eliwell
by Schneider Electric

V910 V3

Bipolar electronic expansion valve driver

03/2017

USER GUIDE

9MA10280

www.eliwell.com

The information given in this document contains general descriptions and/or technical characteristics concerning the performance of the products contained. This document is not intended to replace and must not be used to determine the suitability and reliability of these products for any users' specific applications. Each user or integrator is responsible for performing the risk analysis, evaluation and appropriate and complete testing of the products according to the specific application or use in question. Neither Eliwell Controls nor any of its sister companies or subsidiaries shall be legally or economically liable for any incorrect use of the information contained in this documentation.
If you have any suggestions for improvement or modification, or find any errors in this publication, please contact us.

The installation and use of this product must comply with all applicable state, regional and local safety regulations. For safety reasons and to ensure greater compliance with the data of the documented system, component repairs must be performed exclusively by the manufacturer.

When using devices for applications with technical safety requirements, comply with the relevant instructions.

Failure to use Eliwell Controls software or other software approved by Eliwell Controls with our hardware products can result in injury, damage or incorrect operating results.

Failure to comply with this information can result in injury or damage to the equipment.

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INFORMATION ABOUT...

Document objective

This document describes the drivers and accessories for the **V910 V3 electronic expansion valves**, found in the information on installation and cabling.

Note regarding validity

This document is valid for **Device Manager**.

Related documents

Document title	Reference number
Driver for EEV V910 V3 - Instructions card	9IS64552 (6L)

You can download these technical publications and other technical information from our website at:

www.eliwell.com

SAFETY INFORMATION

Important information

Read these instructions carefully and visually inspect the equipment to familiarise yourself with the device before attempting to install it, put it into operation or service it. The following warning messages may appear anywhere in this documentation or on the equipment to warn of potential dangers or to call your attention to information that can clarify or simplify a procedure.

The addition of this symbol to a danger warning label indicates the electrical danger that could result in persona injury should the user fail to follow the instructions.

This is the safety warning signal. It is used to warn the user of potential dangers of personal injury. Observe all the safety warnings that follow this symbol to avoid the risk of serous injury or death.

⚠ DANGER

DANGER indicates a dangerous situation which, if not prevented, **may cause** serious injury or death**.**

⚠ WARNING

WARNING indicates a potentially dangerous situation which, if not avoided**,** could **result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially dangerous situation which, if not avoided**,** can **result in minor** or moderate injury.

NOTICE

NOTICE used in reference to procedures not connected to physical injuries.

NB

Electrical equipment must be installed, used and repaired by qualified personnel only.
Eliwell accepts no responsibility for any consequences resulting from the use of this material.
A qualified person is someone who has specific skills and knowledge regarding the structure and the operation of electrical equipment and who has received safety training on how to avoid the inherent dangers.

Permitted use

This product is used to control stepper bipolar electronic expansion valves.

For safety reasons, the device must be installed and used in accordance with the instructions provided. In particular, parts carrying dangerous voltages must not be accessible under normal conditions.

The device must be adequately protected from water and dust with regard to the application, and must only be accessible using tools (with the exception of the front panel).

The device is also suitable for use in commercial and household refrigeration appliances and/or similar equipment and has been tested for safety aspects in accordance with the harmonized European reference standards.

Prohibited use

Any use other than that described in the previous paragraph, Permitted Use, is strictly forbidden.

The relay contacts supplied are electromagnetic and are subject to wear. The protection devices required by international or local laws must be installed outside the instrument.

Liability and residual risks

The liability of Eliwell Controls limited to the correct and professional use of the product according to the directives referred to herein and in the other supporting documents, and does not cover any damage (including but not limited to) the following causes:

- unspecified installation/use and, in particular, in contravention of the safety requirements of established legislation or specified in this document
- use on equipment which does not provide adequate protection against electrocution, water and dust in the actual installation conditions;
- use on equipment in which dangerous components can be accessed without the use of specific tools;
- installation/use on equipment which does not comply with established legislation and technical standards.

Disposal

The equipment (or product) must be subjected to separate waste collection in compliance with the local legislation on waste disposal.

Product related information

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Turn off all devices, including connected devices, before removing any covers or doors, or installing/un-installing accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

This device is designed to operate outside of any dangerous location.
Install this device only in areas known to be free from dangerous atmospheres.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

POTENTIAL FOR EXPLOSION AND FIRE

Do not use this device with applications that use R290 inflammable refrigerant.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The control system designer must consider the potential failure modes of the control circuit and, for some critical control functions, provide a means for reaching a safe condition during and after a circuit failure. Examples of critical control functions are the emergency stop and end of travel stop, power supply cut-off and restart.
- Separate or redundant control circuits must be provided for critical control functions.
- The system control circuits can include communication connections. Keep in mind the implications of transmission delays or sudden connection failures.
- Comply with all the standards regarding accident protection and the local applicable safety directives.(1)
- Every implementation of this device must be tested individually and completely in order to check its proper operation before putting it in service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For additional information, refer to the standards NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and NEMA ICS 7.1 (latest edition) “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems” or to equivalent standards that regulate your particular location.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Eliwell Controls when using this device.
- Update your application program each time the physical hardware configuration changes.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

1 - INTRODUCTION

1.1 - General description

V910 V3 is the compact solution of the Eliwell Controls platform stepper electronic expansion motor valves suited for a range of needs in the HVAC/R market and beyond.

The possibility to select refrigerant types and compatibility with most commercially available valves make the **V910 V3** a particularly versatile module.

V910 V3 offers the possibility to configure a refrigerant that is not included in the factory default settings.

The valve controlled by driven motor under current and the independent operation for hot and cold by means of double regulator mapping improves performance.

Indeed, the **V910 V3** ensures a very precise, stable and reliable control of the refrigerant flow, consequently increasing efficiency and energy savings by adjusting the overheating and opening the valve according to the performance demanded by the system and in different working conditions.

Reliability is guaranteed by the isolated serial connections and the use of back-up sensors.

V910 V3 is available in various models, which can be used as single actuators or in “stand-alone” mode (via Digital inputs or RS485 serial port). The models are available in the version with assembly on DIN rail.

An **SKP 10** terminal is used to configure the parameters and operations to carry out on the device, to be connected to the LAN serial port inside the door.

V910 V3 also includes the interfacing with the serial Modbus RTU communication standard and the possibility of downloading parameter and applicative via the M171 optical programming pen drive (**MFK 100 / UNICARD**).

Ratiometric pressure sensors and **SKP 10** terminals can also be connected with no need for any further serial interfaces.

All digital inputs and digital outputs are independent and configurable, meaning they can be adapted to fit any system.

Power supply is 24 Vac /24 Vdc.

1.2 - Key functions

The key functions of the **V910 V3** are as follows:

- refrigerant selected via selectors (DIP switches) under the door
- back up probes for saturation control and evaporator output (overheating)
- valve state shown via LEDs
- parameter settings via keyboard or PC;
- **MFK 100 / UNICARD** to upload and download parameter and applicative maps
- terminal (up to 100 m) that can be connected directly with no serial interface;
- NTC configurable inputs, Pt1000, 4...20 mA, 0...10 V, 0...5 V ratiometric
- 2 digital inputs to control valve and/or alarms.

2 - VERSIONS AND ACCESSORIES

2.1 - Versions

Version	Analogue inputs with low voltage	Digital inputs no voltage	Digital outputs with high voltage	Open Collector digital output	RS485 serial integral	Power supply
V910 V3 RS485	4	2	1	1	Yes	24 Vac/dc Imax 0.8 A/phase

Tab. 1 Versions

2.2 - Terminal

Version	Installation	Dimensions	Display	Power supply
SKP 10	Panel	74x32x30 mm	LED / 4 digit	From **V910 V3** driver

Tab. 2 Terminal

SKP 10 Terminal not supplied. To be ordered separately.

2.3 - Accessories

Code	Description
SKP 10	LED 32x74 terminal display
MFK 100	MFK 100 programming pen drive
UNICARD	UNICARD programming pen drive
SN8DAC11502AV	NTC 1.5 m FAST IP67 4x40 -50+110 °C Grey
SN8DEB21502C0	NTC 1.5 m IP68 6x20 TPE with grey tab
DMI 100-3	Programmable cable

Tab. 3 Accessories

GENERAL NOTES:

• Connection of remote keyboard via 3-way cables with no optional modules.

2.4 - List of compatible valves

The **V910** driver is compatible with the valves listed below; for use with other valves, contact Eliwell Controls Technical Support.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Check the valve parameters declared by the manufacturer before using the valve in generic valve configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Eliwell Controls Srl is not liable for the data provided by the valve manufacturer, including any technical modifications or updates. Consult the product manual and the valve manual to check the suitability and correct configuration.

Always consult the technical manual of the valve manufacturer, particularly to check the plate data and correct operations.

Version	Power supply:	Notes
DANFOSS ETS50	12 V	Bipolar
DANFOSS ETS100	12 V	Bipolar
Danfoss CM 10, 20, 30, 40	24 V	Bipolar
ALCO EX7	24 V	Bipolar
ALCO EX8	24 V	Bipolar
CAREL E2V E3V E4V E5V E6V E7V	12 V	Bipolar
SPORLAN SER FROM 1.5 TO 20	12 V	Bipolar
SPORLAN SEI-30	12 V	Bipolar
SPORLAN SEI-50	12 V	Bipolar
ALCO EX4, EX5, EX6	24 V	Bipolar
SPORLAN SER(I) G, J, K, B, C, D	12 V	Bipolar
Eliwell by Schneider electric SXVB Body 1	24 V	Bipolar
Eliwell by Schneider electric SXVB Body 2, 3	24 V	Bipolar
Eliwell by Schneider electric SXVB Body 4	24 V	Bipolar

Tab. 4 Compatible/Drivable valves

3 - MECHANICAL ASSEMBLY

3.1 - Before starting

Before starting to install your system, read this chapter carefully. The use and application of information contained in this document requires experience in the design and programming of automated control systems. Only the user, the machine manufacturer or the system integrator can be familiar with all the process conditions and therefore only they are able to determine which automation equipment and relative safety devices and interlocks can be used in a correct and efficient manner. When the automation and control equipment and any other relative equipment or software are selected for a particular application, also the applicable local, regional and national standards and regulations must be taken into consideration. Caution must be used concerning compliance with all safety information, other electrical requirements or laws which may apply to your machine or process when using this device.

The use and application of information contained in this document requires experience in the design and programming of automated control systems. Only the user, the machine manufacturer or the system integrator can be familiar with all the conditions and factors present during installation and set up, preparing, starting-up and servicing the machine the process and therefore only they are able to determine which automation equipment and relative safety devices and interlocks can be used in a correct and efficient manner. When the automation and control equipment and any other relative equipment or software are selected for a particular application, also the applicable local, regional and national standards and regulations must be taken into consideration.

⚠ WARNING

REGULATORY INCOMPATIBILITY

Make sure that all equipment used and the systems designed comply with all applicable local, regional and national laws.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.2 - Disconnection from the power supply

All options and modules must be assembled and installed before installing the control system on an assembly rail, the panel door or other assembly surface. Before disassembling the equipment, remove the control systems from the assembly rail, assembly plate or panel

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Turn off all devices, including connected devices, before removing any covers or doors, or installing/un-installing accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

3.3 - Operating instructions

This device is designed to operate outside of any dangerous location. Install this device only in areas known to be free from dangerous atmospheres.

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

POTENTIAL FOR EXPLOSION AND FIRE

Do not use this device with applications that use R290 inflammable refrigerant.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Install and use the device in compliance with the conditions described in the general technical specifications.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.4 - Comments concerning installation

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in an enclosure appropriately rated for its intended environment.
- For power line and output circuit fuses and connections, comply with local and national regulations corresponding to the nominal current and voltage of the device being used.
- Do not use this equipment in safety-critical machine functions.
- Do not disassemble, repair, or modify this equipment.
- Do not connect wires to unused terminals and/or terminals indicated as “No Connection (N.C.)”.
- Do not install the devices in places subject to high humidity and/or dirt.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Fuses type JDYX2 or JDYX8 are UL recognised and CSA type-approved.

For mechanical sizes see “3.8 - Mechanical assembly” on page 19.

The devices for electronic **V910 V3** expansion valves will be fitted on a DIN rail.

When handling the equipment use caution to avoid damage caused by electrostatic discharge. In particular the unshielded connectors and in certain cases the open circuit boards are extremely vulnerable to electrostatic discharge.

⚠ WARNING

FAULTY OPERATION OF EQUIPMENT DUE TO ELECTROSTATIC DISCHARGE

- Keep the device in the protective packaging until ready for installation.
- The device must only be installed in type-approved casings and/or in points that prevent accidental access and provide protection from electrostatic discharge as defined in IEC 1000-4-2.
- When handling sensitive equipment, use an antistatic bracelet or equivalent earthed protective device against electrostatic discharge.
- Before handling the device, always discharge the static electricity from the body by touching an earthed surface or type-approved antistatic mat.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.5 - Installation of general valve

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Check the valve parameters declared by the manufacturer before using the valve in generic valve configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.6 - Installation of V910 V3

The acceptable room temperature range for correct operation is between –5 and 55 °C (23... 131 °F), with maximum relative humidity of 90% (in the absence of condensation).

Do not mount the device in places exposed to high levels of dirt or humidity. The device is suitable for use in environments with ordinary or normal levels of pollution. Keep the area around the device cooling slots adequately ventilated.

The TTL serial is located on the upper part of the front cover and is inserted vertically.

The instrument is intended for DIN rail mounting.

Referring to Fig. 1, for installation on the DIN rail proceed as follows,

1. move the two “spring docking devices” to their standby position (use a screwdriver to press against the relative compartments);
2. Install the device on the DIN rail pressing on the “spring docking devices” with your fingers to put them into the locked position.

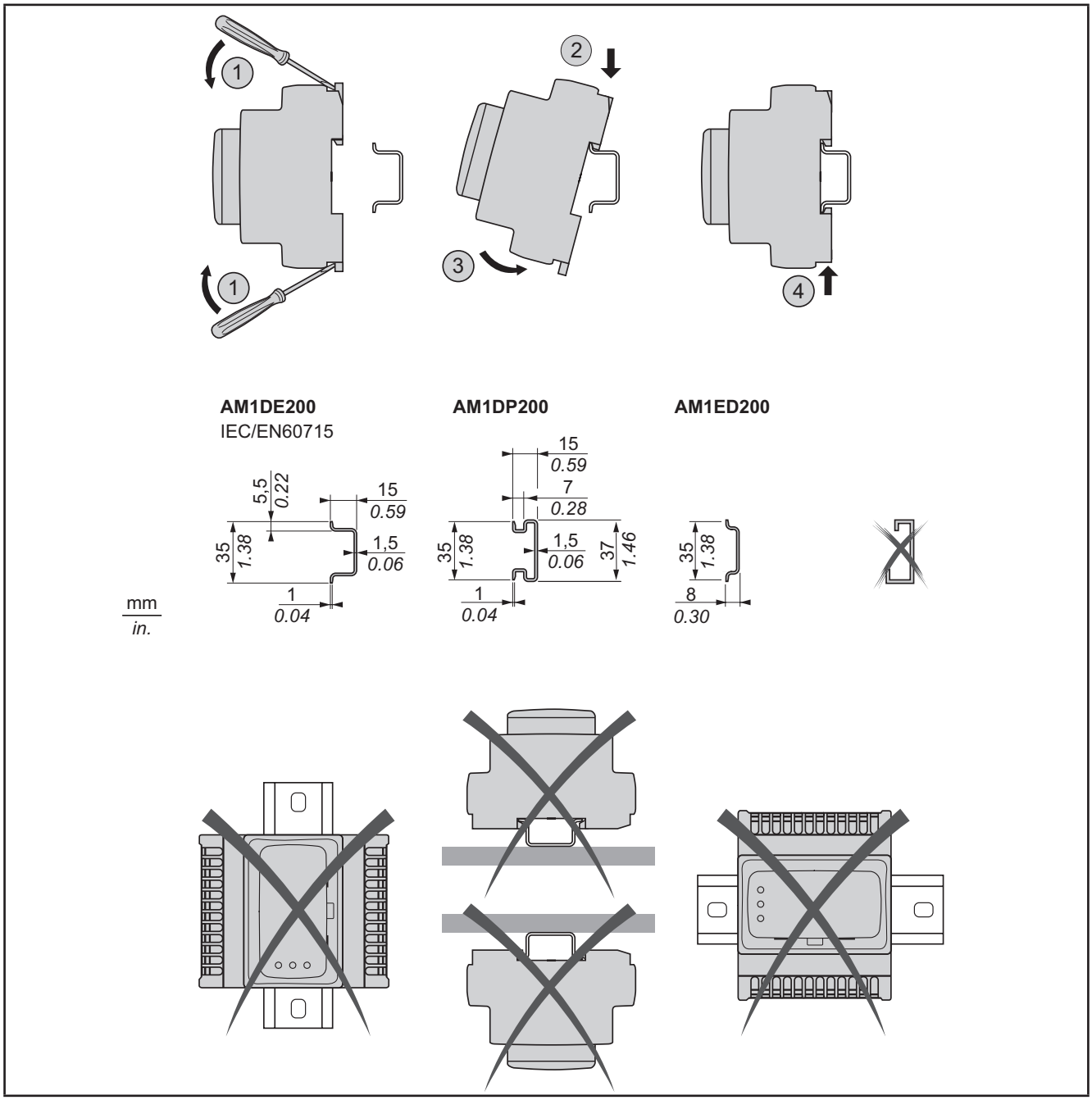


Fig. 1 Installation

The drivers for **electronic V910 V3 expansion valve** have been designed as category IP20 and must be installed in a casing. Comply with the indicated distances when installing the product.
There are 3 types of distances:

- The drivers for **electronic V910 V3 expansion valves** controller and all sides of the cabinet (including the panel door).
- The driver terminal boards for **electronic V910 V3 expansion valves** and the wiring raceways.
  These distances reduce the electromagnetic interference between the controller and the wiring raceways.
- The drivers for **electronic V910 V3 expansion valves** and the other heat-generating devices installed in the same cabinet.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Place the devices dissipating the most heat in the top of the cabinet and ensure suitable ventilation.
- Do not place these devices near or above any devices which could cause overheating.
- Install the device in a point that guarantees the minimum distances from all structures and adjacent equipment as indicated in this document.
- Install all equipment in conformity with the technical specifications given in the respective documentation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

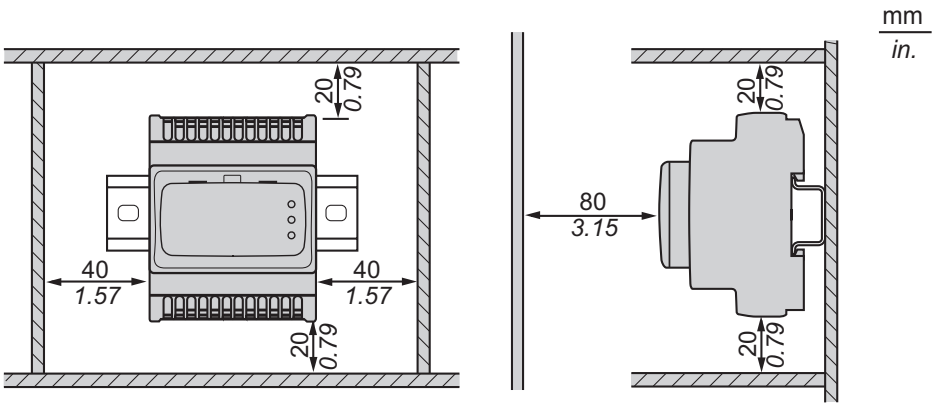


Fig. 2 Distances

3.6.1 - Access to DIP switches/SKP 10

When handling the equipment use caution to avoid damage caused by electrostatic discharge. In particular the unshielded connectors and in certain cases the open circuit boards are extremely vulnerable to electrostatic discharge.

⚠ WARNING

FAULTY OPERATION OF EQUIPMENT DUE TO ELECTROSTATIC DISCHARGE

- Keep the device in the protective packaging until ready for installation.
- The device must only be installed in type-approved casings and/or in points that prevent accidental access and provide protection from electrostatic discharge as defined in IEC 1000-4-2.
- When handling sensitive equipment, use an antistatic bracelet or equivalent earthed protective device against electrostatic discharge.
- Before handling the device, always discharge the static electricity from the body by touching an earthed surface or type-approved antistatic mat.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Referring to **Fig. 3**, for access to the DIP switches proceed as follows:

1. if necessary, use a flat-edge screwdriver or the nail of your index finger to open the door
2. carefully configure the selectors (DIP switches) or connect **SKP 10**
3. if necessary, close the front of the keyboard by pressing with your fingers.

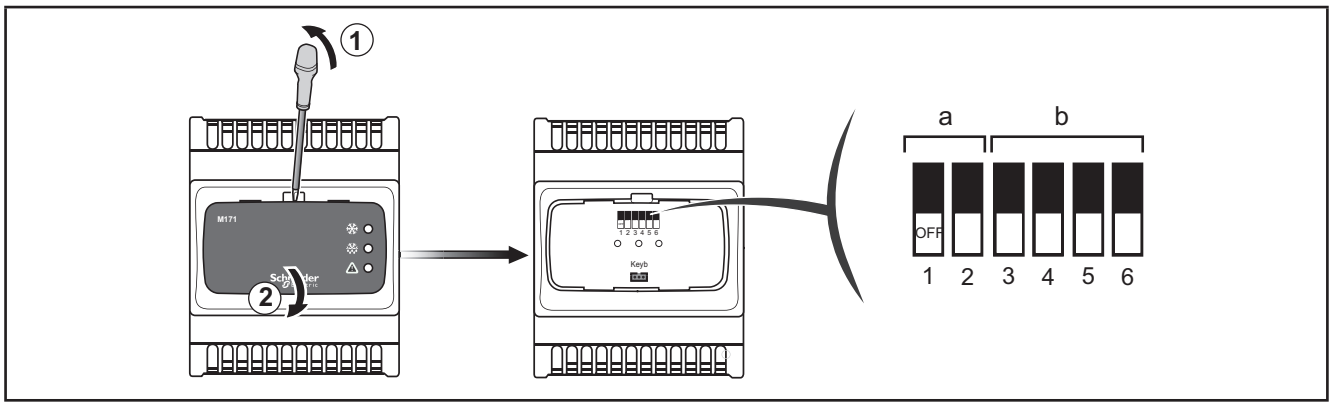


Fig. 3 Access to DIP switches/**SKP 10**

a. Upload/Download parameters from MFK 100 / UNICARD to **V910 V3**

b. Select network address

c. Select type of refrigerant

3.7 - Assembly of the SKP 10 terminal

The **SKP 10** terminal is designed for panel mounting **(Fig. 4)**.

Do not mount the device in places exposed to high levels of dirt or humidity. The device is suitable for use in environments with ordinary or normal levels of pollution. Keep the area around the device cooling slots adequately ventilated.

To mount the **SKP 10**, proceed as follows:

1. make a 71x29 mm hole (2.80x1.14 in.)
2. insert the instrument
3. fix the **SKP 10** using the rods supplied.

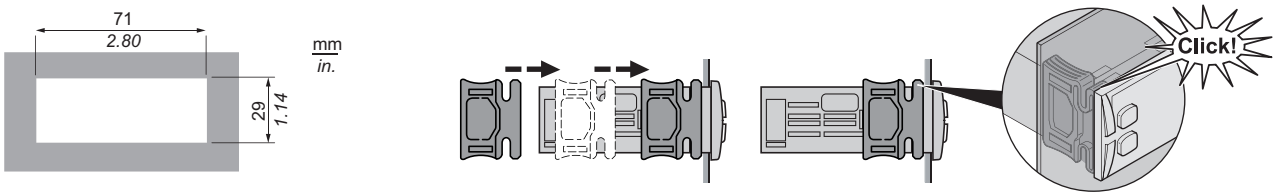


Fig. 4 Assembly of **SKP 10**

3.8 - Mechanical assembly

	Length (L) mm	Depth (d) mm	Height (H) mm	Notes
SKP 10 front cover	76.4	-	35	(+0.2 mm)
V910 V3 (cap) front cover	70	-	45	(+0.2 mm)
SKP 10 measurements	86	30	26	-
V910 measurements	70.2	61.6 56.4 from Din bar to cover	87	4DIN
Hole for panel-mounting **SKP 10**	71	-	29	(+0.2/-0.1 mm)

Tab. 5 Mechanical dimensions

4 - ELECTRICAL CONNECTIONS

4.1 - Best practices for wiring

The following information describes the guidelines for wiring and the best practices to follow when using the drivers for **electronic V910 V3 expansion valves**.

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Turn off all devices, including connected devices, before removing any covers or doors, or installing/un-installing accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products..

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The control system designer must consider the potential failure modes of the control circuit and, for some critical control functions, provide a means for reaching a safe condition during and after a circuit failure. Examples of critical control functions are the emergency stop and end of travel stop, power supply cut-off and restart.
- Separate or redundant control circuits must be provided for critical control functions.
- The system control circuits can include communication connections. Keep in mind the implications of transmission delays or sudden connection failures.
- Comply with all the standards regarding accident protection and the local applicable safety directives.(1)
- Every implementation of this device must be tested individually and completely in order to check its proper operation before putting it in service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For additional information, refer to the standards NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and NEMA ICS 7.1 (latest edition) “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems” or to equivalent standards that regulate your particular location.

4.1.1 - Wiring guidelines

For wiring the drivers for **electronic V910 V3 expansion valves** the following standards must be respected:

- The I/O and communication wiring must be kept separate from the electrical wiring. These two types of wirings must be kept in separate raceways.
- Check that the operating conditions and environment comply with the specification values.
- Use wires of the correct diameter and suited to the voltage and current requirements.
- Use copper conductors (obligatory).
- Use twisted-pair shielded wires for analogue and/or high-speed I/Os.
- Use twisted-pair shielded wires for networks and field buses.

Use correctly earthed shielded wires for all analogue and high-speed inputs and outputs and communication connections. If shielded wires cannot be used for these connections, the electromagnetic interference may deteriorate the signal. Deteriorated signals can result in the controller, modules or attached equipment operating incorrectly.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded wires for all high-speed I/O, analogue I/O and communication signals.
- Earth the wire shields for all analogue I/O, high-speed I/O and communication signals in a single point (1).
- Lay the communication and I/O cables separately from the power cables.
- Reduce the length of the connections as far as possible and avoid winding them round electrically connected parts.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) Earthing in several points is permitted if the connections are made to an equipotential earth surface that is sized to avoid damage to the cable shields in the event of a short circuit in the power supply.

NOTE: The surface temperatures can exceed 60 °C. Lay the main wiring (power wires) separately from the secondary wiring (very low voltage wire coming from intermediate power sources). Where this is not possible, double insulation is required in the form of cable recesses or raceways.

4.1.2 - Rules for screw-type terminal board

The table below illustrates the types of cables and wire sections for a screw-type terminal board **with 5.08** or **5.00**:

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. 5 Step **5.00** mm (0.197 in) or **5.08** mm (0.20 in)

Copper conductors must be used.

⚠ ⚠ DANGER

LOOSE WIRING CAN RESULT IN ELECTRIC SHOCK

- Tighten the connections in compliance with the technical specifications for pairs.
- Do not insert more than one wire in each connector on the terminal board without the ends of the cables specified in the tables given in the information on Rules for screw-type terminal boards.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

FIRE HAZARD

- Use only the recommended wire sections for current capacity of the I/O channels and the electrical power.
- For wiring an 5 A relay output use conductors with section of at least 2.0 mm^2 (AWG 12) with a nominal temperature value of at least 80 °C (176 °F).

Failure to follow these instructions will result in death or serious injury.

4.1.3 - Protecting the outputs from damage from inductive loads

Depending on the load, a protection circuit may be required for controller outputs and certain modules.
Inductive load switching may create voltage impulses that damage or short circuit or reduce the life of the output devices.

⚠ CAUTION

DAMAGE TO OUTPUT CIRCUITS DUE TO INDUCTIVE LOADS

Use an external protective device or circuit able to reduce the risks caused by voltage impulses in the switching of inductive loads.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

If the controller or module has relay outputs, these types of outputs can cope with up to 240 V a.c. Damage from inductive loads to this type of outputs can cause the contacts to weld and lead to the loss of control. Each inductive load must include a protective device such as a peak limiter, an RC circuit or a flyback diode. These relays do not support capacitive loads.

⚠ WARNING

RELAY OUTPUTS WELDED TO CLOSED POSITION

- Always protect the relay outputs from damage resulting from alternating current inductive loads using a suitable external protective device or circuit.
- Do not connect the relay outputs to capacitive loads.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Protection circuit A: this protection circuit can be used for both continuous and alternating current load circuits.

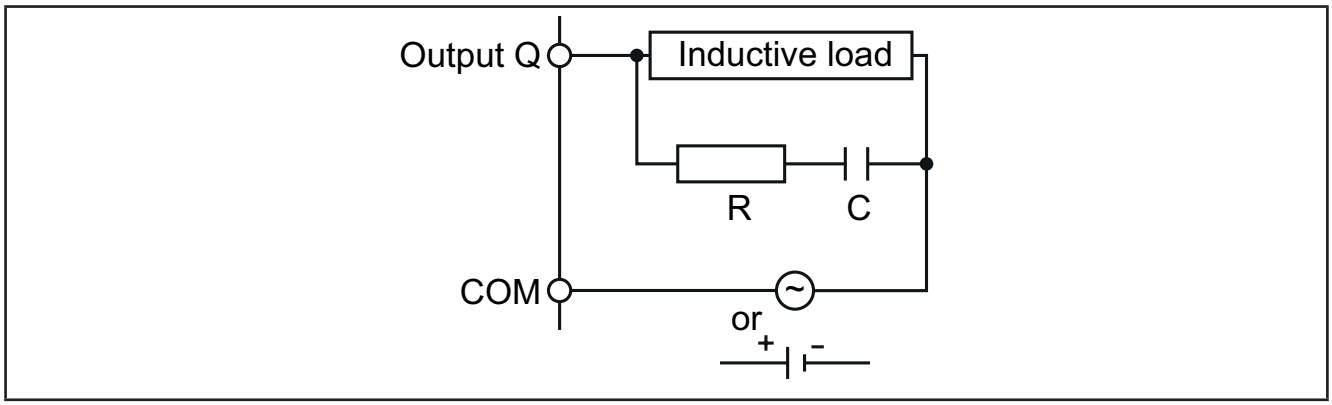


Fig. 6 Protection circuit A

C Value from 0.1 to 1 µF

R Resistor with approximately the same load resistance value

Protection circuit B: this protection circuit can be used for continuous current load circuits.

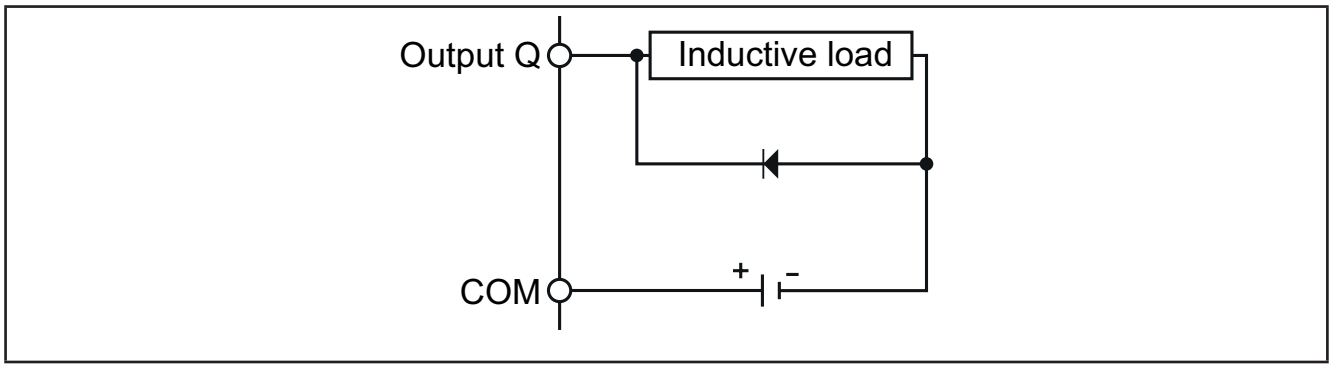


Fig. 7 Protection circuit B

Use a diode with the following nominal characteristics:

- Maximum inverse voltage: load circuit voltage x 10.
- Direct current: greater than the load current.

Protection circuit C: this protection circuit can be used for both continuous and alternating current load circuits.

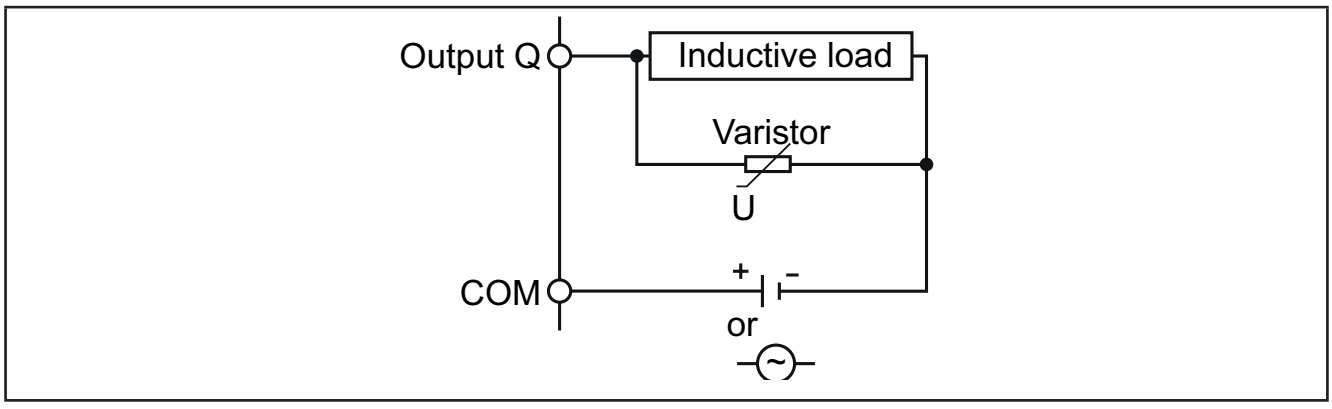


Fig. 8 Protection circuit C

In applications in which the inductive load is frequently and/or rapidly switched on and off, check that the maximum continuous energy (J) of the varistor is 20% or more higher than the peak load energy.

NOTE: Place the protection devices as close as possible to the load.

4.1.4 - Specific considerations for handling

When handling the equipment use caution to avoid damage caused by electrostatic discharge. In particular the unshielded connectors and in certain cases the open circuit boards are extremely vulnerable to electrostatic discharge.

⚠ WARNING

FAULTY OPERATION OF EQUIPMENT DUE TO ELECTROSTATIC DISCHARGE

- Keep the device in the protective packaging until ready for installation.
- The device must only be installed in type-approved casings and/or in points that prevent accidental access and provide protection from electrostatic discharge as defined in IEC 1000-4-2.
- When handling sensitive equipment, use an antistatic bracelet or equivalent earthed protective device against electrostatic discharge.
- Before handling the device, always discharge the static electricity from the body by touching an earthed surface or type-approved antistatic mat.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before any operations, check that the device is connected to a suitable external power supply.
See “5.4 - Electrical connections” on page 33.

Before connecting the valve, carefully configure the **V910 V3** driver, by selecting the type of valve from the list of compatible valves.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Check the valve parameters declared by the manufacturer before using the valve in generic valve configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Always disconnect the equipment’s power supply before carrying out any maintenance on the electrical connections.
For a proper connection, stick to the following:

- Power supplies other than those specified can seriously damage the system.
- Use cables of suitable cross-section for the terminals used.
- Separate the cables of probes and digital inputs from inductive loads and high voltage connections to prevent any electromagnetic interference. Do not place the probe cables near other electrical equipment (switches, meters, etc.).
- Reduce the length of the connections as far as possible and avoid winding them round electrically connected parts.
- To avoid causing static discharges, do not touch the electronic components on the boards.
- The device must be connected to a suitable power supply with the characteristics given in the chapter on Technical Specifications.

4.1.5 - Analogue inputs-probes

Probes have no connection polarity and can be extended using a normal bipolar cable (note that the extension of the probes influences the instrument's EMC electromagnetic compatibility: take great care with the wiring).

NOTE: probes have a specific insertion polarity which must be observed.

NOTICE
INOPERABLE DEVICE Before switching on the electrical power, check all the wiring connections. **Failure to follow these instructions can result in equipment damage.**

NOTE: apply the electrical power supply to all devices powered externally after applying the electrical power to the drivers for **electronic V910 V3 expansion valves**.

⚠ WARNING
FAULTY OPERATION OF EQUIPMENT DUE TO CONNECTIONS The device's signal cables (probes, digital inputs, communication, and relative power supplies), must be laid separately from the power cables. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

4.1.6 - Serial connections

Pay special attention when connecting serial lines. Incorrect wiring may cause the device to work incorrectly or not at all.

Label	Description
TTL	Use a 5-wire TTL cable up to 30 cm in length. We recommend using a TTL cable supplied by Eliwell Controls. Contact Eliwell Controls'sales office to check availability of the item.
MFK / UNICARD	TTL serial present on the upper part of the device for connection to **MFK 100 / UNICARD**
Keyb	3-wire voltage LAN serial inside the door for connection to the I **SKP 10** terminal. Max distance 100 m (328.08 ft)

Tab. 6 Serial connections

NOTE: The **Keyb** connection must be used to configure the device and to view the resources.

NOTE: we recommend you use this connection to work temporarily on the driver.

4.2 - Wiring diagrams

Incorrect cabling causes irreversible damage to the drivers for **electronic V910 V3 expansion valves**.

NOTICE
INOPERABLE DEVICE Before switching on the electrical power, check all the wiring connections. **Failure to follow these instructions can result in equipment damage.**

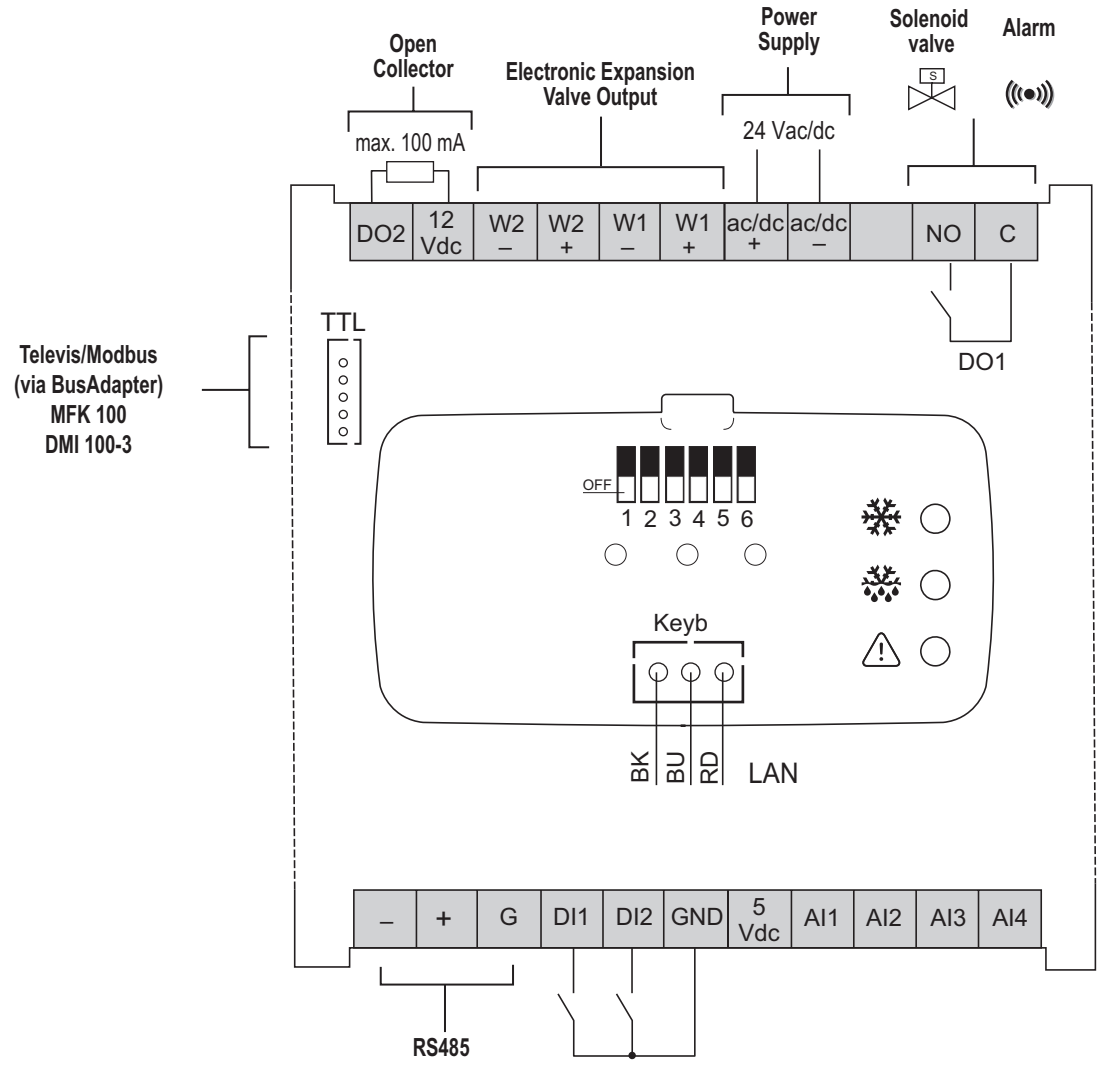
4.2.1 - V910 V3 electric diagrams

Terminal	Label	Description	Notes	Parameters
2-3*	Open Collector	Solenoid valve / Alarm	2=dO; 3= 12 Vdc Max LOAD 100 mA	dL91
3	12 Vdc	Probe power supply	Power supply for probes with inputs under current 4..20 mA and O.C.	-
4 -5 -6 -7	Valve Output	Valve output	4= W2-; 5=W2+; 6=W1-; 7=W1+	-
8-9	Supply	Power supply	Power supply Vdc 8=+; 9=- Respect the polarity	-
11-12	DO1	Relay output	Solenoid valve · Alarm	dL90
14-15-16	485	Direct connection Televis/Modbus serial	-	-
17*	DI1	Digital input 1	Connecting the digital inputs to a power supply output is strictly forbidden	dL40
18*	DI2	Digital input 2		dL41
19	GND	Ground		-
20	5 Vdc	Probe power supply	For ratiometric probe	-
21*	AI1	Analogue input 1	Saturation probe	dL10 / dL11 / dL20
22*	AI2	Analogue input 2	Back-up saturation probe	dL12 / dL13 / dL21
23*	AI3	Analogue input 3	Evaporator output probe (overheating)	dL22
24*	AI4	Analogue input 4	Evaporator output probe (overheating) of back-up	dL23

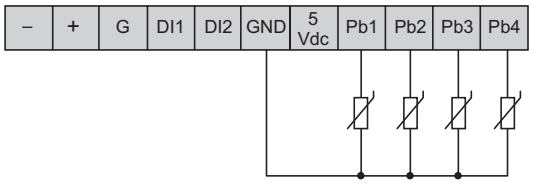
Tab. 7 Wiring diagrams

* Default factory settings for CO_2 applications (cascade systems).

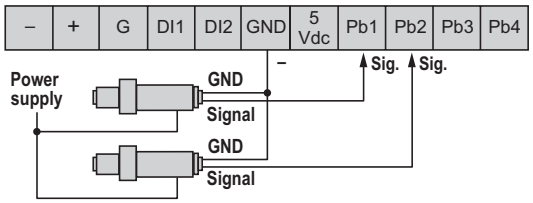
V910 V3



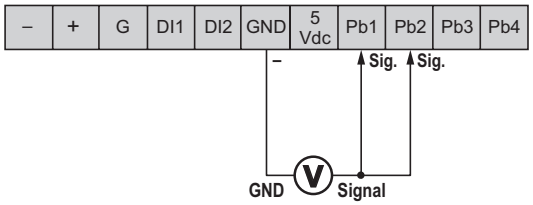
● NTC / Pt1000 Probe Connection



● Current - Transducer 4...20 mA



● Voltage - Transducer 0...10 V



● Voltage - 0...5 V ratiometric or current

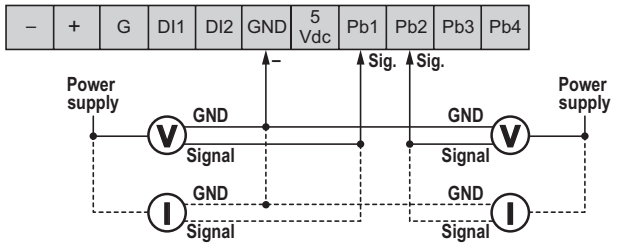


Fig. 9 Electric diagram **V910 V3**

4.3 - V910 V3 - Connection SKP 10

V910 V3

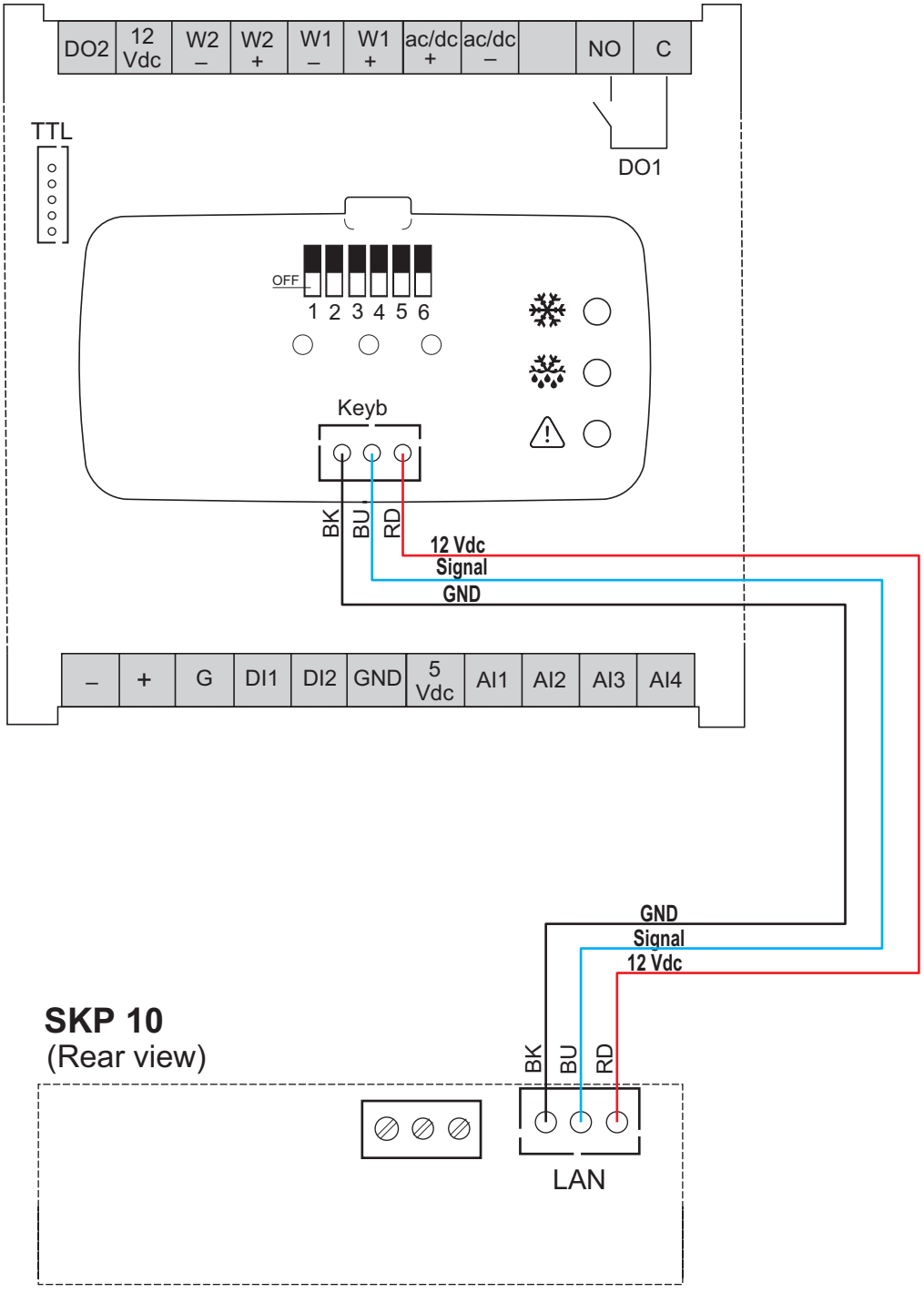


Fig. 10 V910 V3 - Connection **SKP 10**

4.4 - Connection of compatible valves

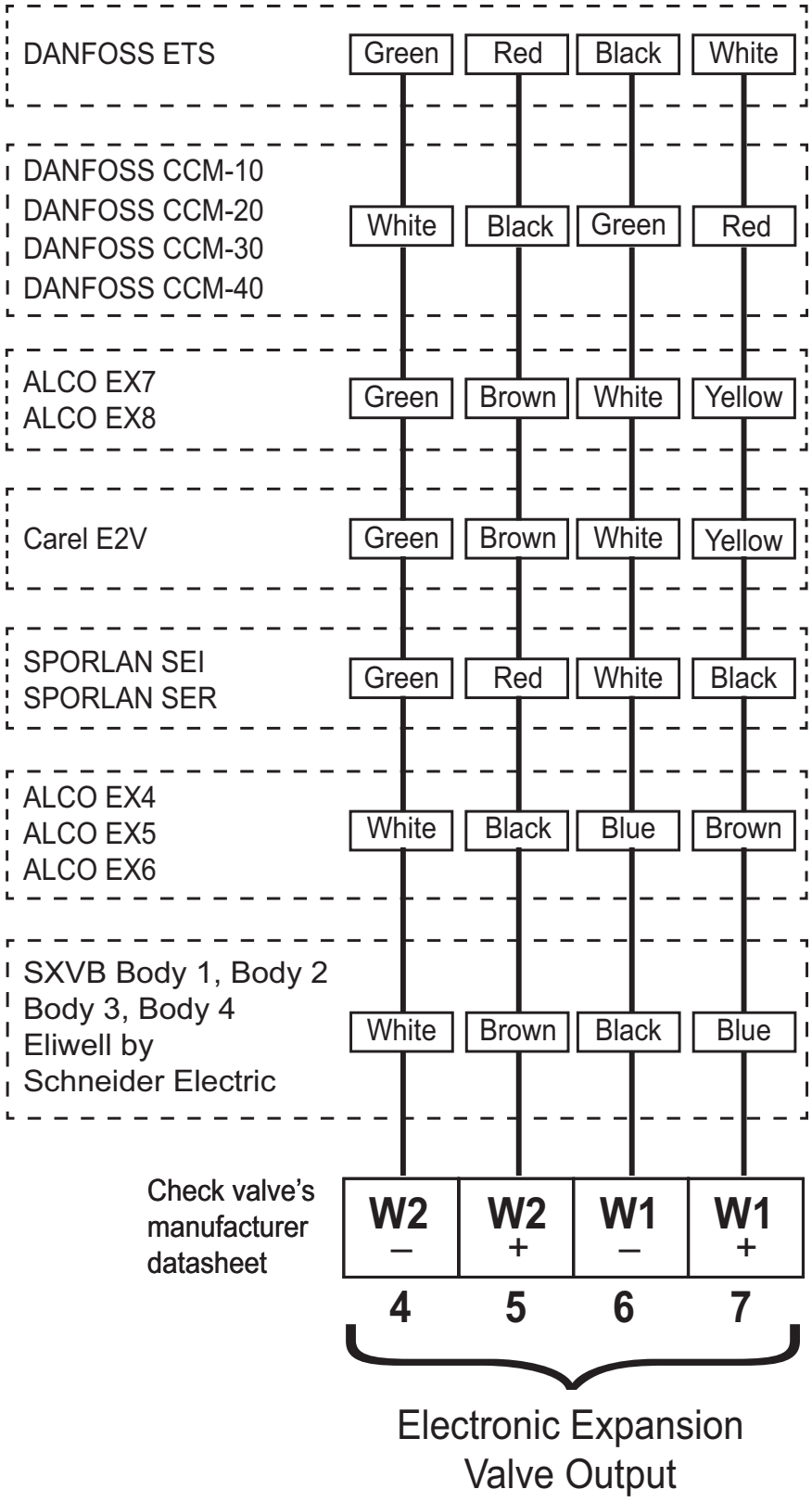


Fig. 11 Electronic expansion valve outlet

5 - TECHNICAL DATA

All the system components of drivers for **electronic V910 V3 expansion valves** meet the European Community (CE) requirements for open devices. They must be installed in a casing or other designated place to suit the environmental conditions and minimise the risk of involuntary contact with high voltages. Use metal casings to improve the immunity of the electromagnetic fields of the driver's system for **electronic V910 V3 expansion valves**. This device meets the CE requirements indicated in the table below.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

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

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The application of incorrect current and voltage values to the analogue inputs and outputs may damage the electronic circuits. Moreover, connecting a current input device to an analogue input configured for voltage and vice versa will also damage the electronic circuits.

NOTICE

INOPERABLE DEVICE

- Do not apply voltages higher than 11 V c.c.to the analogue inputs of the controller or the input/output expansion module if the analogue input is configured as a 0-10 V c.c input.
- Do not apply currents over 30 mA to the controller analogue inputs or the input/output expansion module when the analogue input is configured as an input 0-20 mA or 4-20 mA.
- Make sure that the signal applied corresponds to the analogue input configuration.

Failure to follow these instructions can result in equipment damage.

5.1 - General technical specifications

The product complies with the following harmonized standards	EN 60730-1
Use	Stepper electronic expansion valve driver
Installation	on DIN Omega bar support
Type of action	1.B
Pollution class	2 (normal)
Over voltage category	II
Nominal pulse voltage	2500 V
Digital outputs	Refer to the label on the device
Fire resistance category	D
Software class and structure	A
Type of disconnection or suspension for each circuit	Micro-disconnection
Period of electrical stress on the insulating parts	Long period

Tab. 8 Classification

	Standard	Min.	Max.
Voltage of NON insulated power supply	24Vac/dc ±10%	-	-
Power supply frequency	50 Hz/60 Hz	-	-
Power consumption	30 VA / 25 W	-	-
Insulation class	2	-	-
Ambient operating temperature	25 °C (77 °F)	-5 °C (23 °F)	55 °C (131 °F)
Operating environment humidity (with no condensation)	30%	10%	90%
Storage temperature	25 °C (77 °F)	-20 °C (-4 °F)	85 °C (185 °F)
Operating environment humidity (with no condensation)	30%	10%	90%

Tab. 9 General Specifications

5.2 - Input/output specifications

Type and label	Description
Digital inputs ddi1 - ddi2	2 voltage-free digital inputs closure current for ground: 0.5 mA
Digital outputs with high voltage ddO1	1 SPST relay: N.A. 5 A 250 Vac
Analogue inputs dAi1 - dAi2 dAi3 - dAi4	**dAi1 - dAi2** 2 configurable inputs: a) NTC temperature 103AT-2 10 kΩ, Pt1000 b) input under current 4...20 mA / ratiometric 0-5 V c) voltage connection of) 0-10 V **dAi3 - dAi4** 2 configurable inputs like temperature NTC 103AT 10 kΩ or Pt1000. Measurement range: -50 ... 99.9 °C; (-58 ... 211.82 °F)
Digital output Open Collector SELV ddO2 with low voltage	1 Open Collector output Max. current 100 mA

Tab. 10 Input / output characteristics

	NTC103* -50...+99.9 °C	**Pt1000*** -50...+99.9 °C	**4...20 mA**	**0..10 V**	**0-5 V**
AI1	✔	✔	✔	✔	✔
AI2	✔	✔	✔	✔	✔
AI3	✔	✔	-	-	-
AI4	✔	✔	-	-	-
Resolution	0.1 °C	0.1 °C	0.1 bar	0.1 bar	0.1 bar
F.S. precision	1%	1%	1%	1%	1%
Impedance	-	-	100 ohm	21 kohm	110 kohm
NTC: NTC 103AT-2 (10kΩ @25 °C) BETA value 3435 *** probes not included - contact the Eliwell Sales Office for accessories**					

Tab. 11 Features of analogue inputs

5.3 - Serial functions

Label	Description
TTL (**MFK 100 / DMI 100-3 / UNICARD**)	TTL serial to connect Personal Computer via interface module
	Serial TTL for **MFK 100 / DMI 100-3 / UNICARD connection** load/unload parameters and/or applications
Keyb	3-way JST connector inside the door for connection to **SKP 10** terminal
RS-485	Integrated opto-isolated RS-485 serial

Tab. 12 Serial features

5.4 - Electrical connections

The drivers for electronic **V910 V3** expansion valves and i associated devices require electric power supply with a nominal voltage of 24 V c.a. / 24 V c.c. The power supplies/transformers must be SELV (Safety Extra Low Voltage) classified according to IEC 61140. These electrical power sources are isolated between the input and output electrical circuits of the power supply and are separated by ground (earth), PELV systems and other SELV systems.

⚠ ⚠ DANGER

RING GROUND CAUSING ELECTRICAL SHOCK AND/OR EQUIPMENT MALFUNCTION

- Do not connect the connection to 0 V on the power supply/transformer powering this device to an external earth connection (ground).
- Do not connect the connection to 0 V or earth (ground) on the sensors and actuators connected to this device to an external ground connection.
- If necessary, use separate power supplies/transformers to power the sensors and actuators isolated from this device.

Failure to follow these instructions will result in death or serious injury.

If the specified voltage field is not maintained, or if the actual separation of the SELV circuit connected to the equipment in question is compromised, the products might not work as they should or become damaged and be no longer usable.

⚠ WARNING

POTENTIAL OF OVERHEATING AND FIRE

- Do not connect the equipment directly to mains power.
- To power this devices, use exclusively safe isolated power supplies/transformers (SELV).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The device must be connected to an appropriate power supply/transformer with the following characteristics:

Primary voltage	Depending on the requirements of the individual unit and/or the country of installation.
Secondary voltage	24 Vac/dc
Power supply frequency V~	50/60 Hz
Power	35 VA

5.5 - Mechanical data

Description	Versions
Terminals and connectors:	
1 x JST 3-way JST connector to **SKP 10** terminal. To use with **COLV000033200 CABLE. LAN/FLEX 2 m double conn.**	All versions
Casing:	
PC+ABS plastic resin with V0 flammability rating	All versions

Tab. 13 Mechanical data

6 - USER INTERFACE

The interface, comprising the front cover of the controller, allows you to perform all operations needed to use the device.

Fig. 12 V910 V3

6.1 - LED V910 V3

There are 3 LEDS on the front of the **V910 V3** driver which indicate the status of the valve.

Inside the door there are 3 more LEDS used to upload/download parameters and/or applications (see chapter "**MFK 100**")

	LED	Colour	On	Flashing		Off
	EEV	Green	Valve regulation	Valve closed (no adjustment in progress) Setpoint satisfied		NA*
	Defrost	Yellow	Defrost in progress Valve closed (no adjustment in progress)	No serial connection		No defrost
	Alarm	Red	NA	Alarm present	No serial connection	No alarm

Tab. 14 LED **V910 V3**

* LED off indicates interruption of the driver power supply

6.2 - SKP 10

The **V910 V3** driver is a blind model with no display. Use the **SKP 10** terminal to work the device.

The values shown on the **SKP 10** terminal can have at most 4 digits or 3 digits plus a sign.

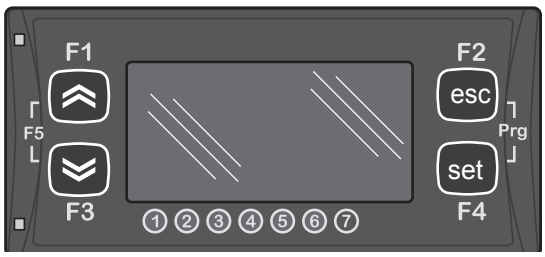


Fig. 13 SKP 10

KEYS

	Key	Single press (press and release)	Long press
⌃⌃	UP	• Rapid overheating Setpoint modification* • Increase the value / Move to next label	**F1**: not used
⌄⌄	DOWN	• Rapid overheating Setpoint modification* • Decrease the value / Move to previous label	**F3**: not used
esc	ESC key	• Exit without saving new settings • Go back to previous level	**F2**: not used
set	SET	• Confirm value / exit and save new settings • Move to next level • Open State Menu. (folder, sub-folder, parameter, value)	**F4**: refer to “6.4 - Main display settings” on page 38
esc + set	ESC+SET	Opens the Programming Menu	**Prg**: refer to “6.4 - Main display settings” on page 38
⌃⌃ + ⌄⌄	UP+DOWN	Alarm acknowledgement	**F5**: not used

Tab. 15 Description of keys

* Also modifiable from parameter **dE31** and **dE32**.

LED

The display shows the value/resource set for the “main display”.

If an alarm is given the E**xx** alarm code will alternate (if there are several alarms, the code with the lower value).

LED			
No.	**Colour**	**Description**	**Notes**
	Red	Menu (ABC)	
	Red	Display pressure (Bar)	Values are in relative bars. If the value is PSI, the symbol does not appear.
	Red	Display temperature (°C)	If the value is °F the symbol does not appear
	Red	Alarm	

Tab. 16 Description of LEDs

6.3 - Access to folders - Menu structure

Folders are organised into menus.

Access to said folders is defined by the keys on the front cover as shown in “6.2 - SKP 10” on page 36.

In the paragraphs that follow (or chapters indicated), we will explain how to enter each individual menu.

There are 2 menus:

- “States” menu: refer to “6.5 - STATES Menu” on page 40;
- “Programming” menu: refer to “6.6 - PROGRAMMING Menu” on page 44;

There are 3 folders / sub-menus in the Programming Menu:

- “Parameters” menu (PAr folder): refer to “10 - PARAMETERS (PAr)” on page 83;
- “MFK” Menu (FnC folder): refer to “12 - MFK 100 (FnC FOLDER)” on page 105;
- “PASS” Password: refer to “10 - PARAMETERS (PAr)” on page 83;

6.4 - Main display settings

“Main display” is what the instrument displays by default, i.e. when the keys are not being used.

V910 V3 makes it possible to change main display according to your requirements.

Choose the required display from the “**disp**” menu.
To access the “**disp**” menu, hold down the “**set**” key for more than 3 seconds.

The main display can be selected from the following.

Label	Description*	Display value	Display value if probe in error (back-up)
drE1	Overheating temperature	dAi3 Probe overheating	dAi4 Back-up overheating probe
drE2	Saturation temperature of refrigerant	dAi1 Saturation probe	dAi2 Back-up saturation probe
drE3	Overheating temperature Back-up probe	dAi4	--- (three dashes)
drE4	Saturation temperature of the back-up Probe refrigerant	dAi2	--- (three dashes)
drE5*	Overheating	Difference drE1-drE2	NA
drE6	Refrigerant Pressure	dAi1 In the case of configuration probe as Saturation probe 4..20 mA or ratiometric	dAi2 In the case configuring the probe as back-up saturation probe 4..20 mA or ratiometric Otherwise --- (three dashes)
drE7	Percentage valve opening	percentage value of valve opening (0....-100%)	--- (three dashes)

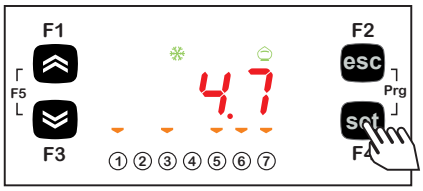
Tab. 17 Fundamental state display

* Default.

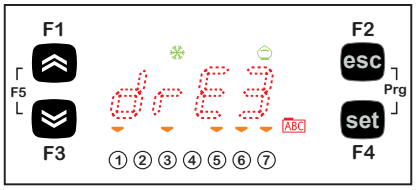
- The analogue inputs are factory-set.
- The probe display is always at temperature
  (for pressure display, see “6.5.2 - Input/output display” on page 42.

A step by step illustration of how to proceed is provided below.

Display settings



To open the “disp” menu to modify the main display setup, press and hold the set key for at least 3 seconds.



This will open the flashing menu on the previous display (in this case drE3).

To modify the display, scroll the menu using the “UP” and “DOWN” keys and press the “set” key to confirm.
When you have decided the type of display (e.g.: drE1), press the set key to confirm. You will be automatically returned to the main display set.

6.5 - STATES Menu

The resource values can be viewed in the **States** menu.

The setpoint can be viewed and modified.

Label	Setpoint				Description	Edit
rE	drE1	drE2	...	drE7	Fundamental state display	No. Only display for setting in this menu, see: “6.5.1 - Setpoint setting” on page 40
Ai	dAi1	dAi2	dAi3	dAi4	Analogue inputs	No
of	ddi1	ddi2			Digital inputs	No
dO	ddO1	ddO2			Digital outputs	No
AL	Er01	Er02	...	Er15	Alarms	No
SP	SP1	SP2	SP3	SP4	Setpoint	Yes (excluding SP4)

Tab. 18 **States** Menu

6.5.1 - Setpoint setting

Setpoint	Description	Settable by parameter	Notes
SP1	setpoint minimum overheating	dE32	If **dE30** = 1 it is understood as objective overheating. Fast change using “UP” and “DOWN” keys
SP2	setpoint maximum overheating	dE31	If **dE32** = 0 it is understood as the only overheating setpoint.
SP3	Setpoint MOP	dE52	Expressed in temperature units.
SP4	setpoint dynamic overheating	Display only, cannot be modified. Calculated dynamically.	Valid if **dE30** = 1. If **dE30** = 0 the set is defined by **dE32**.

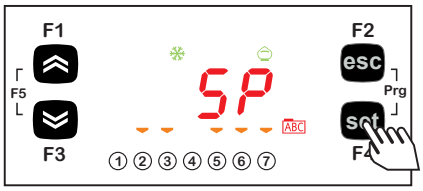
Tab. 19 Setting Setpoint

A step by step illustration of how to proceed is provided below.

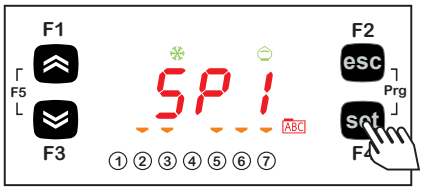
Setting Setpoint

To access the States menu, press and release the “set” key
Label **rE** appears on the display.

(Use the “UP” and “DOWN” keys to browse the other labels until you find the SP label).



Press the “set” key to view the label of the first setpoint SP1.

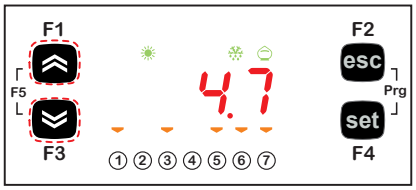


Press the “set” key again to view the value of SP1
(press the “UP” and ‘"DOWN” keys to view the other setpoints).

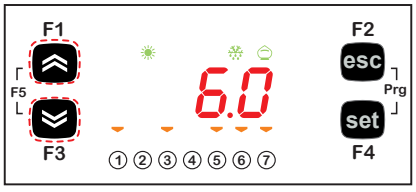
To modify the display use the “UP” and “DOWN” keys and press the “set” key to confirm.

Press “set” to confirm. You will be automatically returned to the main display set.

Fast programming of Setpoint SP1



To quickly modify the setpoint use the “UP” and “DOWN” keys.



The current setpoint value will appear on the display.

To modify the value use the “UP” and “DOWN” keys and press the “set” key to confirm.

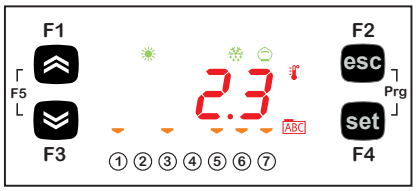
Press “set” to confirm.

You will be automatically returned to the main display set.

6.5.2 - Input/output display

A step by step account of how to display the analogue inputs are given below.

The procedure is the same for other I/Os*.

Input/output display	
	To access the States Menu, press and release the “set” key Label rE appears on the display. (Use the UP and DOWN keys to scroll the other labels until you reach dAi).
	Press the “set” key to view the label of the first analogue input (in this case dAi1).
	Press the “set” key again to view the value of dAi1. Note that the °C icon lights up to indicate that the value shown is in degrees centigrade. Press the “esc” key repeatedly until you reach the main display.

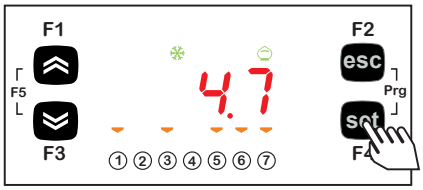
* For Digital inputs the value is:

0 = input not active (for digital inputs this is equivalent to input open)

1 = input active (for digital inputs this is equivalent to input short-circuited to ground).

6.5.3 - Alarm display (AL folder)

A step by step illustration of how to proceed is provided below.

Alarm Display	
	To access the States Menu, press and release the “set” key Label **rE** appears on the display. (Use the “UP” and “DOWN” keys to browse the other labels until you find the AL label).
	Press the “set” key to view the label of the first active alarm (if it exists).
	In this case, the first alarm is Er01. Scroll using the “UP” and “DOWN” keys to find other active alarms. **NOTE**: The menu is not cyclical. For example, if the active alarms are Er01 and Er02, the display will show: Er01 ->Er02<Er01 - > UP,<- DOWN Press the “esc” key repeatedly until you reach the main display.

6.6 - PROGRAMMING Menu

Programming menu	Label			
Parameter folder	PAr			
Parameters sub-folders	dL	dF	dE	Ui
Functions Folder	FnC			
Password folder	PASS			

Tab. 20 Programming menu

6.6.1-Parameters (PAr folder)

A step by step illustration of how to proceed is provided below.

Modifying a parameter	
	To view the Parameters menu (Par), press “esc” and “set” at the same time.
	The Parameters Menu PAr contains all controller folders. Press the “set” key to view the folders.
	The first folder the controller shows is the dL configuration folder. Press the “set” key again to modify individual dL parameters.

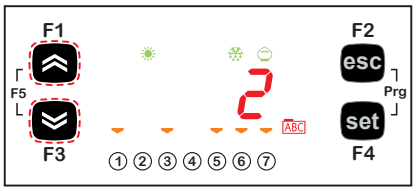
The controller will show parameter dL00 (factory default settings).

Press the “UP” key to scroll through the various parameters or move to the next parameter (dL01 in this case) or the “DOWN” key to go back to the previous parameter (dL91 in this case)

dL00->dL01->dL02->…->dL91->dL00
dL91<-dL00<-dL01<-…<-dL90<-dL91

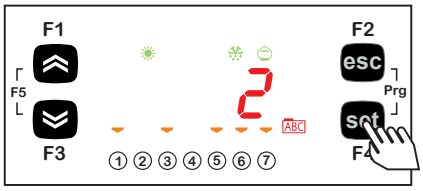
- > UP,<- DOWN

To view the parameter value (dL01 in this case), press the “set” key.



For parameter dL01, the value shown will be 2.

To change the parameter value, press the “UP” and “DOWN” keys.



Having selected a value, press the “set” key. **

To exit this display and return to the previous level, press the “esc” key.

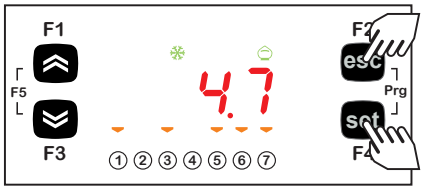
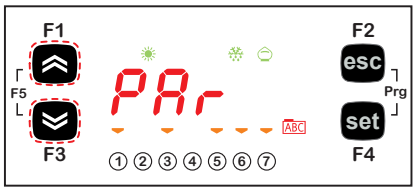
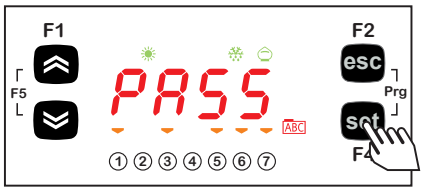
**Press the “set” key to confirm the changed value; press the “esc” key to return to the previous level without saving the new value entered.

6.7 - MFK 100 (PAr/FnC folder)

Refer to “12 - MFK 100 (FnC FOLDER)” on page 105

6.8 - Setting a password (Par/PASS folder)

Access the PASS folder (basic view by pressing “esc” + “set” simultaneously and search the folder using the “UP” and “DOWN” keys); Set the PASS value to have access to the parameters visible for that password.

Setting the password	
	To view the PASS folder in the main display, press “Esc” and “Set” at the same time.
	The menu showing the list of folders will be displayed. Use the “UP” and “DOWN” keys to find the PASS folder.
	Press the “set” key to enter the PASS folder. From here, set the password (installer or manufacturer), press “set” and exit. Now open and view parameters to change a value (refer to **“10 - PARAMETERS (PAr)” on page 83**).

7 - I/O PHYSICAL CONFIGURATION

Every so often, new input models become available, as well as output models and other non-documented devices in the following information. For information on the new devices, contact the Eliwell Controls local reps.

NOTICE

INOPERABLE DEVICE

Each time a new I/O expansion model or other device recently released on to the market for this equipment is installed, update the controller firmware to the latest version.

Failure to follow these instructions can result in equipment damage.

NOTE: For further information on how to update the controller firmware, contact your local Eliwell Controls rep.

The application of incorrect current and voltage values to the analogue inputs and outputs may damage the electronic circuits. Moreover, connecting a current input device to an analogue input configured for voltage and vice versa will also damage the electronic circuits.

NOTICE

INOPERABLE DEVICE

- Do not apply voltages higher than 11 V c.c. to the analogue inputs of the controller or the input/output expansion module if the analogue input is configured as a 0-10 V c.c input.
- Do not apply currents over 30 mA to the controller analogue inputs or the input/output expansion module when the analogue input is configured as an input 0-20 mA or 4-20 mA.
- Make sure that the signal applied corresponds to the analogue input configuration.

Failure to follow these instructions can result in equipment damage.

7.1 - Analogue inputs

There are a total of four analogue inputs, referred to below as **dAi1**…**dAi4**.

Using the parameters, a physical resource (probe, digital input, voltage/current signal) can be “physically” configured for each type of input.

Inputs can be “physically” configured as specified in the table below.

PAr.	Description	0	1	2	3*	4*	5*
dL00	Input types analogue dAi1	Probe not configured	NTC probe	Pt1000	4-20 mA	Ratiometric 0-5 V	0-10 V
dL01	Input types analogue dAi2	Probe not configured	NTC probe	Pt1000	4-20 mA	Ratiometric 0-5 V	0-10 V
dL02	Input types analogue dAi3	Probe not configured	NTC probe	Pt1000	-	-	-
dL03	Input types analogue dAi4	Probe not configured	NTC probe	Pt1000	-	-	-

Tab. 21 Configuration of analogue inputs

***** If **dL00**/**dL01** = 3 or 4 or 5, the value read by the probe is automatically converted into a saturation temperature value.

Analogue input	Parameter	Range	Description
dAi1	**dL10**	**dL11**...999.9	Analogue input dAi1 fullscale value
dAi1	**dL11**	-14,5...**dL10**	Analogue input dAi1 start of scale value
dAi2	**dL12**	**dL13**...999.9	Analogue input dAi2 fullscale value
dAi2	**dL13**	-14,5...**dL12**	Analogue input dAi2 start of scale value

Tab. 22 Description of analogue inputs

The values read by analogue inputs can be configured in the parameters **dL20**...**dL23**

Parameter	Description	Unit of measure	Range
dL20	Analogue input dAi1 differential	bar/PSI -°C/°F	-12.0…12.0
dL21	Analogue input dAi2 differential	bar/PSI -°C/°F	-12.0…12.0
dL22	Analogue input dAi3 differential	°C/°F	-12.0…12.0
dL23	Analogue input dAi4 differential	°C/°F	-12.0…12.0

Tab. 23 Analogue inputs calibration

The analogue inputs can be configured according to the following table.

PAr.	Function	Value	Description	Factory settings
dL30	Configuration analogue input dAi1	0...6	• **0** = Disabled • **1** = Evaporator output (overheating) • **2** = Saturation • **3** = Evaporator output (overheating) back-up • **4** = Back-up saturation • **5** = Discharge • **6** = Regulator ON/OFF	Saturation probe **(dL30 = 2)**
dL31	Configuration analogue input dAi2	0...6		Discharge probe **(dL31 = 5)**
dL32	Configuration analogue input dAi3	0...6		Output probe evaporator (overheating) **(dL32 = 1)**
dL33	Configuration analogue input dAi4	0...6		Not used **(dL33 = 0)**

Tab. 24 Configuration of analogue inputs

7.1.1- Valve opening direct control

If inputs Ai1 and dAi2 are “physically” configured in voltage or current, they are configurable for valve opening direct control as shown in the following table.

PAr	Function	Value
dL00	Analogue input dAi1 type	3-4-5
dL01	Analogue input dAi2 type	3-4-5
dL30	Analogue input dAi1 configuration	5
dL31	Analogue input dAi2 configuration	5

Tab. 25 Configuration of valve opening direct control

In this case the input is converted linearly as a percentage, again using the parameters:

PAr	Function	Range
dL10	Analogue input dAi1 fullscale value	**dL11**...999.9
dL11	Analogue input dAi1 start of scale value	-14.5...**dL10**
dL12	Analogue input dAi2 fullscale value	**dL13**...999.9
dL13	Analogue input dAi2 start of scale value	-14.5...**dL12**

Tab. 26 Configuration of valve opening direct control

You must set:

dAi1

- **dL10** to a value corresponding to a signal of 10 V or 20 mA
- **dL11** to a value corresponding to a signal of 0 V or 4 mA

dAi2

- **dL12** to a value corresponding to a signal of 10 V or 20 mA
- **dL13** to a value corresponding to a signal of 0 V or 4 mA

Valve opening percentage

- **dAi1(2) < -5.0**: valve opening percentage of 0% is controlled
  (clearing, that is repeated until the signal remains under the level of -5.0)
- **-5.0 < dAi1 < 0.0**: valve opening percentage of 0% is controlled
- **dAi1(dAi2) > 0.0**: valve opening percentage is equal to the dAi1 value (dAi2).

7.2 - Digital inputs

There are 2 voltage free digital inputs, identified below as ddi1…ddi2.

The Digital inputs can be configured as shown in the following table.

PAr.	Function	Value	Description	Notes
dL40	Configuration digital input ddi1	-4...+4	• **0** = Digital input not configured • **±1** = ON/OFF adjustment • **±2** = Defrost • **±3** = Alarm • **±4** = Plant functioning mode (only mode 0 and 1)	• The positive values (+) indicate active for closed contact, the negative values (-) indicate active for open contact • If configured (for values ≠ 0) the digital inputs always have priority over any serial commands • **dL40** = **dL41** digital input ddL1 has priority
dL41	Configuration digital input ddi2	-4...+4		

Tab. 27 Configuration of digital inputs

*in OFF **V910 V3** valve opening strength at 50% for 40 seconds.

7.3 digital - outputs

PAr.	Function	Value	Description	Notes
dL90	Output configuration Digital ddO1 (on relay)	-2…2	• **0** = output controlled from serial • **±1** = Solenoid valve control • **±2** = alarm output • **±3** = ON/OFF • **±4** = Remote (only in the case of **dF02** = 1 **serial**)	The positive values (+) indicate active for closed contact, the negative values (-) indicate active for open contact.
dL91	Digital output ddO2 configuration (Open Collector)	-2…2		

Tab. 28 Digital output configuration

7.4 - DIP switch table

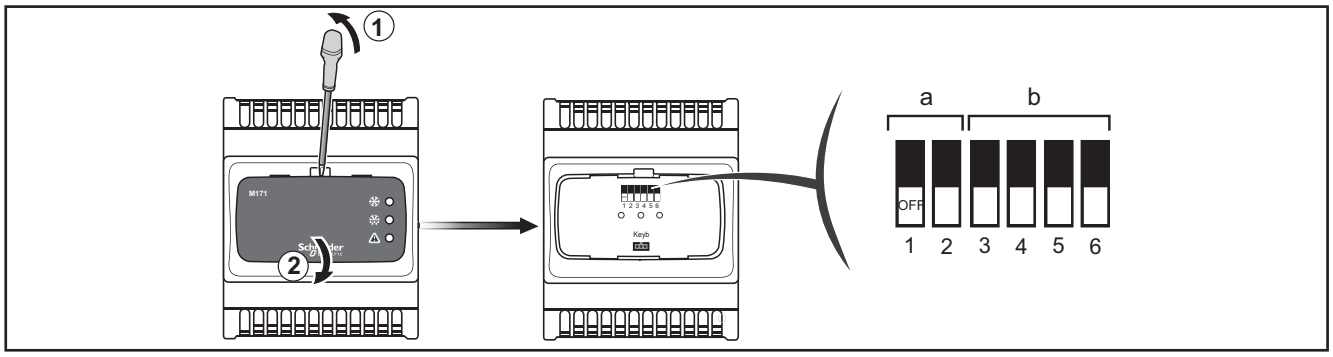


Fig. 14 Access to DIP switches/**SKP 10**

Inside the door there are six selectors (DIP switches) used for quick selection of refrigerant as well as selection of network address and use of the **MFK 100 / UNICARD**.

The operations can also be done from the **SKP 10** terminal by appropriately configuring the dF folder parameters.

The refrigerant can be selected using parameter **dE20**. In this case set the DIP switches to configuration 15 according to the table below.

	Function	Configuration	Refrigerant	Selectors (DIP switches)					
				1	2	3	4	5	6
b	Select refrigerant	0	R404A	-	-	OFF	OFF	OFF	OFF
		1	R22	-	-	ON	OFF	OFF	OFF
		2	R410A	-	-	OFF	ON	OFF	OFF
		3	R134A	-	-	ON	ON	OFF	OFF
		4	R744 (CO_2)	-	-	OFF	OFF	OFF	ON
		5	R407C	-	-	ON	OFF	OFF	ON
		6	R427A	-	-	OFF	ON	ON	ON
		7	R507A	-	-	ON	ON	ON	OFF
		8	R717	-	-	OFF	OFF	OFF	ON
		9	Reserved	-	-	ON	OFF	OFF	ON
		10	R407A	-	-	OFF	ON	OFF	ON
		11	R448A	-	-	ON	ON	OFF	ON
		12	R449A	-	-	OFF	OFF	ON	ON
		13	R450A	-	-	ON	OFF	ON	ON
		14	R513A	-	-	OFF	ON	ON	ON
		15	Set by parameter **dE20** R404A default	-	-	ON	ON	ON	ON
			Action	**1**	**2**	**3**	**4**	**5**	**6**
a	Upload/Download parameters from **MFK 100**	-	Upload from **V910** to **MFK 100**	ON	OFF	-	-	-	-
		-	Download from **MFK 100** to **V910**	OFF	ON	-	-	-	-

Tab. 29 DIP switch

⚠ DANGER

POTENTIAL FOR EXPLOSION AND FIRE

Do not use this device with applications that use R290 inflammable refrigerant.

Failure to follow these instructions will result in death or serious injury.

8 - FUNCTIONING

8.1 - Introduction

V910 V3 is a stepper driver for electronic expansion valves that regulates the minimum overheating value at the evaporator output.

Refer to **(Fig. 15)**.

The control value is the percentage of valve opening which is translated into a percentage of enabling of the output valve according to the following parameters:

- **dE10** - Maximum valve opening percentage is the maximum opening of the valve
- **dE14** - Minimum valve useful opening percentage is the minimum useful valve opening
- **dE15** - Maximum valve useful opening percentage is the maximum useful valve
- If the regulator controls an output of more than or equal to **dE15**, the actual output is equal to **dE10**.
- If **dE15** > **dE10**, the function is ignored.
- If the regulator controls an output of less than or equal to **dE14**, the actual output is equal to 0.
- If the regulator controls an output of more than or equal to **dE10**, for more than the time set in **dE13** a maximum opening alarm **dA07** is generated to indicate a critical system situation such as insufficient load, undersizing, etc.
- To disable the signal, set **dE13**=0.

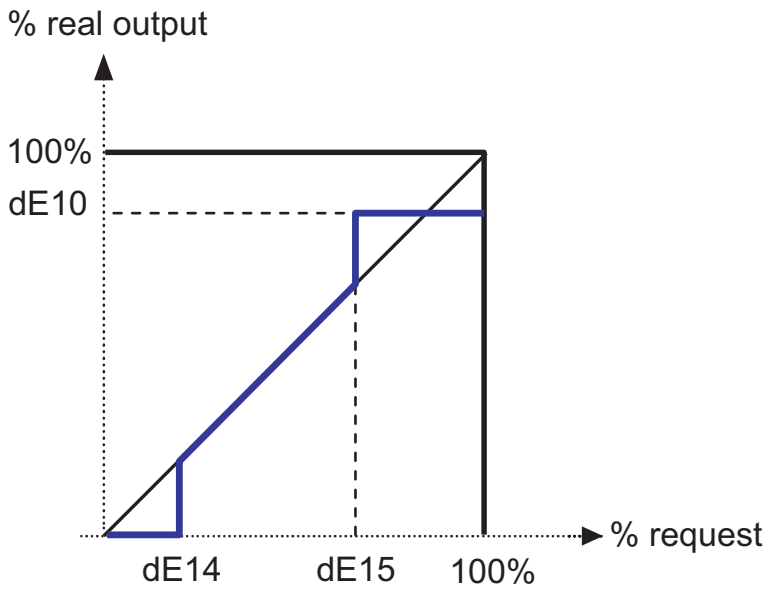


Fig. 15 Operating graph

8.2 - Saturation setting

V910 V3 calculates the real overheating value using the two analogue inputs, overheating **dAi3** and saturation **dAi1**.

A PID controller modulates the valve opening so make the overheating reach the setpoint **dE32**. The algorithm is dynamic: the effective overheating value may not reach the set Setpoint or may temporarily fall below this value.

If this causes liquid to leak from the evaporator the Setpoint **dE32** value must be increased.

* Valid for **dE30=1**.

8.3 - Type of system dE21

The PID configuration parameters are loaded automatically by the device selecting the type of system defined by the parameter **dE21**.

8.4 - MOP (Maximum Operating Pressure)

MOP control has a threshold set by the pressure setpoint **dE52**.

Above this threshold for more than time **dE53**, a MOP alarm is triggered
(refer to “11 - ALARMS” on page 104).

- MOP control can be enabled using parameter **dE50**.
- MOP control can be disabled when the device is switched on/after a defrost condition for an amount of time equal to **dE51**. This allows the pressure to drop below a given level when the system is switched back on.

8.5 - ON/OFF control

The ON/OFF regulator is enabled by setting the parameter **dE78** ≠ 0.

PAr.	Function	Value	Description
dE78	ON/ OFF Regulation Enabling	0…2	• **0** = Disabled • **1** = ON/OFF regulation of hot mode • **2** = ON/OFF regulation of cold mode

Tab. 30 ON/ OFF Regulation Enabling

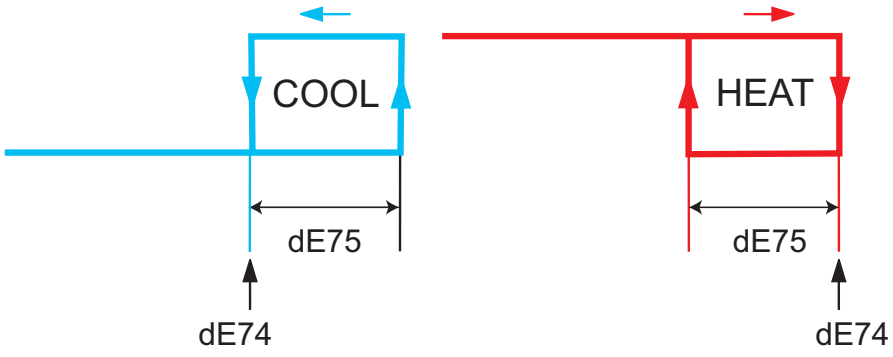


Fig. 16 Graphic operation ON/OFF

The regulation setpoint is set with the parameter **dE74** and the differential with **dE75**.
Parameters **dE76** and **dE77** configure operation in the duty cycle in case of probe error.

PAr.	Function	Value dE76	Value dE77	Regulator status
dE74	Regulator setpoint ON/OFF	0	0	OFF
dE75	Regulator differential ON/OFF	0	≠0	OFF
dE76	ON time in the event of error probe.	≠0	0	ON
dE77	OFF time in the event of error probe.	≠0	≠0	Duty Cycle

Tab. 31 Regulator configuration ON/OFF

8.6 - CO2 Pressure regulation

Enabling of the pressure regulation for cascade systems (CO_2) occurs by configuring the parameter **dE81** ≠ 0.

The condensation pressure is regulated by a PID regulator:

PAr.	Function	Value	Description
dE81	Enabling of PID pressure regulator (condensation)	0...4	• **0 =** Disabled • **1 =** Local regulator • **2 =** Remote • **3 =** Only PID pressure • **4 =** Reserved
dE_5	Minimum overheating percentage - forced mode*	0...100	0 (Default)
dE_6	Activation time of minimum overheating percentage - forced mode*	0...255	0 (Default)

Tab. 32 Enable Regulation pressure CO_2

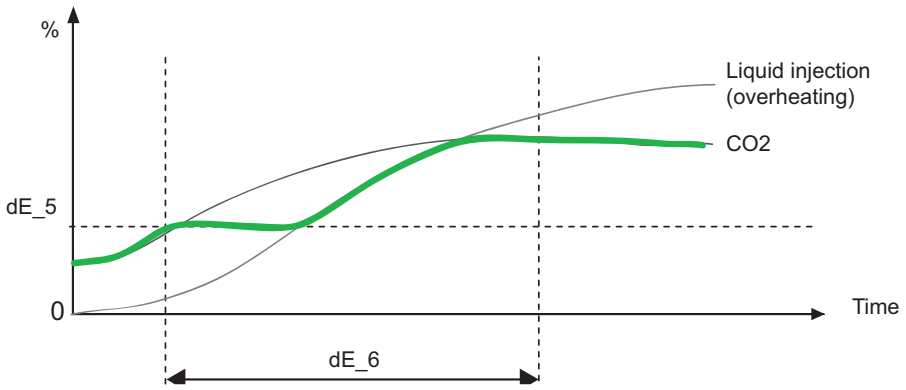


Fig. 17 Liquid injection graph- CO_2

PID regulator

PAr.	Function	Description
dE82	PID pressure regulator proportional band	The HEAT or COOL mode is set according to the sign (positive or negative)
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	-
dE89	Pressure PID neutral zone	-

Tab. 33 Enable Regulation pressure CO_2

In cases of probe error (or value from remote unavailable), the PID regulator output value is pushed to **dE16.**

8.7 - PID Control

The PID regulation acts without derivative component in such a way that the integral component adapts to the thermal-dynamic phenomena. The greater the integral gain **dE83** the greater the reactivity of the system itself.

The proportional component acts out-with the neutral zone in such a way as to speed up the regulation during transition.

The regulation speed of the PID is managed by parameters **dE39**, **dE57**, **dE85**.

PAr.	Function
dE39	Overheating PID cycle period
dE57	MOP PID cycle period
dE85	Pressure PID cycle time

Tab. 34 PID control

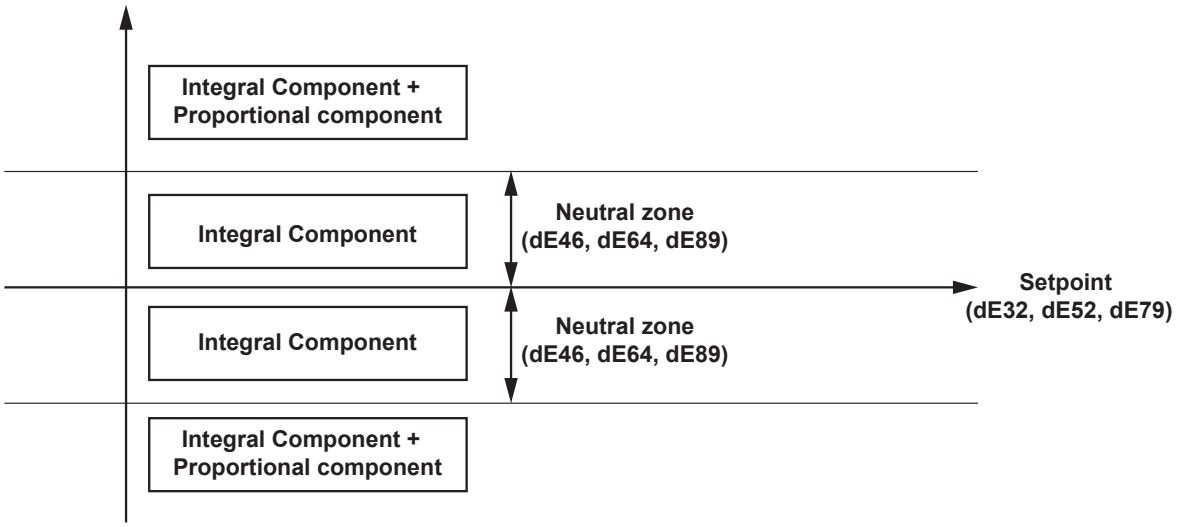


Fig. 18 Graphic operation PID regulator

9 - APPLICATIONS

9.1 - “Stand-alone”

The regulation can be controlled via:

1. digital inputs
2. serial connection.

The **V910 V3** driver controls the electronic expansion valve and receives the commands defrost and valve EEV control from:

1. digital inputs (refer to “7.2 - Digital inputs” on page 51)
2. RS485 serial.

Refer to **(Fig. 19)**.

To set parameter **dF02** refer to“9.1.1 - Control from digital inputs or serial port” on page 57.

9.1.1 - Control from digital inputs or serial port

Suitably set parameter **dF02:**

- **dF02** = 0 digital input
- **dF02** ≠ 0 serial.

If the digital inputs are configured to ≠ 0, they always have priority over the serial command independently of parameter **dF02**.

Refer to “7 - I/O PHYSICAL CONFIGURATION” on page 47.

The selection of the Modbus protocol is set by the parameter **dF00**.

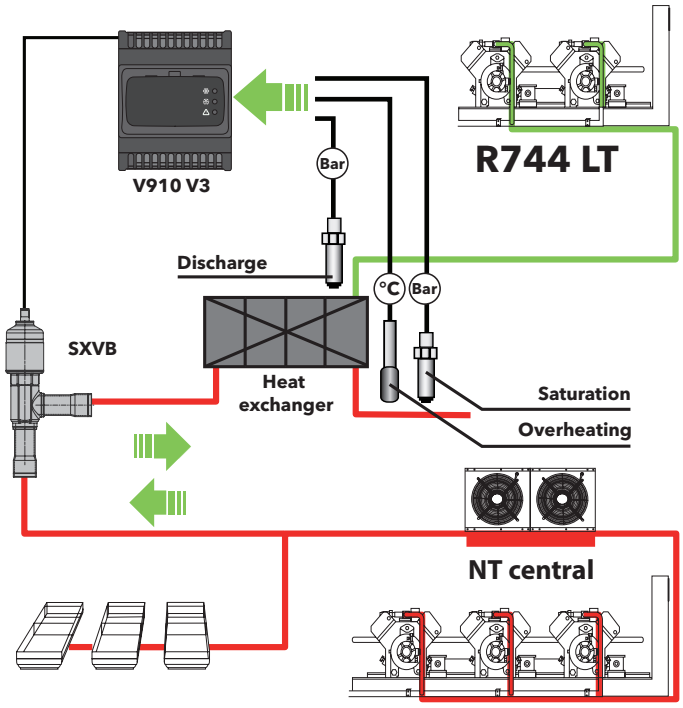


Fig. 19 Application - Stand-Alone

Regulation of digital inputs

Value dL40 - dl41			Notes
±1	ON	Enabling regulation	Forcing valve opening to value: **dE11 - Valve actuation percentage after blackout** For a time: **dE35 - Valve opening freezing timer after OFF->ON**
	OFF	Disabling regulation	Valve closing (save in **dE11** of the current percentage)
±2	ON	Defrost in progress	Valve closing The configured digital input ±1 is ignored until the end of defrost At the end of defrost the valve opening is forced to the value set by: **dE12 - Valve actuation percentage after defrost (If ≠ 0)** Otherwise see **dE11**
	OFF	No defrost	-
±3	ON	Alarm active	Valve closing
	OFF	Alarm not active	-
±4	ON	Factory set regulation enabled	Control enabled with profile defined by **dE22 - Type of system operating mode 1**
	OFF		Control enabled with profile defined by **dE21 - Type of system operating mode 0**

Tab. 35 Regulation of digital inputs

PAr.	Function	Value	Description
dE20	Select type of gas	0...15	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default)

Tab. 36 Select type of gas

The actuated percentage of the valve will be such as to maintain the low circuit condensation pressure setpoint at the desired value (**dE79)** while, in any event, preventing the overheating values at the heat exchanger outlet from dropping below the minimum overheating threshold (**dE32**) in order to prevent liquid from leaking out.

PAr.	Function	Value	Description
dE32	Overheating lower threshold	-600...1000	Used to set the setpoint SP2 to regulate the overheating (objective overheating)
dE79	Pressure setpoint	-999...9999	-

PID regulator

These parameters must be set by qualified staff

PAr.	Function	Description
dE82	PID pressure regulator proportional band	COOL mode <0
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	0.2 (Suggested)
dE89	Pressure PID neutral zone	0.5 (Suggested)

The regulation will use the pressure value read by the sensor positioned at the heat exchanger outlet on the **LT** (**discharge pressure**) and the temperature valves (**overheating**) and pressure (**saturation**) at the heat exchanger outlet on the **NT** side.

PAr.	Function	Value	Description
dL00	Analogue input type dAi1 pressure	3 (420)	-
dL01	Analogue input type dAi2 pressure	3 (420)	-
dL02	Analogue input type dAi3 **temperature**	1 (ntc)	-
dL03	Analogue input dAi4 type	0 (diS)	-
dL30	Analogue input dAi1 configuration	2 (saturation probe)	Saturation
dL31	Analogue input dAi2 configuration	5 (discharge)	Discharge
dL32	Analogue input dAi3 configuration	1 (overheating probe)	Overheating
dL33	Analogue input dAi4 configuration	0	Not used

9.1.3 - EWCM EO

V910 V3 can be directly connected to the serial RS485 of **EWCM EO**. In this mode the driver is driven directly by the **EWCM EO**.

In fact EWCM EO manages one driver per electronic expansion valve (EEV) by using serial RS485 EXP.

Below is a connection diagram between **EWCM EO** and **V910 V3** driver for stepper valves.

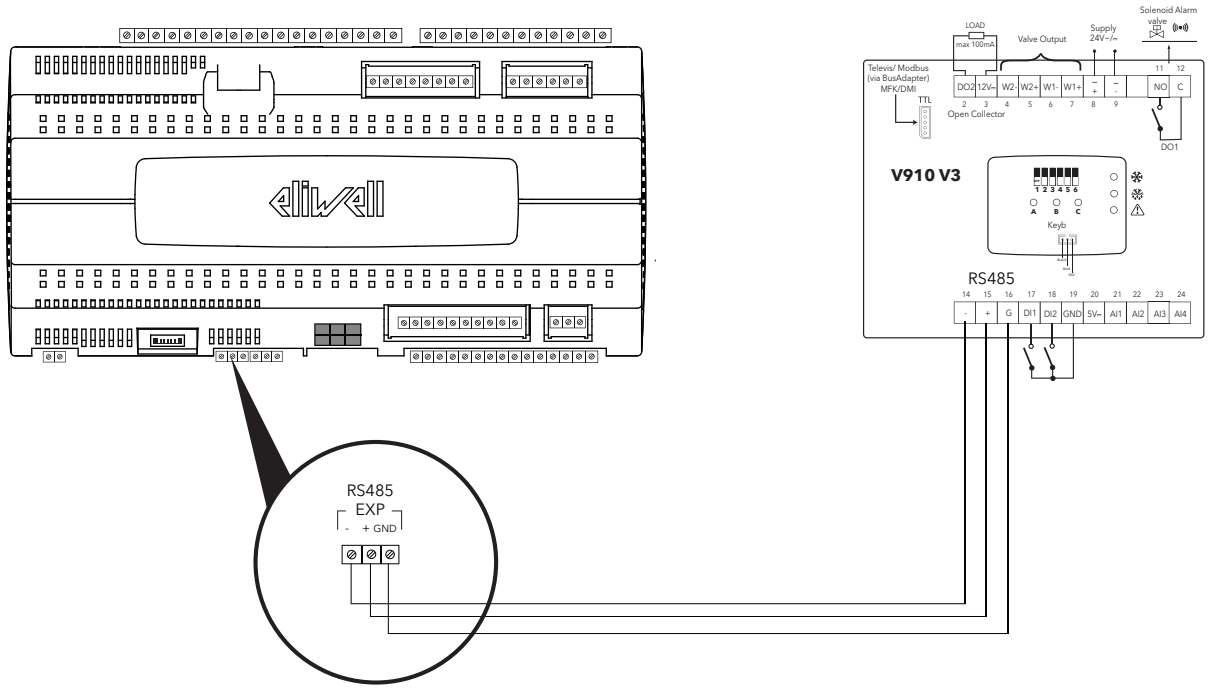


Fig. 20 Application - EWCM EO and Driver EEV V910 V3 Stepper

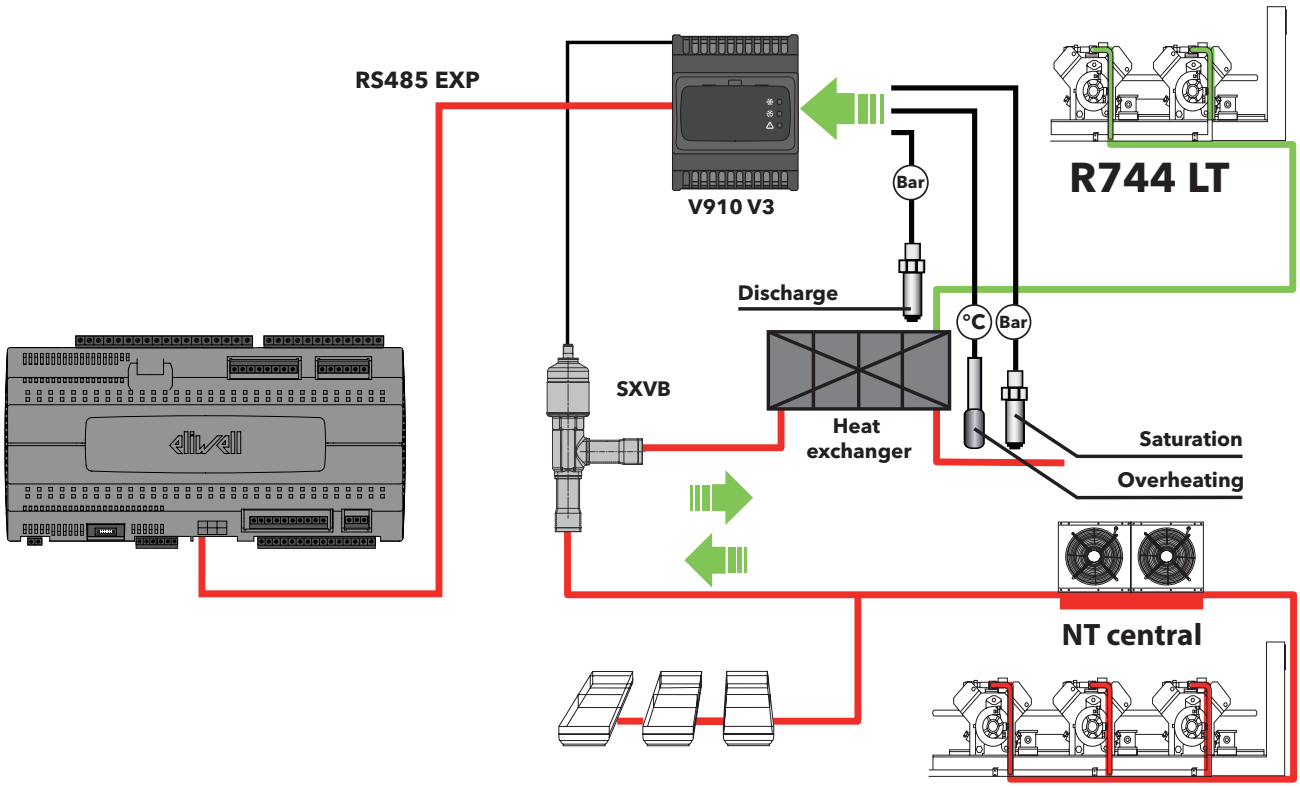


Fig. 21 Heat Exchanger

Addressing and Protocol

Modbus RTU 18200 baud, and, 1

Parameter	Description	Value	Notes
dF00	COM0 protocol selection	0...3	• **0** = Micronet (Televis) • **1** = **Modbus RTU** • **2** = Reserved • **3** = Reserved
dF30	Modbus protocol controller address	1...255	-
dF31	Modbus protocol controller baud rate	0...7	• **0** =1200 baud • **1** =2400 baud • **2** =4800 baud • **3** =9600 baud • **4** =**19200** baud • **5** =38400 baud • **6** =57600 baud • **7** =115200 baud.
dF32	Modbus protocol controller parity	0...2	• **0**=NONE • **1**=**EVEN** (even) • **2**=ODD (uneven).

Type of activation

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	3 (EWCM EO)
dE20	Selection of type of refrigerant (HP plant)	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default).

The actuated percentage of the valve will be such as to maintain the low circuit condensation pressure setpoint at the desired value (**dE79)** while, in any event, preventing the overheating values at the heat exchanger outlet from dropping below the minimum overheating threshold (**dE32**) in order to prevent liquid from leaking out.

Parameter	Description
dE32	Overheating lower threshold
dE79	Pressure set point

The condensation pressure is regulated by a PID regulator whose parameters are:

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	1 (local regulator)

PID regulator

These parameters must be set by qualified staff.

PAr.	Function	Description
dE82	PID pressure regulator proportional band	COOL mode <0
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	0.2 (suggested)
dE89	Pressure PID neutral zone	0.5 (suggested)

The regulation will use the pressure value read by the sensor positioned at the heat exchanger outlet on the **LT** side (**discharge pressure**) and the temperature values (**overheating**) and pressure (**saturation**) at the heat exchanger outlet on the **NT** side.

Configuration of sensors

Parameter	Description	value	Notes
dL00	Analogue input type dAi1 pressure	3 (420)	-
dL01	Analogue input type dAi2 pressure	3 (420)	-
dL02	Analogue input type dAi3 temperature	1 (ntc)	-
dL03	Analogue input dAi4 type	0 (diS)	-
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	5 (discharge)	discharge
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	0	not used

9.1.4 - Regulation via serial

The **V910 V3** driver can be driven by third-party devices, via Modbus.

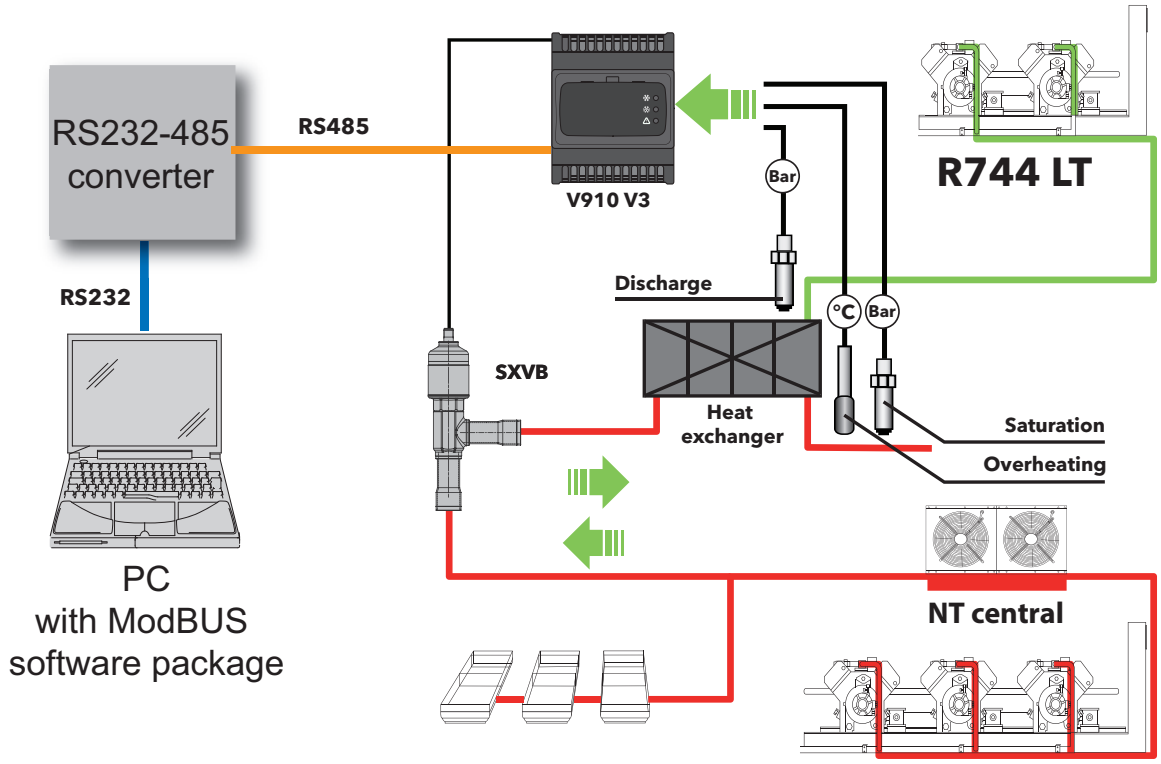


Fig. 22 Applications - Modbus

Addressing and Protocol

Parameter	Description	Value	Notes
dF00	COM0 protocol selection	0...3	• **0** = Micronet (Televis) • **1** = **Modbus RTU** • **2** = NOT USED • **3** = NOT USED.
dF30	Modbus protocol controller address	1...255	-
dF31	Modbus protocol controller baud rate	0...7	• **0** =1200 baud • **1** =2400 baud; • **2** =4800 baud; • **3** =9600 baud; • **4** =**19200** baud; • **5** =38400 baud; • **6** =57600 baud; • **7** =115200 baud.
dF32	Modbus protocol controller parity	0...2	• **0**=NONE • **1**=**EVEN** (even) • **2**=ODD (uneven).

Modbus resources for checking the V910 V3 driver

Variable	Description	ModBUS address	R/W	Notes
EEV_STTS	EEV status bit 0: (0→OFF; 1→ON) bit 1:1→ Alarm ON bit 2: 1→ Defrost ON bit 3...7: → NOT USED bit 8: → Overheating probe error bit 9: → Saturation probe error bit 10: → PID probe (CO2) error bit 11: → Motor alarm bit 12: → External alarm bit 13: → MOP alarm bit 14...15: → NOT USED	33158	R	bit 1: → Alarm bit 2: → Defrost
drE9	valve opening percentage	501	R	0.1%
drE7	Valve overheating	497	R	-
Discharge Pressure	Discharge pressure BT used by **V910 V3**	495	R	0.1 psi

Type of activation

Parameter	Description	value
dF02	Selection of **V910 V3** activation type	1 (Serial)
dE20	Selection of type of refrigerant (HP plant)	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default).

The actuated percentage of the valve will be such as to maintain the low circuit condensation pressure setpoint at the desired value (**dE79**) while, in any event, preventing the overheating values at the heat exchanger outlet from dropping below the minimum overheating threshold (**dE32**) in order to prevent liquid from leaking out.

Parameter	Description
dE32	Overheating lower threshold
dE79	Pressure set point

The condensation pressure is regulated by a PID regulator whose parameters are:

Parameter	Description	value
dE81	Enabling of PID pressure regulator (condensation)	1 (local regulator)

PID regulator

These parameters must be set by qualified staff.

PAr.	Function	Description
dE82	PID pressure regulator proportional band	COOL mode < 0
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	0.5 (Suggested)
dE89	Pressure PID neutral zone	0.2 (Suggested)

The regulation will use the pressure value read by the sensor positioned at the heat exchanger outlet on the **LT** side (**discharge pressure**) and the temperature values (**overheating**) and pressure (**saturation**) at the heat exchanger outlet on the **NT** side.

Configuration of sensors:

Parameter	Description	value	Notes
dL00	Analogue input type dAi1 pressure	3 (420)	-
dL01	Analogue input type dAi2 pressure	3 (420)	-
dL02	Analogue input type dAi3 temperature	1 (ntc)	-
dL03	Analogue input dAi4 type	0 (diS)	-
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	5 (discharge)	discharge
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	0	not used

9.2 - Back pressure

Mode Back-pressure can be used in the applications in which it is required to keep a constant pressure of the refrigerant in the refrigeration circuit.

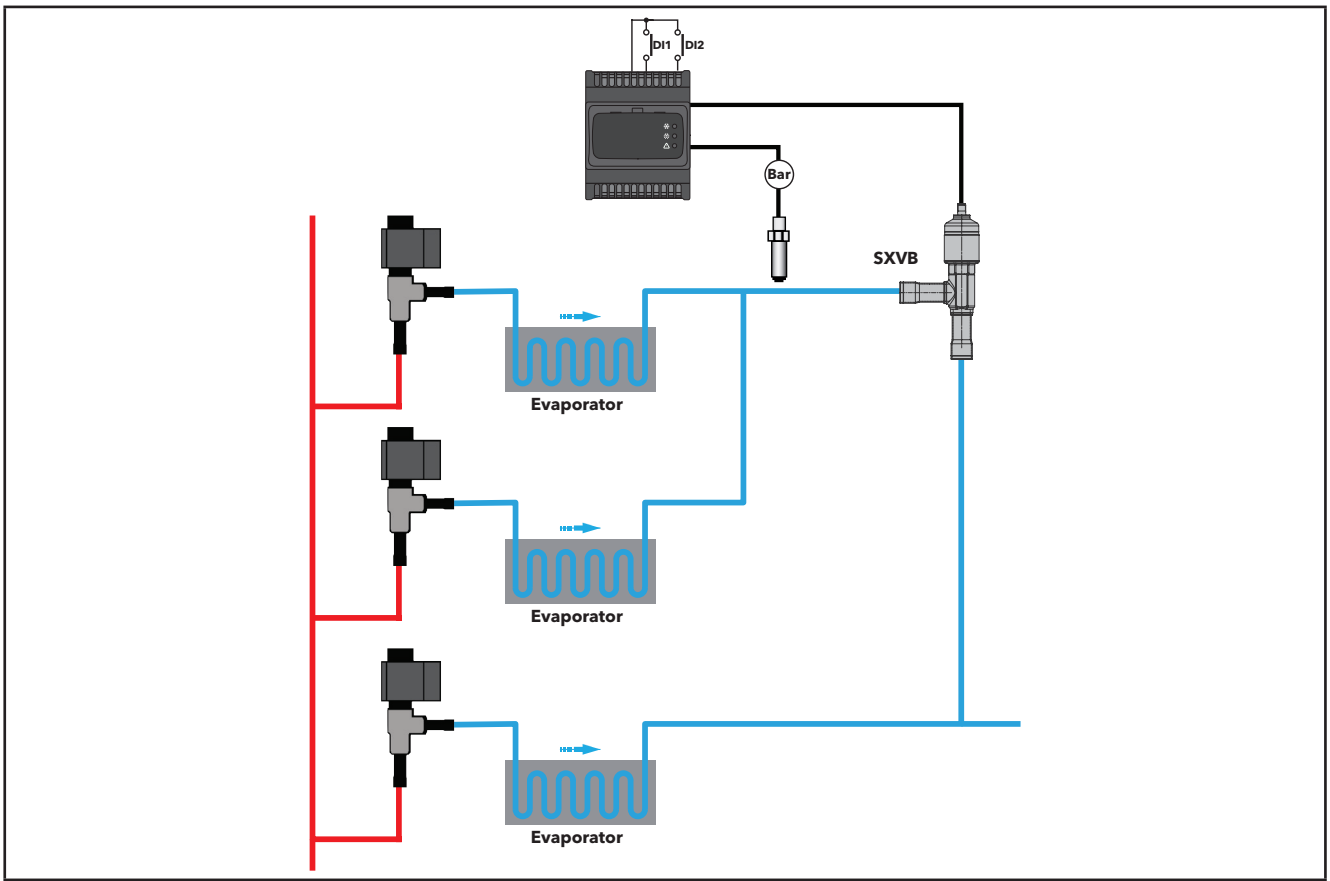


Fig. 23 Applications - Back Pressure

Type of activation

Digital input

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	Select desired refrigerant

The percentage actuated by the valve will be such that it can maintain the discharge pressure at the desired value **(dE79)**.

Parameter	Description	
dE79	Pressure set point	

The condensation pressure is regulated by a PID regulator whose parameters are:

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	3 (only pressure regulator)

PID regulator

These parameters must be set by qualified staff.

Parameter	Function	Description
dE82	PID pressure regulator proportional band	COOL mode = -200
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	0.2 (Suggested)
dE89	Pressure PID neutral zone	0.1 (Suggested)

Valve opening

Parameter	Description	Value
dE14	Minimum valve useful opening percentage	1%

The regulation will use the pressure value read by the sensor positioned upstream from the valve.

NOTE: Regulation in PSI is recommended.

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input type dAi1 pressure	3 (420)	-
dL01	Analogue input type dAi2 pressure	0 (diS)	-
dL02	Analogue input type dAi3 temperature	0 (diS)	-
dL03	Analogue input dAi4 type	0 (diS)	-
dL30	Analogue input dAi1 configuration	5 (*)	(*) suction (CO_2: discharge)
dL31	Analogue input dAi2 configuration	0 (disabled)	not used
dL32	Analogue input dAi3 configuration	0 (disabled)	not used
dL33	Analogue input dAi4 configuration	0 (disabled)	not used

9.3 - Hot gas by-pass

Regulation can be used to control the refrigerator capacity.

If the system is working with a low thermal load, inject hot gas in the evaporator to increase its load.

Only the pressure probe positioned on the compressor aspiration line is regulated.

As the pressure decreases, the regulator increases the amount of hot gas injected.

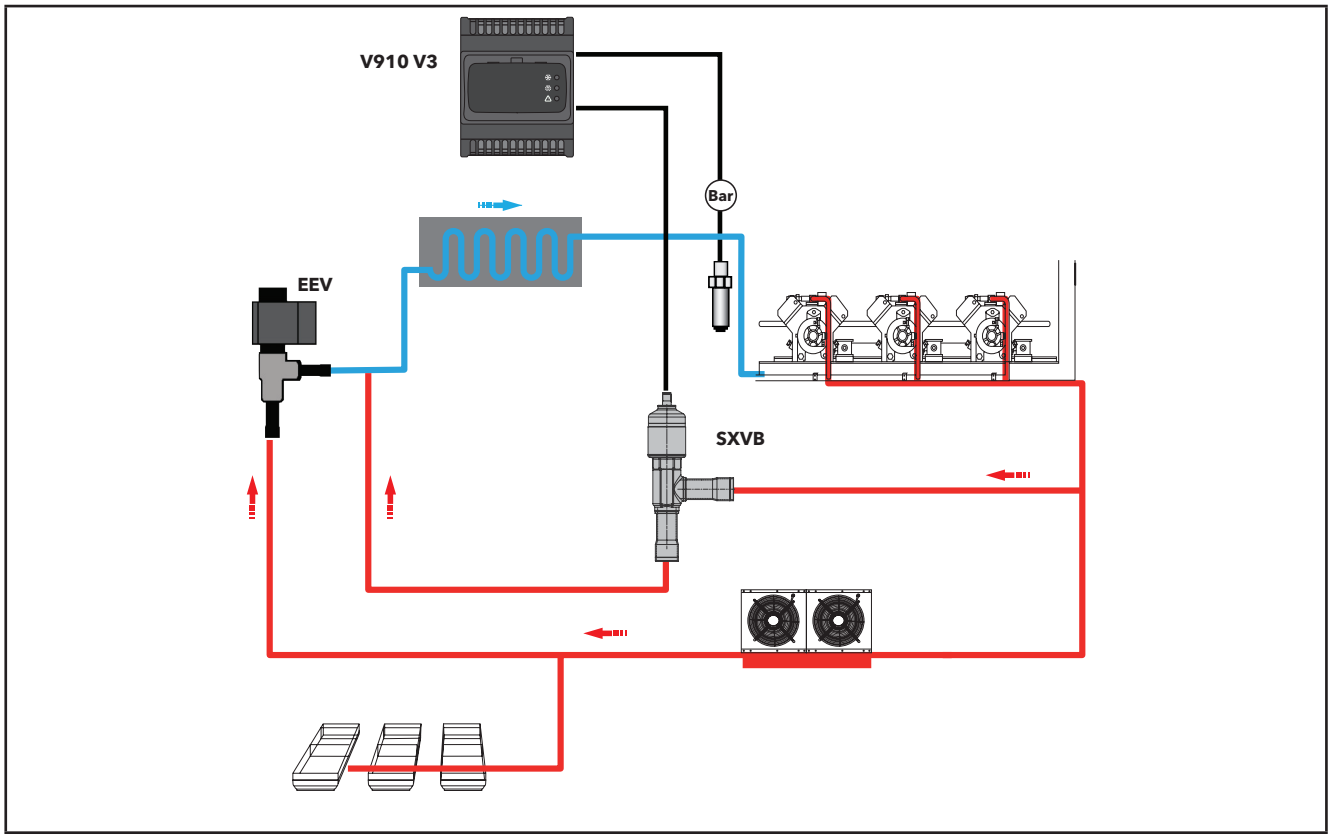


Fig. 24 Applications - Hot gas by-pass

Type of activation

Parameter	Description	value
dF02	Selection of **V910 V3** activation type	0 (Digital Input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)

The percentage actuated by the valve will be such that it can maintain the suction pressure at the desired value **(dE79)**.

Parameter	Description
dE79	Pressure set point

The condensation pressure is regulated by a PID regulator whose parameters are:

Parameter	Description	value
dE81	Enabling of PID pressure regulator (condensation)	3 (only pressure regulator)

PID regulator

These parameters must be set by qualified staff.

Parameter	Description	value
dE82	PID pressure regulator proportional band	COOL mode <0
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	0.2 (Suggested)
dE89	Pressure PID neutral zone	0.1 (Suggested)

The regulation will use the pressure value read by the sensor positioned upstream from the valve.

Configuration of sensors

Parameter	Description	value	Notes
dL00	Analogue input type dAi1 pressure	3 (420)	
dL01	Analogue input dAi2 type	0 (diS)	
dL02	Analogue input dAi3 type	0 (diS)	
dL03	Analogue input dAi4 type	0 (diS)	
dL30	Analogue input dAi1 configuration	5 (*)	(*) suction (CO_2: discharge)
dL31	Analogue input dAi2 configuration	0 (disabled)	not used
dL32	Analogue input dAi3 configuration	0 (disabled)	not used
dL33	Analogue input dAi4 configuration	0 (disabled)	not used

9.4 - Protection of high condensation temperature

The **V910 V3** driver can modulate the injection of liquids, even while monitoring the compressor discharge pressure (or temperature) in a way that prevents the compressor from working in a dangerous area.

If the regulator detects an increase in compressor discharge pressure (or temperature), it will limit the amount of refrigerant introduced into the evaporator in such a way as to reduce the compressor load.

9.4.1 - Pressure protection

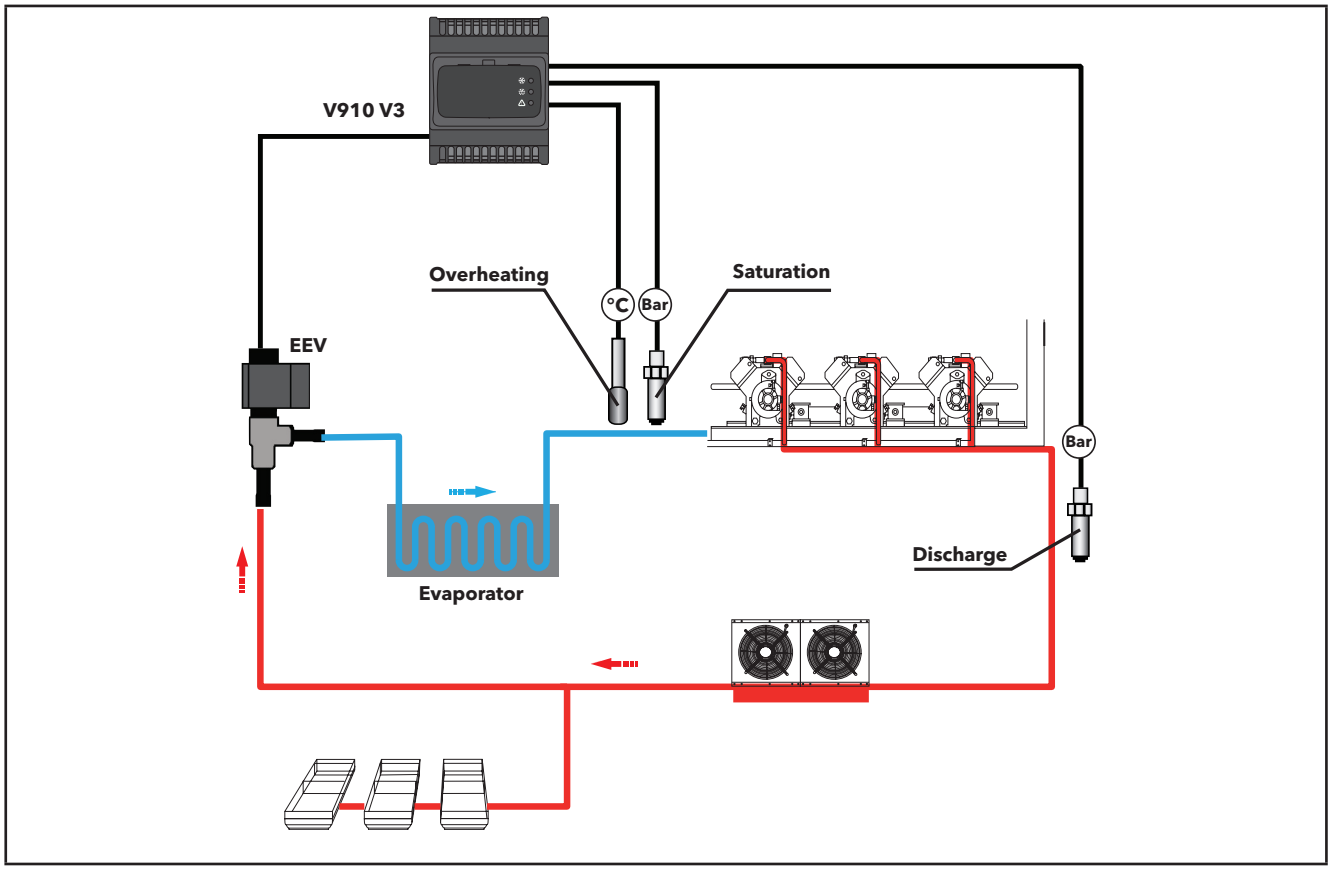


Fig. 25 Applications - Pressure Protection Evaporator

Type of activation

Digital input

Parameter	Description	value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	Select desired refrigerant

The percentage actuated by the valve will be such that it keeps the overheating at the evaporator outlet at the desired value (**dE32**), if the discharge pressure is greater than the threshold set by the pressure setpoint **dE79** the regulator will further decrease the valve opening.

Parameter	Description	
dE32	Overheating lower threshold	
dE79	Pressure set point	

The condensation pressure is regulated by a PID regulator whose parameters are:

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	1 (local regulator)

PID regulator

These parameters must be set by qualified staff.

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input type dAi1 pressure	3 (420)	
dL01	Analogue input type dAi2 pressure	3 (420)	
dL02	Analogue input type dAi3 temperature	1 (ntc)	
dL03	Analogue input dAi4 type	0 (diS)	
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	5 (discharge)	discharge
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	0	not used

9.4.2 - Temperature protection

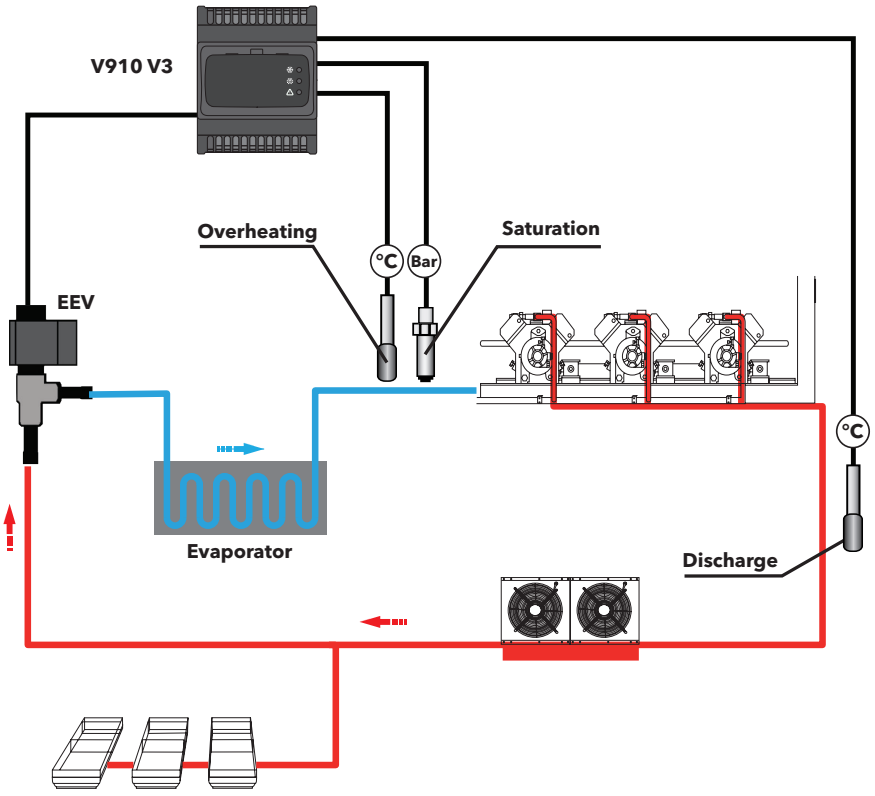


Fig. 26 Applications - Evaporator temperature protection

Type of activation

Digital input

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Configuration of digital input ddl1 (D1)	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default).

The percentage actuated by the valve will be such that it keeps the overheating at the evaporator outlet at the desired value (**dE32**), if the discharge temperature is greater than the threshold set by the setpoint **dE79** the regulator will further decrease the valve opening.

Parameter	Description
dE32	Overheating lower threshold
dE79	Pressure set point

The condensation pressure is regulated by a PID regulator whose parameters are:

Enable

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	1 (local regulator)

PID regulator

These parameters must be set by qualified staff

Parameter	Description	Value
dE82	PID pressure regulator proportional band	HEAT mode > 0
dE83	PID pressure integral gain	
dE85	Pressure PID cycle time	0.2 (Suggested)
dE89	Pressure PID neutral zone	0.1 (Suggested)

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input dAi1 type	3 (420)	saturation
dL01	Analogue input dAi2 type	0 (dis)	not used
dL02	Analogue input dAi3 type	1 (ntc)	overheating
dL03	Analogue input dAi4 type	1 (ntc)	discharge
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	0	not used
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	5 (discharge)	discharge

9.5 - AHU Post-heating

It is possible to modulate the valve opening as a function of a temperature.

In air treatment applications (AHU), it is possible to use the condensation heat to heat the air according to the desired set point.

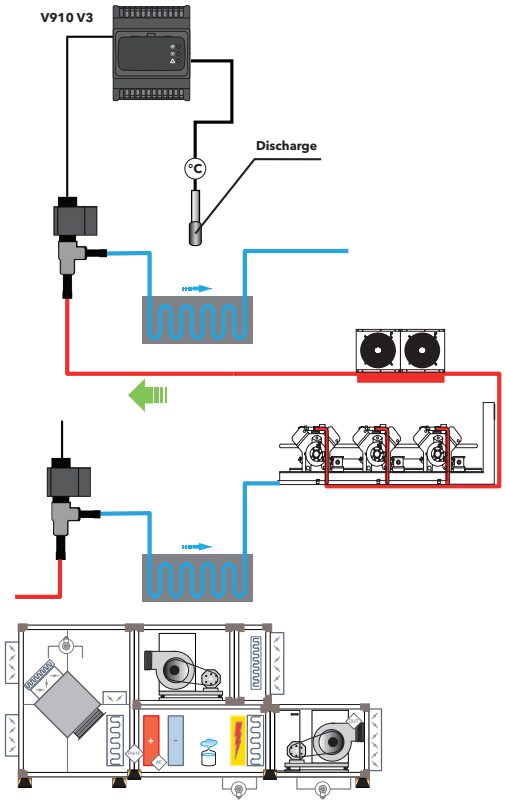


Fig. 27 Applications - AHU

Type of activation

Digital input

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default).

The percentage actuated by the valve will be such that it can maintain the discharge temperature at the desired value (**dE79**).

The condensation pressure is regulated by a PID regulator whose parameters are:

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	3 (only pressure regulator)

PID regulator

These parameters must be set by qualified staff.

Parameter	Description	Value
dE82	PID pressure regulator proportional band	HEAT mode > 0
dE83	PID pressure integral gain	-
dE85	Pressure PID cycle time	0.2 (Suggested)
dE89	Pressure PID neutral zone	0.1 (Suggested)

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input dAi1 type	0 (dis)	
dL01	Analogue input dAi2 type	0 (dis)	
dL02	Analogue input type dAi3 temperature	1 (ntc)	
dL03	Analogue input dAi4 type	0 (dis)	
dL30	Analogue input dAi1 configuration	0	not used
dL31	Analogue input dAi2 configuration	0	not used
dL32	Analogue input dAi3 configuration	5 (discharge)	discharge
dL33	Analogue input dAi4 configuration	0	not used

9.6 - Remote control of capacity

It is possible to remotely limit the upper threshold of the heat capacity supplied by the expansion valve.

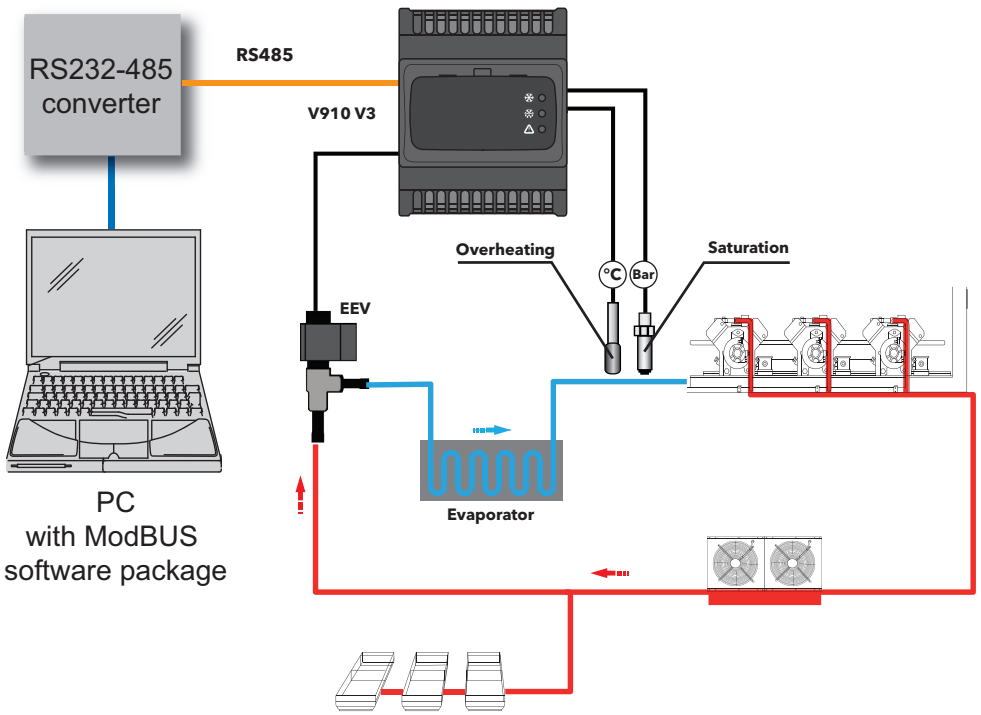


Fig. 28 Applications - Remote control

Modbus resources for checking the **V910 V3** driver:

Variable	Description	Modbus address	R/W	Notes
EEVStatus	EEV status bit 0: 00→ (0→OFF; 1→ON) bit 1: 01→ Alarm ON bit 2: 10→ Defrost ON bit 3: 11→ NOT USED	33158	R	bit 1: → Alarm bit 2: → Defrost
EEVOutPerc	Valve opening percentage	501	R	0.1%
EEVSuperHeatingTemp	Super Heating Temperature	497	R	
EEV_Remote_Threshold	Maximum valve opening percentage	599	RW	0.1%

Addressing and Protocol

Parameter	Description	Value	Notes
dF00	COM0 protocol selection	1	• **0** = Micronet (Televis) • **1** = **Modbus RTU** • **2** = NOT USED • **3** = NOT USED.
dF30	Modbus protocol controller address	1	1 ... 255
dF31	Modbus protocol controller baud rate	4	• **0**= 1200 baud • **1**= 2400 baud • **2**= 4800 baud • **3**= 9600 baud • **4** = **19200 baud** • **5**= 38400 baud • **6**= 57600 baud • **7**= 115200 baud.
dF32	Modbus protocol controller parity	1	• **0** = NONE • **1** = **EVEN (even)**; • **2** = ODD (uneven).

Type of activation

Digital input

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default).

The percentage actuated by the valve will be sufficient for maintaining the overheating of the evaporator outlet at the desired value (**dE32**) when the required value is greater than the value set by remote (EEV_Remote_Threshold) the valve will be actuated at the value set by the threshold.

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	2 (% by remote)

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input dAi1 type	3 (420)	
dL01	Analogue input dAi2 type	0	
dL02	Analogue input dAi3 type	1 (ntc)	
dL03	Analogue input type dAi4 (Not Used)	0 (diS)	
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	0	not used
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	0	not used

9.7 Liquid refrigerator

The **V910 V3** driver can modulate the liquid injection in order to obtain a preset temperature of the cooled liquid (liquid refrigerator).

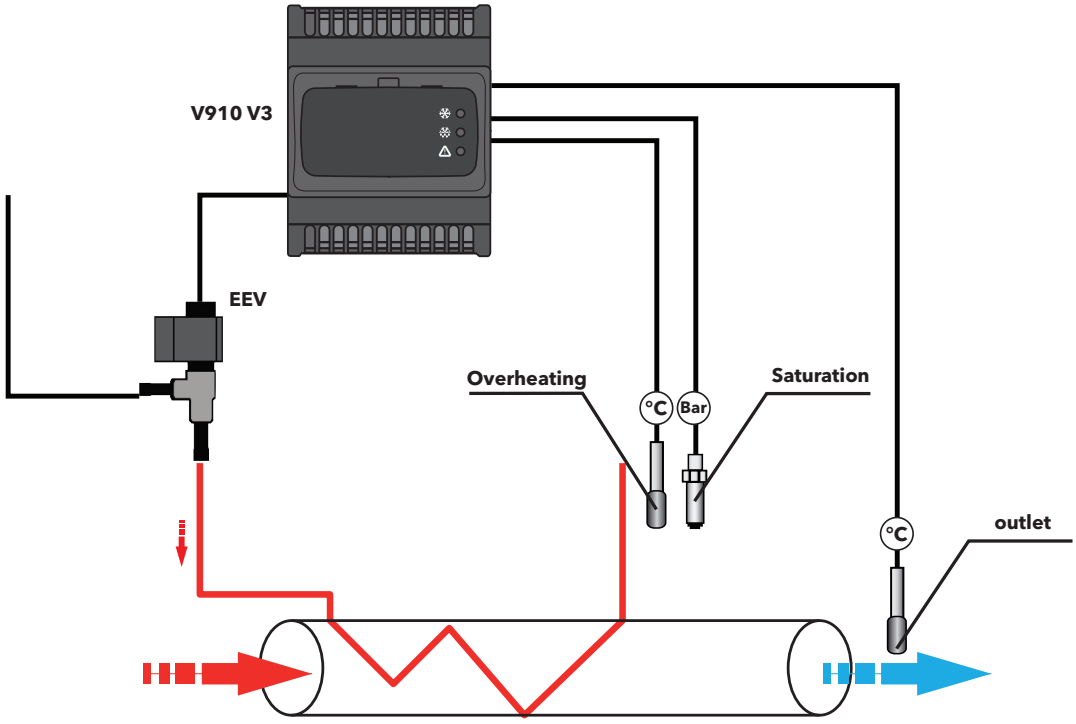


Fig. 29 Applications - Liquid refrigerator

Type of activation

Digital input

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	Select desired refrigerant

The percentage actuated by the valve will be such that it can maintain the saturation temperature at the desired set point (**dE79**) and modulate the liquid injection in such a way as to maintain the overheating at the evaporator outlet no lower than **dE32**.

Enable

Parameter	Description	value
dE81	Enabling of PID pressure regulator (condensation)	1 (local regulator)

Configuration of sensors

Parameter	Description	value	Notes
dL00	Analogue input dAi1 type	3 (420)	
dL01	Analogue input dAi2 type	0	
dL02	Analogue input dAi3 type	1 (ntc)	
dL03	Analogue input dAi4 type	1 (ntc)	
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	0	not used
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	5 (discharge probe)	outlet

9.8 - Refrigerated counter with ON/OFF regulation

In this mode the regulator is able to activate/deactivate the injection of the liquid into the evaporator as a function of the temperature of the counter to be tested (and possibly an optional relay switch).

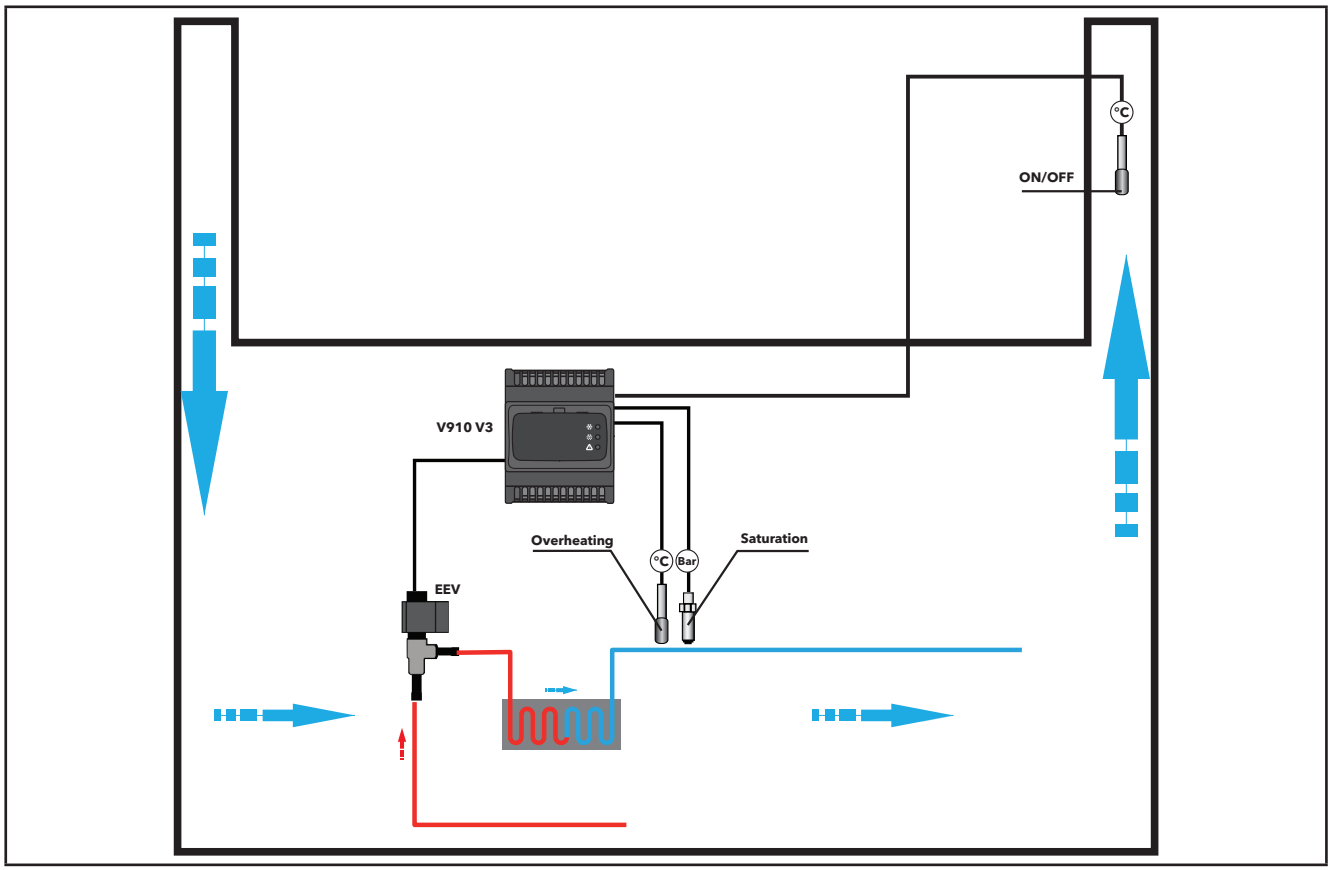


Fig. 30 Applications -Refrigerated counter with ON/OFF regulation

Type of activation

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	2 (ON/OFF Regulator)
dE20	Selection of type of refrigerant (HP plant)	• **(0) r404**=R404A • **(1) r22**=r22 • **(2) r410**=R410a • **(3) r134**=R134a • **(4) r744**=R744 (C02) • **(5) r407**=R407C • **(6) r427**=R427A • **(7) r507**=R507A • **(8) r717**=R717 • **(9) Reserved** • **(10) r407A**=R407A • **(11) r448**=R448A • **(12) r449**=R449A • **(13) r450**=R450A • **(14) r513**=R513A • **(15)** = customisable (R404A default).

The percentage actuated by the valve will be such that it keeps the overheating at the evaporator outlet no lower than **dE32**.

Enable

This regulator is enabled: setting the parameter **dE78** to the desired COOL or HEAT mode.
The regulation setpoint is set with the parameter **dE74** and the differential with **dE75**.
Parameters **dE76** and **dE77** configure operation in the duty cycle in case of probe error.

Parameter	Description	Value
dE74	Regulator setpoint ON/OFF	Set desired temperature
dE75	Regulator differential ON/OFF	value to set
dE76	ON time in cases where the ON/OFF probe is faulty	value to set
dE77	OFF time in cases where the ON/OFF probe is faulty	value to set
dE78	Regulation mode (dis/HEAT/COOL)	2 (COOL)

PID Regulator disabled

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	0 (disabled)

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input dAi1 type	3 (420)	
dL01	Analogue input dAi2 type	0	
dL02	Analogue input dAi3 type	1 (ntc)	
dL03	Analogue input dAi4 type	1 (ntc)	
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	0	not used
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	6 (regulator ON/OFF)	ON/OFF
dL40	Digital input ddl1 configuration	0	not configured

9.9 - Liquid injection regulator with auxiliary thermostat in temperature

The liquid control regulator and auxiliary regulator can regulate independently
The ON/OFF regulator, on driver **V910 V3**, can in fact be used independently of the liquid control for auxiliary regulations.

Type of activation

Digital input

Parameter	Description	Value
dF02	Selection of **V910 V3** activation type	0 (digital input)
dL40	Digital input ddl1 configuration	1 (ON/OFF)
dE20	Selection of type of refrigerant (HP plant)	Select desired refrigerant

The percentage actuated by the valve will be such that it keeps the overheating at the evaporator outlet no lower than **dE32**.

Enable

This regulator is enabled: setting the parameter **dE78** to the desired COOL or HEAT mode.
The regulation setpoint is set with the parameter **dE74** and the differential with **dE75**.
Parameters **dE76** and **dE77** configure operation in the duty cycle in case of probe error.

Parameter	Description	Value
dE74	Regulator setpoint ON/OFF	Set desired temperature
dE75	Regulator differential ON/OFF	-
dE76	ON time in cases where the ON/OFF probe is faulty	-
dE77	OFF time in cases where the ON/OFF probe is faulty	-
dE78	Regulation mode (dis/HEAT/COOL)	1 (HEAT) - 2 (COOL)

PID Regulator disabled

Parameter	Description	Value
dE81	Enabling of PID pressure regulator (condensation)	0 (disabled)

Configuration of sensors

Parameter	Description	Value	Notes
dL00	Analogue input dAi1 type	3 (420)	-
dL01	Analogue input dAi2 type	0	-
dL02	Analogue input dAi3 type	1 (ntc)	-
dL03	Analogue input dAi4 type	1 (ntc)	-
dL30	Analogue input dAi1 configuration	2 (saturation probe)	saturation
dL31	Analogue input dAi2 configuration	0	not used
dL32	Analogue input dAi3 configuration	1 (overheating probe)	overheating
dL33	Analogue input dAi4 configuration	6 (regulator ON/OFF)	ON/OFF

Digital outputs

Parameter	Description	Value	Notes
dL90	Digital output ddO1 configuration	3 (ON/OFF Regulator)	
dL91	Digital output ddO2 configuration (Open Collector).	3 (ON/OFF Regulator)	

10 - PARAMETERS (PAr)

The parameters can be set to wholly configure the **V910 V3**.

The parameters can be modified via:

- **MFK 100 / UNICARD** (MFK)
- keys on the **SKP 10** terminal
- Personal Computer.

The following sections provide a detailed analysis of each parameter, divided into categories (folders).

Each folder is designated with a label showing two figures (example: **dF, UI, etc.).**

Folder label	Meaning of acronym (label)	Parameters
dL	driver Locator configuration	I/O configuration
dF	driver protocol configuration	Protocol configuration
dE	driver valve configuration	Valve configuration
Ui	User interface	User interface

Tab. 37 Parameters (PAr)

Unless otherwise indicated, the parameter is always visible and modifiable, unless customized settings have been configured via serial.

Both parameters and folder visibility can be controlled (See Folder table).
If folder visibility is modified, the new setting will apply to all parameters in the folder.

10.1 - Levels of visibility

There are 4 levels of visibility that can be set by assigning appropriate values to each parameter in the folder exclusively via serial, software (DeviceManager or other software communication) or programming key.

The visibility levels are:

- value 3 = parameter or folder always visible;
- value 2 = user level; these parameters can only be viewed by entering the installer password (see parameter **Ui28**) (all parameters specified as always visible and parameters visible at the installer level will be visible)
- value 1 = user level; these parameters can only be viewed by entering the installer password (See parameter **Ui27**) (all parameters specified as always visible and parameters visible at the installer level will be visible)
- value 0 = parameter or folder NOT visible.

Parameters and/or folders with a level of visibility other than 3 (password-protected) will be visible only if the correct password is entered (installer or manufacturer) following this procedure.

Parameters and/or folders with a level of visibility = 3 are always visible even without a password: in this case, the following procedure is not necessary.

10.2 - Parameters / visibility table, folder visibility table and client table

The tables below list all information required to read, write and decode all accessible resources in the device.

There are 3 tables:

• the **parameter table** lists all controller configuration parameters saved in the non-volatile memory, including visibility

• the **folder table** lists all parameter folder visibility details

• the **client table** includes all I/O and alarm status resources available in the volatile memory of the instrument.

Description of the columns:

The description of the columns contains an explanatory key of the parameters table.

FOLDER	Indicates the label of the folder containing the parameter in question.
LABEL	Indicates the label used to display the parameters in the menu of the controller.
PAR. ADDR.	The whole part represents the address of the MODBUS register containing the value of the resource to be read or written in the controller. The value after the decimal point indicates the position of the most significant data bit inside the register; if not indicated it is taken to be zero. This information is always provided when the register contains more than one information item, and it is necessary to distinguish which bits actually represent the data (the working size of the data indicated in the column DATA SIZE is also taken into consideration). Given that the modbus registers have the size of one WORD (16 bit), the index number after the point can vary from 0 (least significant bit -LSb-) to 15 (most significant bit -MSb-)
VIS. PAR. ADDR.	The same as above. In this case, the MODBUS register address contains the visibility value of the parameter. By default all parameters have: • Data size: 2 bit • Range: 0…3 • Visibility: * 3 • M.U.: num * Refer to “6.8 - Setting a password (Par/PASS folder)” on page 46
RESET (Y/N)	Indicates whether the device MUST be rebooted after the parameter has been changed; • Y=YES the device MUST be rebooted to save the parameter change • N=NO the device DOES NOT need to be rebooted after changing the parameter.
R/W	Indicates the option of reading or writing the resource • R: the resource is read-only; • W: the resource is write-only; • RW: The resource can be both read and written
DATA SIZE	Indicates the size of the data in bits. • WORD = 16 bit • Byte = 8 bit • “n” bit = 1...15 bit based on the value of “n”
DESCRIPTION	This is the description of the parameter function
RANGE	Describes the interval of values that can be assigned to the parameter. It can be correlated with other parameters in the instrument (indicated with the parameter label). If the real value is outside the permitted limits for the parameter (for example, because other parameters defining the limits have been changed), the limit that has been passed and not the actual value will be displayed.

CPL	When the field 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 null. To carry out conversion, proceed as follows: • if the value in the register is between 0 and 32,767, the result is the value itself (zero and positive values); • If the value in the register is between 32,768 and 65,535, the result is the value of the register – 65,536 (negative values)
EXP	If = -1 the value read by the register is divided by 10 (value/10) to convert it to the values indicated in the RANGE and DEFAULT columns using the unit of measurement in the UM column.
Default	Indicate the factory setting. **Example.** Parameter dL01 = 50.0. Column EXP = -1: • The value read by the device is 50.0 • The value read by the register is 500 --> 500/10 = 50.0.
U.M.	Unit of measure for values converted according to the rules indicated in the CPL column The unit of measure shown is for example purposes only, as it may change depending on the application (e.g. parameters with an U.M. in °C/bar could also have %RH).

Examples for PAR ADDR. (in binary form the least significant bit is the first on the right):

ADDR	DATA SIZE	Value	Content of register	
8806	WORD	1350	1350	0000010101000110)
8806	Byte	70	1350	(00000101**01000110**)
8806.8	Byte	5	1350	(**00000101**01000110)
8806.14	1 bit	0	1350	(0**0**000010101000110)
8806.7	4 bit	10	1350	(00000**1010**1000110)

Tab. 38 Description of columns

Note: when the register contains more than one piece of data, the write procedure is as follows:

1. read current register value
2. modify the bits for the resource concerned
3. register writing.

Examples for VIS. PAR. ADDR. (in binary form the least significant bit is the first on the right):

ADDR	DATA SIZE	Value	Content of register	
49482	2 bit	0	120	(0000000001111000)
49482.2	2 bit	2	120	(0000000001111000)
49482.4	2 bit	3	120	(0000000001111000)
49482.6	2 bit	1	120	(0000000001111000)

Tab. 39 Default visibility

ADDR	DATA SIZE	Value	Content of register	
49484	2 bit	0	72	(0000000001001000)

Tab. 40 Visibility modified

10.2.1 - Parameters / visibility table

The change of values in the parameters can lead to the interruption of the drivers functioning waiting for external input via RS485.

NOTICE

INCORRECT PARAMETER CONFIGURATION

In changing the levels of parameters found in the **GREY** cells.

Failure to follow these instructions can result in equipment damage.

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
dF00	49158	49434,6	N	RW	BYTE	Select COM0 protocol • **0** = Eliwell • **1** = Modbus • **2,3** = Reserved.	0 ... 3			1	num
dF02	49200	49435,2	N	RW	BYTE	Selection of activation type valve regulator • **0**= digital input • **1**= RS485 serial communication • **2**= ON/OFF • **3**= EWCM EONote: If **dL40** and/or **dL41** ≠ 0 the control comes from the serial. The Digital inputs DI1, DI2 (when appropriately configured ≠ 0) in any case ALWAYS have priority over the commands received from the serial	0 ... 3			0	num
dF20	49172	49437	N	RW	BYTE	Eliwell protocol controller address **dF20**= address of the device within the family (valid values from 0 to 14) **dF21** = device family (valid values from 0 to 14) The two values **dF20** and **dF21** represent the network address of the device and the pair are indicated in the following format “FF.DD” (where FF=dF21 and DD=dF20).	0 ... 14			0	num
dF21	49173	49437,2	N	RW	BYTE	Eliwell protocol controller family See **dF20**	0 ... 14			0	num
dF30	49175	49437,6	Y	RW	BYTE	Modbus protocol controller address	0 ... 255			1	num
dF31	49176	49438	Y	RW	BYTE	**Modbus baud rate protocol** • **0**=1200 baud • **1**=2400 baud • **2**=4800 baud • **3**=9600 baud • **4**=19200 baud • **5**=38400 baud (maximum speed, to be set using DeviceManager software) • **6**=57600 baud • **7**=115200 baud	0 ... 7			3	num
dF32	49177	49438,2	Y	RW	BYTE	**Modbus parity protocol** • **0**= NONE • **1**= EVEN (even) • **2**= ODD (uneven)	0 ... 2			1	num
dF42	16424	49439		RW	BYTE	**Tab**	0 ... 65535			1	num
dF43				R		**Firmware screen**	0 ... 999			547	num
dF44				R		**Firmware release**	0 ... 999			0	num
dF60	16426	49440	N	RW	WORD	**Customer code 1**	0 ... 999			0	num
dF61	16428	49440	N	RW	WORD	**Customer code 2**	0 ... 999			0	num

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
dL00	50894	49429,2	Y	RW	BYTE	**Analogue input dAi1 type** • **0=** Non configured probe • **1=** NTC • **2=** Pt1000 • **3=** 4..20mA • **4=** Ratiometric transducer 0-5V • **5=**0-10V	0 ... 5			3	num
dL01	50895	49429,4	Y	RW	BYTE	**Analogue input dAi2 type** See **dL00**	0 ... 5			3	num
dL02	50896	49429,6	Y	RW	BYTE	**Analogue input dAi3 type** • **0=** Non configured probe • **1=** NTC • **2=** Pt1000	0 ... 2			1	num
dL03	50897	49430	Y	RW	BYTE	**Analogue input dAi4 type** See **dL02**	0 ... 2			0	num
dL08	50923	49430,2	Y	RW	BYTE	**°C/°F selection** **0=** °C; **1=**°F	0 ... 1			0	flag
dL09	50924	49430,4	N	RW	BYTE	**Pressure unit of measure** **0=** bar **1=**PSI	0 ... 1			0	flag
dL10	18130	49430,6	N	RW	WORD	**Analogue input dAi1 fullscale value**	**dL11** ... 9999	Y	-1	70	bar/PSI
dL11	18140	49431	N	RW	WORD	**Analogue input dAi1 start of scale value**	-145 ... **dL10**	Y	-1	-5	bar/PSI
dL12	18132	49431,2	N	RW	WORD	**Analogue input dAi2 fullscale value**	**dL13** ... 9999	Y	-1	500	bar/PSI
dL13	18142	49431,4	N	RW	WORD	**Analogue input dAi2 start of scale value**	-145 ... **dL12**	Y	-1	0	bar/PSI
dL20	50918	49431,6	Y	RW	BYTE	**Analogue input dAi1 differential**	-120 ... 120	Y	-1	0	bar/PSI °C/°F
dL21	50919	49432	Y	RW	BYTE	**Analogue input dAi2 differential**	-120 ... 120	Y	-1	0	bar/PSI °C/°F
dL22	50920	49432,2	Y	RW	BYTE	**Analogue input dAi3 differential**	-120 ... 120	Y	-1	0	°C/°F
dL23	50921	49432,4	Y	RW	BYTE	**Analogue input dAi4 differential**	-120 ... 120	Y	-1	0	°C/°F
dL30	50934	49432,6	N	RW	BYTE	**Analogue input dAi1 configuration** • **0=** disabled • **1=** evaporator output (overheating) • **2=** saturation • **3=** backup evaporator output (overheating) • **4=** backup saturation • **5=** discharge • **6=** Regulator ON/OFF	0 ... 6			2	num
dL31	50935	49433	N	RW	BYTE	**Analogue input dAi2 configuration** See **dL30**	0 ... 6			5	num
dL32	50936	49433,2	N	RW	BYTE	**Analogue input dAi3 configuration**	0 ... 6			1	num
dL33	50937	49433,4	N	RW	BYTE	**Analogue input dAi4 configuration** See **dL33**	0 ... 6			0	num
dL40	50926	49433,6	Y	RW	BYTE	**Digital input ddi1 configuration** • **0** = digital input not configured • **±1** = ON/OFF adjustment • **±2** = defrost • **±3** = alarm • **±4** = system operating mode (only modes 0 and 1)	-4 ... 4	Y		1	num

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
dL41	50927	49434	Y	RW	BYTE	**Digital input ddi2 configuration** See **dL40**	-4 ... 4	Y		0	num
dL90	50940	49434,2	Y	RW	BYTE	**Digital output ddO1 configuration (relay)** • **0** = output controlled from serial • **±1** = solenoid valve control • **±2** = alarm output • **±3** = ON/OFF output • **±4** = remote	-4 ... 4	Y		1	num
dL91	50941	49434,4	Y	RW	BYTE	**Digital output ddO2 configuration (O.C.)** See **dL90**	-4 ... 4	Y		0	num
dE00	49201	49442	Y	RW	BYTE	**Valve model** see “10.2.2 - Valve configuration parameters” on page 92” • **0** = customisable (see “10.2.3 - Valve configuration parameter table dE01...dE09, dE80 with dE00 = 0” on page 93) For values from 1 to 15 see “10.2.4 - Valve configuration parameter table dE01...dE09, dE80 with dE00 ≠ 0” on page 95 • **1** = DANFOSS ETS50 • **2** = DANFOSS ETS100 • **3** = DANFOSS CM 10-20-30 • **4** = DANFOSS CM 40 • **5**= ALCO EX7 • **6**= ALCO EX8 • **7**= CAREL E2V E3V E4V E5V E6V E7V • **8**= SPORLAN SER 1.5 TO 20 • **9**= SPORLAN SEI-30 • **10**= SPORLAN SEI-50 • **11**= ALCO EX4 EX5 EX6 • **12** = SPORLAN SER(I) G, J, K, B, C, D • **13**= ELIWELL by Schneider electric SXVB Body 1 • **14** = ELIWELL by Schneider electric SXVB Body 2 -3 • **15** = ELIWELL by Schneider Electric SXVB Body 4	0 ... 15			15	num
dE10	49208	49442,2	N	RW	BYTE	**Maximum valve opening percentage** Defines the maximum valve opening value, meaning the actuation limits in percentages. 0 indicates valve completely closed	0 ... 100			100	%
dE11	49209	49442,4	N	RW	BYTE	**Valve actuation percentage after black-out** Value calculated automatically but settable using this parameter for first start-up	0 ... 100			0	%
dE12	49210	49442,6	N	RW	BYTE	**Valve actuation percentage after defrosting** Value calculated automatically but settable using this parameter for first start-up. If = 0 the percentage is defined by dE11	0 ... 100			0	%
dE13	49211	49443	N	RW	BYTE	**Operating time at max opening for alarm signal** If the valve opening remains at a value of greater than dE10 for the time set by dE13 a maximum opening alarm will be given dA07 (see Alarms chapter) If = 0 signal disabled	0 ... 255			60	minutes
dE14	49212	49443,2	N	RW	BYTE	**Minimum valve useful opening percentage** If the regulator commands an output of less than or equal to dE14, the actual output = 0.	0 ... **dE15**			0	%

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
dE15	49213	49443,4	N	RW	BYTE	**Maximum valve useful opening percentage** If the regulator commands an output of more than or equal to dE15 the actual output is dE10 (with dE15 < dE10). Ignored if dE15 > dE10	**dE14** ... **dE10**			100	%
dE16	49214	49443,6	N	RW	BYTE	**Valve opening percentage during probe error** If a probe error sets the valve opening, in percentage, for a time dE13	0 ... 100			0	%
dE19	49222	49444	N	RW	BYTE	**Tolerance on winding resistance Stepper motor**	0 ... 255			65	%
dE74	16464	49461	N	RW	BYTE	**Regulation setpoint**	-999 ... 9999		-1	0	num
dE75	16466	49461,2	N	RW	BYTE	**Differential of set point**	1 ... 9999		-1	40	num
dE76	49236	49461,4	N	RW	BYTE	**ON time of regulator due faulty probe**	0 ... 255			0	min
dE77	49237	49461,6	N	RW	BYTE	**OFF time of regulator due faulty probe**	0 ... 255			0	min
dE78	49229	49462	N	RW	BYTE	**Set point operating mode (Heating/Cooling)** **0=** disabled **1=**HEAT **2=** COOL	0 ... 2			0	num
dE79	16604	49462,2	N	RW	BYTE	**PID Setpoint**	-999 ... 9999		-1	250	num
dE81	49364	49462,4	N	RW	BYTE	**PID regulator mode** 0= disabled 1= local regulator 2= remote 3= only PID pressure 4= RESERVED.	0 ... 4			1	num
dE82	16584	49462,6	N	RW	BYTE	**PID proportional band**	-999 ... 9999		-1	-100	num
dE83	16586	49463,2	N	RW	BYTE	**Pressure integral gain**	1... 9999			60	num
dE85	16590	49463,4	N	RW	BYTE	**Pressure PID cycle time**	1 ... 1999			1	sec*10
dE89	16592	49464,4	N	RW	BYTE	**Pressure PID neutral zone**	1 ... 1999	Y		10	bar/PSI °C/°F
dE97	49224	49464,6	N	RW	BYTE	**Valve override period**	0 ... 255			48	hours
dE_5	49180	49453	N	RW	BYTE	**Minimum overheating percentage in forced mode**	0 ... 100			0	%
dE_6	49181	49426	N	RW	BYTE	**Activation time of minimum overheating percentage - forced mode** During time period dE_6 the CO2 implementation percentage has the dE-5 value as its lower limit	0 ... 255			0	sec
dE93	49231	49444,2	N	RW	BYTE	**Motor activation/disabling time** Sets the enabling/disabling cycle (Duty cycle) of the stepper motor. See **dE08**	0 ... 255			10	sec*10

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
dE20	49215	49444,4	Y	RW	BYTE	**Select type of gas** Use only if the configuration via Dip Switch is set to 15. If not **dE20** will be ignored. • **(0) r404=R404A** • **(1) r22=r22** • **(2) r410=R410a** • **(3) r134=R134a** • **(4) r744=R744 (C02)** • **(5) r407=R407C** • **(6) r427=R427A** • **(7) r507=R507A** • **(8) r717=R717** • **(9) Reserved** • **(10)407A=R407A** • **(11) r448=R448A** • **(12) r449=R449A** • **(13) r450=R450A** • **(14) r513=R513A** • **(15) = customisable (R404A default)**	0 ... 15			3	num
dE21	49216	49444,6	N	RW	BYTE	**Type of system operating mode 0** • **0**= User setting • **1...16**=…RESERVED.	0 ... 16			5	num
dE22	49225	49445	N	RW	BYTE	**Type of system operating mode 1** See **dE02**	0 ... 16			5	num
dE23	49226	49445,2	N	RW	BYTE	**Type of system operating mode 2** See **dE02**	0 ... 16			5	num
dE24	49227	49445,4	N	RW	BYTE	**Type of system operating mode 3** See **dE02**	0 ... 16			5	num
dE30	49308	49445,6	N	RW	BYTE	**Enable overheating recalculation reference** Used to enable the automatic recalculation of the referred Setpoint in order to regulate the overheating **0** = recalculation disabled. Setpoint = **dE31** **1**= automatic recalculation enabled	0 ... 1			0	flag
dE31	16512	49446	N	RW	WORD	**Maximum overheating setpoint offset** Used to set the setpoint SP4 at **dE31** (SP2) to regulate the overheating following a black-out or at the end of defrost. Active for the time set by **dE51** (or when the MOP function is disabled)	0 ... 1000		-1	30	°C/°F
dE32	16510	49446,2	N	RW	WORD	**Overheating lower threshold** Used to set the setpoint SP2 to regulate the overheating (objective overheating) If **dE30=1** and the calculated setpoint < **dE32**, then the dynamic setpoint will be = **dE32**.	-600 ... 1000		-1	60	°C/°F
dE33	16514	49446,4	N	RW	WORD	**Overheating reference recalculation period** Valid for dE30=1 Defines the recalculation period of the dynamic setpoint (every dE33 seconds)	0 ... 999			20	seconds
dE34	16516	49446,6	N	RW	WORD	**Overheating recalculation step** Dynamic setpoint varies by **dE34** degrees according to the overheating value compared to **dE32**.	0 ... 1000		-1	1	°C/°F
dE35	16470	49447	N	RW	WORD	**Valve opening freezing timer after OFF->ON**	0 ... 1999			0	seconds
dE36	16518	49447,2	N	RW	WORD	**Overheating proportional band**	-9999 ... -1	Y	-1	-100	K
dE37	16520	49447,4	N	RW	WORD	**Overheating integral gain**	1 ... 1999			60	num
dE39	16524	49448	N	RW	WORD	**Overheating PID cycle period**	1 ... 1999		-1	1	seconds

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
dE46	16526	49449,6	N	RW	WORD	**Overheating PID neutral zone**	1 ... 1999		-1	10	bar/PSI °C/°F
dE47	49329	49450	N	RW	BYTE	**Enable valve manual opening** **0=** Automatic valve opening **1=** Manual valve opening.	0 ... 1			0	flag
dE48	16546	49450,2	N	RW	WORD	**Valve manual opening** Note: valid if **dE47=1**. Note: valve opening switched from automatic to manual (**dE47**=1) the opening percentage is not 0% as per default parameter but the percentage indicated by this parameter	0.0 ... 100.0		-1	0	%
dE50	49270	49450,4	N	RW	BYTE	**Enable MOP** **0=** MOP disabled; **1 =** MOP enabled.	0 ... 1			0	flag
dE51	16478	49450,6	N	RW	WORD	**MOP disable time at start-up** MOP activation delay on switching on or after defrost.	0 ... 999			0	seconds
dE52	16472	49451	N	RW	WORD	**Evaporator temperature upper threshold** MOP setpoint	-60.0 ... 100.0	Y	-1	0	°C/°F
dE53	49271	49451,2	N	RW	BYTE	**Min time that temp upper threshold is exceeded for alarm activation** If the dE52 threshold is exceeded for longer than dE53 the MOP alarm is given.	0 ... 255			180	seconds
dE54	16480	49451,4	N	RW	BYTE	**MOP proportional band**	1... 9999		-1	10	K
dE55	16482	49451,6	N	RW	BYTE	**MOP integral gain**	1... 9999			10	num
dE57	16486	49452,2	N	RW	BYTE	**MOP PID cycle period**	1... 9999		-1	1	seconds
dE64	16488	49454	N	RW	BYTE	**MOP PID neutral zone**	1... 9999		-1	10	bar/PSI °C/°F
dE65	16508	49454,2	N	RW	BYTE	**Outlet variation speed**	1... 9999		-1	200	%/s
Ui27	17988	49458,6	N	RW	WORD	**Installation engineer password**	0 ... 255			1	num
Ui28	17990	49459	N	RW	WORD	**Manufacturer password**	0 ... 255			2	num

10.2.2 - Valve configuration parameters

dE00	Type of VALVE	dE01	dE02	dE03	dE04	dE05	dE06	dE07	dE08	dE09	dE80
-		steps/s	steps	steps	mA	Ohm	mA	num	%	10*ms/ step	steps/s
0	**Customisable**	200	1596	100	120	100	50	0	100	50	15
1	**DANFOSS** ETS50	160	2625	160	100	52	75	0	100	50	10
2	**DANFOSS** ETS100	300	3530	160	100	52	75	0	100	50	10
3	**DANFOSS** CM 10-20-30	240	2625	160	100	52	0	2	100	0	10
4	**DANFOSS** CM 40	240	3530	160	100	52	0	2	100	50	10
5	**ALCO** EX7	210	1600	100	750	8	250	0	100	50	10
6	**ALCO** EX8	500	2600	100	800	6	500	0	100	50	10
7	**CAREL** E2V E3V E4V E5V E6V E7V	50	480	70	450	36	100	5	30	0	10
8	**SPORLAN** SER 1.5 TO 20	200	1596	100	120	100	50	0	100	50	10
9	**SPORLAN** SEI-30	200	3193	100	160	75	50	0	100	50	10
10	**SPORLAN** SEI-50*	200	6386	100	160	75	50	0	100	50	10
11	**ALCO** EX4 EX5 EX6	500	750	100	500	13	100	0	100	50	10
12	**SPORLAN** SER(I) G, J, K, B, C, D	160	2500	100	120	100	0	0	100	0	0
13	**ELIWELL By SE** SXVB Body 1	35	415	100	-200	35	50	0	100	50	10
14	**ELIWELL By SE** SXVB Body 2-3	20	195	60	-200	54	50	0	100	50	10
15	**ELIWELL By SE** SXVB4 Body 4	35	985	150	-560	35	50	0	100	50	10

Tab. 41 Valve configuration parameters

*Sporlan SEH: bipolar version only

10.2.3 - Valve configuration parameter table dE01...dE09, dE80 with dE00 = 0

NOTE: the parameter visibility cannot be set via the serial.
Check the data given in the valve manufacturer's manual for the correct configuration.

dE00	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
0	**dE01**	16722	RW	WORD	**Stepper motor maximum speed** Defines the maximum valve motor speed to guarantee step precision and integrity	0 ... 9999			200	steps/s
0	**dE02**	16754	RW	WORD	**Stepper motor complete opening** Defines the maximum number of valve steps. The total travel refers to the FULL STEP mode (**dE07**=0) The valve opening is complete when this value is reached.	0 ... 9999			1596	steps
0	**dE03**	49553	RW	BYTE	**Stepper motor extra movement in total closure** Defines the number of extra valve steps beyond the limit switch to guarantee correct total closure. A total closure command implies the valve positioned to zero and a further number of steps **dE03**.	0 ... 255			100	steps
0	**dE04**	16802	RW	WORD	**Stepper motor winding maximum current** Defines the maximum current for the phase used by the valve (maximum torque) Negative value of the current: the maximum current will be set to the value with no sign (absolute) **dE04** with an extra 50% with the valve movement command (starting or end point) within 5% of total opening, to a value equal to the absolute value of **dE04** for the other movements.	-1999 ... 9999			120	mA
0	**dE05**	49601	RW	BYTE	**Stepper motor winding resistance** Defines the electrical resistance of the single phase winding (check fault on connections)	0 ... 255			100	ohm
0	**dE06**	16850	RW	WORD	**Stepper motor winding rated current** Defines the phase circulating current in the valve stop condition (minimum torque)	0 ... 9999			50	mA
0	**dE07**	49649	RW	BYTE	**Type of stepper motor control** Defines the driving modes. • **0**= FULL STEP • **1**= HALF STEP • **2**= MICRO STEP • **3**= Not used • **4**= Not used • **5**= Not used Note that the current driving is a maximum value for the FULL STEP mode while the other two modes, modulating the value of the winding currents, offers greater resolution and fluidity of movement but with less torque. Refer to the literature concerning step-by-step motors for more detail	0 ... 5			0	num

dE00	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
0	**dE08**	50961	RW	BYTE	**Stepper motor enabling/disabling duty cycle** If the case of valve overheating, reduce the enabling duty cycle to allow it to cool down	0 ... 100			100	%
0	**dE09**	50977	RW	BYTE	**Stepper motor acceleration/deceleration** Defines the acceleration/deceleration in motor start/stop. The time between one step and the next is reduced by **dE09** at each step until **dE01** is reached If =0 acceleration is not applied	0 ... 255			50	ms*10/ step
0	**dE80**	50993	RW	BYTE	**Minimum stepper motor speed in acceleration/deceleration** Defines the minimum speed at which the motor starts and stops	0 ... 255			15	steps/s

Tab. 42 Valve configuration parameters **dE01...dE09, dE80 with dE00** =0

10.2.4 - Valve configuration parameter table dE01...dE09, dE80 with dE00 ≠ 0

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
1	**DANFOSS** ETS50	dE01	16722	RW	WORD	Maximum speed of stepper motor	0...9999			160	steps/s
1	**DANFOSS** ETS50	dE02	16754	RW	WORD	Complete opening of stepper motor	0...9999			2625	steps
1	**DANFOSS** ETS50	dE03	49553	RW	BYTE	Extra movement in total closure of stepper motor	0...255			160	steps
1	**DANFOSS** ETS50	dE04	16802	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		100	mA
1	**DANFOSS** ETS50	dE05	49601	RW	BYTE	Stepper motor winding Resistance	0...255			52	ohm
1	**DANFOSS** ETS50	dE06	16850	RW	WORD	Stepper motor winding rated current	0...9999			75	mA
1	**DANFOSS** ETS50	dE07	49649	RW	BYTE	Stepper motor type of control	0...5			0	num
1	**DANFOSS** ETS50	dE08	50961	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
1	**DANFOSS** ETS50	dE09	50977	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
1	**DANFOSS** ETS50	dE80	50993	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			15	steps/s
2	**DANFOSS** ETS100	dE01	16724	RW	WORD	Maximum speed of stepper motor	0...9999			300	steps/s
2	**DANFOSS** ETS100	dE02	16756	RW	WORD	Complete opening of stepper motor	0...9999			3530	steps
2	**DANFOSS** ETS100	dE03	49554	RW	BYTE	Extra movement in total closure of stepper motor	0...255			160	steps
2	**DANFOSS** ETS100	dE04	16804	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		100	mA
2	**DANFOSS** ETS100	dE05	49602	RW	BYTE	Stepper motor winding Resistance	0...255			52	ohm
2	**DANFOSS** ETS100	dE06	16852	RW	WORD	Stepper motor winding rated current	0...9999			75	mA
2	**DANFOSS** ETS100	dE07	49650	RW	BYTE	Stepper motor type of control	0...5			0	num
2	**DANFOSS** ETS100	dE08	50962	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
2	**DANFOSS** ETS100	dE09	50978	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
2	**DANFOSS** ETS100	dE80	50994	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
3	**DANFOSS** CM 10-20-30	dE01	16726	RW	WORD	Maximum speed of stepper motor	0...9999			240	steps/s
3	**DANFOSS** CM 10-20-30	dE02	16758	RW	WORD	Complete opening of stepper motor	0...9999			2625	steps
3	**DANFOSS** CM 10-20-30	dE03	49555	RW	BYTE	Extra movement in total closure of stepper motor	0...255			160	steps
3	**DANFOSS** CM 10-20-30	dE04	16806	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		100	mA
3	**DANFOSS** CM 10-20-30	dE05	49603	RW	BYTE	Stepper motor winding Resistance	0...255			52	ohm
3	**DANFOSS** CM 10-20-30	dE06	16854	RW	WORD	Stepper motor winding rated current	0...9999			0	mA
3	**DANFOSS** CM 10-20-30	dE07	49651	RW	BYTE	Stepper motor type of control	0...5			2	num
3	**DANFOSS** CM 10-20-30	dE08	50963	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
3	**DANFOSS** CM 10-20-30	dE09	50979	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			0	ms*10/ step
3	**DANFOSS** CM 10-20-30	dE80	50995	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
4	**DANFOSS** CM 40	dE01	16728	RW	WORD	Maximum speed of stepper motor	0...9999			240	steps/s
4	**DANFOSS** CM 40	dE02	16760	RW	WORD	Complete opening of stepper motor	0...9999			3530	steps
4	**DANFOSS** CM 40	dE03	49556	RW	BYTE	Extra movement in total closure of stepper motor	0...255			160	steps
4	**DANFOSS** CM 40	dE04	16808	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		100	mA
4	**DANFOSS** CM 40	dE05	49604	RW	BYTE	Stepper motor winding Resistance	0...255			52	ohm
4	**DANFOSS** CM 40	dE06	16856	RW	WORD	Stepper motor winding rated current	0...9999			0	mA
4	**DANFOSS** CM 40	dE07	49652	RW	BYTE	Stepper motor type of control	0...5			2	num
4	**DANFOSS** CM 40	dE08	50964	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
4	**DANFOSS** CM 40	dE09	50980	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
4	**DANFOSS** CM 40	dE80	50996	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
5	**ALCO** EX7	dE01	16730	RW	WORD	Maximum speed of stepper motor	0...9999			210	steps/s
5	**ALCO** EX7	dE02	16762	RW	WORD	Complete opening of stepper motor	0...9999			1600	steps
5	**ALCO** EX7	dE03	49557	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
5	**ALCO** EX7	dE04	16810	RW	WORD	Stepper motor winding maximum current	-1999...9999			750	mA
5	**ALCO** EX7	dE05	49605	RW	BYTE	Stepper motor winding Resistance	0...255			8	ohm
5	**ALCO** EX7	dE06	16858	RW	WORD	Stepper motor winding rated current	0...9999			250	mA
5	**ALCO** EX7	dE07	49653	RW	BYTE	Stepper motor type of control	0...5			0	num
5	**ALCO** EX7	dE08	50965	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
5	**ALCO** EX7	dE09	50981	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
5	**ALCO** EX7	dE80	50997	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
6	**ALCO** EX8	dE01	16732	RW	WORD	Maximum speed of stepper motor	0...9999			500	steps/s
6	**ALCO** EX8	dE02	16764	RW	WORD	Complete opening of stepper motor	0...9999			2600	steps
6	**ALCO** EX8	dE03	49558	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
6	**ALCO** EX8	dE04	16812	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		800	mA
6	**ALCO** EX8	dE05	49606	RW	BYTE	Stepper motor winding Resistance	0...255			6	ohm
6	**ALCO** EX8	dE06	16860	RW	WORD	Stepper motor winding rated current	0...9999			500	mA
6	**ALCO** EX8	dE07	49654	RW	BYTE	Stepper motor type of control	0...5			0	num
6	**ALCO** EX8	dE08	50966	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
6	**ALCO** EX8	dE09	50982	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
6	**ALCO** EX8	dE80	50998	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE01	16734	RW	WORD	Maximum speed of stepper motor	0...9999			50	steps/s
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE02	16766	RW	WORD	Complete opening of stepper motor	0...9999			480	steps
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE03	49559	RW	BYTE	Extra movement in total closure of stepper motor	0...255			70	steps
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE04	16814	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		450	mA
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE05	49607	RW	BYTE	Stepper motor winding Resistance	0...255			36	ohm
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE06	16862	RW	WORD	Stepper motor winding rated current	0...9999			100	mA
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE07	49655	RW	BYTE	Stepper motor type of control	0...5			5	num
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE08	50967	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			30	%
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE09	50983	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			0	ms*10/ step
7	**CAREL** E2V E3V E4V E5V E6V E7V	dE80	50999	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
8	**SPORLAN** SER 1.5 TO 20	dE01	16736	RW	WORD	Maximum speed of stepper motor	0...9999			200	steps/s
8	**SPORLAN** SER 1.5 TO 20	dE02	16768	RW	WORD	Complete opening of stepper motor	0...9999			1596	steps
8	**SPORLAN** SER 1.5 TO 20	dE03	49560	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
8	**SPORLAN** SER 1.5 TO 20	dE04	16816	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		120	mA
8	**SPORLAN** SER 1.5 TO 20	dE05	49608	RW	BYTE	Stepper motor winding Resistance	0...255			100	ohm
8	**SPORLAN** SER 1.5 TO 20	dE06	16864	RW	WORD	Stepper motor winding rated current	0...9999			50	mA
8	**SPORLAN** SER 1.5 TO 20	dE07	49656	RW	BYTE	Stepper motor type of control	0...5			0	num
8	**SPORLAN** SER 1.5 TO 20	dE08	50968	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
8	**SPORLAN** SER 1.5 TO 20	dE09	50984	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
8	**SPORLAN** SER 1.5 TO 20	dE80	51000	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
9	**SPORLAN** SEI-30	dE01	16738	RW	WORD	Maximum speed of stepper motor	0...9999			200	steps/s
9	**SPORLAN** SEI-30	dE02	16770	RW	WORD	Complete opening of stepper motor	0...9999			3193	steps
9	**SPORLAN** SEI-30	dE03	49561	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
9	**SPORLAN** SEI-30	dE04	16818	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		160	mA
9	**SPORLAN** SEI-30	dE05	49609	RW	BYTE	Stepper motor winding Resistance	0...255			75	ohm

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
9	**SPORLAN** SEI-30	dE06	16866	RW	WORD	Stepper motor winding rated current	0...9999			50	mA
9	**SPORLAN** SEI-30	dE07	49657	RW	BYTE	Stepper motor type of control	0...5			0	num
9	**SPORLAN** SEI-30	dE08	50969	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
9	**SPORLAN** SEI-30	dE09	50985	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
9	**SPORLAN** SEI-30	dE80	51001	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
10	**SPORLAN** SEI-50*	dE01	16740	RW	WORD	Maximum speed of stepper motor	0...9999			200	steps/s
10	**SPORLAN** SEI-50*	dE02	16772	RW	WORD	Complete opening of stepper motor	0...9999			6386	steps
10	**SPORLAN** SEI-50*	dE03	49562	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
10	**SPORLAN** SEI-50*	dE04	16820	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		160	mA
10	**SPORLAN** SEI-50*	dE05	49610	RW	BYTE	Stepper motor winding Resistance	0...255			75	ohm
10	**SPORLAN** SEI-50*	dE06	16868	RW	WORD	Stepper motor winding rated current	0...9999			50	mA
10	**SPORLAN** SEI-50*	dE07	49658	RW	BYTE	Stepper motor type of control	0...5			0	num
10	**SPORLAN** SEI-50*	dE08	50970	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
10	**SPORLAN** SEI-50*	dE09	50986	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
10	**SPORLAN** SEI-50*	dE80	51002	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
11	**ALCO** EX4-EX5-EX6	dE01	16742	RW	WORD	Maximum speed of stepper motor	0...9999			500	steps/s
11	**ALCO** EX4-EX5-EX6	dE02	16774	RW	WORD	Complete opening of stepper motor	0...9999			750	steps
11	**ALCO** EX4-EX5-EX6	dE03	49563	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
11	**ALCO** EX4-EX5-EX6	dE04	16822	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		500	mA
11	**ALCO** EX4-EX5-EX6	dE05	49611	RW	BYTE	Stepper motor winding Resistance	0...255			13	ohm
11	**ALCO** EX4-EX5-EX6	dE06	16870	RW	WORD	Stepper motor winding rated current	0...9999			100	mA
11	**ALCO** EX4-EX5-EX6	dE07	49659	RW	BYTE	Stepper motor type of control	0...5			0	num
11	**ALCO** EX4-EX5-EX6	dE08	50971	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
11	**ALCO** EX4-EX5-EX6	dE09	50987	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
11	**ALCO** EX4-EX5-EX6	dE80	51003	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE01	16744	RW	WORD	Maximum speed of stepper motor	0...9999			160	steps/s
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE02	16776	RW	WORD	Complete opening of stepper motor	0...9999			2500	steps
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE03	49564	RW	BYTE	Extra movement in total closure of stepper motor	0...255			10	steps
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE04	16824	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		120	mA

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE05	49612	RW	BYTE	Stepper motor winding Resistance	0...255			100	ohm
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE06	16872	RW	WORD	Stepper motor winding rated current	0...9999			0	mA
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE07	49660	RW	BYTE	Stepper motor type of control	0...5			0	num
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE08	50972	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE09	50988	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			0	ms*10/ step
12	**SPORLAN** SER(I) G, J, K, B, C, D	dE80	51004	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			0	steps/s
13	**ELIWELL By SE** SXVB Body 1	dE01	16746	RW	WORD	Maximum speed of stepper motor	0...9999			35	steps/s
13	**ELIWELL By SE** SXVB Body 1	dE02	16778	RW	WORD	Complete opening of stepper motor	0...9999			415	steps
13	**ELIWELL By SE** SXVB Body 1	dE03	49565	RW	BYTE	Extra movement in total closure of stepper motor	0...255			100	steps
13	**ELIWELL By SE** SXVB Body 1	dE04	16826	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		-200	mA
13	**ELIWELL By SE** SXVB Body 1	dE05	49613	RW	BYTE	Stepper motor winding Resistance	0...255			35	ohm
13	**ELIWELL By SE** SXVB Body 1	dE06	16874	RW	WORD	Stepper motor winding rated current	0...9999			50	mA
13	**ELIWELL By SE** SXVB Body 1	dE07	49661	RW	BYTE	Stepper motor type of control	0...5			0	num
13	**ELIWELL By SE** SXVB Body 1	dE08	50973	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
13	**ELIWELL By SE** SXVB Body 1	dE09	50989	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
13	**ELIWELL By SE** SXVB Body 1	dE80	51005	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
14	**ELIWELL By SE** SXVB Body 2-3	dE01	16748	RW	WORD	Maximum speed of stepper motor	0...9999			20	steps/s
14	**ELIWELL By SE** SXVB Body 2-3	dE02	16780	RW	WORD	Complete opening of stepper motor	0...9999			195	steps
14	**ELIWELL By SE** SXVB Body 2-3	dE03	49566	RW	BYTE	Extra movement in total closure of stepper motor	0...255			60	steps
14	**ELIWELL By SE** SXVB Body 2-3	dE04	16828	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		-200	mA

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	DEFAULT	U.M.
14	**ELIWELL By SE** SXVB Body 2-3	dE05	49614	RW	BYTE	Stepper motor winding Resistance	0...255			54	ohm
14	**ELIWELL By SE** SXVB Body 2-3	dE06	16876	RW	WORD	Stepper motor winding rated current	0...9999			50	mA
14	**ELIWELL By SE** SXVB Body 2-3	dE07	49662	RW	BYTE	Stepper motor type of control	0...5			0	num
14	**ELIWELL By SE** SXVB Body 2-3	dE08	50974	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
14	**ELIWELL By SE** SXVB Body 2-3	dE09	50990	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
14	**ELIWELL By SE** SXVB Body 2-3	dE80	51006	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s
15	**ELIWELL By SE** SXVB4 Body 4	dE01	16750	RW	WORD	Maximum speed of stepper motor	0...9999			35	steps/s
15	**ELIWELL By SE** SXVB4 Body 4	dE02	16782	RW	WORD	Complete opening of stepper motor	0...9999			985	steps
15	**ELIWELL By SE** SXVB4 Body 4	dE03	49567	RW	BYTE	Extra movement in total closure of stepper motor	0...255			150	steps
15	**ELIWELL By SE** SXVB4 Body 4	dE04	16830	RW	WORD	Stepper motor winding maximum current	-1999...9999	Y		-560	mA
15	**ELIWELL By SE** SXVB4 Body 4	dE05	49615	RW	BYTE	Stepper motor winding Resistance	0...255			35	ohm
15	**ELIWELL By SE** SXVB4 Body 4	dE06	16878	RW	WORD	Stepper motor winding rated current	0...9999			50	mA
15	**ELIWELL By SE** SXVB4 Body 4	dE07	49663	RW	BYTE	Stepper motor type of control	0...5			0	num
15	**ELIWELL By SE** SXVB4 Body 4	dE08	50975	RW	BYTE	Duty cycle activation/disabling of stepper motor	0...100			100	%
15	**ELIWELL By SE** SXVB4 Body 4	dE09	50991	RW	BYTE	Acceleration/deceleration of stepper motor	0...255			50	ms*10/ step
15	**ELIWELL By SE** SXVB4 Body 4	dE80	51007	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10	steps/s

Tab. 43 Valve configuration parameters **dE01**...**dE09**, **dE80** with **dE** ≠0

10.2.5 - Folder visibility table

LABEL	PAR. ADDR	R/W	DESCRIPTION	DATA SIZE	RANGE	CPL	EXP	DEFAULT	U.M.
rE	49424	RW	Folder visibility	2 bit	0...3			3	num
Ai	49424,2	RW	Folder visibility	2 bit	0...3			3	num
of	49424,4	RW	Folder visibility	2 bit	0...3			3	num
dO	49424,6	RW	Folder visibility	2 bit	0...3			3	num
SP	49425	RW	Folder visibility	2 bit	0...3			3	num
PAr	49425,2	RW	Folder visibility	2 bit	0...3			3	num
FnC	49425,4	RW	Folder visibility	2 bit	0...3			3	num
PASS	49425,6	RW	Folder visibility	2 bit	0...3			3	num
SP1	49426,2	RW	Folder visibility	2 bit	0...3			3	num
SP2	49426,4	RW	Folder visibility	2 bit	0...3			3	num
SP3	49426,6	RW	Folder visibility	2 bit	0...3			3	num
SP4	49427	RW	Folder visibility	2 bit	0...3			3	num
dF	49427,4	RW	Folder visibility	2 bit	0...3			3	num
dF43	49449	RW	Folder visibility	2 bit	0...3			3	num
dF44	49449,2	RW	Folder visibility	2 bit	0...3			3	num
dL	49427,2	RW	Folder visibility	2 bit	0...3			3	num
dE	49427,6	RW	Folder visibility	2 bit	0...3			3	num
UI	49428	RW	Folder visibility	2 bit	0...3			3	num
CC	49428,2	RW	Folder visibility	2 bit	0...3			3	num
UL	49459,2	RW	Folder visibility	2 bit	0...3			3	num
DL	49459,4	RW	Folder visibility	2 bit	0...3			3	num
FR	49459,6	RW	Folder visibility	2 bit	0...3			3	num

Tab. 44 Display Folder

10.2.6 - Client Table

INDEX	FOLDER	LABEL	PAR. ADDR	R/W	DESCRIPTION	DATA SIZE	RANGE	CPL	EXP	U.M.
1	Ai	dAi1	563	R	Analogue input 1 (display)	WORD	-500...9999	Y	-1	°C/°F/ bar/PSI
2	Ai	dAi2	565	R	Analogue input 2 (display)	WORD	-500...9999	Y	-1	°C/°F/ bar/PSI
5	Ai	dAi3	567	R	Analogue input 3 (display)	WORD	-500...9999	Y	-1	°C/°F
6	Ai	dAi4	569	R	Analogue input 4 (display)	WORD	-500...9999	Y	-1	°C/°F
7	Ai	drE1	432	R	Valve overheating temperature EEVD	WORD	-500...9999	Y	-1	°C/°F
8	Ai	drE2	434	R	Valve saturation temperature EEVD	WORD	-500...9999	Y	-1	°C/°F
9	Ai	drE3	436	R	Valve overheating temperature EEVD (back-up)	WORD	-500...9999	Y	-1	°C/°F
10	Ai	drE4	438	R	Valve saturation temperature EEVD (back-up)	WORD	-500...9999	Y	-1	°C/°F
11	Ai	drE5	446	R	Valve overheating EEVD	WORD	-500...9999	Y	-1	K/°R
12	Ai	drE6	448	R	valve evaporator pressure EEVD	WORD	-500...9999	Y	-1	bar/PSI
13	Ai	drE7	450	R	valve opening percentage EEVD	WORD	-500...9999		-1	%
14	Ai	SP4	519	R	valve overheating setpoint EEVD	WORD	-500...9999	Y	-1	K/°R
29	Ai	evaporatorPress	525	RW	remote valve evaporator pressure (shared probe)	WORD	-500...9999	Y	-1	PSI
30	Ai	evaporatorTemp	527	RW	valve saturation temperature from remote (shared probe)	WORD	-500...9999	Y	-1	°F
31	Di	ddi1	33062	R	Digital input 1	1 bit	0...1			flag
32	Di	ddi2	33062,1	R	Digital input 2	1 bit	0...1			flag
33	Di	Dip1	33058,1	R	DIP switch 1 status	1 bit	0...1			flag
34	Di	Dip2	33058,2	R	DIP switch 2 status	1 bit	0...1			flag
35	Di	Dip3	33058,3	R	DIP switch 3 status	1 bit	0...1			flag
36	Di	Dip4	33058,4	R	DIP switch 4 status	1 bit	0...1			flag
37	Di	Dip5	33058,5	R	DIP switch 5 status	1 bit	0...1			flag
38	Di	Dip6	33058,6	R	DIP switch 6 status	1 bit	0...1			flag
39	dO	ddO1	33063,6	R	Digital output ddO1	1 bit	0...1			flag
40	dO	ddO2	33063,5	R	Digital output ddO2	1 bit	0...1			flag
41	Alarm	Er01	33052,1	R	Probe error dAi1	1 bit	0...1			flag
42	Alarm	Er02	33052,2	R	Probe error dAi2	1 bit	0...1			flag
43	Alarm	Er03	33052,3	R	Probe error dAi3	1 bit	0...1			flag
44	Alarm	Er04	33052,4	R	Probe error dAi4	1 bit	0...1			flag
45	Alarm	Er05	33052,5	R	Valve overheating probe alarm EEVD	1 bit	0...1			flag
46	Alarm	Er06	33052,6	R	Valve saturation probe alarm EEVD	1 bit	0...1			flag
47	Alarm	Er07	33052,7	R	Valve MOP alarm EEVD	1 bit	0...1			flag
48	Alarm	Er08	33053	R	Valve output max alarm EEVD	1 bit	0...1			flag
49	Alarm	Er09	33053,1	R	Valve external alarm EEVD	1 bit	0...1			flag
50	Alarm	Er10	33053,2	R	Valve no-link alarm EEVD	1 bit	0...1			flag
51	Alarm	Er11	33053,3	R	Valve motor alarm EEVD: high current absorption	1 bit	0...1			flag
52	Alarm	Er12	33053,4	R	Valve motor alarm EEVD: winder 1 not connected	1 bit	0...1			flag
53	Alarm	Er13	33053,5	R	Valve motor alarm EEVD: winder 1 in short circuit	1 bit	0...1			flag
54	Alarm	Er14	33053,6	R	Valve motor alarm EEVD: winder 2 not connected	1 bit	0...1			flag
55	Alarm	Er15	33053,7	R	Valve motor alarm EEVD: winder 2 in short circuit	1 bit	0...1			flag
56	Resource	EEV_STTS_ON	33257	R	Enable EEVD valve control	1 bit	0...1			flag
57	Resource	EEV_STTS_ALM	33257,1	R	EEVD alarm	1 bit	0...1			flag

INDEX	FOLDER	LABEL	PAR. ADDR	R/W	DESCRIPTION	DATA SIZE	RANGE	CPL	EXP	U.M.
58	Resource	EEV_STTS_DEFR	33257,2	R	EEVD defrost	1 bit	0...1			flag
59	Resource	EEV_STTS_NOLINK	33257,3	R	control status in no-link	1 bit	0...1			flag
60	Resource	EEV_STTS_MOD	33257,4	R	Select operating mode	2 bit	0...3			num
61	Resource	EEV_STTS_ SPECIAL_ON	33257,6	R	Opening state of fixed valve before EEVD closure	1 bit	0...1			num
62	Resource	EEV_STTS_FORCE_ OPEN	33257,7	R	Forced complete EEVC valve opening state	1 bit	0...1			num
63	Net Command	EEV_STTS_ON_SET	33259	W	Valve control ON	1 bit	0...1			flag
64	Net Command	EEV_STTS_ALM_ SET	33259,1	W	Alarm status ON	1 bit	0...1			flag
65	Net Command	EEV_STTS_DEFR_ SET	33259,2	W	Defrost status ON	1 bit	0...1			flag
66	Net Command	EEV_STTS_ SPECIAL_ON_SET	33259,6	W	Valve opening command FIX ON	1 bit	0...1			flag
67	Net Command	EEV_STTS_FORCE_ OPEN_SET	33259,7	W	Valve opening command 100% ON	1 bit	0...1			flag
68	Net Command	EEV_STTS_MOD_ SET	33259,4	W	Select operating mode control 0: 00 → control 1 1: 01 → control 2 2: 10 → control 3 3: 11 → control 4	2 bit	0...3			num
72	Net Command	EEV_STTS_ON_ RESET	33259	W	Valve control OFF	1 bit	0...1			flag
73	Net Command	EEV_STTS_ALM_ RESET	33259,1	W	Alarm status OFF	1 bit	0...1			flag
74	Net Command	EEV_STTS_DEFR_ RESET	33259,2	W	Defrost status OFF	1 bit	0...1			flag
75	Net Command	EEV_STTS_ SPECIAL_ON_ RESET	33259,6	W	Valve opening command FIX OFF	1 bit	0...1			flag
76	Net Command	EEV_STTS_FORCE_ OPEN_RESET	33259,7	W	Valve opening command 100% OFF	1 bit	0...1			flag

Tab. 45 Client

11 - ALARMS

V910 V3 can run integral diagnostics of the installation, signalling any operating faults with specific alarms, and record and signal any user-defined unusual events on the display in order to have greater control over the installation.

The alarm condition is always reported by the LED near the alarm icon and the enabling of the output on the relay, if appropriately configured.

The probe error is shown directly on the **SKP 10** terminal display. Refer to “11.1 - Alarm table” on page 104.

11.1 - Alarm table

Label	Description/Cause (factory settings)	Effect	Reset	Solution
Er01	**Probe error dAi1** • Measured values are outside nominal range • Control probe un-used/short-circuited/open	• Signal only if the relative back-up dAi2 probe is configured. • Otherwise see Er06.	A	• Check the probe wiring. • Replace probe. • When error has been removed, regulation continues as normal.
Er02	**Probe error dAi2** Same as Er01.	Same as Er01 (probe dAi1).	A	Same as Er01.
Er03	**Probe error dAi3** Same as Er01.	• Signal only if the relative back-up dAi4 probe is configured. • Otherwise see Er05.	A	Same as Er01.
Er04	**Probe error dAi4** Same as Er01.	Same as Er01 (probe dAi3).	A	Same as Er01.
Er05	**Evaporator output probe error.** Both Ai3 Ai4 probes are faulty.	% valve opening =dE16.	A	Same as Er01.
Er06	**Saturation output error.** Both Ai1, Ai2 probes cannot be used.	• Case dE50 = 0 % valve opening =dE16 • Case dE50 = 1 Valve closed.	A	Same as Er01.
Er07	**MOP alarm.** Saturation temperature > MOP setpoint (dE52) for a longer period than dE53.	Valid only if dE50=1. Valve closed.	A	Wait for saturation temperature to return < dE52.
Er08	Maximum valve opening % drE7 ≥ dE10 for a longer period than dE13.	Report only.	A	Wait for return of maximum valve opening drE7 < dE10.
Er09	**External alarm.** Activation of digital input configured as external alarm. See parameters dL40/dL41=±3.	Valve closed.	A	Deactivation of digital input configured as external alarm.
Er10	**NO link alarm.** Unsuccessful serial communication (dF02 = 1, 2)	Valve closed.	A	Restore communication.
Er11	**Motor protection alarm.** Excessive current absorption.	Valve closed.	A	• Check motor phases. • Check motor connection.
Er12	**Motor protection alarm.** Winder 1 disconnected.	Valve closed.	A	• Check winder 1 connection (terminals 6-7). • Check correct parameter settings dE01...dE09, dE80.
Er13	**Motor protection alarm.** Winder 1 short circuit.	Valve closed.	A	Same as Er12.
Er14	**Motor protection alarm.** Winder 2 disconnected.	Valve closed.	A	• Check winder 2 connection (terminals 4-5). • Check correct parameter settings dE01...dE09, dE80.
Er15	**Motor protection alarm.** Winder 2 short circuit.	Valve closed.	A	Same as Er14.

Tab. 46 Alarms

12 - MFK 100 (FnC FOLDER)

12.1 - Introduction

The **MFK 100 / UNICARD** (MFK) is an accessory that when connected to the TTL serial port, allows rapid programming of the controller parameters (up/download parameter map to or from one or more controllers of the same type) rapidly and/or the controller's application software.

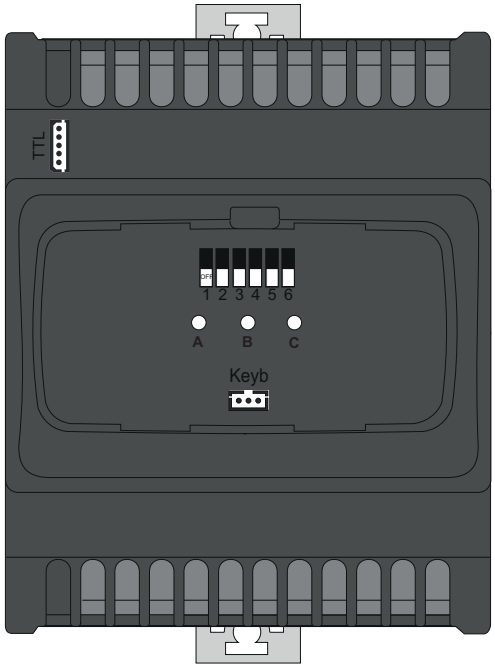


Fig. 31 Connecting the Multi Function Key

To connect the MFK / UNICARD to the TTL serial port, use the yellow cable supplied.

The upload (label **UL**), download (label **dL**) and copy card formatting (label Fr) operations are performed as explained below:

UPLOAD: copy from INSTRUMENT to **MFK 100 / UNICARD** (MFK)
By doing this, the programming parameters and/or application will be uploaded to the MFK.

DOWNLOAD: copy from **MFK 100 / UNICARD** (MFK) to INSTRUMENT
With this operation the programming parameters are downloaded from MFK in the instrument.

FORMAT*: The formatting of the **MFK 100** consists of deleting its content.

*This should be done prior to Uploading when used for the first time.

There are two ways of using the **MFK 100**

- Using the DIP switches (only Upload/Download)
- Via the **SKP 10** terminal

12.2 - Upload/Download via DIP switch

Proceed as follows:

1. Insert the **in the MFK 100 (MFK)** in the appropriate connector with the instrument switched on
2. place the DIP switches 1 or 2 inside the door to “ON”, as described in the following table
3. when the operation has been completed, remove the **MFK 100** (MFK)
4. return the DIP switch to OFF.

		Dip1	2	3	4	5	6
Upload/Download parameters from MFK (**MFK 100**)	Upload	ON	OFF	-	-	-	-
	Download	OFF	ON	-	-	-	-

Tab. 47 Upload/Download via DIP switch

12.2.1 - LED DIP switches

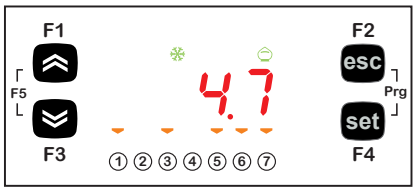
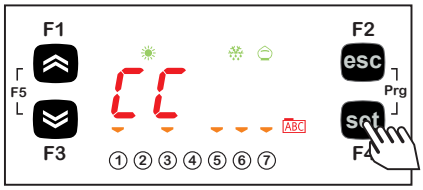
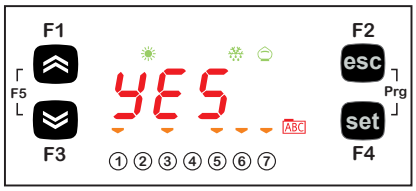
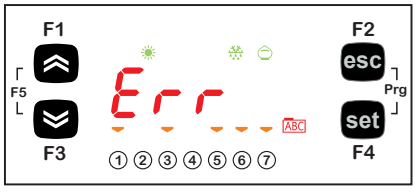
The LEDS A/B/C inside the door indicate the operating state.

LED	Colour	Upload		
		Underway	Completed properly	Completed incorrectly
A	Green	Flashing	ON	ON
B	Yellow	-	-	-
C	Green	-	-	Flashing
LED	**Colour**	**Download**		
		Underway	**Completed properly**	**Completed incorrectly**
A	Green	-	-	-
B	Yellow	Flashing	ON	ON
C	Green	-	-	Flashing

Tab. 48 DIP switch led

12.3 - Upload/Download via SKP 10

A step by step illustration of how to proceed is provided below.

Upload/Download/Format	
	From the main display press “esc” and “set” at the same time. The label ‘PAr’ will appear. Use “UP” and “DOWN” keys to view the “FnC” label. Press “set”. The CC label will appear.
	The commands you need to use the Multi Function Key are in the CC folder. Press “set” to access the functions.
	Use “UP” and “DOWN” keys to view the required function: • UL for upload • dL for download • Fr for format Press the “set” key to upload or download (in the example dL- download). Wait for a few seconds.
	If the operation is successful, the display shows “YES”.
	If the operation is unsuccessful, the display shows “Err”.

12.3.1 - Download from MFK 100

Connect the pen drive with the device switched off.

Firmware download

At start up, if a compatible firmware is loaded into the **MFK 100** (MFK), the new firmware is downloaded into the device.

This happens as follows:

- firmware verification/update (LED flashes of the **MFK 100**)
- termination with successful programming (LED of the **MFK 100** on fixed)
- device switch off.

Note: If a compatible firmware is not loaded into the **MFK 100**, no download takes place.

If, on termination, the **MFK 100** LED not stay on fixed, the operation must be repeated as this means it failed.

Download parameters

On start up, if there is a compatible parameter map in the **MFK 100**, the programming parameters are loaded into the instrument

Download from reset

Case A

lamp test completed…

…the display shows dLY…

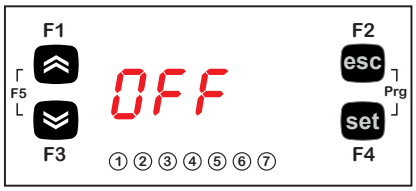
If the procedure was completed successfully.

Case B

lamp test completed…

…dLn appears on the display....

Completion of the procedure was unsuccessful°.



In both cases, the instrument will be switched OFF locally (OFF appears on the display).

When you press “DOWN” (°°), the instrument will operate:

- With the new map Example A;
- With the previous map Example B.

On completion, remove the pen drive.

- If the **MFK 100** is loaded with both a compatible firmware and a compatible parameter map, the firmware is downloaded first and then (after the device has been switched off and back on again manually) the parameter map.
- The formatting function is ONLY REQUIRED FOR UPLOADING **.
  - in order to use the **MFK 100** for the first time (MFK never used)
  - when using the **MFK 100** with device versions that are not compatible with each other.

****Note**: a pre-programmed pen drive supplied by Eliwell to DOWNLOAD parameters does not need to be formatted.

Formatting **CANNOT** be undone.

- After the download operation, the instrument will work with the newly loaded parameters map/firmware.
- Remove the pen drive on completion of the procedure.

° If the string Err / dLn (download from reset) appears:

- check that the pen drive is connected to the device
- Check the **MFK 100** – **V910 V3** connection (check the TTL cable)
- check that the key is compatible with the device;
- contact the Eliwell Technical Support.

°° Refer to “6 - USER INTERFACE” on page 35.

13 - SUPERVISION

The serial TTL - also called COM0 – can be used to configure the instrument, parameters, states, and variables with Modbus via the Modbus protocol.

13.1 - Configuration with Modbus RTU

Modbus is a client/server protocol for communication between devices connected in a network.

Modbus devices communicate using a master-slave technique in which only one device (master) can send messages.
The other devices in the network (slave) respond, returning the data requested by the master or executing the action contained in the message sent. A slave is a device connected to a network that processes information and sends the results to the master using the Modbus protocol.

The master device can send messages to individual slaves or to the entire network (broadcast) whilst slave devices only respond individually to the master device.

The Modbus standard used by Eliwell Controls employs the RTU code for data transmission.

13.2 - Data format (RTU)

The coding model used defines the structure of messages transmitted on the network and the way in which this information is deciphered. The coding type is usually chosen according to specific parameters (baud rate, parity, etc.)*. Some devices also support only certain coding models. However, this must be the same for all devices connected to a Modbus network.

The protocol used adopts the RTU binary method with bytes configured as follows:
• 8 bit for data, even parity bit (not configurable), 1 stop bit.

* Can be set via parameters **dF30**, **dF31**.

Parameter setting allows the integral configuration of the device.

The parameters can be modified via:
• **SKP 10** terminal
• **MFK 100** (MFK)

sending data via Modbus protocol directly to an individual controller or broadcasting it using the address 0.

Refer to **(Fig. 32)** and **(Fig. 33)** for the connection diagram for use with Modbus.

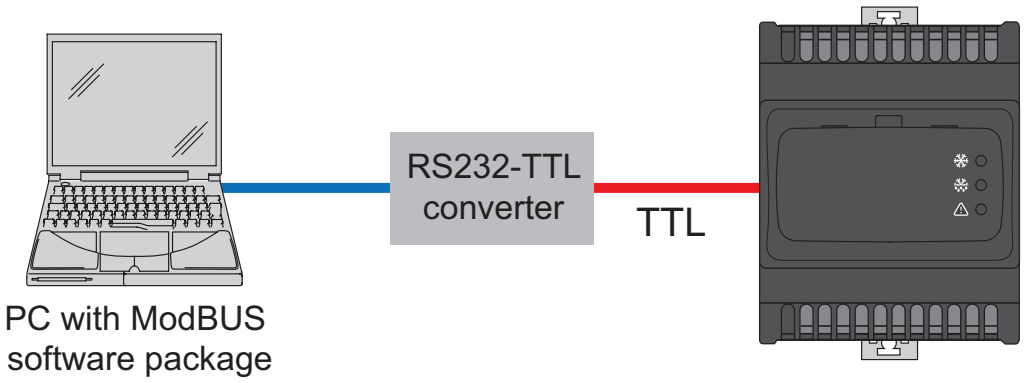


Fig. 32 ModBus connection to individual devices via TTL

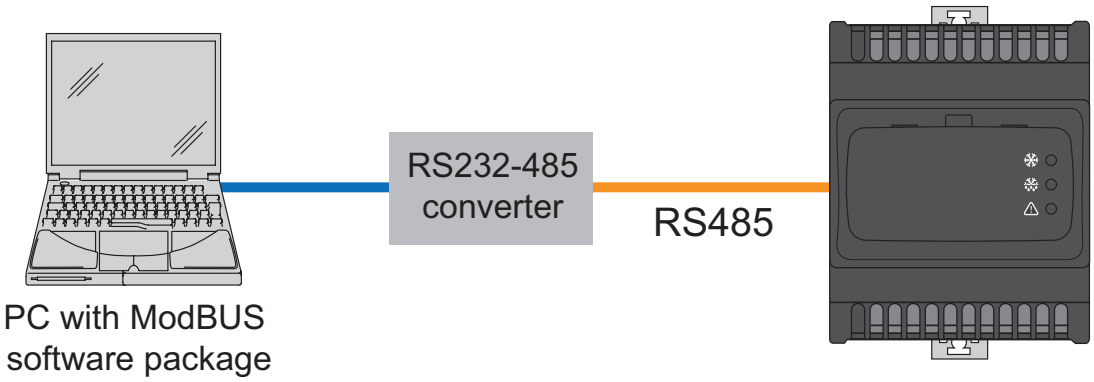


Fig. 33 ModBus connection to multiple devices via RS485

PC connection / Interface	RS232 cable
Device / TTL Interfaces connection	5-way TTL connector cable (30 cm) (other sizes/lengths available)
Device / RS485 Interfaces connection	Shielded and twisted RS485 cable (e.g. Belden cable version 8762)

Tab. 49 Connection for use with modbus

Modbus commands available and data areas

Modbus command	Description of command	
3	Read multiple registers on Client side	
16	Write multiple registers on Client side	
43	0	Manufacturer ID
	1	Version ID
	2	Instrument ID

Tab. 50 Modbus commands available and data areas

Maximum length in bytes of messages sent to device	60 BYTE
Maximum length in bytes of messages received from the device	60 BYTE

Tab. 51 Length restrictions

13.3 - Configuration of device address

The address of a device (Device Number) in a ModBus message is defined in parameter dF30.
Refer to “10 - PARAMETERS (PAr)” on page 83.

The address 0 is used for broadcast messages that all slaves recognize. The slaves do not respond to broadcast messages.

13.4 - Configuration of parameter addresses

For the list of addresses, refer to “10.2.1 - Parameters / visibility table” on page 86.

13.5 - Configuration of variable addresses / states

For the list of addresses, refer to “10.2.6 - Client Table” on page 102.

Eliwell Controls s.r.l.
Via dell'Industria, 15 • Z.I. Paludi
32010 Alpago (Belluno) ITALY
Telephone +39 0437 986 111
www.eliwell.com

Customer's Technical Support
Telephone +39 0437 986 300
E techsuppeliwell@schneider-electric.com

Sales office
Telephone +39 0437 986 100 (Italy)
Telephone +39 0437 986 200 (other countries)
E saleseliwell@schneider-electric.com

ISO 9001

9MA10280 - V910 V3 - EN - 03/17