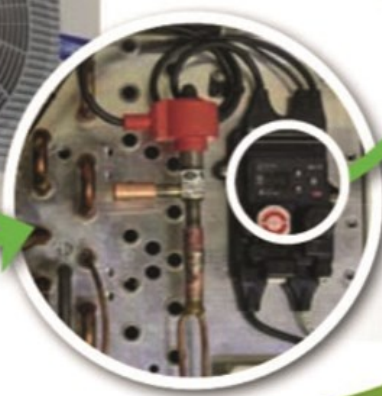


# EVD ICE Superheat Control

*Quick Set – Up, Programming and Operating Instructions For Lu-Ve  
“PLUG & SAVE EEV CONTROLLER”*

Display for  
setting working  
parameters.

The direct expansion unit coolers are available  
with electronic valve and electronic control unit  
already fitted and wired up (see Refriger<sup>®</sup>).



Electronic direct  
expansion valve and  
electronic control unit.



THE COMPLETE CAREL PRODUCT USER  
MANUAL IS AVAILABLE FOR DOWNLOAD AT

[www.carel.com](http://www.carel.com)



**LU-VE**<sup>®</sup>  
*exchangers*



**WARNING SYMBOLS AND THEIR MEANING**



**Hand Injury Possible**



**Forklift Traffic**



**Electricity**



**Toxic Substances**



**Hot Surfaces**



**Automatic Start**



**Overhead Load**



**Sharp Element**

**MANDATORY SIGNS AND THEIR MEANING**



**Hand Protection Required**



**Eye Protection Required**



**Ear Protection Required**



**Check Guard**



**Protective Clothing Required**



**Hard Hat Area**



**Use Safety Footwear**



**Connect To Earth Ground**



**Activate Before Work**

**OTHER SIGNS AND THEIR MEANING**



**No Fire, Open Flame or Smoking**



**This is only a "Right To Know" law in the state of CA. It does not mean that Lu-ve products contain any substance or materials that may cause cancer or reproductive harm**

## QUICK SET - UP, PROGRAMMING & OPERATING INSTRUCTIONS

### OVERVIEW

#### WARNINGS

**Only qualified personnel should install or carry out technical service on the product!**

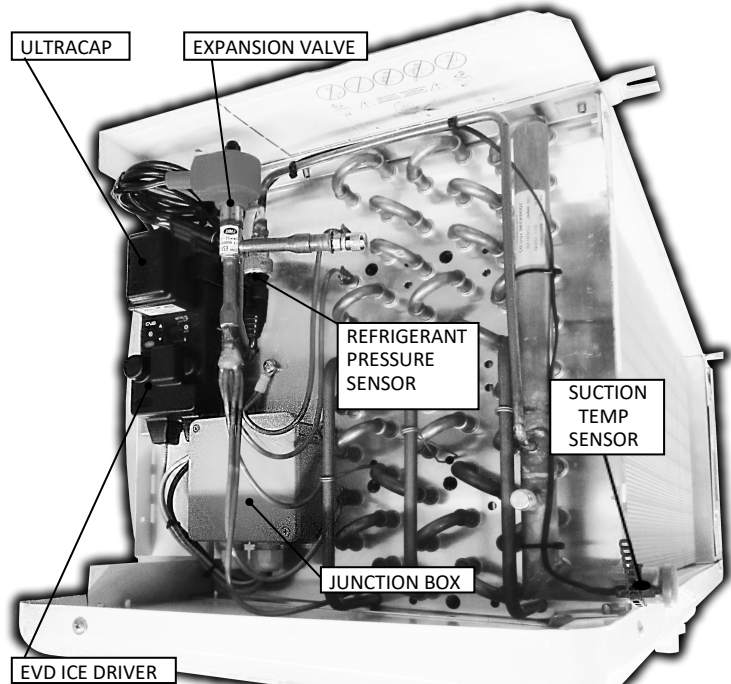
The customer must only use the product in the manner described in the documentation relating to the product.

In addition to observing any further warnings described in this manual the following warnings must be heeded:

- Prevent the electronic circuits from getting wet. Rain, humidity and all types of liquids or condensate contain corrosive minerals that may damage the electronic circuits. The product must only be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not install the device in particularly hot environments. High temperatures may reduce the life of electronic devices, damage them and deform or melt the plastic parts. The product must only be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not attempt to open the device in any way other than as described in the manual.
- Do not drop, hit or shake the device as the internal circuits and mechanisms may be irreparably damaged.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the device.
- Do not use the product for applications other than those specified in the manual.

All of the above stipulations apply to the controller, serial boards, programming keys or any other connected components or accessories.

#### SYSTEM COMPONENTS



#### INSTALLATION ENVIRONMENT

**IMPORTANT! Avoid installing the driver in environments with any of the following characteristics;**

- Strong vibrations or excessive movement / shaking.
- Exposure to aggressive or polluting atmospheres (ex., sulphur or ammonia fumes, salt mist, smoke) to avoid corrosion and/or oxidation.
- Strong magnetic and/or radio frequency interference (avoid installing the device near any transmitting antenna).
- Exposure of the driver to direct sunlight and to outdoor elements in general.

**IMPORTANT! The following warnings must be observed when connecting the driver;**

- If the driver is used in a way that is not specified in this user manual warranty coverage cannot be guaranteed.
- Incorrect power wiring connections may seriously damage the driver.
- Separate as much as possible (at least 1-3/16") the temperature sensor, pressure transducer and EEV lead wires from electrical wiring / loads to avoid any possible electromagnetic disturbances. Never run power wiring and sensor / valve lead wires in the same conduit.
- Do not run sensor / valve lead wires in the immediate vicinity of power devices (contactors, circuit breakers, etc.).
- Keep all sensor lead wires as short as possible and avoid wrapping leads around power wiring or other power devices (see above).
- EVD ice is a controller to be incorporated into the final equipment - it must not be remote / wall-mounted.
- DIN VDE 0100: Protective separation must be guaranteed between the SELV circuits (Safety Extra Low Voltage) and the other circuits. The requirements of DIN VDE 0100 must be complied with. To prevent disruption of the protective separation (between the SELV circuits and the other circuits) ensure additional fastening near the terminations. This additional fastening must secure the shielded cable and not the wires themselves.

# DRIVER AND UNIPOLAR ELECTRONIC EXPANSION VALVE

## DESCRIPTION

The EVD ice driver for EEV's with a unipolar stepper motor is a PID controller that efficiently manages the superheat of the refrigerant at the evaporator coil outlet. It allows considerable system flexibility since it is compatible with multiple refrigerants and temperature ranges. It features low superheat protection (LowSH) as well as high evaporator pressure (MOP) and low evaporator pressure (LOP) alarm functions.

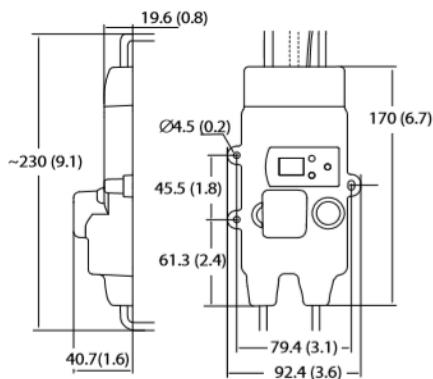
The LED display and keypad can be used for simple programming of the controller at start up. Only (3) initial operating inputs are required to start the system;

- ◆ Refrigerant Type
- ◆ Design Room Temp
- ◆ Superheat Set Point

The plastic casing with resin coating ensures IP67 protection, as well as protecting the controller against the cold, humid environment inside the cooler / freezer. The driver can also be configured from a computer using the CAREL VPM software (Visual Parameter Manager) which is available at <http://ksa.carel.com>. The driver can be connected to a CAREL pCO series controller via serial link to a CAREL supervisor or to the cold room control Ultracella.



## DIMENSIONS (MM / IN)



CABLE TYPE	LENGTH
Supply	19-11/16"
RS485	19-11/16"
Pressure Transducer	31-1/2"
Temperature Sensor	70-7/8"
Electronic Expansion Valve	23-5/8"
Ultracap Module	3-15/16"

## UNIPOLAR VALVE BODY

A removable cap nut attached to a threaded stud on the top of the valve enclosing tube secures the unipolar stepper drive motor to the valve body so either the valve or stepper motor may be individually replaced.



For the applicable part numbers see the CAREL product catalog.

## ULTRACAP

The Ultracap module guarantees temporary power to the driver in the event of a loss of power to the unit - long enough to completely close the EEV. This eliminates the need to install a solenoid valve in the liquid line piping prior to the EEV.

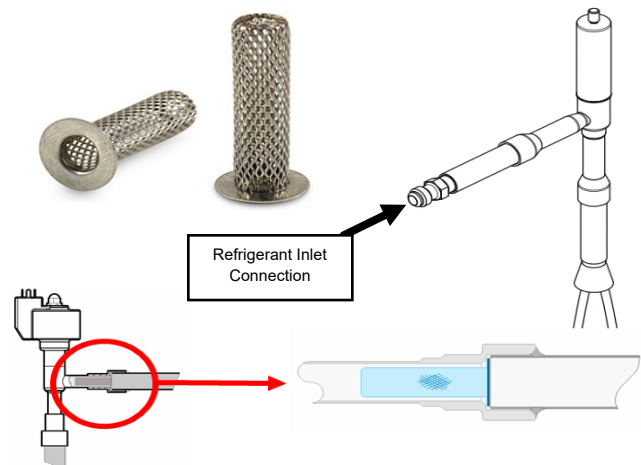
The module is constructed using Ultracap storage capacitors which ensure reliability in terms of much longer component life than a module constructed using lead acid batteries.



## INLET FILTER

The E2V electronic expansion valve is provided with a tubular, 304 stainless steel inlet filter / screen that prevents system contaminants from entering the valve which could potentially damage the valve or negatively impact its operation.

This filter is not field accessible once the valve has been installed in the unit so it is extremely important that, should it become necessary to replace the valve, the installer use a nitrogen purge during brazing of all field piping and install a filter drier in the liquid line upstream of the EEV to ensure an internally clean system and trouble free valve operation.



## RATIOMETRIC PRESSURE TRANSDUCER

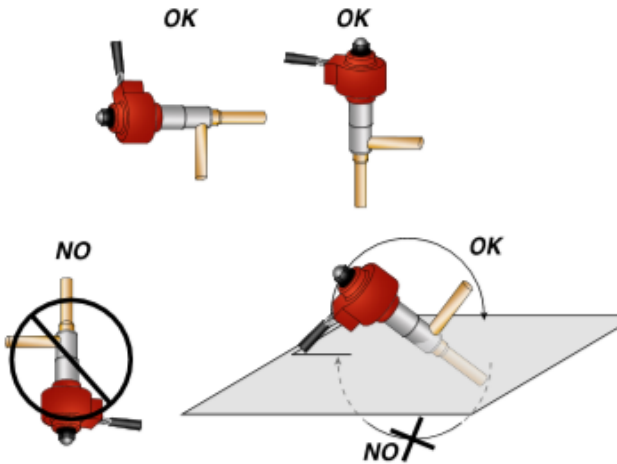
The suction pressure transducer which is provided as standard with the assembly has an operating range from -14.5" vacuum to 134.9 PSIG. The maximum over-pressure rating of this transducer is 430 PSIG. The transducer incorporates an internal depressor which activates the Shrader valve core stem when properly torqued onto the valve, allowing for easy removal in the field. Should replacement become necessary the transducer is listed under Carel part number SPKT0013P0.



# UNIPOLAR ELECTRONIC EXPANSION VALVE

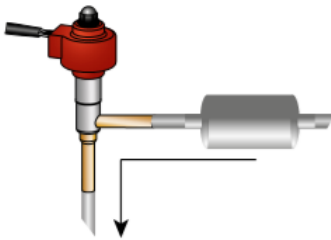
## POSITIONING THE VALVE BODY

**Important:** The valve must never be installed with the valve body below the horizontal plane or upside-down with the stator on the bottom of the valve.



## INSTALLING THE VALVE

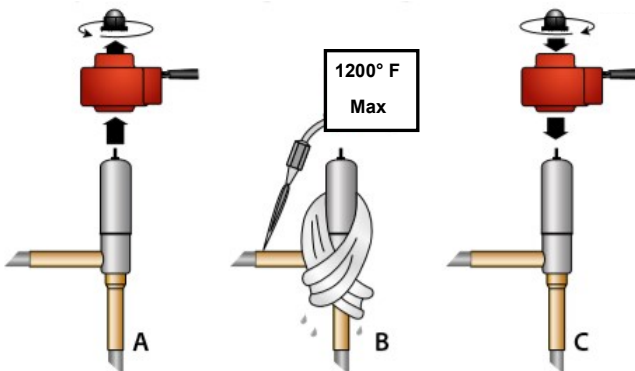
The recommended direction of refrigerant flow / valve connection is to use the side fitting as the inlet connection.



The E2V unipolar valve has copper connections for easier field brazing. Follow these steps - with reference to the diagram (below);

- Unscrew the cap nut which holds the stator / coil to the valve body and lift the coil straight off the valve body.
- Wrap the valve body with a wet cloth or apply thermal paste to prevent overheating the valve.
- After the valve body / connections have cooled, reinstall the stator / coil onto the valve body and tighten the cap nut.

**Note:** A tubular, stainless steel inlet filter is pre-installed in the side / inlet connection of the valve to prevent the entrance of contaminants into the valve body.



## GENERAL WARNINGS

**Always observe the following warnings!**

- Prevent water or any other foreign materials / fluids from entering the valve as this would make it impossible to completely clean the internal valve parts.
- It is preferable to use the side fitting of the valve for the refrigerant inlet connection as this position will help force the valve closed in the event of power failure.
- Do not install the valve with the stator facing down.
- Install a filter / drier upstream of the valve inlet.
- Install a sight glass upstream of the valve inlet to verify that a full column of refrigerant is flowing to the valve during operation.
- Remove the stator from the valve body before brazing.
- Before welding connections, wrap the valve body with a wet cloth or apply thermal paste before welding.
- Never point the torch flame directly at the valve body.
- Never exert any twisting or straining directly of the valve body or any of the field piping connected to the valve.
- Do not exert excessive pressure or force on the stator when attaching it to the valve body to avoid deforming the plastic cap on the bottom of the stator.
- Do not hit the valve with hammers or other tools nor drop the valve.
- Do not use pliers or other tools that may deform the valve body or damage internal parts.
- Never place the valve near magnets and/or magnetic fields.
- Take extreme care to ensure that no impurities enter the refrigeration circuit.
- Do not install or use the valve if there is a deformation or damage to any visible parts (outer cap and connections).
- Do not install following strong impact, for example after dropping the valve.
- Do not install or use if the stator (winding), cable or any of the connectors are damaged.



## VALVE PART NUMBERS / CONNECTIONS

PART #	DESCRIPTION	CONN
31054155	VALVOLA E2V 05 BWB-C-1 (UL)	3/8" / 1/2"
31053606	VALVOLA E2V 09 BWB-C-1 (UL)	3/8" / 1/2"
31053608	VALVOLA E2V 11 BWB-C-1 (UL)	3/8" / 1/2"
31053610	VALVOLA E2V 14 BWB-C-1 (UL)	3/8" / 1/2"
31053612	VALVOLA E2V 18 BWB-C-1 (UL)	3/8" / 1/2"
31054157	VALVOLA E2V 24 BWB-C-1 (UL)	3/8" / 1/2"

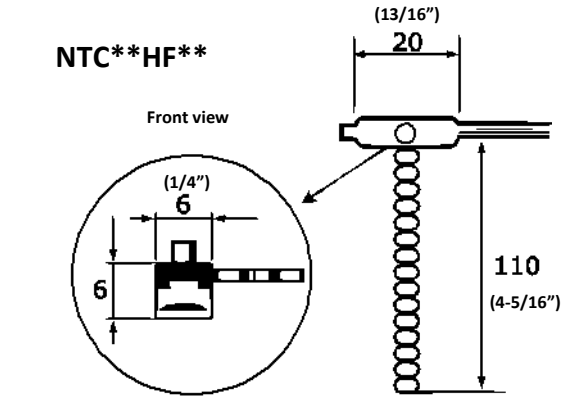
# TEMPERATURE SENSOR FOR DRIVER AND UNIPOLAR ELECTRONIC EXPANSION VALVE

## POSITIONING THE TEMPERATURE PROBE

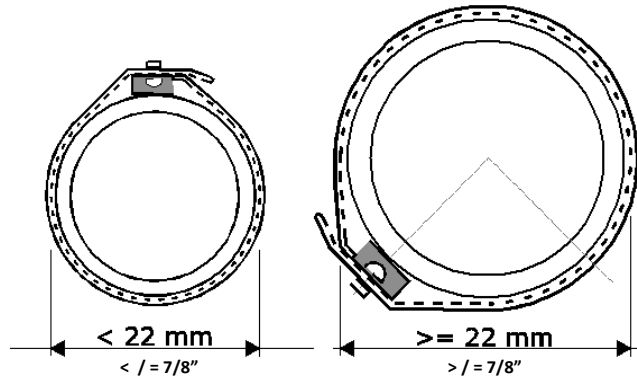
To measure the operating superheat the driver uses (2) sensor inputs; one which measures the suction line temperature and the other which measures the suction pressure of the refrigerant as it exits the evaporator coil. The pressure transducer is factory mounted to a 1/4" Schrader fitting directly attached to the suction header of the coil while the temperature sensor must be mounted at the point of installation.

**IMPORTANT! The suction temperature probe must be physically removed from the suction pipe connection stub during brazing of the field pipe connections - then re-installed and insulated after the tubing has sufficiently cooled. Failure to do this will damage the sensor, potentially resulting in damage to other system components and voiding the product warranty coverage!**

The position of this probe is extremely important as it determines the accuracy of the superheat value and the speed / response time to any fluctuations / variations. The probe should be installed on or immediately after the unit cooler outlet connection stub in a straight and horizontal section of tubing. Comparing the cross section of the suction tubing to the face of a clock the probe must be positioned at 12:00 for tubing with a diameter up to 7/8" O.D and at 4:30 or 7:30 for tubing with a diameter greater than or equal to 7/8" O.D..



Contact zone in thermoplastic rubber

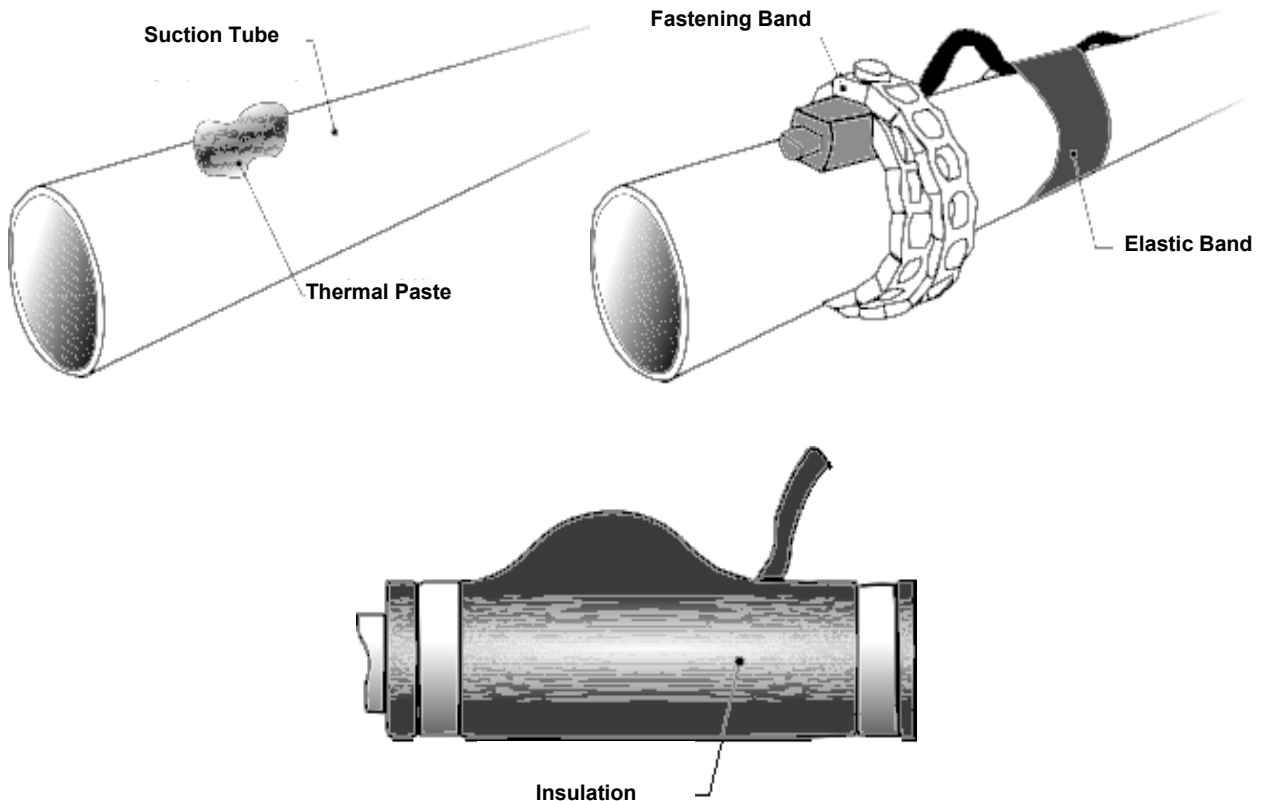


All precautions must be taken to ensure good thermal contact between the copper suction tubing and the temperature sensor. Apply conductive thermal paste on the point of contact between the probe and the pipe and securely fasten the probe to the pipe with the fastening band / clamp provided (included with the NTC\*\*HF\*\*).

The sensor cable must be looped upwards in the immediate vicinity of the temperature probe and then secured to the suction tube by an elastic band or strap. This will prevent expansion and contraction - which occurs with any significant variations in temperature (such as during the defrost cycle) from damaging the cable connection to the sensor.

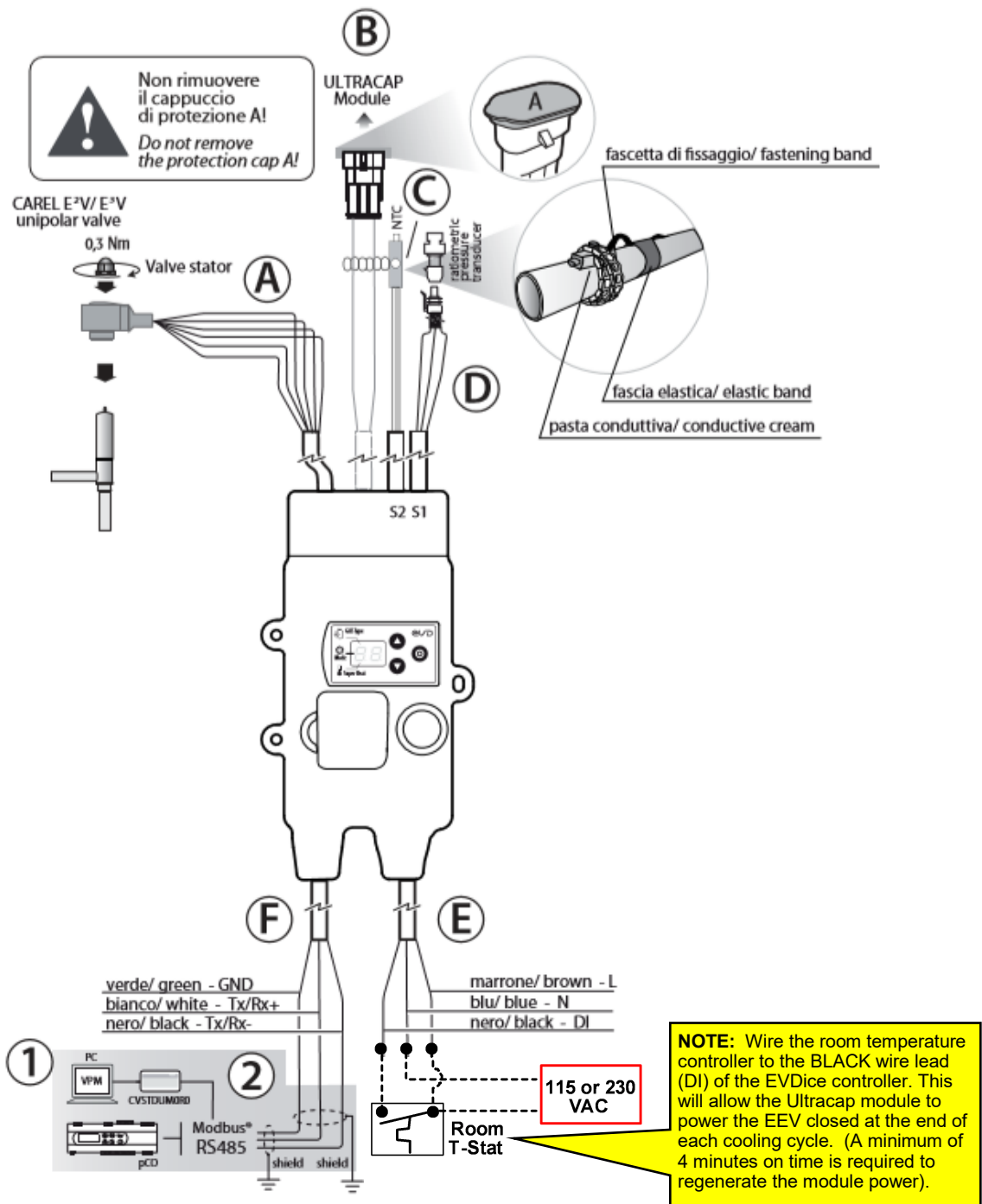
Finally, the temperature sensor / probe assembly should be covered with aluminum tape, then wrapped with insulating material.

**No type of adhesive should be used since it could potentially damage the plastic material used to make the probe or the cable**



# DRIVER FOR UNIPOLAR ELECTRONIC EXPANSION VALVE

## WIRING CONNECTIONS / DESCRIPTIONS



REFERENCE	CABLE	DESCRIPTION
<b>A</b>	EEV	Unipolar Electronic Valve Connection
<b>B</b>	Ultracap	Ultracap Module Connection
<b>C</b>	Probe S2	NTC Temperature Probe
<b>D</b>	Probe S1	Ratiometric Pressure Probe
<b>E</b>	<b>Power Supply</b>	
	L - Brown	Line Voltage (L1) - 115 or 230 VAC
	N - Blue	Line Voltage (L2) - 115 or 230 VAC
	DI - Black	115 or 230 VAC Input To Enable Control
<b>F</b>	<b>Serial</b>	
	Tx/Rx + (White)	RS485 Connection
	Tx/Rx - (Black)	
GND (Green)		
<b>1</b>	-	Computer For Configuration
<b>2</b>	-	USB - RS485 Converter (For Computer)





# DRIVER FOR UNIPOLAR ELECTRONIC EXPANSION VALVE

## INITIAL START UP / PROGRAMMING

### ***IMPORTANT!***

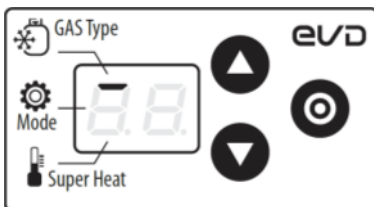
Until the initial start-up programming has been completed the controller will not regulate the expansion valve  
The system refrigerant type must be changed (if required) during the initial programming. The default setting is "3" (R-404A)

Upon initial power up of the controller the display will light up and the driver will "wait" for the initial programming input (indicated by hyphens or dashes on the display).

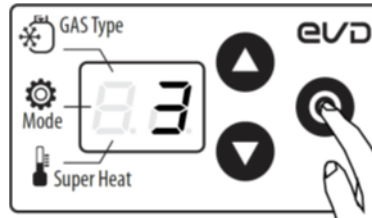
The pre-programmed default parameters are as follows;

- 1) Refrigerant Type; 3 (R-404A)
- 2) Type of Control; 1 (multiplexed showcase/cold room)
- 3) Superheat Set Point; 11K (-439.87° F)

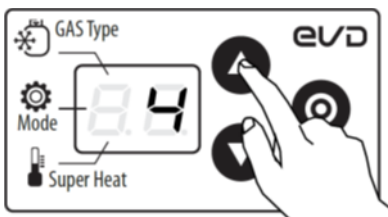
### PROGRAMMING PROCEDURE



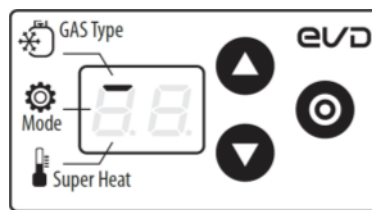
STEP 1 - The display shows the top bar: refrigerant (GAS Type)



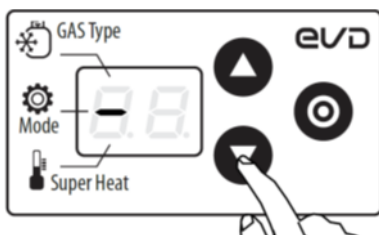
STEP 2 - Press PRG / Set: the refrigerant setting is shown



STEP 3 - Press UP / Down to change the value



STEP 4- Press PRG / Set to save and return to the refrigerant parameter code (bar at top).



STEP 5- Press DOWN to move to the next parameter (Mode is indicated by the bar in the middle of display)

Repeat steps 2, 3, 4 & 5 to set the values of the other parameters (Mode - superheat set point)



Press and hold PRG / Set for 2 seconds to exit commissioning procedure and activate expansion valve regulation. The display will return to standard visualization (current superheat is displayed)

### Gas Type (Refrigerant)

0				Default
1	R22	21	R245FA	3=R404A
2	R134a	22	R407F	
3	R404A	23	R32 (0...17.3 barg)	
4	R407C	24	HTR01	
5	R410A	25	HTR02	
6	R507A	26	R23	
7	R290	28	R1234ze (-1...4.2 barg)	
8	R600 (-1...4.2 barg)	29	R455A (-1...12.8 barg)	
9	R600a (-1...4.2 barg)	30	R170 (0...17.3 barg)	
10	R717	31	R442A (-1...12.8 barg)	
11	R744 (0...45 barg)	32	R447A (-1...12.8 barg)	
12	R728	33	R448A	
13	R1270	34	R449A	
14	R417A	35	R450A (-1...4.2 barg)	
15	R422D	36	R452A (-1...12.8 barg)	
16	R431A	37	R508B (-1...4.2 barg)	
17	R422A	38	R452B	
18	R423A	39	R513A (-1...4.2 barg)	
19	R407A	40	R454B	
20	R427A			

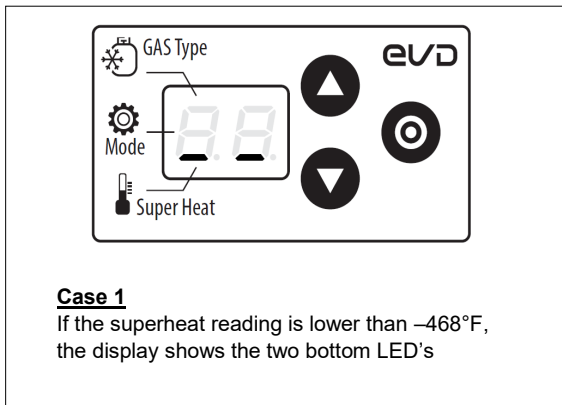
### Mode (Operating Mode)

		Default
1	Multiplexed cabinet/cold room	1
2	Air-conditioner/chiller with plate heat exchanger	
3	Air-conditioner/chiller with tube bundle heat exchanger	
4	Air-conditioner/chiller with finned coil heat exchanger	
5	Reserved	
6	Reserved	
7	Cabinet / cold room with subcritical (R744) CO2	

## DRIVER FOR UNIPOLAR ELECTRONIC EXPANSION VALVE

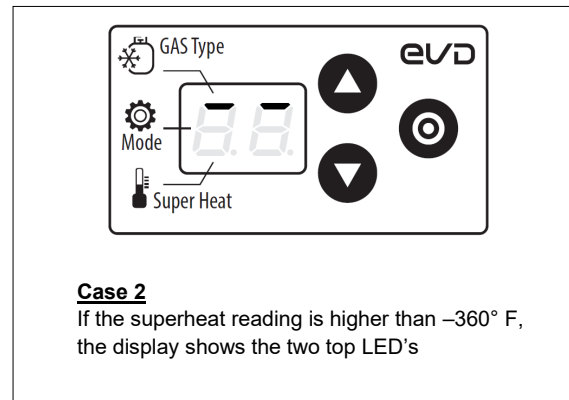
### MINIMUM AND MAXIMUM SUPERHEAT LIMITS

**If a probe alarm occurs it may be due to the superheat value exceeding the allowed display range (-5 to 55 K / -9 to 99° F). The display will show the probe alarm code (A1/A2) and will appear as noted below;**



**Case 1**

If the superheat reading is lower than -468°F, the display shows the two bottom LED's



**Case 2**

If the superheat reading is higher than -360° F, the display shows the two top LED's

### TECHNICAL SPECIFICATIONS

Power Supply	115 / 230 VAC (+10% / -15%) 50/60 Hz
Power Input (Max Watts)	15
Emergency Power Supply	13 Vdc +/-10% (If installed, the optional Ultracp Module for EVD ice)
Driver	Unipolar Driver
Valve Connection	6-wire cable AWG, 18/22 type, Lmax=1m
Digital Input Connection	Digital Input 230V, opto-isolated. Closing current; 10 mA, Lmax = 10m for residential / industrial environments, 2m for domestic environments
Probes	
S1 (Pressure)	Ratiometric pressure probe (0 - 5V); Resolution 0.1% fs Measurement error; 2% fs max / 1% typical
S2 (Temperature)	Low temperature NTC. 10kΩ @ 25°C; -50° to +90°C Measurement error; 1°C in the range -50° to +50°C; 3°C in the range +50° to +90°C
RS485 Serial Connection	Modbus, Lmax=500m, shielded cable, earth connection on both ends of shielded cable
Assembly	Screws
Dimensions	230 mm High X 93 mm Wide x 41 mm Deep
Operating Conditions	-30° to +40°C (Don't use EVDIS* lower than -20°C); <90% U.R. non-condensing
Storage Conditions	-35° to +60°C (Don't store EVDIS* lower than -30°C); humidity 90% U.R. non-condensing
Index of Protection	IP65 / IP67
Environmental Pollution	2
Temperature For Glow Wire Test	+850°C
Immunity Against Voltage Surges	Category II
Class of Insulation	II
Software Class and Structure	A
Conformity	Electrical safety; EN 60730-1, UL 60730-1, UL 60730-2-9 Electromagnetic compatibility; EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 55014-1, EN61000-3-3

***NOTE - For additional information, programming and complete technical specifications on the EVD ice controller go to [www.carel.com](http://www.carel.com) and download the complete instruction manual — User Manual "EVD ice" +0300038EN***



[www.luvegroup.com](http://www.luvegroup.com)

[www.zyklusHeatTansfer.com](http://www.zyklusHeatTansfer.com)

**USA Customer Service — Toll Free Number  
833-908-3355**

**For Replacement Parts and Equipment Orders  
[ordersusa@luvegroup.com](mailto:ordersusa@luvegroup.com)**

**For USA Equipment Sales  
[salesusa@luvegroup.com](mailto:salesusa@luvegroup.com)**

**Zyklus Heat Transfer Products, Inc  
PO Box 60 - Jacksonville, TX 75766**