# XEV22D

## DRIVER FOR STEPPER ELECTRONIC EXPANSION VALVES

### CONTENTS

### 1. GENERAL WARNING

#### 1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

#### 1.2 ⚠ SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.p.A." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

### 2. GENERAL DESCRIPTION

The **XEV22D** module is able to drive a large variety of **stepper electronic expansion valves**. XEV22D permits to regulate the superheat (SH) of the fluid that runs into refrigerating unit in order to obtain optimized performance and a functioning of the evaporator independent by climatic or load conditions. **XEV22D** modules are equipped with two probe inputs, one for 4÷20mA or 0÷5V pressure transducer and another for Pt1000 or NTC temperature probe. A LAN connection permits to transmit the pressure signal to others XEV modules in order to use only one pressure transducer in multiplexed cabinet applications. There are also two configurable digital inputs, the first one is free of voltage and the other ones is at high voltage in order to simplify connections with cooling request signal. With the useful display it's possible to see the value of superheat (SH), the degree of opening of the valve or the probe values, the local keyboard allows to program the instrument without any other devices. To complete instrument equipment, a RS485 serial link permits to connect XEV22D to **dixell** monitoring and supervising systems.

### 3. WIRING CONNECTIONS

The superheat regulation is performed only when the cooling digital input is enabled. The following scheme shows how the device takes the request of cooling:



Compressor Output

Digital Input Configured as CCL

Please see the following scheme to make the right wirings. With "First Level" are indicated the connections on the floor of the 4 DIN module and, of course, with "Second Level" the connections of the 1st floor that are only for the stepper motor of the valve and for HOTKEY.
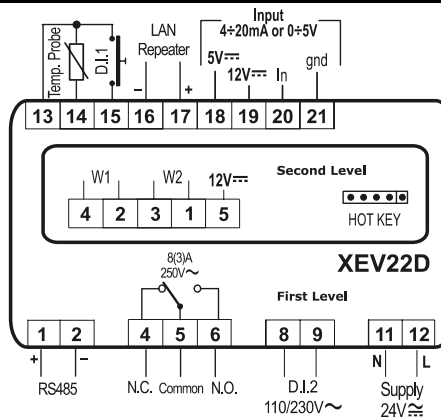


### 4. VALVE CONNECTIONS AND CONFIGURATION

#### !!!!!!!!!! WARNING !!!!!!!!!!!!!!!

To avoid possible problems, before connecting the valve configure the driver by making the right changes on the parameters. Select the kind of motor (**tEU parameter**) and check if the valve is present in **tEP parameter table** reported here below:

| tEP | Model | LSt (steps*10) | uSt (steps*10) | CPP (mA*10) | CHd (mA*10) | Sr (step/s) |
|---|---|---|---|---|---|---|
| 0 | **Manual settings** | Par | Par | Par | Par | Par |
| 1 | Sporlan SEI 0.5-20 | 10 | 159 | 20 | 5 | 200 |
| 2 | Sporlan SEI 30 | 20 | 319 | 20 | 5 | 200 |
| 3 | Sporlan SEH 50-250 | 40 | 638 | 20 | 5 | 200 |
| 4 | Alco EX5-EX6 | 10 | 75 | 40 | 10 | 450 |
| 5 | Alco EX7 | 25 | 160 | 75 | 25 | 330 |
| 6 | Alco EX8 330 step/s | 25 | 260 | 80 | 50 | 330 |
| 7 | Alco EX8 500 step/s | 25 | 260 | 80 | 50 | 500 |
| 8 | Danfoss ETS-25/50 | 20 | 262 | 14 | 8 | 120 |
| 9 | Danfoss ETS-100 | 30 | 353 | 14 | 8 | 120 |
| 10 | Danfoss ETS-250/400 | 35 | 381 | 14 | 8 | 120 |

If you can see your valve on the table, please select the valve through **tEP parameter.** In this way, you can be sure of a right configuration.

About the connection, please pay attention to the following table to have a quick reference on the connection mode for valves of different manufacturer. In any case, **the unique and valid reference has to be considered the datasheet made by manufacturer of the valve**:

**4 WIRES VALVES (BIPOLAR)**

| Connection numbering | ALCO EX* | ALCO EX5/6 | SPORLAN SEI-SHE | DANFOSS ETS |
|---|---|---|---|---|
| 4 | WHITE | BLUE | WHITE | BLACK |
| 2 | YELLOW | BROWN | BLACK | WHITE |
| 3 | BROWN | BLACK | RED | RED |
| 1 | GREEN | WHITE | GREEN | GREEN |

**5-6 WIRES VALVES (UNIPOLAR)**

| Connection numbering | SPORLAN | SAGINOMIYA |
|---|---|---|
| 4 | ORANGE | ORANGE |
| 2 | RED | RED |
| 3 | YELLOW | YELLOW |
| 1 | BLACK | BLACK |
| 5 – Common | GRAY | GRAY |

**AFTER MAKING THE CONNECTION, PLEASE SWITCH OFF AND ON THE XEV CONTROLLER IN ORDER TO BE SURE OF THE RIGHT POSITIONING OF THE VALVE.**

### 5. ABSOLUTE MAXIMUM POWER

**XEV22D** is able to drive a wide range of stepper valves, in the following table are indicated the maximum values of current that the actuator can supply to the stepper wiring. The **dixell** transformer to use is the **TF20D**.

**NOTE:** the electrical power absorption of the valve can be unrelated to refrigeration power that valve has. Before using the actuator, please read the technical manual of the valve supplied by the manufacturer and check the maximum current used to drive the valve in order to verify that they are lower than those indicated below.

| VALVE TYPE | | |
|---|---|---|
| | BIPOLAR VALVES (4 wires) | Maximum Current 0.9A |
| | UNIPOLAR VALVES (5-6 wires) | Maximum Current 0.33A |

### 6. FRONT PANEL

## 6.1 XEV22D LEDS

On display there are some luminous dots. Their meaning is described in the following table:

| LED | MODE | Function |
|---|---|---|
| L◎ | ON | Low pressure alarm |
| H◎ | ON | Maximum Operating Pressure alarm |
| ⇥◁ | OFF | Valve is completely closed |
| ⇥◁ | BLINKING | Valve is moving |
| ⇥◁ | ON | Valve is completely opened |
| ⇌ | BLINKING | Serial communication present |
| ⇌ | OFF | Serial communication absent |
| ((!)) | ON | Superheat alarm |

## 7. USER INTERFACE

### 7.1 TO SEE THE READ-ONLY VALUES

1) Press and release ▲ key;
2) First read-only label is showed;
3) Slide labels with ▲ or ▼ narrows;
4) Press **SET** to see read-only value. To change parameter you want to see, press **SET**
5) To leave the fast access menu, press and release **SET**+▲ or wait time-out of about 3 minutes.

### 7.2 TO SEE THE SET POINT

1) Press the **SET** key until the set point will be showed;
2) To come back to see temperature, wait about 5s or press newly **SET** key.

### 7.3 TO MODIFY THE SET POINT

To change the set point value operate as follows:
1) Press the **SET** key until the set point will be showed;
2) Use ▲ or ▼ to change its value.
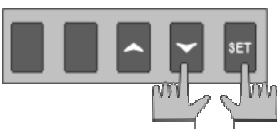3) Press "**SET**" to store the new value.

### 7.4 TO GO TO "PR1" PARAMETERS
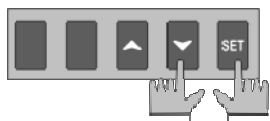


To enter in "Pr1" level menu:
1) Pressing **SET**+ ▼ keys for about 3 seconds.
2) Instruments shows first parameter in Pr1 menu

### 7.5 TO GO TO "PR2" PARAMETERS



To enter to "Pr2" parameters list:
1. Enter to "Pr1"
2. Select "Pr2" parameter and press SET
3. The "PAS" label will be shown, then "0 - - " with 0 blinking.
4. Insert "321" password through ▲ and ▼ keys, then press SET to confirm.

### 7.6 TO MODIFY THE PARAMETERS VALUE



To change the parameter's value operate as follows:
1. Enter the Programming mode by pressing the Set and ▼ key for about 3s.
2. Select the required parameter.
3. Press the "**SET**" key to display its value
4. Use ▲ or ▼ to change its value.
5. Press "**SET**" to store the new value and move to the following parameter.

To exit: Press **SET** + ▲ or wait 30s without pressing a key.
**NOTE**: the set value is stored even when the procedure is exited by waiting the time-out to expire.

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## 8. PARAMETER LIST

**NOTE:** All pressure parameters are relatives or absolutes depending on PrM parameter.
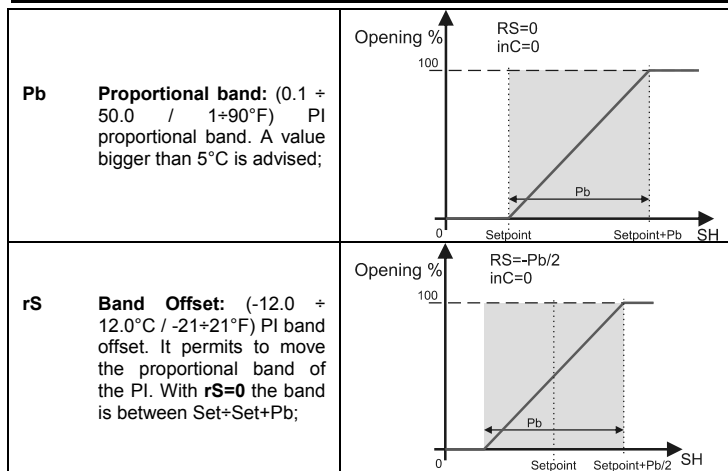
### REGULATION

**FtY**    **Kind of gas (**R22, 134, 404, 407, 410, 507,CO2): Type of gas used by plant. **Fundamental parameter for correct functioning of all system**.

**PEO**    **Probe Error opening percentage:** (0÷100%) if a temporary probe error occurs, valve opening percentage is **PEo** until **PEd** time is elapsed. If PEO is different from 0 it assures cooling also with probe error, because even if the device cannot calculate superheat the valve can work at PEO percentage.

**PEd**    **Probe Error delay before stopping regulation:** (0÷239 sec. – 240=On=unlimited) if probe error duration is bigger than **PEd** valve closes completely. **Pf** message is showed. If **PEd=On** valve opening is **PEo** until probe error finishes;

**tEU**    **Type of Stepper motor:** (uP- bP) it permits to select the kind of valve. **uP=** 5-6 wires unipolar valves; **bP=** 4 wires bipolar valves; **!!!!! WARNING !!!!!** by changing this parameter the valve has to be reinitialized.

**tEP**    **Predefined valve selection:** (0÷10) if **tEP=0** the user has to modify all the parameters of configuration in order to use the valve. If **tEP is different from 0** the device performs a fast configuration of the following parameters: **LSt, uSt, Sr, CPP, CHd**. To select the right number please read the following table:

| tEP | Model | LSt (steps*10) | uSt (steps*10) | CPP (mA*10) | CHd (mA*10) | Sr (step/s) |
|---|---|---|---|---|---|---|
| **0** | **Manual settings** | Par | Par | Par | Par | Par |
| 1 | Sporlan SEI 0.5-20 | 10 | 159 | 20 | 5 | 200 |
| 2 | Sporlan SEI 30 | 20 | 319 | 20 | 5 | 200 |
| 3 | Sporlan SEH 50-250 | 40 | 638 | 20 | 5 | 200 |
| 4 | Alco EX5-EX6 | 10 | 75 | 40 | 10 | 450 |
| 5 | Alco EX7 | 25 | 160 | 75 | 25 | 330 |
| 6 | Alco EX8 330 step/s | 25 | 260 | 80 | 50 | 330 |
| 7 | Alco EX8 500 step/s | 25 | 260 | 80 | 50 | 500 |
| 8 | Danfoss ETS-25/50 | 20 | 262 | 14 | 8 | 120 |
| 9 | Danfoss ETS-100 | 30 | 353 | 14 | 8 | 120 |
| 10 | Danfoss ETS-250/400 | 35 | 381 | 14 | 8 | 120 |

If **tEP is different from 0** previous configuration of **LSt,uSt,Sr,CPP and CHd** are overwritten.

**LSt**    **Minimum number of steps:** (0 ÷ USt) It permits to select the minimum number of steps. At this number of steps the valve should be closed. So it's necessary the reading of manufacturer datasheet to set correctly this parameter. It's the minimum number of steps to stay in advised range of functioning; **!!!!! WARNING !!!!!** by changing this parameter the valve has to be reinitialized. The device perform this procedure automatically and restart its normal functioning when the programming mode ends;

**USt**    **Maximum number of steps:** (LSt÷800*10) It permits to select the maximum number of steps. At this number of steps the valve should be completely opened. Read the datasheet provided by manufacturer of the valve to set correctly this parameter. It's the maximum number of steps to stay in advised range of functioning; **!!!!! WARNING !!!!!** by changing this parameter the valve has to be reinitialized. The device perform this procedure automatically and restart its normal functioning when the programming mode ends;

**Sr**    **Step rate** (10÷600 step/sec) it's the maximum speed to change step without losing precision (=losing steps). It's advised to stay under the maximum speed;

**CPP**    **Current per phase (only bipolar valves):** (0÷100*10mA) it's the maximum current per phase used to drive valve. It's used **only with bipolar valves**

**CHd**    **Holding current per phase (only bipolar valves):** (0÷100*10mA) it's the current per phase when the valve is stopped for more than 4 minutes. It's used **only with bipolar valves**

**OPE**    **Start opening Percentage:** (0÷100%) Opening valve percentage when start function is active and during post defrost phase. This phase duration is **SFd** time;

**SFd**    **Start Function duration: (0.0÷42.0 min: tens of seconds)** It sets start function duration and post-defrost duration. **During this phase the alarms are neglected**

**Sti**    **Stop regulation interval: (0.0÷24.0 hours: tens of minutes)** after regulating continuously for **Sti** time, the valve closes for **Std** time in order to prevent ice creation.

**Std**    **Stop duration:** (0÷60 min.) it defines stop regulation time after **Sti**. During this stop display shows **StP** message

**MnF**    **Maximum opening percentage at normal Functioning:** (0÷100%) during regulation it sets the maximum valve opening percentage.

**FoP**    **Forced Opening percentage**: **(0÷100 - nu)** if FoP=nu valve works with regulation algorithm. If **Fop is different from nu** the valve stays at Fop opening percentage. This function could be useful during plant starting or during service operations.

### PI PARAMETERS (trained staff)

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**Keys legend (top right):**

| | |
|---|---|
| **SET** | To display and to modify the set point. In programming mode it selects a parameter or it confirms a value. |
| ▲ | By pressing and releasing this key, it's possible to see the values of the probes. In programming mode it slides the codes of the parameters or it increases their values. |
| ▼ | In programming mode it slides the codes of parameters or it decreases their values. |

**KEYS COMBINATIONS**

▼ + ▲    To lock or to unlock the keyboard

**SET** + ▼    To enter programming mode.

| | | |
|---|---|---|
| **Pb** | **Proportional band:** (0.1 ÷ 50.0 / 1÷90°F) PI proportional band. A value bigger than 5°C is advised; | Opening % — RS=0 inC=0 — graph with axes Opening % (0–100) vs SH, showing Pb between Setpoint and Setpoint+Pb |
| **rS** | **Band Offset:** (-12.0 ÷ 12.0°C / -21÷21°F) PI band offset. It permits to move the proportional band of the PI. With **rS=0** the band is between Set÷Set+Pb; | Opening % — RS=-Pb/2 inC=0 — graph showing Pb between Setpoint and Setpoint+Pb/2 |

**inC**     **Integration time:** (0 ÷ 255s) PI integration time

## PROBE PARAMETERS

**tPP**    **type of Pressure transducer: (420 – 5V – LAn)** it sets type of pressure transducer to use: **420=** 4÷20mA pressure transducer; **5V=** 0÷5V ratiometric transducer, **LAn=** the pressure signal comes from another XEV module.

**LPP**    **Enable pressure probe sending in LAN:** (n÷Y) if **LPP=Y** the value of pressure read by device is sent in LAN. **Only one device of the LAN can have LPP=Y**

**PA4**    **Probe value At 4mA or At 0V:** (-1.0 ÷ P20 bar / -14 ÷ PSI) pressure value measured by probe at 4mA or at 0V (related to PrM parameter)

**P20**    **Probe value 20mA or At 5V:** (PA4 ÷ 50.0 bar / 725 psi) pressure value measured by probe at 20mA or at 5V (related to PrM parameter)

**oPr**    **Pressure probe calibration:** (-12.0 ÷ 12.0 bar / -174÷174 psi)

**ttE**    **type of tEmperature probe:** (PtM ÷ Ntc) it allows to set the kind of probe used by the instrument: **PtM =** Pt1000, **ntC =** NTC probe.

**otE**    **Temperature probe calibration:** (-12.0 ÷ 12.0 °C / -21÷21 °F)

## DIGITAL INPUTS

**i1P**    **Digital Input 1 (Free of voltage) digital input polarity:** (cL,OP) **CL=** activated when closed; **OP=** activated when opened

**i1F**    **Digital Input 1 (Free of voltage) digital input function:** (CCL, rL) **CCL=** cooling call; **rL=** digital input activates relay;

**d1d**    **Digital Input 1 (Free of voltage) activation delay:** (0÷255 min.) this activation delay is used only if digital input is configured as rL

**i2P**    **Digital Input 2 (High voltage) digital input polarity:** (CL,OP) **CL=** activated when closed; **OP=**activated when opened

**i2F**    **Digital Input 2 (High voltage) digital input function:** (CCL, rL) **CCL=** cooling call; **rL=** digital input activates relay;

**d2d**    **Digital Input 2 (High voltage) activation delay:** (0÷255 min.) this activation delay is used only if digital input is configured as rL

## ALARM

**dAO**    **Alarm delay after restarting regulation: (0.0÷42.0 min: tens of seconds)** time between digital input activation (configured as CCL) and alarm signalling. The LSH alarm is always signalled also during this time;

**tdA**    **Type of alarm signalled by relay:** (ALL, SH, PrE, di) **ALL=** all alarm; **SH=** superheat alarm; **PrE=** pressure alarm; **di=** activation only when digital input configured as **rL** is actived;

**LPL**    **Lower Pressure Limit for superheat regulation:** (PA4 ÷ P20 bar / psi ) when suction pressure comes down to LPL the regulation is performed with a LPL fixed value for pressure, when pressure comes back to LPL the normal pressure value is used. (related to PrM parameter)

**MOP**    **Maximum Operating Pressure threshold:** (PA4 ÷ P20 bar / psi) if suction pressure exceeds maximum operating pressure value, instrument signals situation with alarm LED **H**. (related to PrM parameter)

**LOP**    **Lowest Operating Pressure:** (PA4 ÷ P20 bar / psi) if the suction pressure comes down to this value a low pressure alarm is signalled with alarm LED **L**. (related to PrM parameter)

**PHy**    **Pressure alarm Hysteresis:** (0.1 ÷ 5.0 bar / 1÷ 72 PSI) alarm hysteresis to disable alarm signalling.

**dML**    **delta MOP-LOP:** (0 ÷ 100%) when a MOP alarm occurs valve will close of the dML percentage every one second until MOP alarm is active. When LOP occurs valve will open of the dML percentage every one second until LOP alarm is active.

**MSH**    **Maximum SuperHeat alarm:** (LSH÷32,0°C / LSH÷176°F) when superheat exceeds this value an high superheat alarm is signalled after interval **SHd**

**LSH**    **Lowest SuperHeat alarm:** (0.0÷MSH °C / 32÷MSH °F) when superheat goes down to this value a low superheat alarm is signalled after interval **SHd**

**SHy**    **SuperHeat alarm Hysteresis:** (0.0÷25.5°C / 1÷77°F) hysteresis for superheat alarm deactivation

**SHd**    **SuperHeat alarm activation delay:** (0÷255s) when a superheat alarm occurs, the time SHd have to pass before signalling alarm

**FrC**    **Fast-recovery Constant:** (0÷100s) permits to increase integral time when SH is below the set-point. If **FrC=0** fast recovery function is disabled.

## DISPLAY

**Lod**    **Local display:**(SH, PEr, P1, P2) **SH=** superheat; **PEr =** valve opening percentage; **P1=** value of temperature measured; **P2=** pressure measured by P2 probe.

**CF**    **Temperature measurement units:** (°C÷°F) **°C=** Celsius degree; **°F=** Fahrenheit degree; **ATTENTION:** by changing measurement unit, the regulation parameters have to be correctly changed

**PMu**    **Pressure Measurement units:** (bAr, PSI) **bAr=** bar; **PSI=** psi; **ATTENTION:** by changing measurement unit, the regulation parameters have to be correctly changed

**rES**    **Resolution (only °C):** (dE÷in)

**PrM**    **Pressure visualization Mode:** (rEL÷AbS) **rEL=** relative pressure; **AbS=** absolute pressure; **All pressure parameters depend on this parameter**

**CLP**    **CooLing Percentage (read only):** Display the percentage of time during which the cooling call was active in the time interval defined by **parameter CLt**

**tP1**    **temperature Probe value (read only):** it shows temperature probe value from P1

**PPr**    **Pressure probe value (read only):** it shows pressure probe value. The value depends on **PrM**.

**tP2**    **temperature from P2 (read only):** it shows temperature obtained from conversion of pressure value

**OPP**    **Opening Percentage (read only):** it shows the actual opening percentage of the valve;

**d1S**    **Free of voltage digital input State (read only):** it shows the free of voltage digital input;

**d2S**    **High voltage digital input State (read only):** it shows the high voltage digital input state;

**Adr**    **RS485 Serial Address:** (1÷247) Identifies the instrument address when connected to a ModBUS compatible monitoring system.

**Mod**    **ModBus:** (AdU÷StD) **AdU=** (Only for XWEB systems) in this case XEV and thermostatic controller are considered an alone instrument (it requires a custom library for XWEB); **StD=** to use XEV in stand-alone mode, in this case normal Modbus-RTU protocol is used;

**Ptb**    **Parameters map: (read only)** it identifies parameters map written by factory

**rEL**    **Release Firmware: (read only)** it shows firmware release

**Pr2**    **Second level menu**

## 9. DIGITAL INPUTS

The device is provided with two digital inputs. One is free of voltage and the other is at high voltage and both can be configured as cooling call. In this way the cooling signal can come from instruments with direct load outputs or via instruments with output without voltage. **One of these inputs must be configured as cooling call.**

## 10. FORCED OPENING

If necessary, by changing **FoP** parameter it's possible to force the valve opening. For example, by setting **FoP=50** the valve will be open at half of full scale. **To disable this function it's necessary to set FoP=nu** (default value). The valve opening is enabled only when CCL digital input is enabled.

## 11. ELECTRICAL CONNECTIONS

The instrument are provided with disconnectable screw terminal block to connect cables with a cross section up to 2,5 mm². Heat-resistant cables have to be used. Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

### 11.1 PROBES

Advised temperature probe placement is illustrated in figure nearby. Between 0 and 180 inclination degrees respect to horizontal pipe section. For suction pressure probe there aren't any particular prescriptions
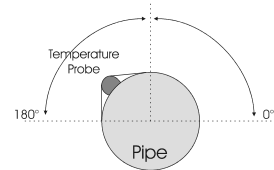
## 12. RS485 SERIAL LINE

All models can be connected to the monitoring and supervising system XWEB3000. If **Mod=Std** standard ModBUS-RTU protocol is used, if **Mod=AdU custom XWEB library is required**. This last configuration makes possible to use the same serial address of the thermostat that gives the cooling request to XEV. In this way, it's possible to reduce the number of addresses used.

## 13. HOW TO USE THE HOTKEY

### 13.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)

1) Program one controller with the front keypad.
2) When the controller is <u>ON</u>, insert the "Hot key" and push ▲ key; the **"uPL"** message appears followed a by flashing **"End"**
3) Push **"SET"** key and the **End** will stop flashing.
4) <u>Turn OFF</u> the instrument remove the **"Hot Key",** then turn it ON again.

**NOTE**: the "Err" message is displayed for failed programming. In this case push again ▲ key if you want to restart the upload again or remove the "**Hot key**" to abort the operation.

### 13.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

1) Turn OFF the instrument.
2) Insert a programmed "Hot Key" into the 5 PIN connector and then turn the Controller ON.

3) Automatically the parameter list of the **"Hot Key"** is downloaded into the Controller memory, the "**doL**" message is blinking followed a by flashing **"End"**.
4) After 10 seconds the instrument will restart working with the new parameters.
5) Remove the **"Hot Key"**.

**NOTE** the message "**Err**" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "**Hot key**" to abort the operation.

## 14. DISPLAY MESSAGES

| Mess. | Cause | Outputs |
|---|---|---|
| "nA" | None of digital inputs configured as CCL are activated | Valve closed |
| "Pf" | The PEd time is elapsed and the regulation is stopped | Valve closed after PEd. There is a probe error |
| "P1" | Temperature probe fault | according to **PEo** and **PEd** |
| "P2" | Pressure transducer fault | according to **PEo** and **PEd** |
| "HSH" | High superheat alarm | By PI |
| "LSH" | Low superheat alarm | Valve Closed |
| "LPL" | Low pressure limit | see **LPL** parameter |
| "MOP" | Maximum Operating Pressure | see **dML** parameter |
| "LOP" | Lowest Operating Pressure | see **dML** parameter |
| "StF" | Start Function enabled | see **SFd** parameter |
| "StP" | Regulation stop caused by Std and Sti | Valve closed |
| "EE" | Memory anomaly | |

### 14.1 ALARM RECOVERY

Probe alarms "**P1**", "**P2**" start few seconds after the fault in the probe; they automatically stop few seconds after the probe restarts normal operation. Check connections before replacing the probe. Max. and min. alarms "**HSH**" "**LSH**" "**MOP**" "**LOP**" automatically stop as soon as the variable returns to normal values.
The instrument is provided with an internal check verifying memory integrity. Alarm "**EE**" flashes when a failure in the internal memory is detected. In such case call the service.

## 15. TECHNICAL DATA

**Housing:** self extinguishing ABS.
**Case:** 4 DIN modules 70x135mm with male and female connectors; depth 60mm;
**Mounting:** DIN RAIL mounted in a omega (3) din rail
**Protection**: IP20.
**Connections:** disconnectable Screw terminal block ≤ 2,5 mm² wiring.
**Power supply:** 24Vac/dc ±10%;
**Power absorption: depending on connected valve** 20VA max
**Display**: three digits with icons, red LEDs, height 14,2 mm.
**Inputs**: 1 temperature probe Pt1000 or NTC;
1 pressure transducer 4÷20mA o 0÷5V;
**Digital inputs:** 1 free of voltage
1 at High voltage
**Outputs for valve:** bipolar or unipolare valves
**Data storage:** on the non-volatile memory (EEPROM).
**Kind of action:** 1B; **Pollution grade:** normal; S**oftware Class: A**
**Operating temperature:** 0÷60°C; **Storage temperature:** -25÷60 °C.
**Relative humidity:** 20÷85% (no condensing)
**Resolution:** 0,1 °C or 1 °F; **Precision a 25°C**:: ±0,7 °C ±1 digit

## 16. STANDARD VALUES

| Label | Description | Range | Default | Level |
|---|---|---|---|---|
| FtY | Kind of gas | R22 , 134 , 404, 407, 410, 507, CO2 | 404 | Pr2 |
| PEo | Probe Error opening percentage | 0 ÷ 100 % | 50 | Pr2 |
| PEd | Probe Error delay before stopping regulation | 0 ÷ 239 s - On | On | Pr2 |
| tEU | Type of Stepper motor | uP – bP | bP | Pr2 |
| tEP | Automatic Valve configuration | 0÷10 | 1 | Pr2 |
| LSt | Minimum number of steps | 0 – Ust | See tEP | Pr2 |
| USt | Maximum number of steps | LSt – 800*10 | See tEP | Pr2 |
| Sr | Step rate | 10 ÷ 600 step/s | See tEP | Pr2 |
| CPP | Current per phase (only bipolar valves) | 0 ÷ 100 *10mA | See tEP | Pr2 |
| CHd | Holding current per phase (only bipolar valves) | 0 ÷ 100 *10mA | See tEP | Pr2 |
| OPE | Start opening Percentage | 0 ÷ 100 % | 85 | Pr2 |
| SFd | Start Function duration | **0.0÷42.0 minutes: tens of seconds** | **1.3** | Pr2 |
| Sti | Stop regulation interval | **0.0÷24.0 hours: tens of minutes** | **0** | Pr2 |
| Std | Stop duration | 0 ÷ 60 min. | 0 | Pr2 |
| MnF | Maximum opening percentage | 0 ÷ 100 % | 100 | Pr2 |
| FOP | Forced Opening time-out | 0 ÷ 100 % - nu | **nu** | Pr2 |
| **PI PARAMETERS (trained staff)** | | | | |
| Pb | Proportional band | 0.1 ÷ 50.0 °C / 1÷90 °F | 10.0 | Pr2 |

| Label | Description | Range | Default | Level |
|---|---|---|---|---|
| rS | Band Offset | -12.0 ÷ 12.0 °C / -21 ÷ 21°F | 0.0 | Pr2 |
| inC | Integration time | 0 ÷ 255 s | 120 | Pr2 |
| **PROBE PARAMETERS** | | | | |
| tPP | Type of pressure transducer | 420 - 5V- LAn | 420 | Pr2 |
| LPP | Enable pressure probe sending in LAN | n ÷ Y | n | Pr2 |
| PA4 | Probe value at 4mA or at 0V (related to PrM parameter) | -1.0 bar / -14 PSI | -0.5 | Pr2 |
| P20 | Probe value at 20mA or at 5V (related to PrM parameter) | PA4 ÷ 50.0 bar / 725 PSI | 11.0 | Pr2 |
| oPr | Pressure probe calibration | -12.0 ÷ 12.0 bar / -174 ÷ 174 psi | 0 | Pr2 |
| ttE | type of temperature probe | PtM ÷ ntc | PtM | Pr2 |
| otE | Temperature probe calibration | -12.0 ÷ 12.0 °C / -21 ÷ 21 °F | 0 | Pr2 |
| **DIGITAL INPUTS** | | | | |
| i1P | Free of voltage digital input polarity | cL – OP | CL | Pr2 |
| i1F | Free of voltage digital input function | CCL , rL | CCL | Pr2 |
| d1d | Digital input 1 (free of voltage) activation delay | 0 ÷ 255 min. | 0 | Pr2 |
| i2P | Main voltage digital input polarity | cL – OP | CL | Pr2 |
| i2F | Main voltage digital input function | CCL , rL | CCL | Pr2 |
| d2d | Digital input 2 (Main voltage) activation delay | 0 ÷ 255min. | 0 | Pr2 |
| **ALARMS** | | | | |
| dAO | Alarm delay after restarting regulation | **0.0÷42.0 min: tens of seconds** | **10.0** | Pr2 |
| tdA | Type of alarm signalled by relay | ALL, SH, PrE, DI | ALL | Pr2 |
| LPL | Lower pressure limit for superheat regulation (related to PrM parameter) | PA4 ÷ P20 bar / PSI | -0.5 | Pr2 |
| MOP | Maximum operating pressure threshold (related to PrM parameter) | PA4 ÷ P20 bar / PSI | 11.0 | Pr2 |
| LOP | Minimum suction pressure limit (related to PrM parameter) | PA4 ÷ P20 bar / PSI | -0.5 | Pr2 |
| PHy | Pressure alarm Hysteresis | 0.1 ÷ 5.0 bar / 1÷ 72 PSI | 0.1 | Pr2 |
| dML | delta MOP-LOP | 0 ÷ 100% | 30 | Pr2 |
| MSH | Maximum superheat alarm | LSH ÷ 32.0 °C / LSH ÷ 176 °F | 80.0 | Pr1 |
| LSH | Lowest superheat alarm | 0.0 ÷ MSH °C / 32 ÷ MSH °F | 2.5 | Pr1 |
| SHy | Superheat hysteresis | 0.1 ÷ 25.5 °C / 1 ÷77°F | 0.1 | Pr2 |
| SHd | Superheat alarm activation delay | 0 ÷ 255 s | 120 | Pr1 |
| FrC | Fast-Recovery Constant | 0÷100 s | 50 | Pr2 |
| **DISPLAY** | | | | |
| Lod | Local display | SH - PEr – P1 - P2 | SH | Pr1 |
| CF | Temperature measurement units | °C - °F | °C | Pr2 |
| PMu | Pressure measurement unit | bAr – PSI | bAr | Pr2 |
| rES | Resolution (only °C) | dE – in | dE | Pr2 |
| PrM | Type of pressure (Absolute / relative) | rEL – AbS | rEL | Pr2 |
| CLP | Cooling call percentage | Read only | - - - | Pr2 |
| tP1 | Temperature probe value | Read only | - -- | Pr1 |
| PPr | Pressure probe value | Read only | - - - | Pr1 |
| tP2 | Temperature converted from pressure probe | Read only | - - - | Pr1 |
| OPP | Acutal Opening percentage | Read only | - - - | Pr1 |
| d1S | Free of voltage digital input state | Read only | - - - | Pr1 |
| d2S | Main voltage digital input state | Read only | - - - | Pr1 |
| Adr | Serial address | 1÷247 | 1 | Pr2 |
| Mod | Modbus type | Std – AdU | StD | Pr2 |
| Ptb | Parameters map | - - - | - - - | Pr2 |
| rEL | Release software | - - - | - - - | Pr2 |
| Pr2 | Second level menu | - - - | - - - | Pr1 |