	I	TTL stop bits. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0

Par.	PW	Description	MU	Range	Default
BLE (C10)	I	Epoca TTL usage.	---	0...247	0
C11	I	CAN serial address.	---	1...127	11
C12	I	CAN baud rate. **1** = 20k; **2** = 50k; **3** = 125k; **4** = 500k.	---	0...4	1
C13	I	CAN timeout.	s	0...60	5
	PASSWORD group				
C14	C	User password.	---	-32768...32767	10
C15	C	Maintenance password.	---	-32768...32767	20
C16	C	Installer password.	---	-32768...32767	30
C17	C	Manufacturer password.	---	-32768...32767	40
C18	C	EPoCA level 1 password.	---	-32768...32767	426
C19	C	EPoCA level 2 password.	---	-32768...32767	824
C20	C	EPoCA level 3 password.	---	-32768...32767	398

11. VALVE CONFIGURATION

11.1 INTRODUCTION

The configurations listed below are presented in compliance with the technical documentation from the corresponding manufacturers.
EVCO is not responsible for any changes made to the values by the manufacturers. Always refer to the latest available version of the manufacturer's technical documentation.

11.2 CONFIGURATIONS

P04•	EEV	Minimum steps [Step]	Maximum steps [Step]	Absolute steps [Step]	Nominal speed [Step/s]	Maximum blackout speed [Step/s]	Maximum current [mA]	Stationary current [mA]	Step mode
0	Customisable values	0	0	0	0	0	0	0	Full step 2 phases ON
1	Sporlan CO2	0	2500	3125	400	400	275	0	Full step 2 phases ON
2	Sporlan SER AA-D	0	2500	3500	400	400	120	0	Full step 2 phases ON
3	Sporlan SERI F-L	0	2500	3500	400	400	120	0	Full step 2 phases ON
4	Sporlan SER 1.5-20	0	1596	3500	400	400	160	0	Full step 2 phases ON
5	Sporlan SEI 0.5-11	0	1596	3500	400	400	160	0	Full step 2 phases ON
6	Sporlan SEI 30	0	3193	6500	400	400	160	0	Full step 2 phases ON
7	Sporlan SEI 50	0	6386	7500	400	400	160	0	Full step 2 phases ON
8	Sporlan SEH 100	0	6386	7500	400	400	160	0	Full step 2 phases ON
9	Sporlan SEHI 175/400	0	6386	6500	400	400	160	0	Full step 2 phases ON
10	Sporlan SDR-3	0	3193	3512	200	200	160	0	Full step 2 phases ON
11	Sporlan SDR-4	0	6386	7025	200	200	160	0	Full step 2 phases ON
12	Sporlan ESX uni	24	224	300	40	40	260	0	Full step 2 phases ON
13	Sporlan EDEV B/C uni	0	800	1250	200	200	120	0	Full step 2 phases ON
20	Castel 261	0	415	515	35	35	200	0	Full step 2 phases ON
21	Castel 262/263	0	195	255	25	25	200	50	Full step 2 phases ON
22	Castel 264	0	985	1135	70	70	560	50	Full step 2 phases ON
30	Alco EXM/L uni	16	250	350	45	45	130	0	Half step
31	Alco EX4-6	0	750	1000	500	500	500	100	Full step 2 phases ON
32	Alco EX7	0	1600	2000	500	500	750	250	Full step 2 phases ON
33	Alco EX8	0	2600	3250	500	500	800	500	Full step 2 phases ON
40	Danfoss ETS 12-100C	30	600	628	240	240	800	160	Half step
41	Danfoss ETS 12.5-50	0	2625	3150	300	300	100	75	Half step
42	Danfoss ETS 100	0	3530	4250	300	300	100	75	Half step
43	Danfoss ETS 250/400	0	3810	4550	300	300	100	75	Half step

P04•	EEV	Minimum steps [Step]	Maximum steps [Step]	Absolute steps [Step]	Nominal speed [Step/s]	Maximum blackout speed [Step/s]	Maximum current [mA]	Stationary current [mA]	Step mode
44	Danfoss ETS 6 uni	0	240	260	25	25	260	0	Half step
50	Sanhua VPF 12.5-50	0	2600	3000	300	300	140	0	Full step 2 phases ON
51	Sanhua VPF 100	0	3500	4400	300	300	140	0	Full step 2 phases ON
52	Sanhua VPF 150-400	0	3800	4400	300	300	140	0	Full step 2 phases ON
55	Carel ExV	50	480	500	50	50	450	100	Half step

12. DIAGNOSTICS

The table below lists alarms with corresponding solutions. Warnings are made via alert LED ⚠ lighting up. Each alarm is recorded in the Alarms menu.

12.1 TABLE OF ALARMS

Code	Description	Cause	Effects	Solution
AL01	Memory alarm	Device memory in error	• Showing code **AL01** • Default values of the parameters restored	• Reconfigure the parameters • Contact EVCO technical support • Automatic reset
AL02	Valve A communication alarm	Communication with Master device lacking for a time period > **A03A**	• Showing code **AL02** • Valve in alarm position • Regulation OFF	• Restore communication with the Master device • Automatic reset
AL03	Valve A high regulation temperature alarm	• If **R08A** = 0: Regulation temperature > **A08A** for time period > **A07A** • If **R08A** = 1: Regulation temperature > **A38A** for time period > **A07A**	• Showing code **AL03** • Protective action ON	• Check probe operation • Check system operation • Wait for the temperatures < **A08A-A09A** (SET1) or **A38A-A09A** (SET2) • Automatic reset
AL04	Valve A low regulation temperature alarm	• If **R08A** = 0: Regulation temperature < **A05A** for time period > **A04A** • If **R08A** = 1: Regulation temperature < **A35A** for time period > **A04A**	• Showing code **AL04** • Protective action ON	• Check probe operation • Check system operation • Wait for the temperatures > **A05A+A06A** (SET1) or **A35A+A06A** (SET2) • Automatic reset
AL05	Valve A MOP high pressure alarm	• If **R08A** = 0: Saturation temperature > **A14A** for time period > **A13A** • If **R08A** = 1: Saturation temperature > **A44A** for time period > **A13A**	• Showing code **AL05** • Protective action ON if **A17A** ≠ 0 • MOP alarm forced decrease activation if **A20A** ≠ 0	• Check probe operation • Check system operation • Wait for the saturation temperature < **A14A-A15A** (SET1) or **A44A-A15A** (SET2) • Automatic reset
AL06	Valve A LOP low pressure alarm	• If **R08A** = 0: Saturation temperature < **A11A** for time period > **A10A** • If **R08A** = 1: Saturation temperature < **A41A** for time period > **A10A**	• Showing code **AL06** • Protective action ON • *If alarm in regulation*: valve stopped in current position *If alarm in start-up*: valve open	• Check probe operation • Check system operation • Wait for the saturation temperature > **A11A+A12A** (SET1) or **A41A+A12A** (SET2) • Automatic reset
AL07	Valve A alarm	• Valve motor not working • No connection	• Showing code **AL07** • Valve in alarm position • Regulation OFF	• Check the motor status and connections • Switch **EVDRIVE07** off then on again • Manual reset
AL08	Valve A configuration alarm	Incorrect configuration of valve A parameters	• Showing code **AL08** • Valve in alarm position • Regulation OFF	• Check parameter configuration • Switch **EVDRIVE07** off then on again • Manual reset

Code	Description	Cause	Effects	Solution
AL09	Probe AI1 in error	• Probe not working • Probe not connected properly • Incorrect probe type	• Showing code **AL09** • If regulation probe: valve in alarm position and regulation OFF	• Check the probe type (**PO**) • Check the probe wiring • Change the probe type • Automatic reset
AL10	Probe AI2 in error		• Showing code **AL10** • If regulation probe: valve in alarm position and regulation OFF	
AL11	Probe AI3 in error		• Showing code **AL11** • If regulation probe: valve in alarm position and regulation OFF	
AL12	Probe AI4 in error		• Showing code **AL12** • If regulation probe: valve in alarm position and regulation OFF	
AL16	Internal board alarm	**EVDRIVE07** not working	• Showing code **AL16** • Regulation OFF	Contact EVCO technical support
AL17	Power supply alarm	Power supply cut off	• Showing code **AL17** • Regulation OFF	• Check the power supply source • Automatic reset
AL18	Valve B communication alarm	Communication with Master device lacking for a time period > **A03B**	• Showing code **AL18** • Valve B disabled • Regulation OFF	• Restore communication with the Master device • Automatic reset
AL19	Valve B high regulation temperature alarm	• If **R08B** = 0: Regulation temperature > **A08B** for time period > **A07B** • If **R08B** = 1: Regulation temperature > **A38B** for time period > **A07B**	• Showing code **AL19** • Protective action ON	• Check probe operation • Check system operation • Wait for the temperatures < **A08B-A09B** (SET1) or **A38B-A09B** (SET2) • Automatic reset
AL20	Valve B low regulation temperature alarm	• If **R08B** = 0: Regulation temperature < **A05B** for time period > **A04B** • If **R08B** = 1: Regulation temperature < **A35B** for time period > **A04B**	• Showing code **AL20** • Protective action ON	• Check probe operation • Check system operation • Wait for the temperatures > **A05B+A06B** (SET1) or **A35B+A06B** (SET2) • Automatic reset
AL21	Valve B MOP high pressure alarm	• If **R08B** = 0: Saturation temperature > **A14B** for time period > **A13B** • If **R08B** = 1: Saturation temperature > **A44B** for time period > **A13B**	• Showing code **AL21** • Protective action ON if **A17B** ≠ 0 • MOP alarm forced decrease activation if **A20A** ≠ 0	• Check probe operation • Check system operation • Wait for the saturation temperature < **A14B-A15B** (SET1) or **A44B-A15B** (SET2) • Automatic reset
AL22	Valve B LOP low pressure alarm	• If **R08B** = 0: Saturation temperature < **A11B** for time period > **A10B** • If **R08B** = 1: Saturation temperature < **A41B** for time period > **A10B**	• Showing code **AL22** • Protective action ON • *If alarm in regulation*: valve stopped in current position *If alarm in start-up*: valve open	• Check probe operation • Check system operation • Wait for the saturation temperature > **A11B+A12B** (SET1) or **A41B+A12B** (SET2) • Automatic reset
AL23	Valve B alarm	• Valve motor not working • No connection	• Showing code **AL23** • Valve in alarm position • Regulation OFF	• Check the motor status and connections. • Switch **EVDRIVE07** off then on again • Manual reset
AL24	Valve B configuration alarm	Incorrect configuration of valve B parameters	• Showing code **AL24** • Valve in alarm position • Regulation OFF	• Check parameter configuration • Switch **EVDRIVE07** off then on again • Manual reset

Code	Description	Cause	Effects	Solution
AL25	Probe AI5 in error alarm	• Probe not working • Probe not connected properly • Incorrect probe type	• Showing code **AL25** • If regulation probe: valve in alarm position and regulation OFF	• Check the sensor type • Check the probe wiring • Change the probe type • Automatic reset
AL26	Probe AI6 in error alarm		• Showing code **AL26** • If regulation probe: valve in alarm position and regulation OFF	
AL27	Probe AI7 in error alarm		• Showing code **AL27** • If regulation probe: valve in alarm position and regulation OFF	
AL28	Probe AI8 in error alarm		• Showing code **AL28** • If regulation probe: valve in alarm position and regulation OFF	

13. MODBUS RTU FUNCTIONS AND RESOURCES

13.1 INTRODUCTION

Modbus RTU (Remote Terminal Unit) protocol is a means of communication which allows data exchange between a computer and programmable logic controllers.
This protocol is based on the exchange of messages between master-slave and client-server devices. Master devices can receive information from slaves and write to their registers, while slave devices cannot initiate any information transfer until they receive a request from the slave device.
Modbus communication is used in industrial automation systems (IAS) and in the construction of building management systems (BMS). Modbus protocol is widely utilised due to the fact it is easy to use, very reliable and has an open source code that can be used royalty-free on any application or device.

Modbus RTU is the most common application and uses CRC error detection and binary encoding.

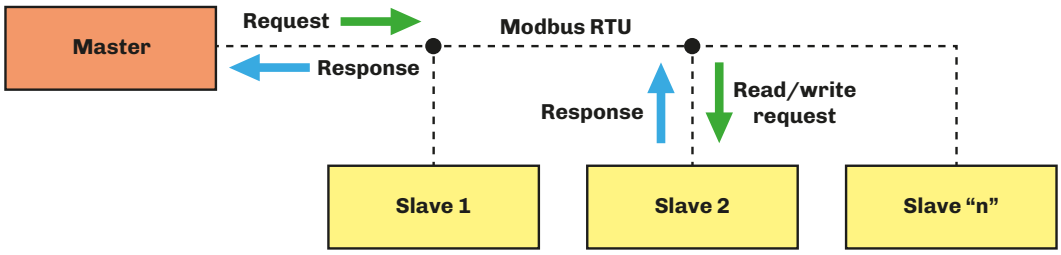


FIG. 33. *Diagram showing message exchange in a Modbus communication*

Modbus protocol establishes a Protocol Data Unit (PDU) independent from the communication layer below it, introducing some additional fields specified on the Application Data Unit (ADU) (***"FIG. 34. FRAMING OF A MESSAGE USING MODBUS PROTOCOL" ON PAGE 58***) to specific buses and networks.

Devices such as PLCs (Programmable Logic Controller), HMIs (Human Machine Interface), control panels, drivers, motion controllers, I/O devices, etc. can use Modbus to begin a remote procedure, and the protocol is often used to connect a supervising computer with a Remote Terminal Unit in a supervision, control and data acquisition (SCADA) system.

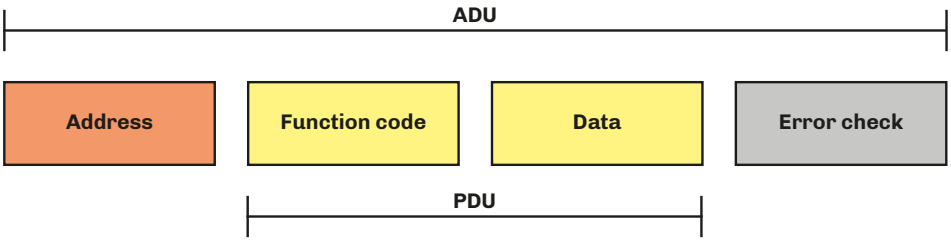


FIG. 34. *Framing of a message using Modbus protocol*

For further information relating to Modbus protocol, visit the official Modbus website: www.modbus.org.

13.2 MODBUS MESSAGE STRUCTURE

Modbus RTU protocol requires the message to start with a silent time interval of at least 3.5 character times. This feature is often implemented by executing a time interval of multiple of character times at the baud rate used in the network. The characters available for each field are in binary form.

A description of the structure of a Modbus RTU message is provided below.

Start	Address	Function	Data	CRC	Stop
3.5 x character time	8 bit	8 bit	(N x 8 bit)	16 bit	3.5 x character time
Time period in which data must not be exchanged over the communication bus, to allow the connected instruments to recognise the end of one message and the start of the next	Corresponds to the address for the device with which the master has established dialogue; this is a value between 1...247. The address 0 is reserved for the broadcast message sent to all slave devices	Code for the function to execute or which has been executed	Contains the data sent by the master or sent back by the slave as a response to a question	Allows the master and the slave to check whether any errors are present during communication, and if there are, to ignore the message received	Time period in which data must not be exchanged over the communication bus, to allow the connected instruments to recognise the end of one message and the start of the next

13.3 MODBUS FUNCTIONS AND REGISTERS

The Modbus registers for the device are organised around the four types of basic data reference indicated above, and this type of data is further identified by the first number of the address.

13.3.1 Available Modbus commands and data areas

The commands implemented are as follows:

Command	Description
03 (hex 0x03)	Resource reading command
06 (hex 0x06)	Resource writing command

13.4 ADDRESS CONFIGURATION

The RS-485 communication serial port can be used to configure the device, the parameters, the statuses and the Modbus variables and to monitor device operation using Modbus protocol.

The device address in a Modbus message is set by parameter **C01**.

Serial line configuration parameters, which can be accessed via the user interface menu, are:

Par.	Description	MU	Range	Default
C01	Modbus serial address.	---	0...247	0
C02	Modbus baud rate. **0** = 1200; **1** = 2400; **2** = 4800; **3** = 9600; **4** = 19200.	---	0...4	0
C03	Modbus parity. **0** = None; **1** = Odd; **2** = Even.	---	0...2	0
C04	Modbus stop bits. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0

The RS-485 RTU serial line has the following characteristics:

- RTU mode;
- Bit: 8 bit

13.5 CONNECTIONS

For the entire system to work properly, including the RS-485 RTU serial line, observe the instructions provided in chapter ***"4. ELECTRICAL CONNECTIONS" ON PAGE 16***.

In particular, take care to make the connections correctly, observing the instructions in section ***"4. ELECTRICAL CONNECTIONS" ON PAGE 16.***

13.6 MODBUS TABLE CONTENT

Table content description

The table below contains the information required to access the resources properly and directly.
There are two tables:

- The Modbus address table, which contains all the configuration parameters for the device and the corresponding Modbus addresses;
- Modbus resource table, which contains all the status (I/O) and alarm resources in the device memory.

Description of columns in the Table of addresses

- **Par.**: list of configurable device parameters;
- **Description**: indicates parameter operation and any possible selections;
- **MU**: measurement unit relating to the parameter;
- **Range**: describes the interval of values that the parameter can assume. This can be correlated with other instrument parameters (indicated with the parameter code).
  NOTE: if the actual value is outside the permitted limits for that parameter (for example, because other parameters defining the aforementioned limits have been altered), the value of the violated limit is displayed instead of the actual value;
- **Val. Adr.**: indicates the address of the Modbus register containing the resource you want to access;
- **R/W:** indicates the option of reading or writing the resource:
  - **R**: the resource is read-only;
  - **W**: the resource is write-only;
  - **R/W**: the resource can be both read and written.
- **CPL**: when the fields indicates Y, the value read by the register needs to be converted because the value represents a number with a sign. In the other cases the value is always positive or zero.
- **DATA SIZE**: indicates the size in data bits:
  - **DWORD** = 32 bit
  - **DOUBLE** = 32 bit with sign
  - **SHORT** = 16 bit with sign
  - **WORD** = 16 bit
  - **Byte** = 8 bit
  - The "**n**" bits = 0...15 bit depending on the value of "n".

13.7 MODBUS ADDRESSES

13.7.1 Modbus parameter and address table

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
	REGULATION group							
R01A	Valve A operating mode. **-3** = EPR with shared pressure probe; **-2** = Economizer with shared pressure probe; **-1** = SH mode with shared pressure probe; **0** = No control; **1** = SH mode; **2** = Economizer; **3** = EPR; **4** = HotGasBypass; **5** = Positioning device; **6** = Manual.	1605	---	R/W	SHORT	Y	---	-3...6
R01B	Valve B operating mode. Same as **R01A.**	1606	---	R/W	SHORT	Y	---	-3...6
R02A	Standby position.	1607	---	R/W	BYTES	---	%	0...100
R02B	Standby position.	1608	---	R/W	BYTES	---	%	0...100
R03A	Position in error.	1609	---	R/W	SHORT	Y	%	-1...100
R03B	Position in error.	1610	---	R/W	SHORT	Y	%	-1...100
R04A	Enable adaptive SH. **0** = Disabled; **1** = Enabled.	1611	---	R/W	1 BIT	---	K	0/1
R04B	Enable adaptive SH. Same as **R04A**.	1612	---	R/W	1 BIT	---	K	0/1
R05A	Equalising time.	1613	---	R/W	BYTES	---	s	0...255
R05B	Equalising time.	1614	---	R/W	BYTES	---	s	0...255
R06A	Equalising position.	1615	---	R/W	BYTES	---	%	0...100
R06B	Equalising position.	1616	---	R/W	BYTES	---	%	0...100
R07A	Manual valve percentage position.	1617	---	R/W	BYTES	---	%	0...100
R07B	Manual valve percentage position.	1618	---	R/W	BYTES	---	%	0...100
R08A	Parameter set selection. **0** = SET 1 parameters (R20•...R34•); **1** = SET 2 parameters (R40•...R54•).	1619	---	R/W	1 BIT	---	---	0/1
R08B	Parameter set selection. Same as **R08A**.	1620	---	R/W	1 BIT	---	---	0/1
R10A	Minimum value that can be assigned to the regulation setpoint.	1623	---	R/W	SHORT	Y	---	-99.9...99.9
R10B	Minimum value that can be assigned to the regulation setpoint.	1624	---	R/W	SHORT	Y	---	-99.9...99.9
R11A	Maximum value that can be assigned to the regulation setpoint.	1625	---	R/W	SHORT	Y	---	-99.9...99.9
R11B	Maximum value that can be assigned to the regulation setpoint.	1626	---	R/W	SHORT	Y	---	99.9...99.9
R12A	dSH minimum setpoint.	1627	---	R/W	BYTES	---	K	0,0...**R13A**
R12B	dSH minimum setpoint.	1628	---	R/W	BYTES	---	K	0,0...**R13B**
R13A	dSH maximum setpoint.	1629	---	R/W	BYTES	---	K	**R12A** = 50.0
R13B	dSH maximum setpoint.	1630	---	R/W	BYTES	---	K	**R12B** = 50.0
R14A	dSH minimum delay.	1631	---	R/W	WORD	---	min	1...10000
R14B	dSH minimum delay.	1632	---	R/W	WORD	---	min	1...10000
R15A	dSH maximum delay.	1633	---	R/W	WORD	---	min	0...10000
R15B	dSH maximum delay.	1634	---	R/W	WORD	---	min	0...10000
R16A	dSH minimum SH variation.	1635	---	R/W	2 BIT	---	K	0.1...2.0
R16B	dSH minimum SH variation.	1636	---	R/W	2 BIT	---	K	0.1...2.0
R17A	dSH maximum SH variation.	1637	---	R/W	2 BIT	---	K	0.1...2.0
R17B	dSH maximum SH variation.	1638	---	R/W	2 BIT	---	K	0.1...2.0
R18A	dSH neutral zone minimum band.	1639	---	R/W	BYTES	---	K	0.0...50.0
R18B	dSH neutral zone minimum band.	1640	---	R/W	BYTES	---	K	0.0...50.0
R19A	dSH neutral zone maximum band.	1641	---	R/W	BYTES	---	K	0.0...50.0
R19B	dSH neutral zone maximum band.	1642	---	R/W	BYTES	---	K	0.0...50.0
	SET 1 REGULATION group							

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
R20A	Start-up time.	1643	---	R/W	BYTES	---	s	0...255
R20B	Start-up time.	1644	---	R/W	BYTES	---	s	0...255
R21A	Start-up position.	1645	---	R/W	BYTES	---	%	0...100
R21B	Start-up position.	1646	---	R/W	BYTES	---	%	0...100
R22A	Regulation setpoint.	1647	---	R/W	SHORT	Y	K/°C	**R10A**...**R11A**
R22B	Regulation setpoint.	1648	---	R/W	SHORT	Y	K/°C	**R10B**...**R11B**
R23A	PID proportional band.	1649	---	R/W	BYTES	---	K	1.0...99.9
R23B	PID proportional band.	1650	---	R/W	BYTES	---	K	1.0...99.9
R24A	PID integral time.	1651	---	R/W	WORD	---	s	0...999
R24B	PID integral time.	1652	---	R/W	WORD	---	s	0...999
R25A	PID derivative time.	1653	---	R/W	WORD	---	s	0...999
R25B	PID derivative time.	1654	---	R/W	WORD	---	s	0...999
R26A	Neutral zone threshold.	1655	---	R/W	BYTES	---	K	0,0...**R27A**
R26B	Neutral zone threshold.	1656	---	R/W	BYTES	---	K	0,0...**R27B**
R27A	Proportional band threshold constant.	1657	---	R/W	BYTES	---	K	**R26A** = 99.9
R27B	Proportional band threshold constant.	1658	---	R/W	BYTES	---	K	**R26B** = 99.9
R28A	Fast action level.	1659	---	R/W	BYTES	---	%	1...100
R28B	Fast action level.	1660	---	R/W	BYTES	---	%	1...100
R29A	Number of oscillations per minSH.	1661	---	R/W	BYTES	---	---	0...10
R29B	Number of oscillations per minSH.	1662	---	R/W	BYTES	---	---	0...10
R30A	Maximum time for minSH oscillations.	1663	---	R/W	BYTES	---	min	0...250
R30B	Maximum time for minSH oscillations.	1664	---	R/W	BYTES	---	min	0...250
R31A	Maximum time spent outside minSH band.	1665	---	R/W	BYTES	---	min	0...250
R31B	Maximum time spent outside minSH band.	1666	---	R/W	BYTES	---	min	0...250
R32A	LOP PID proportional band.	1667	---	R/W	BYTES	---	K	0.0...100.0
R32B	LOP PID proportional band.	1668	---	R/W	BYTES	---	K	0.0...100.0
R33A	LOP PID integral time.	1669	---	R/W	WORD	---	s	0...1000
R33B	LOP PID integral time.	1670	---	R/W	WORD	---	s	0...1000
R34A	LOP PID derivative time.	1671	---	R/W	WORD	---	s	0...1000
R34B	LOP PID derivative time.	1672	---	R/W	WORD	---	s	0...1000
	SET 2 REGULATION group							
R40A	Start-up time.	1683	---	R/W	BYTES	---	s	0...255
R40B	Start-up time.	1684	---	R/W	BYTES	---	s	0...255
R41A	Start-up position.	1685	---	R/W	BYTES	---	%	0...100
R41B	Start-up position.	1686	---	R/W	BYTES	---	%	0...100
R42A	Regulation setpoint.	1687	---	R/W	SHORT	Y	K	**R10A**...**R11A**
R42B	Regulation setpoint.	1688	---	R/W	SHORT	Y	K	**R10B**...**R11B**
R43A	PID proportional band.	1689	---	R/W	BYTES	---	K	1.0...99.9
R43B	PID proportional band.	1690	---	R/W	BYTES	---	K	1.0...99.9
R44A	PID integral time.	1691	---	R/W	WORD	---	s	0...999
R44B	PID integral time.	1692	---	R/W	WORD	---	s	0...999
R45A	PID derivative time.	1693	---	R/W	WORD	---	s	0...999
R45B	PID derivative time.	1694	---	R/W	WORD	---	s	0...999
R46A	Neutral zone threshold.	1695	---	R/W	BYTES	---	K	0,0...**R47A**
R46B	Neutral zone threshold.	1696	---	R/W	BYTES	---	K	0,0...**R47B**
R47A	Proportional band threshold constant.	1697	---	R/W	BYTES	---	K	0.0...99.9
R47B	Proportional band threshold constant.	1698	---	R/W	BYTES	---	K	0.0...99.9
R48A	Fast action level.	1699	---	R/W	BYTES	---	%	1...100
R48B	Fast action level.	1700	---	R/W	BYTES	---	%	1...100
R49A	Number of oscillations per minSH.	1701	---	R/W	BYTES	---	---	0...10
R49B	Number of oscillations per minSH.	1702	---	R/W	BYTES	---	---	0...10
R50A	Maximum time for minSH oscillations.	1703	---	R/W	BYTES	---	min	0...250

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
R50B	Maximum time for minSH oscillations.	1704	---	R/W	BYTES	---	min	0...250
R51A	Maximum time spent outside minSH band.	1705	---	R/W	BYTES	---	min	0...250
R51B	Maximum time spent outside minSH band.	1706	---	R/W	BYTES	---	min	0...250
R52A	LOP PID proportional band.	1707	---	R/W	BYTES	---	K	0.0...100.0
R52B	LOP PID proportional band.	1708	---	R/W	BYTES	---	K	0.0...100.0
R53A	LOP PID integral time.	1709	---	R/W	WORD	---	s	0...1000
R53B	LOP PID integral time.	1710	---	R/W	WORD	---	s	0...1000
R54A	LOP PID derivative time.	1711	---	R/W	WORD	---	s	0...1000
R54B	LOP PID derivative time.	1712	---	R/W	WORD	---	s	0...1000
	THERMOSTAT REGULATION group							
R60A	Thermostat enabling. **0** = Thermostat disabled; **1** = Thermostat enabled.	1723	---	R/W	3 BIT	---	---	0/1
R60B	Thermostat enabling. Same as **R60A**.	1724	---	R/W	3 BIT	---	---	0/1
R61A	Thermostat season. **0** = Cooling; **1** = Heating.	1725	---	R/W	1 BIT	---	---	0/1
R61B	Thermostat season. Same as **R61A**.	1726	---	R/W	1 BIT	---	---	0/1
R62A	Thermostat setpoint.	1727	---	R/W	SHORT	Y	°C	-100.0...100.0
R62B	Thermostat setpoint.	1728	---	R/W	SHORT	Y	°C	-100.0...100.0
R63A	Thermostat hysteresis.	1729	---	R/W	BYTES	---	K	0.0...10.0
R63B	Thermostat hysteresis.	1730	---	R/W	BYTES	---	K	0.0...10.0
	SYSTEM CONFIGURATION group							
P01	Refrigerant gas type. **0** = R22; **1** = r134a; **2** = r402a; **3** = r404a3; **4** = r407a; **5** = r407c; **6** = r410a; **7** = r417a; **8** = r422a; **9** = r422d; **10** = r507a; **11** = r744; **12** = r438a; **13** = r401b; **14** = r290; **15** = r717; **16** = r1270; **17** = r32; **18** = r407f; **19** = r1234ze; **20** = r1234yf; **21** = r723; **22** = r452a; **23** = r513a; **24** = r454b; **25** = r448a; **26** = r449a; **27** = r23.	1537	---	R/W	BYTES	---	---	0...27
P02	Pressure unit of measure. **0** = Bar; **1** = Psi.	1538	---	R/W	1 BIT	---	---	0/1
P03	Temperature unit of measure. **0** = °C/K; **1** = °F/R.	1539	---	R/W	1 BIT	---	---	0/1

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
P04A	Valve A selection. **0** = Generic valve; **1** = Sporlan CO2; **2** = Sporlan SER AA-D; **3** = Sporlan SERI F-L; **4** = Sporlan SER 1.5-20; **5** = Sporlan SEI 0.5-11; **6** = Sporlan SEI 30; **7** = Sporlan SEI 50; **8** = Sporlan SEH 100; **9** = Sporlan SEHI 175/400; **10** = Sporlan SDR-3; **11** = Sporlan SDR-4; **12** = Sporlan ESX UNI; **13** = Sporlan EDEV B/C UNI; **20** = Castel 261; **21** = Castel 262/263; **22** = Castel 264; **30** = Alco EXM/L UNI; **31** = Alco EX4-6; **32** = Alco EX7; **33** = Alco EX8; **40** = Danfoss ETS 12-100c; **41** = Danfoss ETS 12.5-50; **42** = Danfoss ETS 100; **43** = Danfoss ETS 250/400; **44** = Danfoss ETS 6 UNI; **50** = Sanhua VPF 12.5-50; **51** = Sanhua VPF 100; **52** = Sanhua VPF 150-400; **55** = Carel EXV.	1540	---	R/W	BYTES	---	---	0...60
P04B	Valve B selection. Same as **P04A.**	1541	---	R/W	BYTES	---	---	0...60
P05A	Maximum valve opening limit.	1542	---	R/W	BYTES	---	%	50...100
P05B	Maximum valve opening limit.	1543	---	R/W	BYTES	---	%	50...100
P06A	Minimum valve opening limit.	1544	---	R/W	BYTES	---	%	0...50
P06B	Minimum valve opening limit.	1545	---	R/W	BYTES	---	%	0...50
P07A	Re-sync interval.	1546	---	R/W	WORD	---	hours	0...10000
P07B	Re-sync interval.	1547	---	R/W	WORD	---	hours	0...10000
P08A	Valve duty cycle.	1548	---	R/W	BYTES	---	%	30...100
P08B	Valve duty cycle.	1549	---	R/W	BYTES	---	%	30...100
P10A	Stepping mode for generic valve.	1552	---	R/W	BYTES	---	---	0...5
P10B	Stepping mode for generic valve.	1553	---	R/W	BYTES	---	---	0...5
P11A	Generic valve minimum steps.	1554	---	R/W	WORD	---	steps	0...**P12A**
P11B	Generic valve minimum steps.	1555	---	R/W	WORD	---	steps	0...**P12B**
P12A	Generic valve maximum steps.	1556	---	R/W	WORD	---	steps	**P11A**...9999
P12B	Generic valve maximum steps.	1557	---	R/W	WORD	---	steps	**P11B**...9999
P13A	Extra steps for full generic valve closure.	1558	---	R/W	WORD	---	steps	**P12A**...9999
P13B	Extra steps for full generic valve closure.	1559	---	R/W	WORD	---	steps	**P12B**...9999
P14A	Generic valve step rate.	1560	---	R/W	WORD	---	step/s	0...1000
P14B	Generic valve step rate.	1561	---	R/W	WORD	---	step/s	0...1000
P15A	Generic valve maximum step rate.	1562	---	R/W	WORD	---	step/s	**P14A**...1000
P15B	Generic valve maximum step rate.	1563	---	R/W	WORD	---	step/s	**P14B**...1000
P16A	Generic valve operating current.	1564	---	R/W	WORD	---	mA	0...1000
P16B	Generic valve operating current.	1565	---	R/W	WORD	---	mA	0...1000
P17A	Generic valve maintenance current.	1566	---	R/W	WORD	---	mA	0...1000
P17B	Generic valve maintenance current.	1567	---	R/W	WORD	---	mA	0...1000
	ALARM CONFIGURATION group							
A01	Backup battery enabling.	1831	---	R/W	1 BIT	---	---	0/1
A02A	Valve alarm bypass.	1832	---	R/W	BYTES	---	s	1...120

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
A02B	Valve alarm bypass.	1833	---	R/W	BYTES	---	s	1...120
A03A	Communication alarm delay.	1834	---	R/W	BYTES	---	s	0...120
A03B	Communication alarm delay.	1835	---	R/W	BYTES	---	s	0...120
A04A	Low temperature alarm delay.	1836	---	R/W	BYTES	---	s	0...250
A04B	Low temperature alarm delay.	1837	---	R/W	BYTES	---	s	0...250
A05A	Low regulation temperature alarm setpoint.	1838	---	R/W	SHORT	Y	K	-40.0...0
A05B	Low regulation temperature alarm setpoint.	1839	---	R/W	SHORT	Y	K	-40.0...0
A06A	Low temperature alarm hysteresis.	1840	---	R/W	BYTES	---	K	0.0...25.0
A06B	Low temperature alarm hysteresis.	1841	---	R/W	BYTES	---	K	0.0...25.0
A07A	High temperature alarm delay.	1842	---	R/W	BYTES	---	K	0...250
A07B	High temperature alarm delay.	1843	---	R/W	BYTES	---	K	0...250
A08A	High regulation temperature alarm setpoint.	1844	---	R/W	BYTES	---	K	**R23A**...**R27A**
A08B	High regulation temperature alarm setpoint.	1845	---	R/W	BYTES	---	K	**R23B**...**R27B**
A09A	High temperature alarm hysteresis.	1846	---	R/W	BYTES	---	K	0.0...25.0
A09B	High temperature alarm hysteresis.	1847	---	R/W	BYTES	---	K	0.0...25.0
A10A	LOP delay.	1848	---	R/W	BYTES	---	s	0...250
A10B	LOP delay.	1849	---	R/W	BYTES	---	s	0...250
A11A	Low pressure alarm setpoint.	1850	---	R/W	SHORT	Y	°C	-350.0...105.0
A11B	Low pressure alarm setpoint.	1851	---	R/W	SHORT	Y	°C	-350.0...105.0
A12A	LOP hysteresis.	1852	---	R/W	BYTES	---	K	0.0...10.0
A12B	LOP hysteresis.	1853	---	R/W	BYTES	---	K	0.0...10.0
A13A	MOP delay.	1854	---	R/W	BYTES	---	s	0...250
A13B	MOP delay.	1855	---	R/W	BYTES	---	s	0...250
A14A	High pressure alarm setpoint.	1856	---	R/W	SHORT	Y	°C	-40.0...105.0
A14B	High pressure alarm setpoint.	1857	---	R/W	SHORT	Y	°C	-40.0...105.0
A15A	MOP hysteresis.	1858	---	R/W	BYTES	---	K	0.0...10.0
A15B	MOP hysteresis.	1859	---	R/W	BYTES	---	K	0.0...10.0
A16A	dSH maximum applicable MOP.	1860	---	R/W	BYTES	---	K	0.0...25.0
A16B	dSH maximum applicable MOP.	1861	---	R/W	BYTES	---	K	0.0...25.0
A17A	MOP algorithm band.	1862	---	R/W	BYTES	---	K	0.0...25.0
A17B	MOP algorithm band.	1863	---	R/W	BYTES	---	K	0.0...25.0
A19A	MOP bypass.	1866	---	R/W	BYTES	---	s	0...255
A19B	MOP bypass.	1867	---	R/W	BYTES	---	s	0...255
A20A	MOP alarm forced decrease.	1868	---	R/W	BYTES	---	%	0...100
A20B	MOP alarm forced decrease.	1869	---	R/W	BYTES	---	%	0...100
A21A	MOP alarm forced decrease time.	1870	---	R/W	BYTES	---	s	0...120
A21B	MOP alarm forced decrease time.	1871	---	R/W	BYTES	---	s	0...120
A35A	Low regulation temperature alarm setpoint.	1878	---	R/W	SHORT	Y	K	-40.0...0
A35B	Low regulation temperature alarm setpoint.	1879	---	R/W	SHORT	Y	K	-40.0...0
A38A	High regulation temperature alarm setpoint.	1884	---	R/W	SHORT	Y	K	**R43A**...**R47A**
A38B	High regulation temperature alarm setpoint.	1885	---	R/W	SHORT	Y	K	**R43B**...**R47B**
A41A	Low pressure alarm setpoint.	1890	---	R/W	SHORT	Y	°C	-350.0...105.0
A41B	Low pressure alarm setpoint.	1891	---	R/W	SHORT	Y	°C	-350.0...105.0
A44A	High pressure alarm setpoint.	1898	---	R/W	SHORT	Y	°C	-40.0...105.0
A44B	High pressure alarm setpoint.	1899	---	R/W	SHORT	Y	°C	-40.0...105.0
	I/O CONFIGURATION group							
I01A	Function **DI1**. **0** = Disabled; **±1** = Enable valve A EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	1901	---	R/W	SHORT	Y	---	-1...1

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
I01B	Function **DI4**. **0** = Disabled; **±1** = Enable valve B EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	1902	---	R/W	SHORT	Y	---	-1...1
I02A	Function **DI2**. **0** = Disabled; **±1** = Re-sync valve A EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	1903	---	R/W	SHORT	Y	---	-1...1
I02B	Function **DI5**. **0** = Disabled; **±1** = Re-sync valve B EEV. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	1904	---	R/W	SHORT	Y	---	-1...1
I03A	Function **DI3**. **0** = Disabled; **±1** = Valve A parameter set selection. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	1905	---	R/W	SHORT	Y	---	-1...1
I03B	Function **DI6**. **0** = Disabled; **±1** = Valve B parameter set selection. **NOTE**: **"+"** indicates that the input is active if the contact is closed. **"-"** indicates that the input is active if the contact is open.	1906	---	R/W	SHORT	Y	---	-1...1
I04A	Function **DO1** (Valve A). **0** = No function; **±1** = Alarm; **±2** = Solenoid valve activation; **±3** = Re-sync request; **±4** = Remote; **±5** = Thermostat; **±6** = Remote via CAN. **NOTE**: **"+"** indicates that the output is active if the contact is closed. **"-"** indicates that the output is active if the contact is open.	1907	---	R/W	SHORT	Y	---	-6...6
I04B	Function **DO2** (Valve B). Same as **I04A**.	1908	---	R/W	SHORT	Y	---	-6...6
I05A	Sensor type **AI3**. **0** = Digital input; **1** = NTC probe; **6** = Pt1000 probe.	1909	---	R/W	BYTES	---	---	1...6
I05B	Sensor type **AI7**. Same as **I05A.**	1910	---	R/W	BYTES	---	---	1...6
I06A	Sensor type **AI4**. Same as **I05A.**	1911	---	R/W	BYTES	---	---	1...6
I06B	Sensor type **AI8**. Same as **I05A.**	1912	---	R/W	BYTES	---	---	1...6
I07A	Sensor type **AI1**. **0** = Digital input; **1** = NTC probe; **6** = Pt1000 probe; **10** = Transducer 4...20 mA (0...10 barg); **11** = Transducer 4...20 mA (0...16 barg); **12** = Transducer 4...20 mA (0...30 barg); **13** = Transducer 4...20 mA (0...50 barg); **20** = Ratiometric transducer 0...5 V (0...7 barg); **21** = Ratiometric transducer 0...5 V (0...25 barg); **22** = Ratiometric transducer 0...5 V (0...60 barg); **30** = Custom transducer (probe_Scaling).	1913	---	R/W	BYTES	---	---	0...30

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
I07B	Sensor type **AI5**. Same as **I07A**.	1914	---	R/W	BYTES	---	---	0...30
I08A	Sensor type **AI2**. Same as **I07A**.	1915	---	R/W	BYTES	---	---	0...30
I08B	Sensor type **AI6**. Same as **I07A**.	1916	---	R/W	BYTES	---	---	0...30
	CUSTOM INPUT CONFIGURATION group							
I09A	Probe type x-axis **AI1**. **0** = 0...20 mA; **1** = 4...20 mA; **2** = 0...5 V; **3** = 0...10 V; **4** = 4...20 mA repeater; **5** = NTC.	1917	---	R/W	BYTES	---	---	0...5
I09B	Probe type x-axis **AI5**. Same as **I09A**.	1918	---	R/W	BYTES	---	---	0...5
I10A	Probe type x-axis **AI2**. Same as **I09A**.	1919	---	R/W	BYTES	---	---	0...5
I10B	Probe type x-axis **AI6**. Same as **I09A**.	1920	---	R/W	BYTES	---	---	0...5
I11A	Minimum value x-axis **AI1**.	1921	---	R/W	BYTES	---	---	0.00...20.00
I11B	Minimum value x-axis **AI5**.	1922	---	R/W	BYTES	---	---	0.00...20.00
I12A	Minimum value x-axis **AI2**.	1923	---	R/W	BYTES	---	---	0.00...20.00
I12B	Minimum value x-axis **AI6**.	1924	---	R/W	BYTES	---	---	0.00...20.00
I13A	Maximum value x-axis **AI1**.	1925	---	R/W	BYTES	---	---	0.00...20.00
I13B	Maximum value x-axis **AI5**.	1926	---	R/W	BYTES	---	---	0.00...20.00
I14A	Maximum value x-axis **AI2**.	1927	---	R/W	BYTES	---	---	0.00...20.00
I14B	Maximum value x-axis **AI6**.	1928	---	R/W	BYTES	---	---	0.00...20.00
I15A	Minimum value y-axis **AI1**.	1929	---	R/W	SHORT	Y	---	-327.68...327.67
I15B	Minimum value y-axis **AI5**.	1930	---	R/W	SHORT	Y	---	-327.68...327.67
I16A	Minimum value y-axis **AI2**.	1931	---	R/W	SHORT	Y	---	-327.68...327.67
I16B	Minimum value y-axis **AI6**.	1932	---	R/W	SHORT	Y	---	-327.68...327.67
I17A	Maximum value y-axis **AI1**.	1933	---	R/W	SHORT	Y	---	-32768...32767
I17B	Maximum value y-axis **AI5**.	1934	---	R/W	SHORT	Y	---	-32768...32767
I18A	Maximum value y-axis **AI2**.	1935	---	R/W	SHORT	Y	---	-32768...32767
I18B	Maximum value y-axis **AI6**.	1936	---	R/W	SHORT	Y	---	-32768...32767
I19A	Temperature offset **AI1**.	1937	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I20A	Temperature offset **AI2**.	1938	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I21A	Temperature offset **AI3**.	1939	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I22A	Temperature offset **AI4**.	1940	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I19B	Temperature offset **AI5**.	1941	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I20B	Temperature offset **AI6**.	1942	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I21B	Temperature offset **AI7**.	1943	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I22B	Temperature offset **AI8**.	1944	---	R/W	SHORT	Y	°C/°F	-10.0...10.0
I24A	Probe configuration **AI1**. **0** = Reserved; **1** = PTC; **2** = NTC; **3** = 0...20 mA; **4** = 4...20 mA; **5** = 0...5; **6** = 0...10 V; **7** = Pt1000; **8, 9** = Reserved; **10** = NTC10K2; **11** = NTC10K3; **12** = Resistive; **13** = 4...20 mA repeater.	1959	---	R/W	BYTES	---	---	0...13
I25A	Probe configuration **AI2**. Same as **I24A**.	1960	---	R/W	BYTES	---	---	0...13
I26A	Probe configuration **AI3**. Same as **I24A**.	1961	---	R/W	BYTES	---	---	0...13
I27A	Probe configuration **AI4**. Same as **I24A**.	1962	---	R/W	BYTES	---	---	0...13
I24B	Probe configuration **AI5**. Same as **I24A**.	1963	---	R/W	BYTES	---	---	0...13

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
I25B	Probe configuration **AI6**. Same as **I24A**.	1964	---	R/W	BYTES	---	---	0...13
I26B	Probe configuration **AI7**. Same as **I24A**.	1965	---	R/W	BYTES	---	---	0...13
I27B	Probe configuration **AI8**. Same as **I24A**.	1966	---	R/W	BYTES	---	---	0...13
	SIMULATOR group							
I90	Enable simulator. **0** = Disabled; **1** = Enabled.	2010	---	R/W	1 BIT	---	---	0/1
I91A	Simulator **DI1**. **0** = Not active; **1** = Active.	2011	---	R/W	1 BIT	---	---	0/1
I92A	Simulator **DI2**. **0** = Not active; **1** = Active.	2012	---	R/W	1 BIT	---	---	0/1
I93A	Simulator **DI3**. **0** = Not active; **1** = Active.	2013	---	R/W	1 BIT	---	---	0/1
I91B	Simulator **DI4**. **0** = Not active; **1** = Active.	2014	---	R/W	1 BIT	---	---	0/1
I92B	Simulator **DI5**. **0** = Not active; **1** = Active.	2015	---	R/W	1 BIT	---	---	0/1
I93B	Simulator **DI6**. **0** = Not active; **1** = Active.	2016	---	R/W	1 BIT	---	---	0/1
I94A	Simulator **AI1**.	2017	---	R/W	SHORT	Y	---	-3276.8...3276.7
I95A	Simulator **AI2**.	2018	---	R/W	SHORT	Y	---	-3276.8...3276.7
I96A	Simulator **AI3**.	2019	---	R/W	SHORT	Y	---	-3276.8...3276.7
I97A	Simulator **AI4**.	2020	---	R/W	SHORT	Y	---	-3276.8...3276.7
I94B	Simulator **AI5**.	2021	---	R/W	SHORT	Y	---	-3276.8...3276.7
I95B	Simulator **AI6**.	2022	---	R/W	SHORT	Y	---	-3276.8...3276.7
I96B	Simulator **AI7**.	2023	---	R/W	SHORT	Y	---	-3276.8...3276.7
I97B	Simulator **AI8**.	2024	---	R/W	SHORT	Y	---	-3276.8...3276.7
	SERIAL COMMUNICATION PORT CONFIGURATION group							
C01	Modbus serial address.	1041	---	R/W	BYTES	---	---	1...247
C02	Modbus baud rate. **0** = 1200; **1** = 2400; **2** = 4800; **3** = 9600; **4** = 19200.	1042	---	R/W	BYTES	---	---	0...4
C03	Modbus parity. **0** = None; **1** = Odd; **2** = Even.	1043	---	R/W	2 BIT	---	---	0...2
C04	Modbus stop bits. **0** = 1 stop bit; **1** = 2 stop bits.	1044	---	R/W	1 BIT	---	---	0/1
C05	Ib serial address.	1051	---	R/W	BYTES	---	---	1...247
C06	TTL serial address.	1061	---	R/W	BYTES	---	---	1...247
C07	TTL baud rate. **0** = 1200; **1** = 2400; **2** = 4800; **3** = 9600; **4** = 19200.	1062	---	R/W	3 BIT	---	---	0...4

Par.	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
C08	TTL parity. **0** = None; **1** = Odd; **2** = Even.	1063	---	R/W	2 BIT	---	---	0...2
C09	TTL stop bits. **0** = 1 stop bit; **1** = 2 stop bits.	1064	---	R/W	1 BIT	---	---	0/1
BLE (C10)	Epoca TTL usage.	1065	---	R/W	BYTES	---	---	0...247
C11	CAN serial address.	1071	---	R/W	BYTES	---	---	1...127
C12	CAN baud rate. **1** = 20k; **2** = 50k; **3** = 125k; **4** = 500k.	1072	---	R/W	3 BIT	---	---	0...4
C13	CAN timeout.	1073	---	R/W	BYTES	---	s	0...60
	PASSWORD group							
C14	User password.	1999	---	R/W	SHORT	Y	---	-32768...32767
C15	Maintenance password.	2000	---	R/W	SHORT	Y	---	-32768...32767
C16	Installer password.	2001	---	R/W	SHORT	Y	---	-32768...32767
C17	Manufacturer password.	2002	---	R/W	SHORT	Y	---	-32768...32767
C18	EPoCA level 1 password.	2003	---	R/W	SHORT	Y	---	-32768...32767
C19	EPoCA level 2 password.	2004	---	R/W	SHORT	Y	---	-32768...32767
C20	EPoCA level 3 password.	2005	---	R/W	SHORT	Y	---	-32768...32767

13.7.2 Modbus resource and status table

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
S01	Number of power supply cut-offs.	1300	---	R/W	WORD	---	---	0...32767
S02A	Copy current valve to generic valve.	1301	---	R/W	BYTES	---	---	0...60
S02B	Copy current valve to generic valve.	1302	---	R/W	BYTES	---	---	0...60
S03A	FMS status.	1303	---	R	BYTES	---	---	0...255
S03B	FMS status.	1304	---	R	BYTES	---	---	0...255
S04A	Current valve percentage position.	1305	---	R	WORD	---	%	0.00 ... 100.00
S04B	Current valve percentage position.	1306	---	R	WORD	---	%	0.00 ... 100.00
S05A	Current valve position.	1307	---	R	WORD	---	steps	0...32767
S05B	Current valve position.	1308	---	R	WORD	---	steps	0...32767
S06A	PID regulation setpoint position.	1309	---	R	WORD	---	%	0.0 0... 327.67
S06B	PID regulation setpoint position.	1310	---	R	WORD	---	%	0.00 ... 327.67
S07A	Setpoint position as a percentage.	1311	---	R	WORD	---	%	0.00 ... 100.00
S07B	Setpoint position as a percentage.	1312	---	R	WORD	---	%	0.00 ... 100.00
S08A	Valve enabling status.	1313	---	R	1 BIT	---	---	0/1
S08B	Valve enabling status.	1314	---	R	1 BIT	---	---	0/1
S09A	Re-sync request status.	1315	---	R	1 BIT	---	---	0/1
S09B	Re-sync request status.	1316	---	R	1 BIT	---	---	0/1
S10A	Current valve maintenance enabling status.	1317	---	R	1 BIT	---	---	0/1
S10B	Current valve maintenance enabling status.	1318	---	R	1 BIT	---	---	0/1
S11A	Control value A.	1319	---	R	SHORT	Y	K/°C (if HGB or Temp.)	-3276.8... 3276.7

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
S11B	Control value B.	1320	---	R	SHORT	Y	K/°C (if HGB or Temp.)	-3276.8... 3276.7
S12A	Valve A regulation setpoint.	1321	---	R	SHORT	Y	K	-32768... 32767
S12B	Valve B regulation setpoint.	1322	---	R	SHORT	Y	K	-32768... 32767
S14A	Valve movement mode.	1325	---	R	BYTES	---	---	0...255
S14B	Valve movement mode.	1326	---	R	BYTES	---	---	0...255
S15A	Valve step rate in use.	1327	---	R	SHORT	Y	---	-32768... 32767
S15B	Valve step rate in use.	1328	---	R	SHORT	Y	---	-32768... 32767
S16A	Manual valve percentage position.	1329	---	R/W	BYTES	---	%	0...100
S16B	Manual valve percentage position.	1330	---	R/W	BYTES	---	%	0...100
S17A	Remote control temperature value.	1331	---	R/W	SHORT	Y	°C	-3276.8... 3276.7
S17B	Remote control temperature value.	1332	---	R/W	SHORT	Y	°C	-3276.8... 3276.7
S18A	Unit run time.	1333	---	R/W	WORD	---	---	0...10000
S18B	Unit run time.	1334	---	R/W	WORD	---	---	0...10000
S19A	DO1 remote control.	1335	---	R/W	1 BIT	---	---	0/1
S19B	DO2 remote control.	1336	---	R/W	1 BIT	---	---	0/1
S20A	Remote reset.	1337	---	R/W	WORD	---	---	0...65535
S20B	Remote reset.	1338	---	R/W	WORD	---	---	0...65535
S21A	Remote valve A enabling.	1339	---	R/W	WORD	---	---	0...32767
S21B	Remote valve A enabling.	1340	---	R/W	WORD	---	---	0...32767
S22A	Remote valve A re-sync.	1341	---	R/W	1 BIT	---	---	0/1
S22B	Remote valve B re-sync.	1342	---	R/W	1 BIT	---	---	0/1
S23A	Current parameter set for valve A.	1343	---	R	1 BIT	---	---	0/1
S23B	Current parameter set for valve B.	1344	---	R	1 BIT	---	---	0/1
S24A	Valve A algorithm status.	1345	---	R	WORD	---	---	0...65535
S24B	Valve B algorithm status.	1346	---	R	WORD	---	---	0...65535
S25A	Valve A alarm status.	1347	---	R	WORD	---	---	0...65535
S25B	Valve B alarm status.	1348	---	R	WORD	---	---	0...65535
PHYSICAL I/O VALUES								
S26A	Input value **AI1**. **(*)** Depending on the type of probe/sensor connected.	513	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S27A	**AI2** input value.	514	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S28A	**AI3** input value.	515	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S29A	**AI4** input value.	516	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S26B	**AI5** input value.	517	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S27B	**AI6** input value.	518	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S28B	**AI7** input value.	519	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S29B	**AI8** input value.	520	---	R	SHORT	Y	(*)	-3276.8... 3276.7
S30A	**AI1** temperature.	1349	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
S30B	**AI5** temperature.	1350	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S31A	**AI2** temperature.	1351	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S31B	**AI6** temperature.	1352	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S32A	**AI3** temperature.	1353	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S32B	**AI7** temperature.	1354	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S33A	**AI4** temperature.	1355	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S33B	**AI8** temperature.	1356	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
S34A	**AI1** pressure.	1357	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S34B	**AI5** pressure.	1358	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S35A	**AI2** pressure.	1359	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S35B	**AI6** pressure.	1360	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S36A	**AI3** pressure.	1361	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S36B	**AI7** pressure.	1362	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S37A	**AI4** pressure.	1363	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S37B	**AI8** pressure.	1364	---	R	SHORT	Y	Bar / 10xPsi	-3276.8... 3276.7
S38A	Probe **AI1** used.	1365	---	R	1 BIT	---	---	0/1
S38B	Probe **AI5** used.	1366	---	R	1 BIT	---	---	0/1
S39A	Probe **AI2** used.	1367	---	R	1 BIT	---	---	0/1
S39B	Probe **AI6** used.	1368	---	R	1 BIT	---	---	0/1
S40A	Probe **AI3** used.	1369	---	R	1 BIT	---	---	0/1
S40B	Probe **AI7** used.	1370	---	R	1 BIT	---	---	0/1
S41A	Probe **AI4** used.	1371	---	R	1 BIT	---	---	0/1
S41B	Probe **AI8** used.	1372	---	R	1 BIT	---	---	0/1
S42	Reserved.	1373	---	R	1 BIT	---	---	0/1
S43	Reserved.	1374	---	R	1 BIT	---	---	0/1
S44	Reserved.	1375	---	R	1 BIT	---	---	0/1
ALARM STATUS								
AL01	Memory alarm.	769	---	R	1 BIT	---	---	0/1
AL02	Valve A communication alarm.	770	---	R	1 BIT	---	---	0/1
AL03	Valve A high regulation temperature alarm.	771	---	R	1 BIT	---	---	0/1
AL04	Valve A low regulation temperature alarm.	772	---	R	1 BIT	---	---	0/1
AL05	Valve A high pressure alarm.	773	---	R	1 BIT	---	---	0/1
AL06	Valve A low pressure alarm.	774	---	R	1 BIT	---	---	0/1
AL07	Valve A alarm.	775	---	R	1 BIT	---	---	0/1
AL08	Valve A configuration alarm.	776	---	R	1 BIT	---	---	0/1
AL09	Probe **AI1**.	777	---	R	1 BIT	---	---	0/1
AL10	Probe **AI2**.	778	---	R	1 BIT	---	---	0/1
AL11	Probe **AI3**.	779	---	R	1 BIT	---	---	0/1
AL12	Probe **AI4**.	780	---	R	1 BIT	---	---	0/1
AL17	Expansion board alarm.	785	---	R	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
AL18	Valve B communication alarm.	786	---	R	1 BIT	---	---	0/1
AL19	Valve B high regulation temperature alarm.	787	---	R	1 BIT	---	---	0/1
AL20	Valve B low regulation temperature alarm.	788	---	R	1 BIT	---	---	0/1
AL21	Valve B high pressure alarm.	789	---	R	1 BIT	---	---	0/1
AL22	Valve B low pressure alarm.	790	---	R	1 BIT	---	---	0/1
AL23	Valve B alarm.	791	---	R	1 BIT	---	---	0/1
AL24	Valve B configuration alarm.	792	---	R	1 BIT	---	---	0/1
AL25	Probe **AI5** alarm.	793	---	R	1 BIT	---	---	0/1
AL26	Probe **AI6** alarm.	794	---	R	1 BIT	---	---	0/1
AL27	Probe **AI7** alarm.	795	---	R	1 BIT	---	---	0/1
AL28	Probe **AI8** alarm.	796	---	R	1 BIT	---	---	0/1

This page has been left blank on purpose.

MADE IN ITALY

EVCO S.p.A.
Via Feltre 81, 32036 Sedico (BL) ITALY
Telephone: +39 0437 8422
Fax: +39 0437 83648
email: info@evco.it
Web: **www.evco.it**