

## Specification Description *dynamx*<sup>™</sup> Electronic pressure-independent flow control valves

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Last update: 17.02.2022





### 1. Pressure-independent electronic flow control valve

These control valves are also used for power measurement based on ultrasonic flow measurement and temperature measurements on the flow and return lines.

Selection notes and calculations of the valves shall be submitted for execution.

The electronic flow control valve shall be fully automatic and shall have both an adjustment function (design flow) and a flow control function. The flow control valve shall operate pressure independent thanks to an integrated flow measurement and shall electronically regulate the actual flow rate to the required flow rate when varying pressures in the hydraulic network due to variable flow distribution. Thus, a continuous hydraulic balance should be ensured even in part-load operation. Alternatively, the electronic flow control valve should also be able to operate as а flow limiter. The electronic flow control valve shall be supplied as one compact unit ex works and shall include the control valve, actuator, measurement sensors and flow controller. Thus, the electronic flow control valve combines up to five different functions-in-one: (1) a flow control valve, (2) a dynamic, pressure-independent balancing valve, (3) a shut-off valve, (4) -optionally- additional measurement and/or control functions, and (5) -optionally- an energy measurement.

The integrated control valve shall be operable at a maximum differential pressure of (at least) 1bar. The nominal working pressure should be 16 bar (PN16). All seals should be made of EPDM. The (after)control valves up to DN50 are threaded, those from DN65 are flanged.

The integrated flow sensor and temperature sensors must allow the reading of the actual flow rate and medium temperature in the electronic flow control valve at all times. The integrated flow sensor shall not contain any moving parts and shall be of the ultrasonic type.

The electronic flow control valve shall be maintenance-free.

The electronic flow control valve shall be provided with an integrated flow control function that shall allow modulation of the flow even at low flow settings, guaranteeing 100% authority at each flow setting.

The control curve of the electronic flow control valve shall be optionally equiprocentric or linear. No minimum upstream pressure for the electronic flow control valve shall be required for proper and pressure-independent operation.



The electronic flow control valve, in the 2- or 3-way version, shall have a 'flush mode' that puts it in the fully open position to allow flow and/or adjustment of the plant's pump control. After switching off this 'flush mode', the flow control valve shall automatically go to its pressure independent control based on the set flow rate or flow limitation. When delivered, the electronic flow control valve in the 6-way version has the flush mode activated in cooling or heating mode. This can be changed via the Bluetooth app.

### OPTION

The electronic flow control valve should have at least one or two integrated temperature sensors that measure the medium temperature. In case of small temperature differences between supply and return (5K or smaller) a temperature differential measurement should be mandatory.

### Remarks

- 1) The diameter determination of the valves is made in accordance with the pressure drop, the calculated design flow rate and a control opening that is at least 75-80 % of the maximum control opening. Electronic flow control valves have no required minimum hydraulic pre-pressure. When sizing, the aim is always to achieve the smallest possible pressure differential across the control valve in operation; preferably less than 15kPa in the fully open position. Where possible, the electronic flow control valve will follow the pipe diameter of the circuit in order to minimize resistance.
- 2) when low temperatures are used, a dew point control must be used to avoid condensation on the electronic
- 3) The control curve is always adjustable in the flow control valve, via a software tool specific to the flow control valve or via the BMS.



## 2. Control and communication

The control of the electronic flow control valve (adjustment of the desired flow rate) must be analog (0...10Vdc) or digital (via the communication bus). With digital control, the set point value can be set either as a relative set point value (relative to the set flow limit) or an absolute set point value (expressed in the selected flow unit).

Only MODBUS MSTP and BACnet MSTP are permitted as communication protocols. The available data points for the protocol should be documented openly and license-free so that the electronic flow control valve can be integrated into a BMS without additional information.

The flow reading and flow demand value setting shall be capable of being made in various units, including m<sup>3</sup> per hour, liters per minute and liters per second (setting freely selectable).

The adjustable and readable parameters (flow setting, flow limitation, flush position, control curve, power, energy,...) should be able to be read and/or adjusted via the communication bus. The electronic flow control valve should be able to be commissioned completely wirelessly via the integrated Bluetooth link. The required application for this is freely downloadable (Android & IOS).

Following parameters should be brought to the BMS as a minimum to enable life time commissioning and troubleshooting: design flow rate, requested flow rate, measured flow rate.

In analog mode, the internal flow controller of the dynamx<sup>™</sup> valve receives a set point from the room T° controller via a split-range Y1: 0..10Vdc control signal. For heating: 0.5..4.5Vdc and for cooling:

5.5..9.5Vdc. Thus, the dead zone between cooling and heating never exceeds 1V or 10% of the control signal. Internally, this analog control signal is converted into a flow setpoint, either heating or cooling.





### OPTION

The electronic flow control valve shall have an integrated thermal power calculation and energy count. These shall be derived by the electronic flow control valve from the prevailing flow rate and the prevailing medium temperature difference. If the device has only one integrated temperature sensor, then it should be possible to set and read back the second medium temperature in the device via the communication bus, on which basis the power, consumption and energy count is then established.

For energy monitoring, the current power, energy consumption and medium temperatures (supply/return) should also be added in the BMS.



## 3. Specifications for the drive system

The electronic flow control valve features a microprocessor-controlled electric motor actuator. This electric actuator is suitable for flow control and has a wear-resistant positioning system. The actuators on the flow control valve with flange connection are equipped with a manual control that allows the actuator to be positioned in case of emergency. The electric actuator on the flow control valve shall be electronically protected against overload and shall not require end of line contacts.

In addition to the flow reading on the flow control valve (via communication bus or analog 0-10V signal), the position of the actuator is made visible locally thanks to a mechanical position indication.



### 4. Control Features

#### 4.1 Temperature limitation / mixing temperature control

The flow control function of the electronic flow control valve regulates the flow rate between Vsmin and Vsmax. In addition, a P(I) controller is provided in the electronic flow control valve, which, based on the sensors integrated in the flow control valve, will monitor the return temperature and, if necessary, adjust the requested flow rate to obtain a target return temperature. If the return water temperature is too high (in heating) or too cold (in cooling), compared to the maximum and minimum set points, the flow rate (set point) will be adjusted.

In this way, the system for condensing boilers is optimized on the return water temperature without incorporating additional components. These minimum and maximum temperatures (Tset) can be set via MODBUS MSTP or BACnet MSTP.



2-way and 3-way dynamx



### 4.2 Return temperature control \_04 (Rücklauftemperaturbegrenzung)

The flow control function of the electronic flow control valve regulates the flow rate between Vsmin and Vsmax. Additionally, a P(I) controller will be provided in the electronic flow control valve which will regulate a measured medium temperature (Tmeas) to the set point (Tset). For this purpose, the electronic flow control valve will be equipped with an additional analog input that allows the connection of an additional external sensor (Tb) that will be responsible for measuring the mixing temperature. This measured value will also be transmitted to the BMS.





### 4.3 Room temperature control \_00

In addition to the flow control function, an additional P(I) controller will be provided in the electronic flow control valve that will maintain the room temperature within centrally manageable limits. To simplify system construction, the room temperature sensor and potentiometer for temperature personalization will be connected by the user directly to the electronic flow control valve.

The set point, night reduction and the deviation from this set point (adjustable from +/-1°C to +/-5°C) can always be managed centrally via MODBUS MSTP or BACnet MSTP.

Any window contact, presence sensor, condensation detection and/or contact for night reduction should also be connected directly to the electronic flow control valve. All parameters must be transmitted to the central control system via MODBUS MSTP or BACnet MSTP..





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#### 4.4 Room temperature control with changeover (only for DXN6)

In addition to the flow control function, an additional P(I) controller will be provided in the electronic flow control valve that will maintain the room temperature within centrally manageable limits. To simplify system construction, the room temperature sensor and potentiometer for temperature personalization will be connected by the user directly to the electronic flow control valve.

The set point, night reduction and the deviation from this set point (adjustable from +/-1°C to +/-5°C) can always be managed centrally via MODBUS MSTP or BACnet MSTP.

Any window contact, presence sensor, condensation detection and/or contact for night reduction should also be connected directly to the electronic flow control valve. All parameters must be transmitted to the central control system via MODBUS MSTP or BACnet MSTP.

The room controller will also be able to control the full change-over function between heating and cooling with an adjustable "dead zone between heating and cooling. To avoid mixing of heating water and cooling water, only an electronic flow control valve type 6-way ball valve with ultrasonic flow will be accepted at change-over.

Any window contact, presence sensor, condensation detection and/or contact for night reduction should also be connected directly to the electronic flow control valve. All parameters must be transmitted to the central management system via MODBUS MSTP or BACnet MSTP.

For fan coil applications, the 0-10V X1 signal can be used to control the EC fan



## 5. Technical specifications *dynamx<sup>TM</sup>* DXC\_B

Compact modulating 2-way linear readjustment valve with integrated electronic pressure-independent flow and temperature control.

### Desired product

Manufacture: BELPARTS Series: DXC\_B

The electronic flow control valve shall meet the following characteristics:

- Pressure-independent flow control
- Maintenance-free linear control valve with valve and seat
- · Integrated ultrasonic flow sensor, with no moving parts
- Wireless configuration via App (Android / iOS)
- The flow set point comes from the room temperature control via a 0..10Vdc control signal, which is translated into the desired flow rate. This set point is also provided via MODBUS MSTP or BACnet MSTP.
- Medium: water without glycol, water quality according to VDI 2035
- Maximum flow rate adjustable, eliminating the need for a (static) balancing valve and a readjustment valve
- A 0..10Vdc feedback signal can be used to read out the actual flow rate.
- MODBUS MSTP or BACnet MSTP communication network can accommodate at least 127 and up to 247 devices on 1 network
- OPTION: Paired temperature sensors, class M1 according to MID (Measuring Instruments Directive 2014/32/EU) and EN1434, for the purpose of energy logging

Power supply voltage		AC 24 Volt (-10%/+10%), 50Hz
Consumption during		2W (8VA), 8W peak capacity
Control Signal		010Vdc (0.17mA)
Sensor type		ultrasonic TTM, no moving parts
Measuring unit		m³/h, l/s, l/min
Nominal pressure		PN16 (16 bar)
Control curve setting		electronically adjustable (equiprocentric or linear)
Leakage flow rate		tightly fitting
Nominal pressure	minimum	no minimal differential pressure required
	maximum	max. 1.5bar
Flow range		DN20: 01.400l/h
Maximum flow rate setting		heating and cooling separately adjustable
Kvs-value		1.9m <sup>3</sup> /h
Hydraulic authority		100% in any position of the valve
Material control valve		bronze and/or DZR brass
Medium		water (without glycol)
Medium quality		in compliance with VDI 2035
Medium temperature		+15°C+80°C
Connection		flat-sealing ISO228/1 : G¾"
Position powerless		normally closed (NC)
IP protection level		minimal IP42





## 6. Technical specifications *dynamx<sup>TM</sup>* DXN6\_B

Modulating 6-way control ball valve for switching between heating and cooling, equipped with servo motor, optional integrated post control and hydraulic overpressure protection.

### Desired product:

Manufacture: BELPARTS Series: DXN6\_B



The electronic flow control valve shall meet the following characteristics:

- Pressure-independent flow control
- Maintenance-free rotary 6-way ball valve made of brass CW617N, with internal pressure equalization
- · Integrated ultrasonic flow sensor, with no moving parts
- Wireless configuration via App (Android / iOS)
- The flow setpoint comes from the room temperature control via a 0..10Vdc control signal, which is translated into the desired flow rate. This set point can also be provided via MODBUS MSTP or BACnet MSTP.
- medium : water without glycol, water quality according to VDI 2035
- Maximum flow rate adjustable, eliminating the need for a (static) balancing valve and a readjustment valve
- A 0..10Vdc feedback signal can be used to read out the actual flow rate.
- MODBUS MSTP or BACnet MSTP communication network can accommodate at least 127 and up to 247 devices on 1 network
- OPTION: Paired temperature sensors, class M1 according to MID (Measuring Instruments Directive 2014/32/EU) and EN1434, for the purpose of energy logging

Power supply voltage	AC 24 Volt (-20%/+20%), 50Hz
Consumption during	3W (4VA)
at rest	1,5W (2VA)
Control Signal	010Vdc (0.17mA), split range
Sensor type	ultrasonic TTM, no moving parts
Measuring unit	m³/h, l/s, l/min
Nominal pressure	PN16 (16 bar)
Control curve	electronically adjustable (equiprocentric or linear)
Leakage flow rate	tightly closing; bubble dense
Leakage class (according to EN12266-	A, no leakage
Differential pressure minimum	no minimal differential pressure required
maximum	max. 2bar
Flow range	DN15: 01.400l/h,
r low range	DN25: 02.500l/h
Maximum flow rate setting	heating and cooling separately adjustable
Kvs value	DN15: 1.4m <sup>3</sup> /h, DN25: 2.5m <sup>3</sup> /h
Hydraulic authority	100% in any position of the valve
Material control valve	Messing CW617N
Medium	water (without glycol)
Medium quality	in compliance with VDI 2035
Medium temperature	+5°C+90°C
Connection DN15	flat-sealing ISO228/1 : G½"
DN25	flat-sealing ISO228/1 : G1"



IP protection level minimaal IP42 7. Technical specifications *dynamx*<sup>TM</sup> DXMB\_C

Modulating 2- or 3-way control ball valve with integrated electronic pressure-independent flow and temperature control.

Desired product Manufacture: BELPARTS Series: DXMB\_C



The electronic flow control valve shall meet the following characteristics:

- Pressure-independent flow control
- Maintenance-free rotary control ball valve made of DZR (dezincification-free) brass
- Integrated ultrasonic flow sensor made of DZR brass
- Wireless configuration via App (Android / iOS)
- The flow setpoint comes from the external control via a 0..10Vdc control signal, which is translated into the desired flow rate. This set point can also be provided via MODBUS MSTP or BACnet MSTP.
- medium : water without glycol, water quality according to VDI 2035
- Maximum flow rate adjustable, eliminating the need for a (static) balancing valve and a readjustment valve
- A 0..10Vdc feedback signal can be used to read out the actual flow rate.
- MODBUS MSTP or BACnet MSTP communication network can accommodate at least 127 and up to 247 devices on 1 network
- OPTION: Paired temperature sensors, class M1 according to MID (Measuring Instruments Directive 2014/32/EU) and EN1434, for the purpose of energy logging

Power supply voltage		AC 24 Volt (-20%/+20%), 50Hz / DC 24 Volt (-10%/+10%)
Consumption during regulation	วท	5W (5VA)
Control Signal		010Vdc (0.17mA)
Sensor type		ultrasonic TTM, no moving parts
Measuring unit		m³/h, l/s, l/min
Nominal pressure		PN16 (16 bar)
Control curve setting		electronically adjustable (equiprocentric or linear)
Leakage flow rateLe		max. 0,001% van de Kvs-waarde
Differential pressure	minimum	no minimal differential pressure required
	maximum	max. 2bar
Flow range		028.000l/h
Available diameters		DN15 DN50
Maximum flow rate setting		heating and cooling separately adjustable
Kvs-value		to be determined from the flow rate of the circuit
Hydraulic authority		100% in any position of the valve
Material control valve		DZR brass
Medium		water (without glycol)
Medium quality		in compliance with VDI 2035
Medium temperature		+2°C+100°C
Connection DN15DN50		Threaded connection flat-sealing ISO228/1
IP protection level		IP54



## 8. Technical specifications *dynamx<sup>™</sup>* DXUB\_C

Modulating 2- or 3-way control ball valve with flange connection, with integrated electronic pressure-independent flow and temperature control.

### **Desired product**

Manufacture: BELPARTS Series: DXUB\_C

The electronic flow control valve shall meet the following characteristics:

- Pressure-independent flow control
- Maintenance-free rotary control ball valve made of DZR (dezincificationfree) brass
- · Integrated ultrasonic flow sensor, with no moving parts
- Wireless configuration via App (Android / iOS)
- The flow setpoint comes from the external control via a 0..10Vdc control signal, which is translated into the desired flow rate. This set point can also be provided via MODBUS MSTP or BACnet MSTP.
- Medium: water without glycol, water quality according to VDI 2035
- Maximum flow rate adjustable, eliminating the need for a (static) balancing valve and a readjustment valve
- maximum controllable flow rate 272,000l/h
- A 0..10Vdc feedback signal can be used to read out the actual flow rate.
- MODBUS MSTP or BACnet MSTP communication network can accommodate at least 127 and up to 247 devices on 1 network
- OPTION: Paired temperature sensors, class M1 according to MID (Measuring Instruments Directive 2014/32/EU) and EN1434, for the purpose of energy logging

Power supply voltage		AC 24 Volt (-20%/+20%), 50Hz
Consumption during regulation	on	5.5W (6VA) tot 20,5W (21VA)
Control Signal		010Vdc (0.17mA)
Sensor type		ultrasonic TTM, no moving parts
Measuring unit		m³/h, l/s, l/min
Nominal pressure		PN16 (16 bar)
Control curve setting		electronically adjustable (equiprocentric or linear)
Leakage flow rate		tightly fitting
Differential pressure	minimum	no minimal differential pressure required
	maximum	max. 1bar
Flow range		0272.000l/h
Available diameters		DN65 DN150
Maximum flow rate setting		heating and cooling separately adjustable
Kvs-value		to be determined from the flow rate of the circuit
Hydraulic authority		100% in any position of the valve
Material control valve		gray cast iron GG25 (EN-JL1040) and/or stainless steel
Medium		water (without glycol)
Medium quality		in compliance with VDI 2035
Medium temperature		+2°C+130°C
Connection		flange connection in accordance with EN1092-2
IP protection level		minimal IP42







## 9. Technical specifications *dynamx<sup>™</sup>* DXU\_C

Modulating 2- or 3-way linear control valve with flange connection, with integrated electronic pressure-independent flow and temperature control.

### Desired product

Manufacture: BELPARTS Series: DXU\_C

The electronic flow control valve shall meet the following characteristics:

- Pressure-independent flow control
- Maintenance-free linear control valve with valve and seat
- · Integrated ultrasonic flow sensor, with no moving parts
- Wireless configuration via App (Android/ iOS)
- The flow setpoint comes from the external control via a 0..10Vdc control signal, which is translated into the desired flow rate. This set point can also be provided via MODBUS MSTP or BACnet MSTP.
- Medium: water zonder glycol, waterkwaliteit volgens VDI 2035
- Maximum flow rate adjustable, eliminating the need for a (static) balancing valve and a readjustment valve
- maximum controllable flow 254,000l/h
- A 0..10Vdc feedback signal can be used to read out the actual flow rate.
- MODBUS MSTP or BACnet MSTP communication network can accommodate at least 127 and up to 247 devices on 1 network
- OPTION: Paired temperature sensors, class M1 according to MID (Measuring Instruments Directive 2014/32/EU) and EN1434, for the purpose of energy logging

Power supply voltage		AC 24 Volt (-10%/+10%), 50Hz
Consumption during regulation	n	5.5W (6VA) tot 20,5W (21VA)
Control Signal		010Vdc (0.17mA)
Sensor type		ultrasonic TTM, no moving parts
Measuring unit		m³/h, l/s, l/min
Nominal pressure		PN16 (16 bar)
Control curve setting		electronically adjustable (equiprocentric or linear)
Leakage flow rate		tightly fitting
Differential pressure	minimum	no minimal differential pressure required
	maximum	max. 1bar
Flow range		0254.000l/h
Available diameters		DN15 DN150
Maximum flow rate setting		heating and cooling separately adjustable
Kvs-value		to be determined from the flow rate of the circuit
Hydraulic authority		100% in any position of the valve
Material control valve		gray cast iron GG25 (EN-JL1040) and/or stainless steel
Medium		water (without glycol)
Medium quality		in compliance with VDI 2035
Medium temperature		+2°C+130°C
Connection		flange connection in accordance with EN1092-2
IP protection level		minimal IP42





## 10. Technical specifications *dynamx<sup>™</sup>* DXU\_D

Modulating 2- or 3-way linear control valve with flange connection, with integrated electronic pressure-independent flow and temperature control.

### **Desired product**

Manufacture: BELPARTS Series: DXU\_D

The electronic flow control valve shall meet the following characteristics:

- Pressure-independent flow control
- Maintenance-free linear control valve with valve and seat
- Integrated ultrasonic flow sensor, with no moving parts
- Wireless configuration via App (Android/ iOS)
- The flow set point comes from the external control via a 0..10Vdc control signal, which is translated into the desired flow rate. This set point can also be provided via MODBUS MSTP or BACnet MSTP.
- Medium: water without glycol, water quality according to VDI 2035
- Maximum flow rate adjustable, eliminating the need for a (static) balancing valve and a readjustment valve
- maximum controllable flow 1.194.000l/h
- A 0..10Vdc feedback signal can be used to read out the actual flow rate.
- MODBUS MSTP or BACnet MSTP communication network can accommodate at least 127 and up to 247 devices on 1 network
- OPTION: Paired temperature sensors, class M1 according to MID (Measuring Instruments Directive 2014/32/EU) and EN1434, for the purpose of energy logging

#### Technical specifications

Power supply voltage Power	supply	AC 230 Volt (-10%/+10%), 50Hz
Consumption during regulation	n	5.5W (6VA) tot 20,5W (21VA)
Control Signal		010Vdc (0.17mA)
Sensor type		ultrasonic TTM, no moving parts
Measuring unit		m³/h, l/s, l/min
Nominal pressure		PN16 (16 bar)
Control curve setting		electronically adjustable (equiprocentric or linear)
Leakage flow rate		tightly fitting
Differential pressure	minimum	no minimal differential pressure required
	maximum	max. 1bar
Flow range		01.194.000l/h
Beschikbare diameters		DN100 DN300
Maximum flow rate setting		heating and cooling separately adjustable
Kvs-value		to be determined from the flow rate of the circuit
Hydraulic authority		100% in any position of the valve
Material control valve		gray cast iron GG25 (EN-JL1040) and/or stainless steel
Medium		water (without glycol)
Medium quality		in compliance with VDI 2035
Medium temperature		+2°C+130°C
Connection		flange connection in accordance with EN1092-2
IP protection level		minimaal IP42

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