EBV

Energy Balancing Control Valve

MOD.	DN	FLOW [m³/h]		PN	ΔP max [kPa]	POWER SUPPLY
		Q min	Q max			
EBV65	65	12	37	16	35-800	24 V AC/DC 230 V AC
EBV80	80	25	59			
EBV100	100	45	77			
EBV125	125	61	118			
EBV150	150	80	177			

APPLICATION AND USE

Energy balancing and control valve EBV is the ultimate solutions for heating groups and air handling units control.
It is able not only to control the flow but also to control the heat transfer and power consumption, this involeve energy efficiency needed in Building Automation industry.
The EBV system is able to measure the pressure difference between upstream and downstream of the valve and to maintain the correct flow despite pressure variations thus ensuring that the flow rate changes only when the energy demand changes or the ΔT is outside the specifications. Furthermore, it is also possible to control the thermal power transferred from the coil or limits the power consumption and estimate the energy consumption.

EBV integrates the following functionalities in a unique smart device:
- Pressure independent Control function with ΔT optimization;
- Energy consumption monitoring with BACnet MS/TP and Modbus RTU connectivity for a user friendly data analysis;
- Temperature monitoring ΔT and temperature – control and limit;
- Power control and limit;
- Diagnostic and monitoring available via USB or BACnet MS/TP and Modbus RTU.

EBV can work as Electronic Pressure Independent Control Valve (models without pressure sensors) selecting models without supply and return temperature sensors or it can be used as full thermal power control valve selecting models with supply and return temperature sensors.
Furthermore the energy monitoring capability as well as the diagnostic and condition monitoring functions facilitates work, save times as well as ensure comfort and increase energy efficiency in buildings.
EBV is also equipped with a USB port for local configuration and diagnostics. When USB cable is connected, the actuator cannot be controlled (BLDC motor is disabled).
In EBV is also possible change the model using DIP5 and iC Actuator Configurator (change also the valve model according to the EBV model selected).

OPERATING

The energy balancing and control valve EBV is composed by the following elements:
- high resolution actuator able to collect and elaborate all the data coming from sensors and the BMS (via Modbus/BACnet) in order to properly position the control valve;
- flanged Globe Valve with equipercentage control characteristic equipped with pressure sensor plugs;
- a couple of high resolution pressure sensors able to continuously monitor the valve differential pressure;
- a couple of NTC 10 kOhm temperature sensors with stainless steel cases able to continuously monitor the supply and return fluid temperature.

EBV can be controlled via:
- Network: BACnet MS/TP or Modbus RTU
- Analog Control signal: with selectable range of action 0-10 V DC (default), 2-10 V DC, 0-5/2-6 V DC, 5-10/6-10 V DC and 4-20 mA.

The command mode can be set via BACnet MS/TP, Modbus RTU, USB or via the DIP switches on the board.
All settings and configurations can be done over the RS485 network by the free of charge iC Actuator Configurator.

The performances stated in this sheet can be modified without any prior notice.

Modbus RTU registers and BACnet MS/TP objects description is available in the DMP310 manual.

TECHNICAL CHARACTERISTICS

ENVIRONMENTAL DATA		
Temperature rating, media		-10°C to 120°C (14°F to 248°F)
Working temp., environment		-10°C to 50°C (14°F to 122°F)
Protection	Actuator	IP54
	Temp. sensors	IP65
	Pressure sensors	IP65

ELECTRICAL DATA	
Supply voltage	24 V AC/DC, 230 V AC
Control signal	0-10 V DC, 2-10 V DC, 0-5 V DC, 2-6 V DC, 5-10 V DC, 6-10 V DC and 4-20 mA or 0-100% Modbus/BACnet control signal
Output signal	2-10 V DC (0-100%); max load 2 mA or 0-100% Modbus signal

HYDRAULIC DATA	DN65	DN80	DN100	DN125	DN150
Valve connections	Flanged PN16				
Fluids	Water, glycol-water mixture (50% max)				
Measuring principle	ΔP calculation and control of valve characteristic curve				
Accuracy *	±10%				
Min. flow measurement [l/h]	148	300	320	1070	2840
Min/Max flow rate range ** [l/h]	12000 / 37000	25000 / 59000	45000 / 77000	61000 / 118000	80000 / 177000
Leakage [l/h]	19	30	39	60	90
Max. close off pressure	800 kPa				
Max. operational ΔP	800 kPa				
Min. operational ΔP	35 kPa				
Allowable operating pressure	1600 kPa max				
Max consumption	21 VA / 11 W				
Transformer sizing	50 VA				
Standard	Emission/Immunity EMC 2014/30/UE according to EN 61326-1:2013 standard LVD 2014/35/UE according to EN61010-1 standard				

* Measurement tolerance may increase near the lower operating threshold.
** Qmin and Qmax refer to the Modbus 100% control signal or 10 V (0-10 V control signal).

PRESSURE SENSORS	
Type	Active sensors
Pressure Range	0 to 16 bar
Media Temp. Range	-15°C to 125°C (-5°F to 257°F)
Output signal	0-10 V DC
Power Supply	16 V DC (supplied from the actuator)
Valve connection	1/8”

TEMPERATURE SENSORS (EBVXX-XXX-XX1 models only)	
Type	NTC 10 kOhm (β @ 25° = 3435)
Type of signal	Resistance

TEMPERATURE SENSORS (EBVXX-XXX-XX1 models only)	
Accuracy	1%
Resolution	0.1°C
Temperature Range	-50°C to 110°C (-58°F to 230°F)

BMS Connectivity: Modbus RTU, BACnet MS/TP (slave)

FUNCTIONS AND SETTINGS

EBV electronic balancing control valve can offer the followings features

Calibration Function

EBV is equipped with an automatic calibration function. The plug & play function enables the calibration at the first start-up of the actuator and therefore no further calibration operations are required unless maintenance is required on the valve or particular alarm conditions occur. If it is necessary to repeat the calibration, it can be activated by pressing the S2 button on the electronic board or remotely via BACnet MS/TP or Modbus RTU or via USB with iC Actuator Configurator.

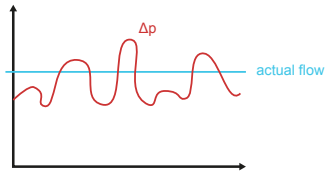
Direct/Reverse Action

In EBV is possible to define actuator position using type of action (Direct or Reverse).
EBV uses 2FGB.B valves that are closing Up valve.
Changing type of action change the relationship between BMS command, feedback and indicated flow rate as described in the table below.

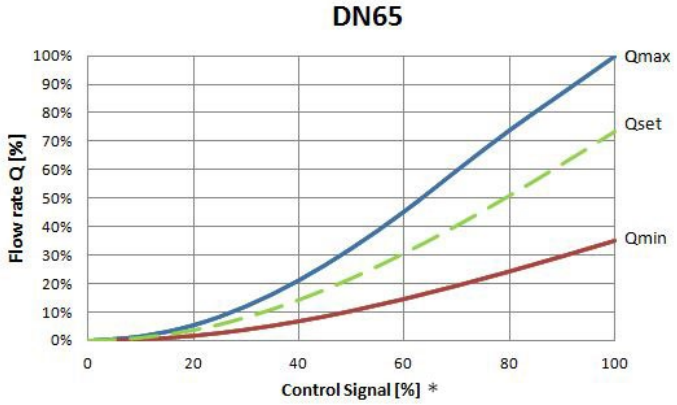
Type of action	Command	Actuator position	Feedback	Indicated flow	
Direct	0%	Up	0%	0%	
Direct	100%	Down	100%	Max	
Reverse	0%	Down	100%	Max	
Reverse	100%	Up	0%	0%	

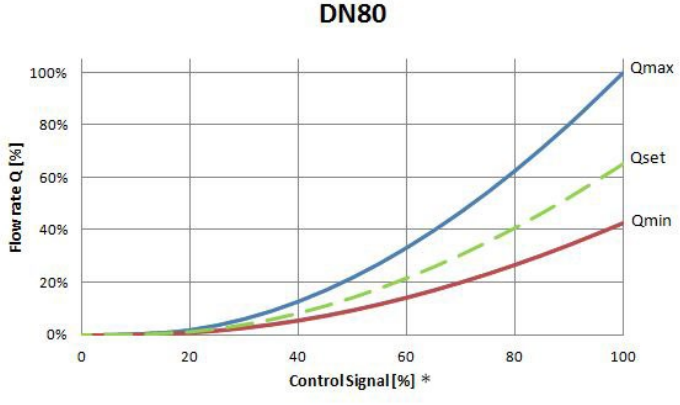
Pressure Independent Control Function

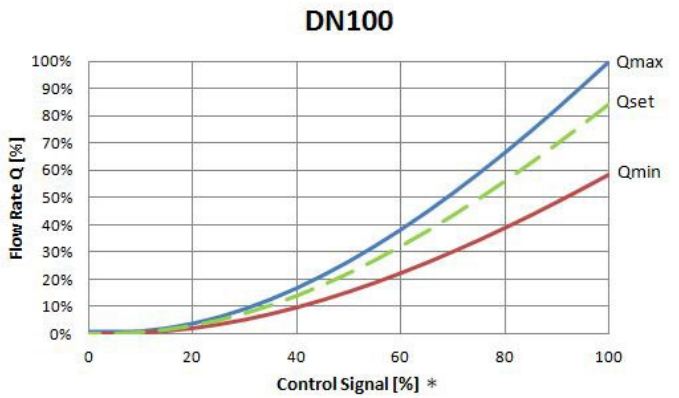
The control signal coming from the BMS is considered as the flow rate set point the BMS wants to deliver to the specific coil (e.g. Input 0 V Flow 0; Input 10 V: Flow: Qmax). The positioning algorithm set the stem position considering the valve characteristics and the current differential pressure across it. This function allows to control the flow delivered to the coil regardless the pressure fluctuations in the system.

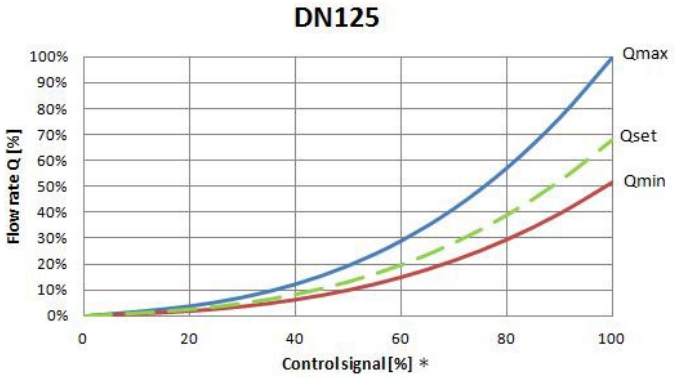


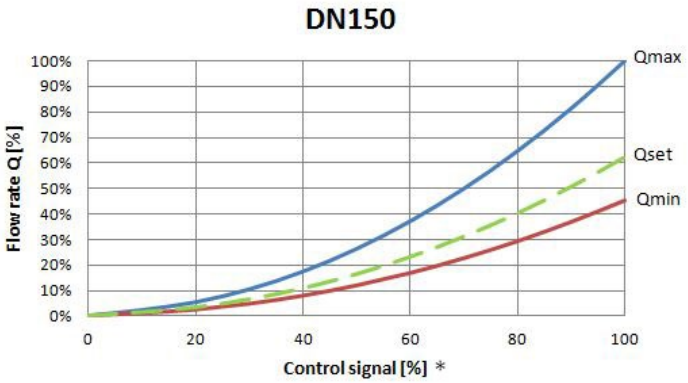
The flow setpoint is determined by the setting of the desired maximum flow rate (Qset) and by the control signal from the BMS through an equal percentage equation.





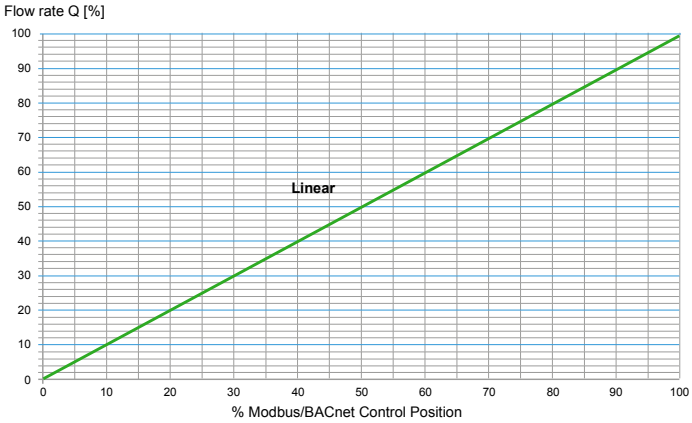






* 100% control corresponds to 10 V with 0-10 V control signal.

EBV default curve is equipercentage but it is also possible to set it linear. In this case the relationship between flow rate setpoint and command will be linear.

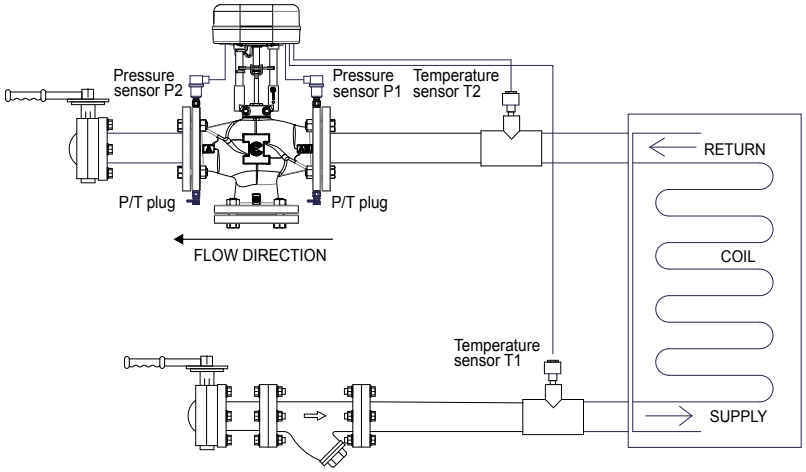


This function is applicable only when control via BMS is active (via analog or BACnet MS-TP/Modbus RTU digital signal). In temperature control Loop or when temperature and power limits are active the BMS command is not applicable (EBV is controlled by the temperature), and in this case EQP function is not applicable.

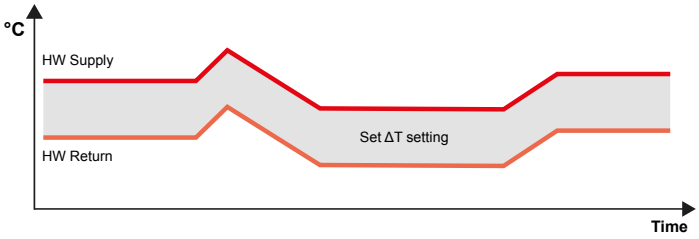
It is possible to set the desired maximum flow rate whose value is included between the values of Qmax and Qmin defined for valve. To do this, It is possible to use iC Actuator Configurator. For further details refer to the DMP310 manual.
By default the value of the maximum desired flow rate is set to the maximum flow rate value. The maximum desired flow rate value corresponds to the maximum command signal (generally 10 V or 100%).
For pressure differences below 0.01 bar, the flow rate calculated is 0 l/h and the valve position does not depend on the positioning algorithm, but directly on the control signal set by the BMS.

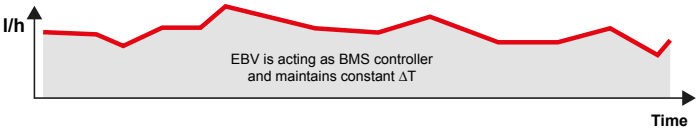
Temperature Control Loop (EBVXXX-XXX-X11 models only)

EBV is equipped with a temperature control loop (PID): the actuator independently controls the supply or the return temperature or the ΔT according to a set-point provided by the BMS; the BMS only sets the temperature or ΔT setpoint and the actuator works independently even in the absence of the RS485 connection.
If only temperatures monitoring is required, the measured values are made available to the BMS through dedicated Modbus registers or BACnet objects.
Temperature setpoints, PID control parameters, and Heating/Cooling mode can be set via Modbus registers, BACnet objects or with iC Actuator Configurator.

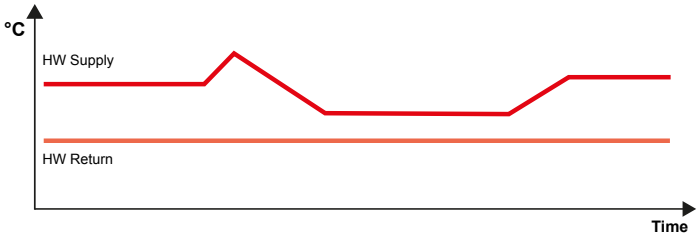


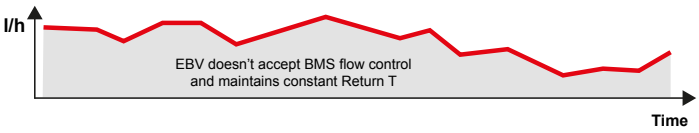
ΔT control loop (water heating example)





T Return control loop (water heating example)

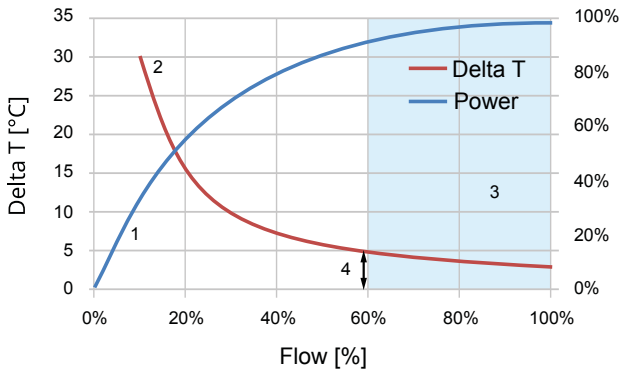




ΔT Limit Function (EBVXXX-XXX-X11 models only)

If a heating or cooling system works with a differential temperature between the supply and return that is too low, it means that there is no heat exchange between the fluid and the air flow and therefore it is more efficient to reduce the fluid flow as this does not generate any heating or cooling effect. This means that the pumps circulate too much water with unnecessary increase of energy consumption.

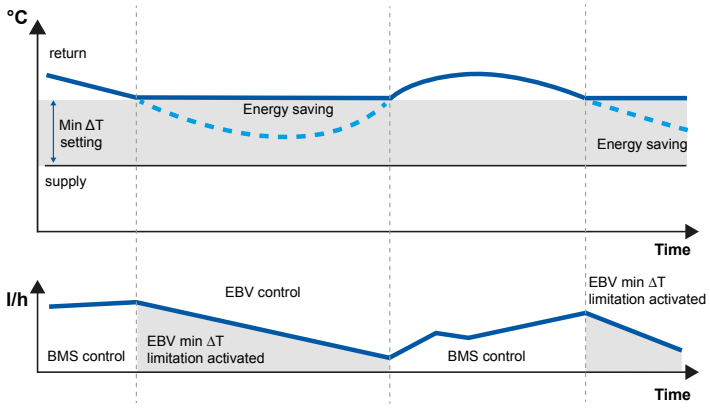
The ΔT limit function automatically limits the flow rate to prevent the ΔT level from falling below the desired differential temperature.



1 – Power output of the heating or cooling coil
2 – Diff. temperature between supply and return
3 – Loss zone (heating or cooling coil saturation)
4 – Adjustable minimum differential temperature

This function overrides the control signal from the BMS when the ΔT is lower than the setpoint; BMS will be again in charge of the valve positioning when the ΔT is higher than the setpoint.
The minimum value of ΔT and the other parameters of the control loop (PID) can be set via Modbus registers, BACnet objects or with iC Actuator Configurator.

Min ΔT limitation (water cooling example)

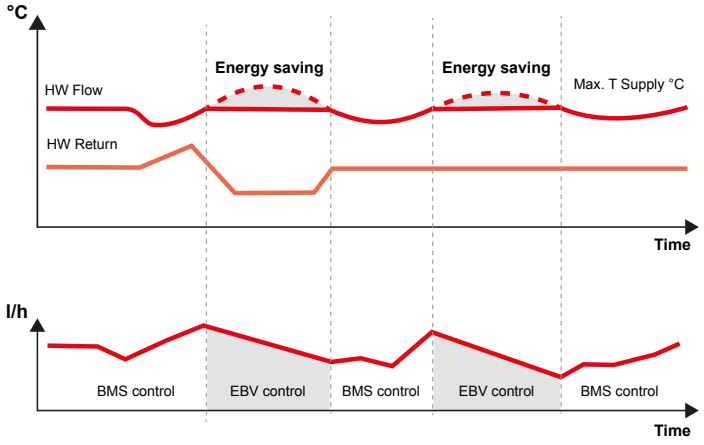


Supply/Return Temperature Limit Function (EBVXXX-XXX-X11 models only)

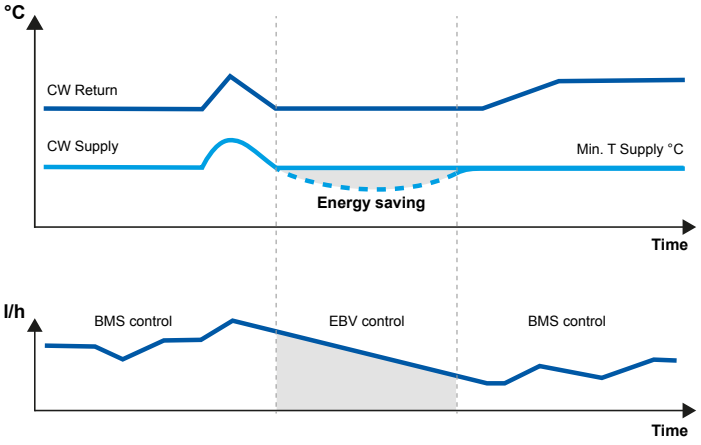
EBV can implement a limit control loop on the return or on the supply temperarature in order to override the BMS control when energy efficiency conditions are not respected. The following limiting functions can be implemented:

- Maximum temperature limit control loop: the actuator will override the BMS control signal when the supply or return temperature is higher than the setpoint; the user can select if the loop has to be implemented on the supply or return temperature sensor. For example in a domestic hot water application the actuator can override the BMS control signal if the supply temperature exceeded a setpoint value that could be dangerous for the user.
- Minimum temperature limit control loop: the actuator will override the BMS control signal when the supply or return temperature is lower than the setpoint; the user can select if the loop has to be implemented on the supply or return temperature sensor. For example in a cooling application the actuator can override the BMS control signal if the return temperature is lower than a setpoint value in order not to affect the chiller efficiency.

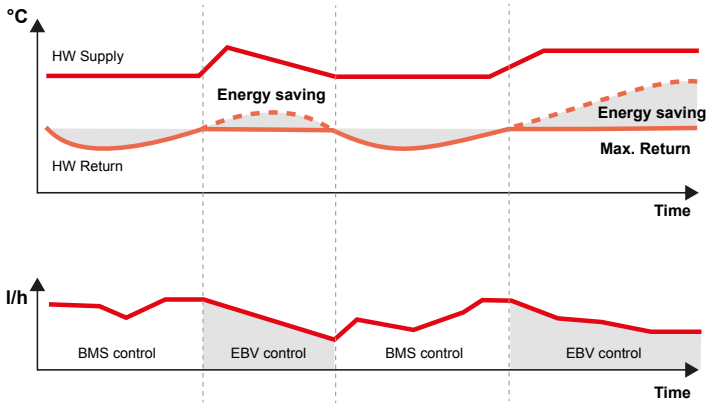
Max T Supply limitation (water heating example)



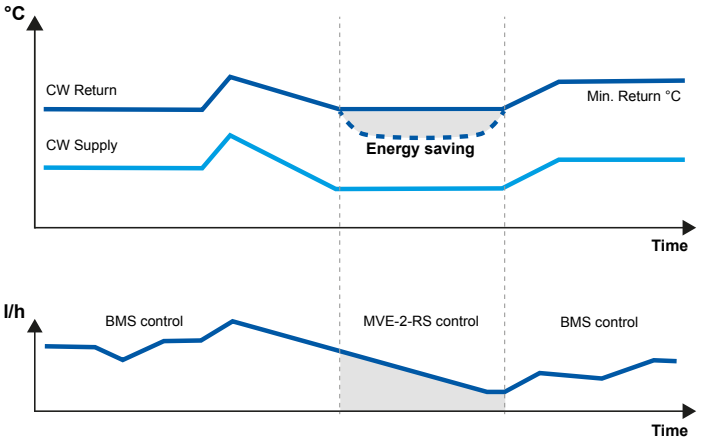
Min T Supply limitation (water cooling example)



Max T Return limitation (water heating example)



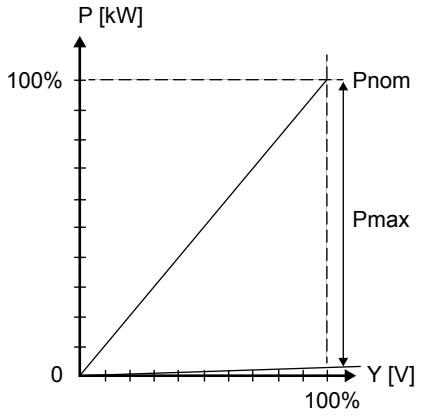
Min T Return limitation (water cooling example)



Power Control Function (EBVXXX-XXX-X11 models only)

When power control function is enabled EBV is able to calculate the thermal power transferred from the coil and to control it independently of pressure fluctuations in the systems and other external conditions that could affect the heat transfer process, lowering the overall efficiency.

It is possible to set the maximum desired power (Design power Pmax) whose value is between zero and the nominal power values (Pnom) defined for the valve at the various ΔT and shown in the following graphic.



This operation can be done via Modbus registers, BACnet objects or with iC Actuator Configurator. For further details refer to the DMP310 manual.

Power Limit Function (EBVXXX-XXX-X11 models only)

Power Limit function can be enabled and the EBV limits the actuator position when the BMS command is greater than the desired Max Power Limit value set.

Energy Function (EBVXXX-XXX-X11 models only)

When the Energy function is enabled, EBV can calculate the instantaneous thermal power and the energy (heating/cooling) delivered by the controlled coil.EBV stores cumulative energy and monthly energy values into dedicated registers with the relative month and year. The current data (e.g., temperatures, flow rates, heating/cooling energy consumption, etc) can be read at any time using Modbus registers, BACnet objects, or with iC Actuator Configurator.

Shut Off Function (EBVXXX-XXX-X11 models only)

This function allows to fully close the valve even if temperature and power function are enabled and active.
In paricular:

- For limit function is possible to fully close the valve by simply writing 0 (or 100 depending on type of action, see chapter “Direct/reverse action”) in the BMS command.
- For control function it is necessary to write 1 in register “FORCE FULLY CLOSE”.

For more information consult the DMP310 manual.

Fully Open Function (EBVXXX-XXX-X11 models only)

This function allows to fully open the valve even if temperature or power function are active.
To do this write 1 in register “FORCE FULLY OPEN”.
For more information consult the DMP310 manual.

Configurator

The free-of-charge iC Actuator Configurator is available on the www.ismacontrolli.com website or in the iC Connect application. The software allows for:

- realtime monitoring of the device during commissioning and troubleshooting;
- device configuration (control functions enable, control loop set point, setting PID parameters, etc);
- visualization of alarms;
- visualization of cumulative energy (heating/cooling) and of the last 12 monthly energy consumptions values;
- change EBV model (using DIP5);
- firmware upgrade.

The configuration tool can be connected to the actuator via USB or via RS485.

Manual Override

There is a manual operation handle on the actuator. When it is low the manual override is engaged and the valve can be manually positioned. The manual override lever stays in position until it is raised again, then board and motor will be powered again. When the manual override is engaged the GREEN and the RED LED are ON.
Manual operation handle can also be used to modify any DIP switch setting or as re-set function after any alarm occurrence.

Position Feedback

The current position of EBV is made available via Modbus registers, BACnet objects or via analog signal 2-10 V DC.

Diagnostic

EBV is equipped with a self-diagnostic algorithm able to detect the following conditions\anomalies:

- Status of the actuator (Normal Operation, Calibration, Initial positioning, Error, Manual).
- Calibration errors on a stroke out of range 5-60 mm; the number of events detected is stored permanently
- Unexpected stall errors (e.g. blocked valve due to actuator not coupled correctly); the number of events detected is stored permanently.
- Extra stroke error (e.g. asctuator detect a stroke higher than the expected one) the number of events detected is stored permanently.
- Power supply voltage outside the allowed range; the number of events detected is stored permanently.
- Total number of opening and closing cycles.

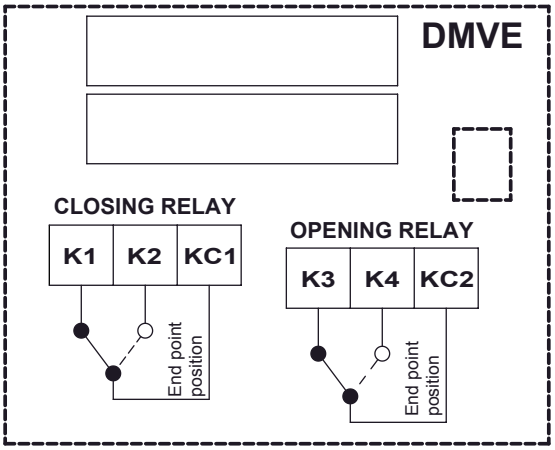
- Temperature sensors outside the temperature range (if any).
- Pressure sensors outside the allowed range (if any).

All the diagnostic information are available through dedicated Modbus registers, BACnet objects or with iC Actuator Configurator.
Furthermore, the anomaly conditions are locally shown by means of two green and red LEDs on the board which are properly flashing (see table on page 16).
For the correct assembly of EBV see the Installation Instruction DIM489.

End Points Switches (DMVE accessory)

The end points relays switch when the valve is fully open or closed. These are dry contacts (24 V AC/DC, 4 A max). Auxiliary switches can be used to indicate the end position of the valve and for relay control of other system devices.
When the actuators are controlled individually or in sequence, it is possible to use the limit switches to indicate the total closing or opening of the valve. The table below indicates the position of the switch based on the 0..10 V DC (Y) command signal.

Control signal (Y)	Relay KC1	Relay KC2
0-0,5 V DC	KC1 to K2	KC2 to K3
0,5-9,5 V DC	KC1 to K1	KC2 to K3
9,5-10 V DC	KC1 to K1	KC2 to K4



MAINTENANCE

The actuator is maintenance-free.

ACCESSORIES

DMVE	Auxiliary limit switches (electrical characteristics 24 V AC/DC, 4 A max)
248	Stem heater (recommended when the fluid temperature drops below 0°)
GMVE	Thermal insulation shell for the actuator *
CONV-USB-RS485	USB-RS485 converter cable
SNTC-SL-3	NTC 10K temperature sensor 3 m length (10 m length available on request)

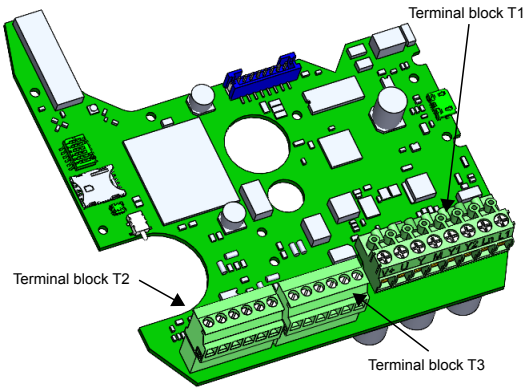
* It is not possible to install the thermal insulation shell and the stem heater at the same time.

ELECTRICAL CONNECTIONS

Remove the cover screw with a screwdriver and then remove the cover.

24 V Models (EBVXXX-024-X1X)

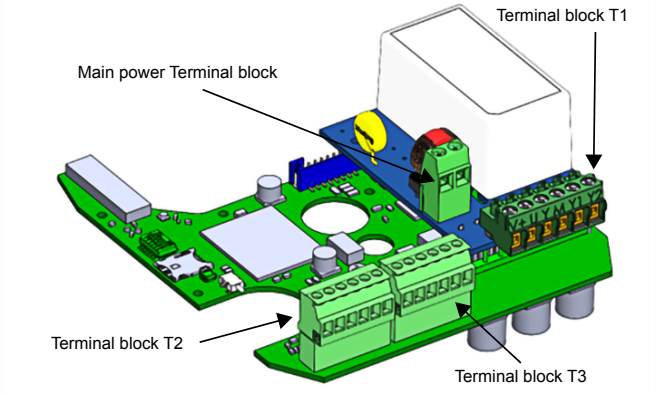
The actuator is equipped with 3 removable terminal block:
- a removable 8-poles terminal block (T1) with power supply, analog and digital command signal and feedback signal; each terminal pole is clearly marked and the same label is shown on the electronic board. Before turning on the actuator, make sure that the terminal block is correctly connected to the board and that the label on the terminals and board match;
- a removable 6-poles terminal block (T2) dedicated to the RS485 bus connection (Modbus RTU/BACnet MS/TP) and pressure sensors;
- a removable 6-poles terminal block (T3) dedicated to the connections of the temperature sensors (only 4 poles are used).



230 V Models (EBVXXX-230-X1X)

The actuator is equipped with 4 removable terminal block:

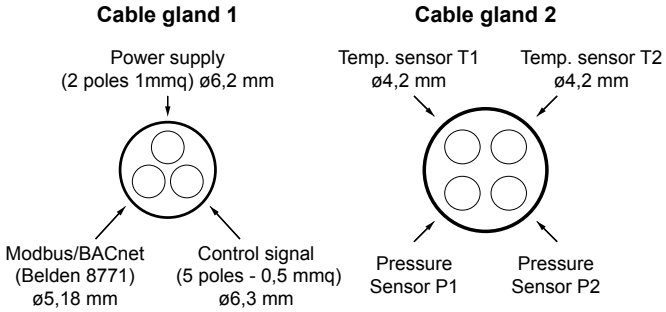
- a not removable 2 poles terminal block for main power supply;
- a removable 6-poles terminal block (T1) with power supply, analog command signal and feedback signal; each terminal pole is clearly marked and the same label is shown on the electronic board. Before turning on the actuator, make sure that the terminal block is correctly connected to the board and that the label on the terminals and board match;
- a removable 6-poles terminal block (T2) dedicated to the RS485 bus connection (Modbus RTU/BACnet MS/TP) and pressure sensors;
- a removable 6-poles terminal block (T3) dedicated to the connections of the temperature sensors (only 4 poles are used).



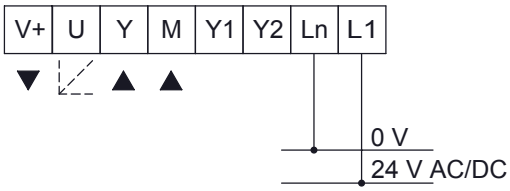
Cable Glands

The actuator is supplied with 2 cable glands with die-cut membranes for safe wiring.

- Cable gland 1 for 3 cables: 2-wires cable for power supply; 5-wires cable for control and feedback signals and 3-wires cable for Modbus/BACnet;
- Cable gland 2 for 4 cables: 2-wires cable for T1 temperature sensor, 2-wires cable for T2 temperature sensor and 3-wires cable for pressure sensor P1 and P2 respectively.

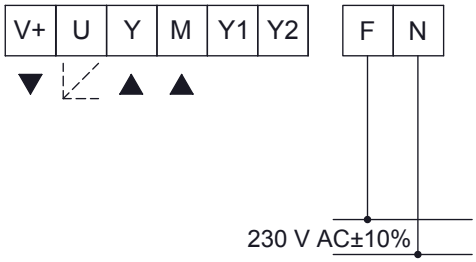


Terminal Block T1 (24 V)



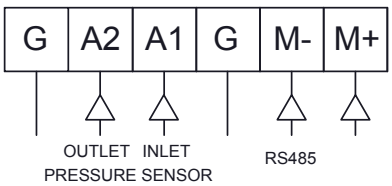
Label	Description	Function	Cable type	Max wire length
L1	24 V AC/DC	Power supply	AWG 16 (min 1 mm² - max 1,5 mm²)	75 m
Ln	0 V			
Y	0-10 V DC	Modulating control input	AWG 20 (min 0,5 mm² - max 1,5 mm²)	200 m
M	0 V (common)			
Y1	Not used			
Y2				
V+	16 V DC	Power supply for pressure sensors	AWG 20 (min 0,5 mm² - max 1,5 mm²)	200 m
M	0 V (common)			
U	2-10 V DC	Feedback output signal	AWG 20 (min 0,5 mm² - max 1,5 mm²)	200 m
M	0 V (common)			

Terminal Block T1 (230 V)



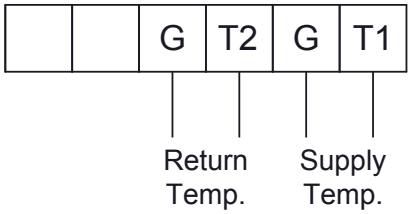
Label	Description	Function	Cable type	Max wire length
F	230 V AC	Power supply	AWG 16 (min 1 mm² - max 1,5 mm²)	75 m
N				
Y	0-10 V DC	Modulating control input	AWG 20 (min 0,5 mm² - max 1,5 mm²)	200 m
M	0 V (common)			
Y1	Not used			
Y2				
V+	16 V DC	Current output max 25 mA	AWG 20 (min 0,5 mm² - max 1,5 mm²)	200 m
M	0 V (common)			
U	2-10 V DC	Feedback output signal	AWG 20 (min 0,5 mm² - max 1,5 mm²)	200 m
M	0 V (common)			

Terminal Block T2



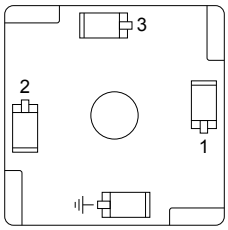
Label	Description	Function	Cable type	Max wire length
M+	Tx	Modbus RTU/BACnet MS/ TP connection	Belden 8771	See chapter RS485 connection
M-	Rx			
G	Shield			
A1	0-10 V from pressure sensor (inlet pressure)	ΔP reading	Three-core cable supplied	75 cm
A2	0-10 V from pressure sensor (outlet pressure)			
G	0 V (Common)	Pressure sensor common		

Terminal Block T3



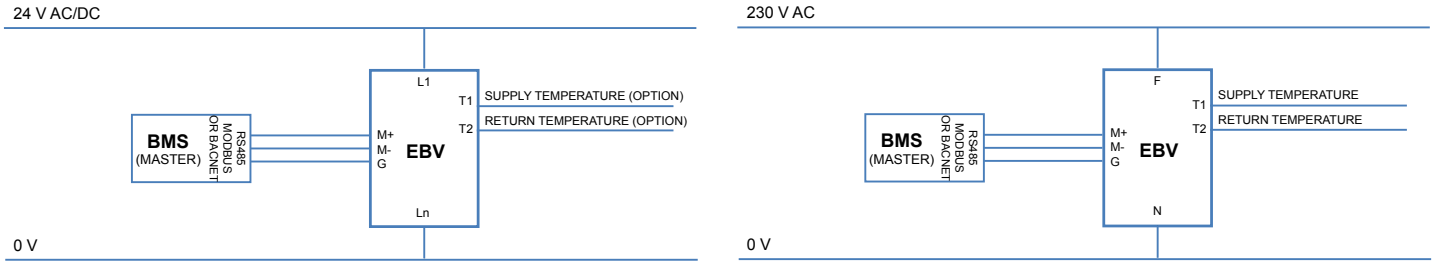
Label	Description	Function	Max wire length
T1	Supply temp. sensor	Temperature control loop/ΔT limit function, power control/limit function and energy function	3 m
G	Common		
T2	Return temp. sensor		
G	Common		

Pressure Transducers Connection

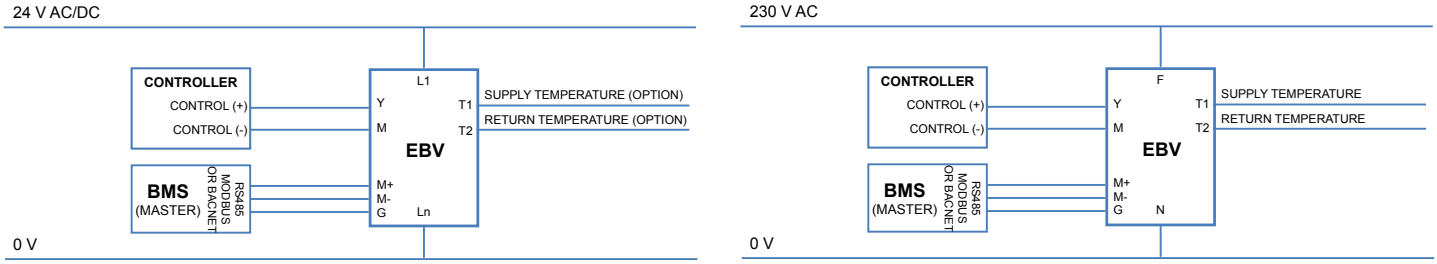
DIN CONNECTOR EN175301-803-A	Term.	Description	Function	Cable type	Max wire length
	1	Power supply	Differential Pressure Reading	Three poles wire (supplied)	75 cm
	2	0-10 V signal			
	3	Common			

Wiring Diagrams

RS485 command



Modulanting Control & Modbus RTU or BACnet MS/TP Supervisory

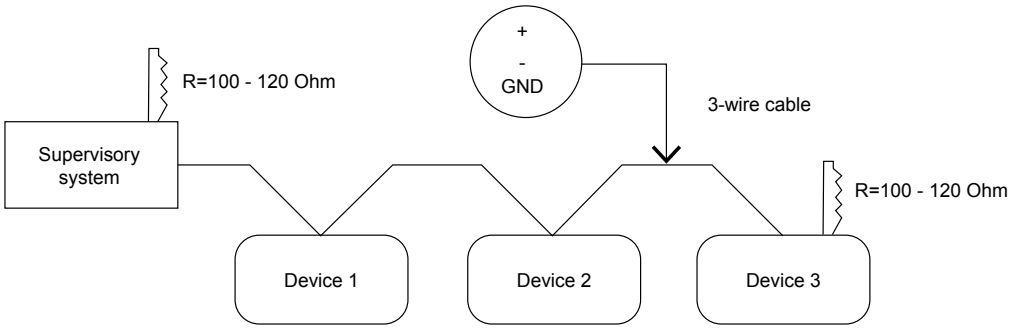


RS485 Connection

RS485 network is made with a 3-conductor cable, which will be recognized below with “+” (M+), “-“ (M-) and “GND” (pin G). For wiring, we recommend the Belden® cable, model 8771. In particularly “noisy” environments, we recommend the Belden® cable, model 3106A connecting the twisted pair respectively to the “+” and “-” signals, the reference conductor to GND and the screen on the ground. Alternatively, a cable with the following electrical and mechanical characteristics can be used:

- AWG 20/22;
- characteristic impedance of 120 Ω;
- copper conductors, of the “braid” type, twisted;
- with braided shielding and protective insulation.

The shield must be connected to the GND signal (pin 25) of the actuator.
The network must only be wired according to the following principle, defined as a “daisy chain” (the device consists of a single RS485 port). Star connections are not allowed.



Connection Warnings

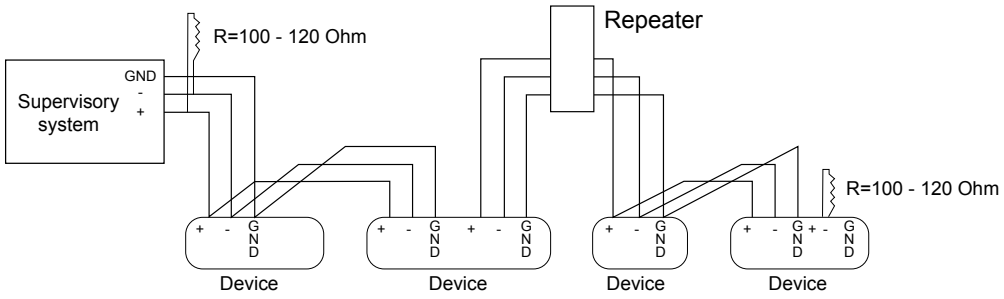
For correct wiring of the network it is recommended to respect the following warnings:

1. Do not use different types of cable to create the same network, but always and only use the same type of cable;
2. The network cable is crossed by SELV safety voltage signals and must not be wired in channels intended for cables with dangerous voltages (for example 230 V AC) or carriers of high currents, especially if in alternating current. Also avoid parallel paths to these power cables;
3. Wire the cable as straight as possible, avoiding folds with tight bending radius, let alone wrapping it in unnecessary charges;
4. Do not twist the cable around power conductors and, if you have to cross them, provide a 90 ° cross between the cable and these conductors;
5. Keep away from electromagnetic field sources, in particular from large motors, switchboards, neon ballasts, antennas of all types;
6. Avoid that the pull tension of the cables exceeds 110N (11.3 kg) to prevent ironing;
7. Evaluate the route in advance so as to shorten it as much as possible and take note of the addresses of the instruments connected with particular reference to their location in orderly sequence. This can be very useful in maintenance; We recommend that you take note of the Modbus address and report it on the product label in the space provided for it.
8. Do not invert the polarity “+” and “-” at the connection terminals;
9. Avoid short pieces of cable in the connection terminals to the instruments, in order to allow a possible maintenance without tearing or pulling of the cable itself;
10. Identify the start and end terminations and avoid “open” segments; Termination resistors and network polarization The slew-rate

control, common to all our converters, and the baud rate limited to 9600 baud (bit/sec) make termination resistors unnecessary. The RS485 network requires polarization typically borne by the Master device; the regulator does not have polarization resistors. The tranceiver used by the actuator allows to drive up to 256 knots.

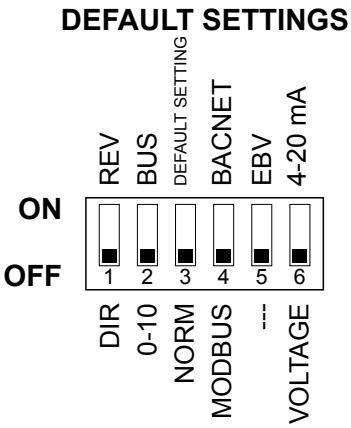
The RS485 standards provide for a maximum length of 1200 m and/or 32 devices on the network. However, it should be noted that the more the “standard” limits are exceeded (maximum limit of 32 devices or cable lengths greater than 1200 m), the higher the probability that communication problems will arise. The phenomenon is not systematic and may not even occur.

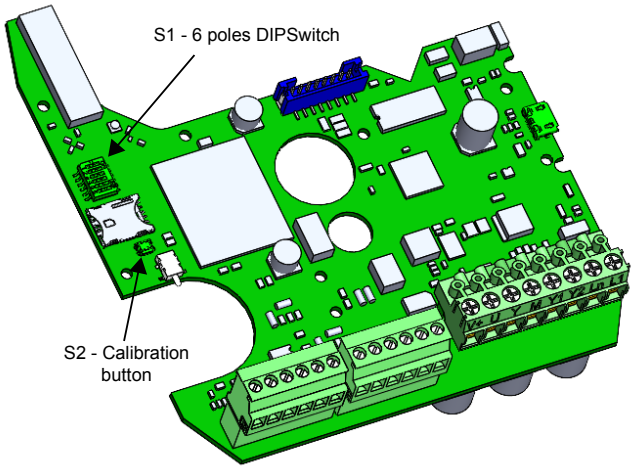
Vice versa, if it occurs, and none of the points indicated in this paragraph has allowed to solve the problem, the connection of a repeater (code CONV-RS485-RIP) is suggested, as shown in the figure below:



NOTE - Use a repeater if the cable length exceeds 1200 m or if there are more than 32 devices.

DIP SWITCH SETTING





DIP switch	OFF	ON
1	Direct action U= feedback U = 2V U = 10V	Reverse action U= feedback U = 10V U = 2V
2	0-10 V (Input between Y [+] and M [-])	Input signal Bus via Modbus RTU or BACnet MS/TP
3	Normal	Default Setting*
4	Modbus RTU	BACnet MS/TP
5	Not used	EBV**
6	Voltage Input Signal (input between Y [+] and M [-])	Current Input Signal 4-20mA (input between Y [+] and M [-])

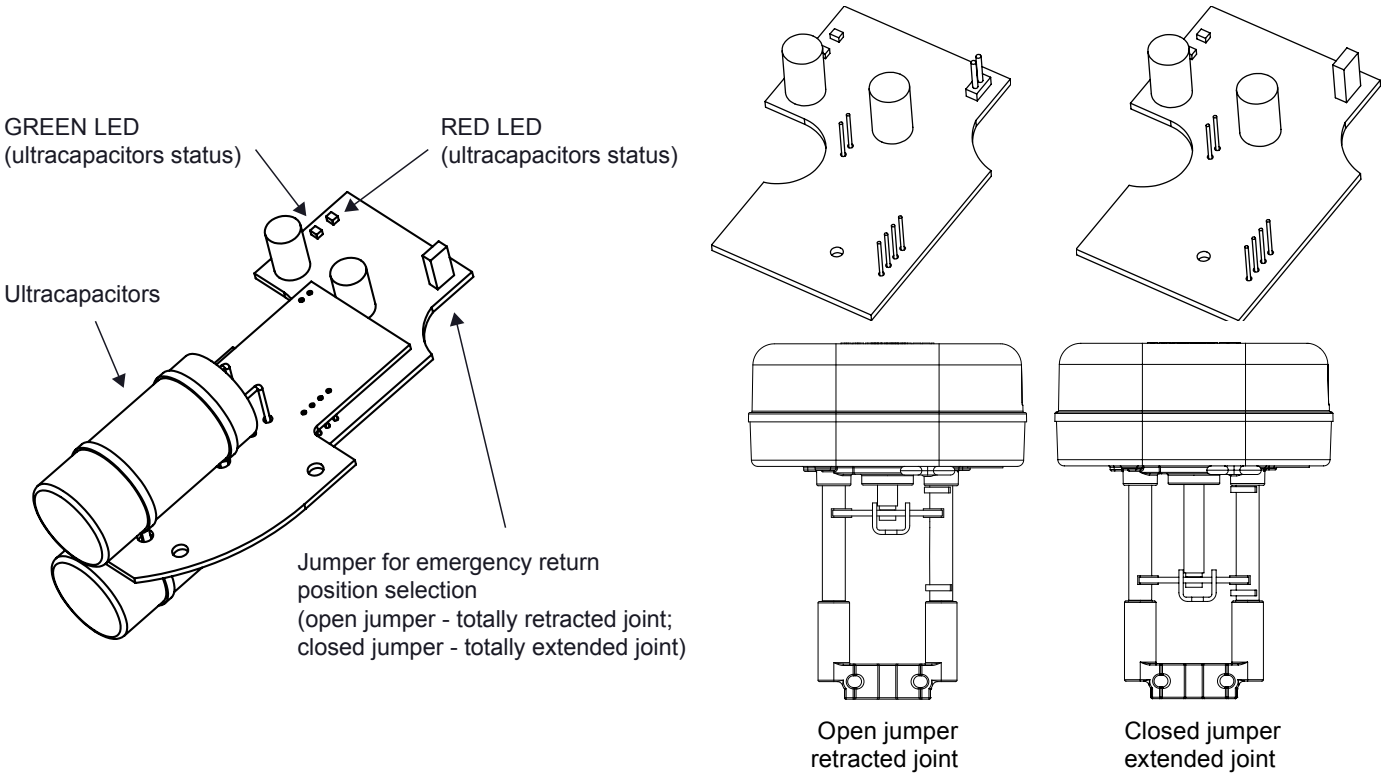
* To restore the device to factory settings:
1. switch DIP3 to ON;

2. disconnect the actuator and in case of model with emergency return wait until the supercapacitors are completely discharged (all the LEDs are OFF);
3. power up the actuator and in case of model with emergency return wait until the supercapacitors are completely charged (Green LED on emergency return module ON);
4. switch DIP3 to OFF;
5. calibration restarts automatically.

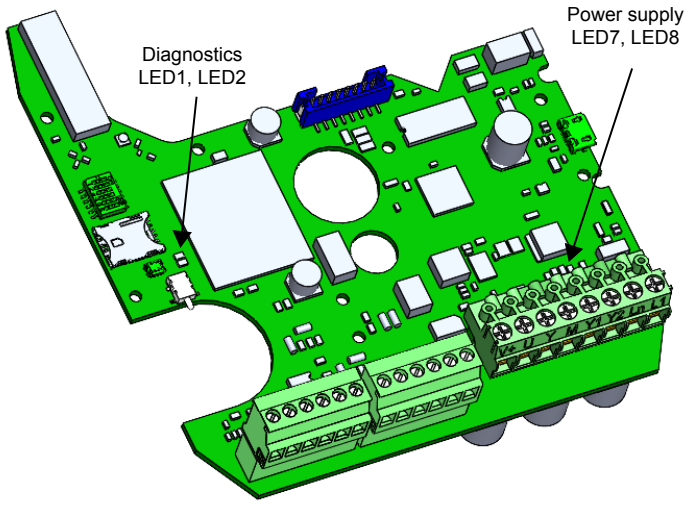
** It is possible to configure another EBV model by following these steps:
1. set the DIP switch to ON;
2. reset the actuator via the configurator or enabling/disabling manual override;
3. select “set as an EBV” in the iC Actuator Configurator software;
4. choose the configuration file of the model to be configured;
5. reset the actuator.

Attention: after changing the DIP switch configuration it is necessary to restart the actuator (by power Off/On, or reset or engaging/disengaging manual override).

Emergency Return Jumper (EBVXXX-XXX-11X models only)



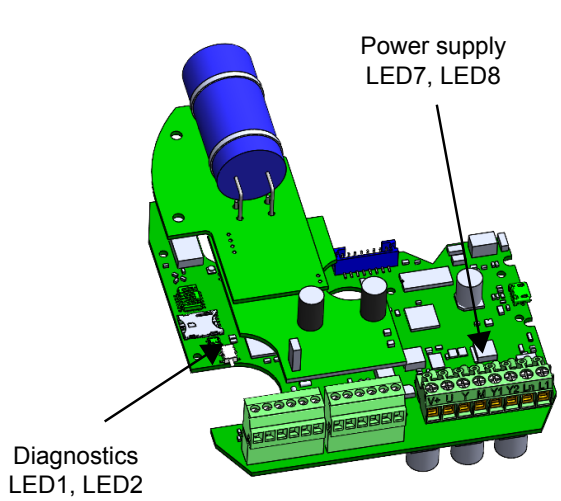
STANDARD LEDs BEHAVIOUR

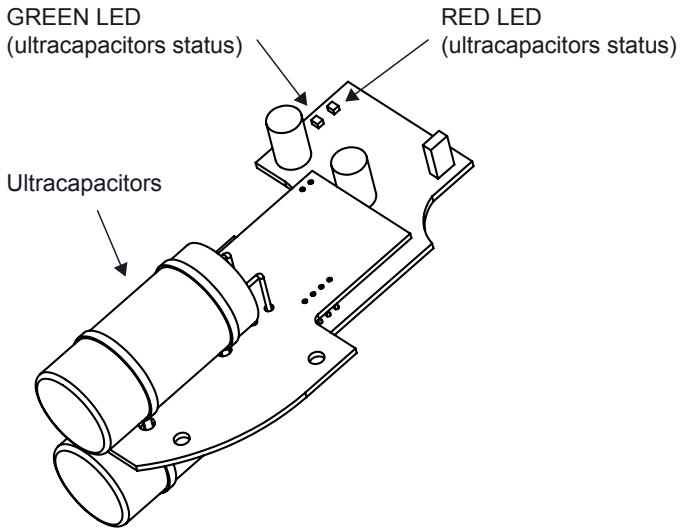


N°	LED 1 and 2	Actuator status
1	FIXED GREEN	Actuator at end point of the calibrated stroke
2	GREEN SLOW BLINKING	Actuator has arrived or is moving towards an intermediate point of the calibrated stroke
3	RED and GREEN BLINKING ALTERNATIVELY	Actuator is calibrating the stroke or performing the initial positioning
4	RED and GREEN FIXED	Manual control activated, the actuator ignores the control signal. WARNING! The board is powered
5	RED and GREEN FAST BLINKING ALTERNATIVELY	Actuator is in bootloader mode

N°	LED 7 (RED) and 8 (RED)	Actuator status
1	LED 7 RED ON; LED 8 RED ON	Stable power supply of the actuator
2	LED 7 RED ON; LED 8 OFF	Unstable actuator power supply; possible hardware problem

Supercap for emergency return (EBVXXX-XXX-11X models only)





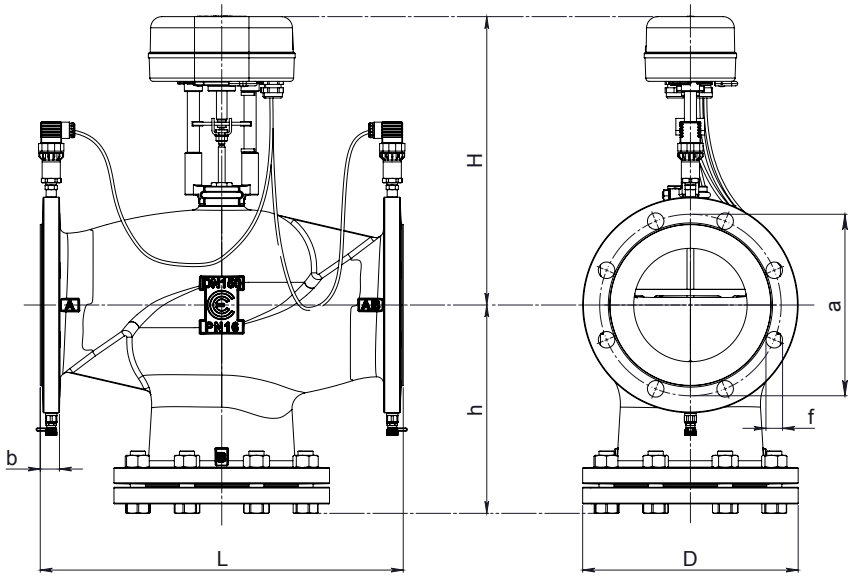
LED	ULTRACAPACITORS STATUS
GREEN	Ultracapacitor charged
RED	Ultracapacitor discharging
OFF	Ultracapacitor totally discharged

During charging phase also DL2 (red led on main PCB) is ON.

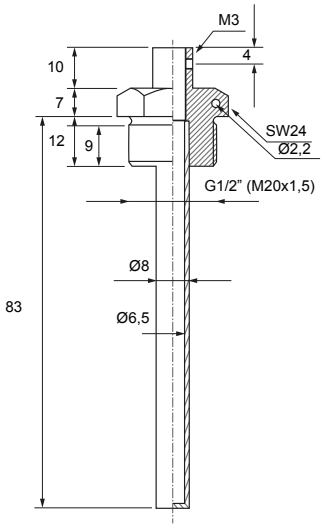
N°	Error type	Actuator status	Actuator behavior	Notification type leds	Possible anomaly	Restore procedure
1	Stroke less than 5 mm	Calibration / first installation	The actuator returns to its initial position and does not respond to the command. The actuator keeps the previous stroke or the default stroke	RED ON	Valve with stroke less than 5 mm	Remove power check valve coupling and re-power On
2	Stroke greater than 60 mm	Calibration / first installation	The actuator leaves the maximum range of 60mm and moves to the new extreme. Once the new stroke limit is reached, it returns to the initial position signaling an anomaly. The actuator does not learn the new stroke.	RED fast blinking + GREEN ON	Valve with stroke greater than 60 mm or incorrect coupling	Remove power check valve coupling and re-power On
3	Unexpected collision within the stroke	Normal operation	The actuator checks the stall condition 5 times. At the end of the attempts it signals an anomaly. The actuator does NOT learn the new stroke, but after 60 s repeats the attempts to check the blocking conditions	RED fast blinking	Valve blocked	Reverse the control signal and remove the obstacle
4	Stroke greater than expected	Normal operation	The actuator moves to the new crash position signaling an anomaly. The actuator does NOT learn the new stroke	RED fast blinking	Damaged valve or incorrect coupling	Reverse the control signal and check valve coupling
5	Low supply voltage	Normal operation	The actuator continues to operate but performance is not guaranteed.	RED slow blinking	1. Wrong sizing of transformer 2. Unstable power supply	Check and restore power
6	High supply voltage	Normal operation	The actuator continues to operate but performance is not guaranteed.	RED slow blinking	1. Wrong sizing of transformer 2. Unstable power supply	Check and restore power
7	Temperature sensors error	Normal operation	Temperature or ΔT regulation loops not working	RED blinking alternately fast (5sec) and slow (5sec)	1. Incorrect temperature probe connection 2. Temperature probes damaged 3. Temperature detected outside the range of use	Check the connection and the condition of the temperature sensor
8	Pressure sensors error	Normal operation	Pressure or ΔP regulation Loops not working		1. Pressure detected outside the range of use 2. Probes damaged	Check the connection and the condition of the pressure sensor

DIMENSIONS [mm]

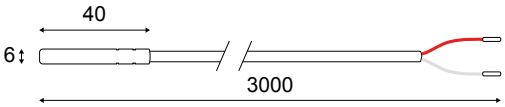
Mod.	DN	L	H	h	D	b	a	f	Holes	Weight [kg]
EBV	65	290	320	175	185	20	145	18	4	18
	80	310	330	186	200	22	160	18	8	28
	100	350	341	206	220	24	180	18	8	32
	125	400	364	255	250	26	210	22	8	45
	150	480	382	275	285	26	240	25	8	60



Temperature Sensor Pocket



Temperature Sensor



ORDERING PART NUMBER

65 = DN65, max flow 37 m³/h
80 = DN80, max flow 59 m³/h
100 = DN100, max flow 77 m³/h
125 = DN125, max flow 118 m³/h
150 = DN150, max flow 177 m³/h

EBVXXX-XXX-X1X

024 = Power supply 24 V AC/DC
230 = Power supply 230 V AC

0 = No emergency return
1 = With emergency return

1 = Modbus & BACnet connection

0 = No temperature sensors
1 = With temperature sensors

Example: **EBV65-024-011** –> Max flow 37 m³/h, DN65, 24 V AC/DC, No emergency return, with Modbus/BACnet connection, with Energy function enabled and 2 temperature sensors included

ATTENTION: In an EBVXXX-XXX-X0X it is possible to update the new functionality of model EBVXXX-XXX-X1X by replacing the PCB.

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