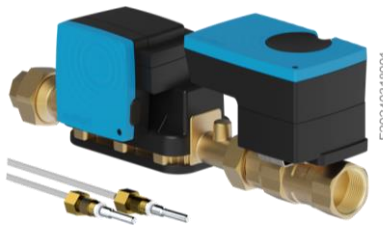
dynamx™ variable flow-control valves, series DXMB_C



DXMB2D032C.111721

- Electronic pressure-independent flow control
- 2-port or 3-port flow-control valves
- Integrated flow measurement
- Integrated ΔT measurement
- Power supply U_v: AC/DC 24Volt
- Flow setpoint via ctrl signal Y_1: 0..10Vdc or digital
- MP *MultiProtocol* : MODBUS RTU and BACnet MSTP communication
- Wireless commissioning through Bluetooth® communication
- Available with integrated application control functions [1)]

0..20'000 l/h

DN15..DN50

Dynamic Flow Networking®

The *dynamx*™ flow-control valves are designed for automatic and dynamic hydronic balancing and real-time flow-control at the same time, thus eliminating the need for extra balancing valves. The *dynamx*™ flow-control valves provide a perfect hydraulic balance in the hydraulic net, at full load as well as in part load, without any extra components: Dynamic Flow Networking® (DFN).

DFN ™

Advantages

- 4-in-1 solution
- automatic balancing
- V_{max} easily adjustable
- permanent flow measurement + control
- flow and energy recording
- MP *MultiProtocol* communications
- Bluetooth® on-board communication

Patented technology
EP2307938
EP2706425
EP3812870

Description

The *dynamx*™ Modular valves, series DXMB_C, are electronic, pressure-independent flow-control valves, that combine four functions: 1) a control valve, 2) a dynamic pressure-independent balancing valve, 3) a shut-off valve and 4) energy monitoring.

DXMB_C is used in HVAC systems with variable flow and is designed e.g. for AHU, heat exchangers, etc. DXMB_C replaces the (static) balancing valve, as well as the control valve.

The DXMB_C series are available as 2-port or 3-port valves with different flow ranges for optimal sizing. DXMB_C can be used in HVAC systems for buildings with a nominal system pressure of 16 bar (PN16) and water temperatures: +2°C..+100°C [2)] (non-condensing).

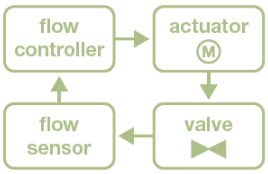
Content

1) optional
2) the pressures mentioned are maximum values, limited by the maximum admissible temperatures in the pressure-temperature flowchart

1. How it works

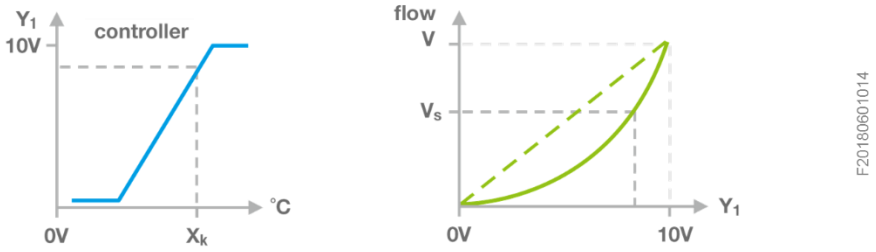
dynamx ™ flow-control valves are designed to accurately control the flow rate in any consumer. To do this, *dynamx*™ has 4 basic building blocks, namely a:

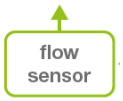
- control valve
- drive
- flow sensor
- flow controller



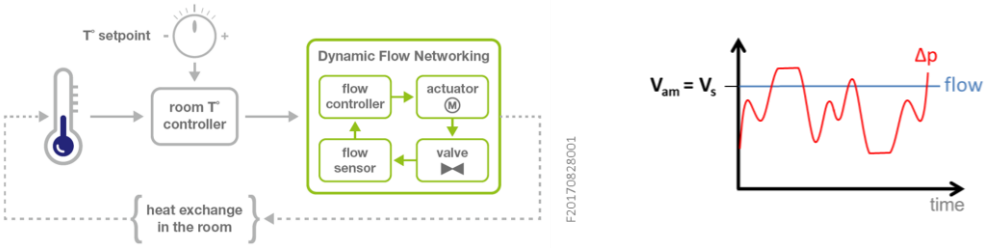
Additional functions can be added on top of these basic building blocks, such as bus communication, wireless communication or additional inputs.

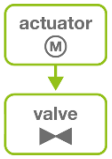
In analog mode, the internal flow controller of the *dynamx*™ valve receives a setpoint from the external controller Y_1: 0..10Vdc. Internally this setpoint is converted into a flow setpoint, either for heating or cooling. Example:





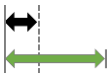
The integrated flow sensor measures continuously the actual flow. The intern control loop will compare the actual flow with the desired flow and adjust the position of the control valve until the measured flow is equal to the required flow rate setpoint.





DXMB_C will control the flow rate to a specified set point, independent of any pressure changes in the system at e.g. part load. The control valve automatically adapts to the system parameters and searches for the ideal set point, aiming for maximum user comfort with minimum energy consumption.

Independent of the operating mode, the DXMB_C can be applied for variable or constant flow control or for maximum flow limitation. The feedback signal X_1 : 0..10Vdc, reflects the actual flow rate and can be used to monitor the actual flow rate.



Thanks to this innovative technology, the *dynamx*™ valves can be used in a much larger flow range compared to traditional control valves.

Bluetooth®

DXMB_C has wireless Bluetooth® communication on board, which allows easy wireless commissioning via a smartphone or tablet, even from several meters away.

MP multiprotocol

The dynamx™ DXMB_C control valves are equipped with MP *MultiProtocol* communication allowing them to be integrated into both MODBUS and BACnet networks.

2. Technical data

Electrical data		
Power supply U_v		AC 24 Volt (±10%), 50Hz
		DC 24 Volt (±10%)
Power consumption	*during control*	3W (4VA)
	stand-by	1,5W (2VA)
Input signal Y_1		0..10Vdc (0.17mA)
Feedback signal X_1		0..10Vdc (≤ 2mA) the actual flow, scaled to the maximum flow settings for heating or cooling
Electric wiring		1m PVC cable, 4x 0,5mm²
Wiring MODBUS/BACnet		1m PVC cable, 1x2x 0,22mm² (STP)
Flow measurement		
Sensor type		ultrasonic TTM, no moving parts
Flow sensor class		according to MID-2014/32/EU, EN1434-4:2007
Measuring unit		m³/h [1], l/s, l/min, gpm (UK), gpm (US)
Temperature measurement		
Sensor type		Pt1000 according to EN60751
Sensor pairing		according to MID-2014/32/EU, EN1434-4:2007
Hydraulic		
Construction	*DXMB2_C*	2-port
	DXMB3_C	3-port, mixing
Nominal pressure rating		PN16 (16 bar) [2]
Control characteristic		equal percentage [1] or linear
Leakage rate	*control port*	watertight (acc. EN 60534-4 L/1), > class 4
	3-port bypass	< 1% of K_{vs} value
Differential pressure	Δp_{min}	no minimum differential pressure required
Maximum flow rate set point	V_{max}	analog (Y_1), via bus communication, or via APP
Medium		water (glycol free)
Medium quality		according to VDI 2035
Medium temperature		+2°C..+100°C
Connections	*inlet*	flat connection, female tail piece ISO7/1
	outlet	female ISO7/1 (Rp)
Start-up time		3..5min after power-up
Material		
Housing		polypropylene, steel
Wetted flow parts		brass CW602N[3], bronze, EPDM sealing, stainless steel (1.4122, 1.4401 and 1.4301), thermoplastics, ceramic materials

[1] Factory default

[2] The pressures given are maximum values limited by the maximum temperatures allowed in the pressure-temperature diagram

[3] All sizes in DZR-brass (CW602N) except for DN15 size, which is in standard brass (CW617N)

2. Technical data

Environment		
Temperature	*ambient*	0°C .. +45°C
	storage	-20°C .. +50°C
IP protection		IP54
Humidity		maximum 90% HR, without condensation
Mechanical environment		M1 (fixed installation with minimum vibrations)
Maintenance / calibration		without maintenance, without calibration

3. MP *MultiProtocol*

The *dynamx*™ DXMB_C control valves can optionally be supplied with an RS485 bus communication interface with the
MP *MultiProtocol* functionality for easy integration[1] into any building management system (BMS).

Thanks to this MP *MultiProtocol* communication, the DXMB_C valves can be integrated into different types of networks:

- MODBUS
- BACnet
- Bluetooth®

By integrating the *dynamx*™ control valves into a MODBUS or BACnet network, the set point can also be controlled by the bus, the actual flow rate can be monitored remotely, etc. The bus also provides the ability to customize a selection of settings.

System Integration		
Protocol	**MODBUS**	RTU/MSTP, slave
	BACnet	MSTP, slave
	Bluetooth®	with license-free APP, dxLink 21™
Physical layer wired network		RS485, isolated
Type of bus cable		2-wire twisted pair with common shielded twisted pair STP or FTP
Unit load		1/8
Terminal resistance		120Ω end resistor at each end of the bus
Communication settings [2]		9600, 19200 or **38400**[3] Baud 1 starter bit **even**[3] / odd / no parity 8 data bits 1 stop bit
Topology		multi-drop bus, maximum length 1,000m
Stub length		maximum 1m, preferably in daisy chain

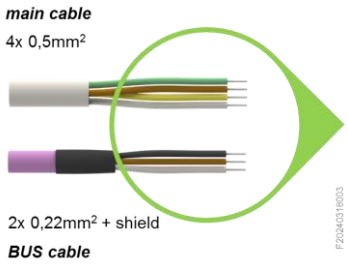
[1] the installer is responsible for compliance with local EMC regulations when installing, connecting and commissioning the DXMB_C in a communications bus network

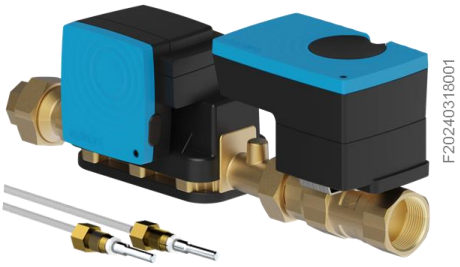
[2] can be set up via the Bluetooth® dxLink21™ APP or via the dxLink™ MS Windows commissioning tool via MODBUS communication

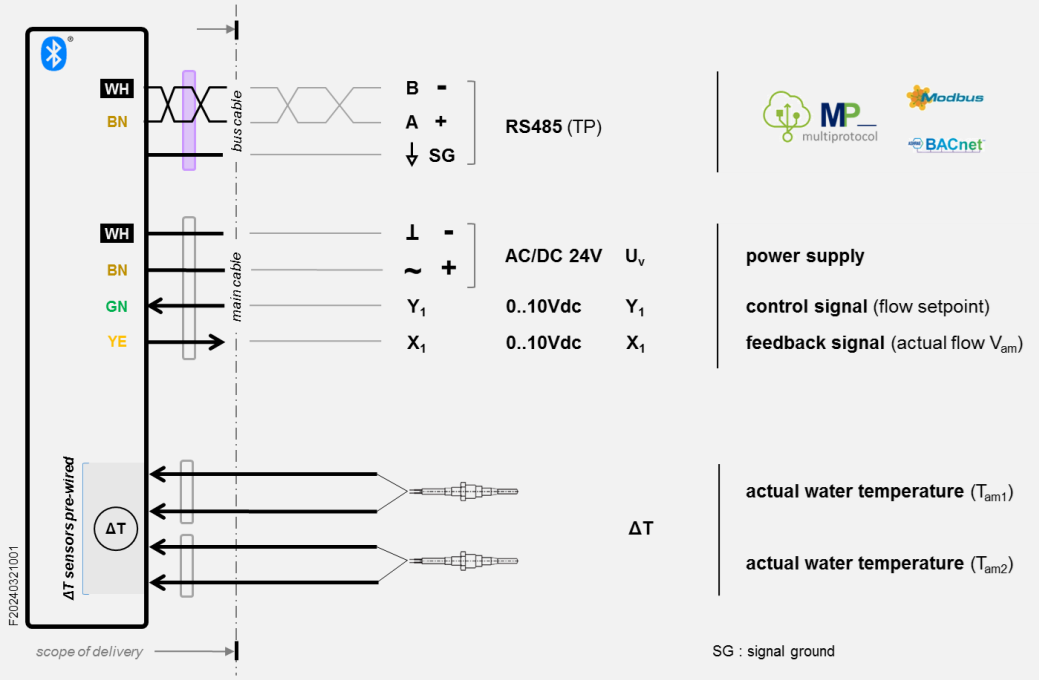
[3] factory default

4. Electrical wiring

DXMB_C. 111721







WH	BN	GN	YE	BU	PK	GY
white	brown	green	yellow	blue	pink	grey
wit	bruin	groen	geel	blauw	roos	grijs
blanc	brun	vert	jaune	bleu	rose	gris
weiß	braun	grün	gelb	blau	pink	grau

Individual wires are color coded, no numbering. Color coding according DIN 47100.

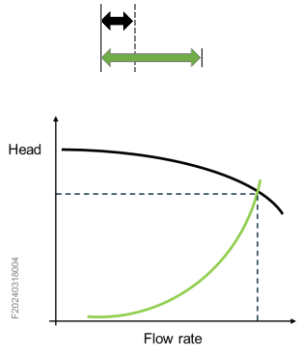
A low voltage transformer must be used in accordance with local regulations.

With alternating current, always observe the correct polarity!

In accordance with the Electromagnetic Compatibility Directive 2014/32/EU, according to the applied standards

- EN 61000-3-2 (2014)
- EN 61000-3-3 (2013)
- EN 61000-6-1 (2007)
- EN 61000-6-3 (2007) (A1: 2011 / AC: 2012)

5. Flow rate and pressure range



To enable optimal sizing and reduce pumping energy to the absolute minimum, *dynamx*™ flow-control valves, DXMB_C series, are available with different flow ranges.

During normal operation a differential pressure Δp is generated across the flow-control valve. As a rule of good practice and energy-friendly plant design, control valves at the design flow rate should be selected so that the differential pressure at this design flow rate is as low as possible. When selecting the flow range of the flow-control valve, the actual differential pressure Δp is preferably verified as provided in the BELPARTS calculation tools.

For normal operation and to ensure low-noise operation, it is recommended that the DXMB_C flow-control valves be used at all times with a differential pressure Δp lower than 200kPa.

		Δp_s							
Type	**DN**	**2-port**	**3-port**	**K_{vs}**	**V_{min}**	**V_5**	**V_{10}**	**V_{20}**	**V_{nom}**
	[mm]	[kPa]	[kPa]	[m³/h]	[l/h]	[l/h]	[l/h]	[l/h]	[l/h]
DXMB_D015C_	15	1.400	-	3,3	17	728	1.029	1.456	3.300
DXMB_D020C_	20	1.400	-	5,7	24	1.285	1.817	2.569	5.700
DXMB_D025C_	25	1.400	-	8,1	24	1.820	2.573	3.639	7.000
DXMB_D032C_	32	1.000	-	10,5	42	2.356	3.332	4.712	10.500
DXMB_D040C_	40	800	-	15,0	70	3.354	4.743	6.708	15.000
DXMB_D050C_	50	600	-	20,0	70	4.472	6.325	8.944	20.000

Flow rate range depending on the differential pressure Δp over the valve

Flow	**Δp**
V_5	5kPa
V_{10}	10kPa
V_{20}	20kPa

Legend

DN	DN size of the valve
Δp_s	maximum close-off differential pressure
K_{vs}	K_{vs}-value of DXMB_C
V_{min}	minimum flow rate of the DXMB_C
V_{nom}	maximum flow rate of the DXMB_C

V_{max} design flow rate = maximum flow rate set point in% (max.100% of V_{nom})

1 bar ≈ 100 kPa

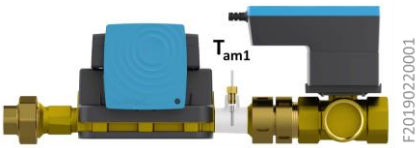
1 m/h^3 = 1.000 l/h = 16.7 l/min = 0.28 l/s

6. Temperature sensors

DXMB_ flow-control control valves come standard with two paired temperature sensors, for measuring supply and return water temperature. Both temperature sensors T_{am1} and T_{am2} have a free cable length of 2m.

T_{am11} + T_{am2} to measure the temperature difference of the medium, $\Delta T = | T_{am1} - T_{am2} |$

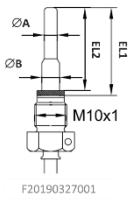
DXMB_ with paired temperature sensors pre-mounted ex-works



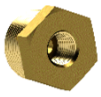
The temperature sensor T_{am1} is mounted ex-works in the *dynamx*™ unit.

The second temperature sensor T_{am2} is electrically connected to the DXMB_C unit ex works and is hydraulically mounted on site.

Both temperature sensors T_{am1} and T_{am2} have a free cable length of 2m.



T_{am1}	direct sensor M10x1, pre-mounted ex-works
T_{am2}	direct sensor M10x1, to be mounted on site (mounting not included)



009056

In the standard scope of delivery of the DXMB_C, one nipple (1pc, article ref.nr. 009056) is provided for mounting the temperature sensor T_{am2}. This nipple with R½ "external thread is provided with M10x1 female thread for the water temperature sensor T_{am2}.

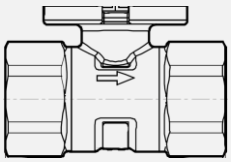
Remark: other accessories for the mounting of temperature sensors are not part of the delivery and can be ordered separately.

7. Installation

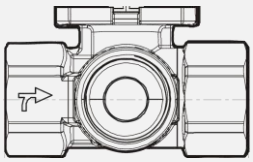
Flow direction

The DXMB_C flow-control valves have a fixed flow direction, as specified in the drawing.

An arrow on the valve body indicates the in- and outputs of the flow control valve.

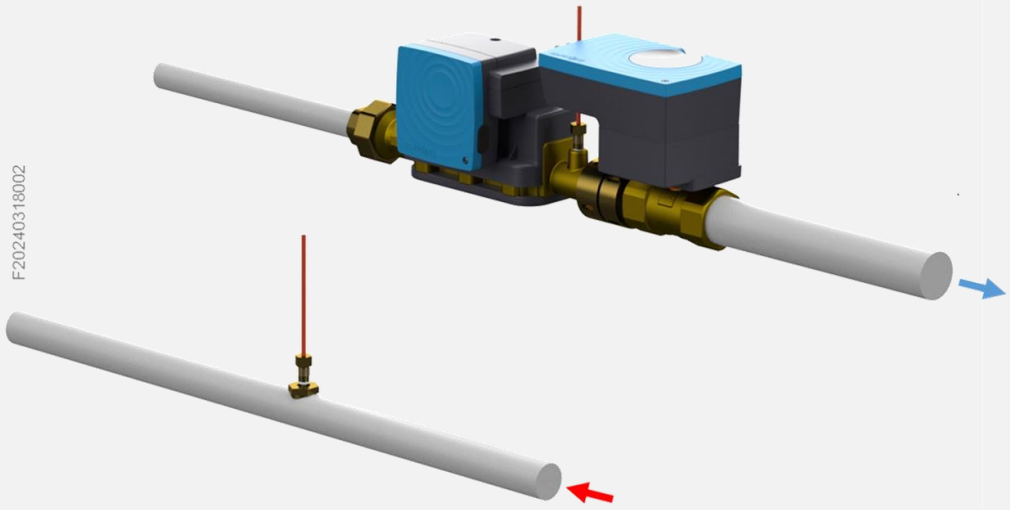


DXMB2_C
(2-port)

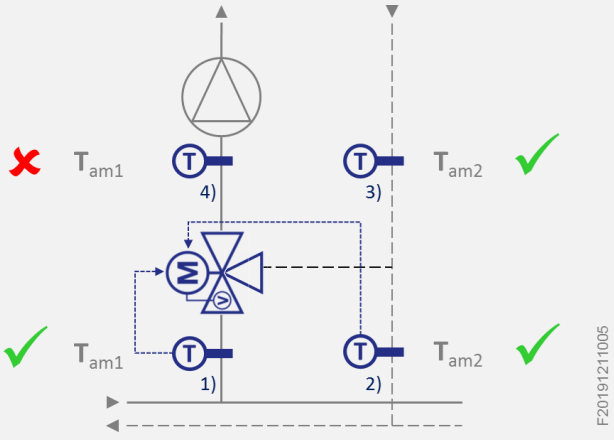


DXMB3_C
(3-port)

Example 2-port valve



Temperature sensors in 3-port applications



In 3-port mixing applications, it is very important that the external temperature sensors are mounted in the right place.

As a rule of thumb the temperature sensors need to “see” the same flow as the flow sensor of the device.

The figure on the right shows how to mount the temperature sensors.

8. Status LED

The two integrated LED's provide useful information during installation for easy commissioning:

+ 1x LED power supply
+ 1x LED status communication

9. Wireless commissioning dxLink21™

Available on the App Store

Google Play

Thanks to the integrated Bluetooth® technology, the DXMB_ valves provide a wireless interface for commissioning purposes.

There is no easier way to install and properly commission your hydraulic systems than with the dxLink™21 APP.

This function can be used simultaneously with MODBUS or BACnet bus communication.

Note: these features may not be available on all versions, check ordering information

10. Software tool dxLink™

All dynamx™ control valves can be easily integrated into any building management system but can also be used as standalone control valves.

dxLink™ is a software tool that allows dynamx™ control valves to be commissioned remotely, using the MODBUS bus communication capabilities of the control valves. This means that commissioning of a dynamx™ control valve does not require on-site intervention but can be performed from a central location. This significantly reduces the time required to commission the HVAC system and makes the system less prone to errors.

The dxLink™ software works with the Windows operating system.

11. Related information

1	Mounting Instructions		MI 20190712001B
2	MODBUS RTU - register list		MI 20220105001A
3	BACnet MSTP - PICS		MI 20220105002A
4	REVIT data files (BIM)	🔗	www.belparts.com

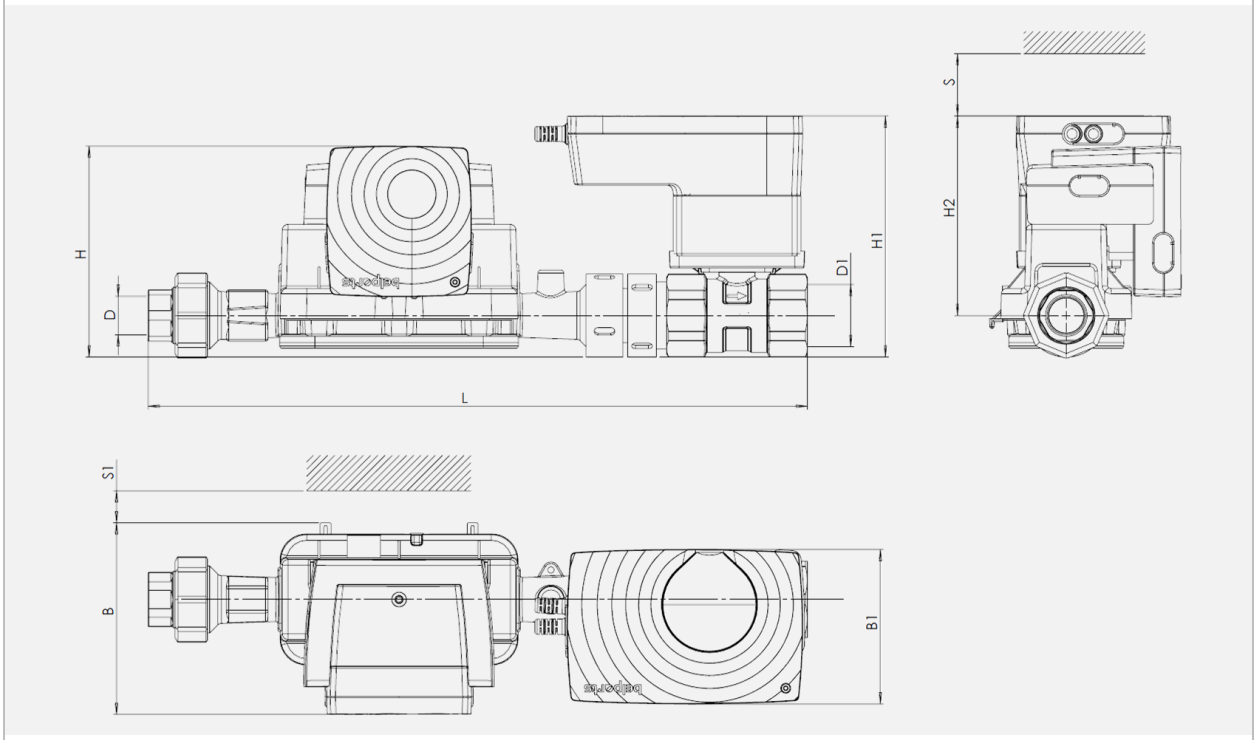
12. Intellectual property

DXMB_ is based on technology protected by international patents:

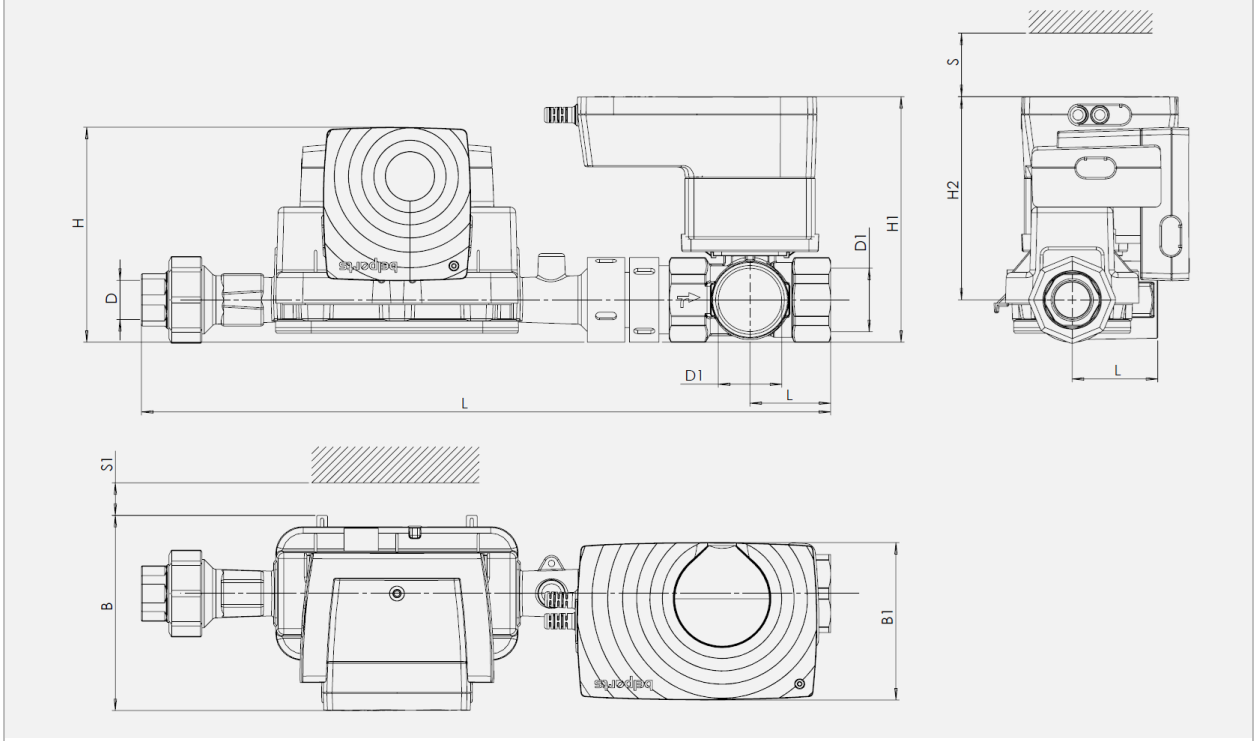
- European Patent No. EP2307938
- European Patent No. EP2706425
- European Patent No. EP3812870
- Chinese patent no. ZL200880130728.9
- United States Patent No. US9823666
- United States Patent No. US10394257
- Registered community model RCD No. 004030633-0001
- Registered community model RCD No. 004030633-0002

13. Dimensions

DXMB2_C.111721



DXMB3_C.111721



13. Dimensions

DXMB-ONE W TP	Afmetingen											
	L	L1	L2	H	H1	D/D1 (D1)	D/D1 (D)	H2	S1	B	B1	S
DXMB2C015	304	na	na	108	168		1/2"	118	Min 50	134	96	Min 40
DXMB3C015	309	33	34	108	168		1/2"	118	Min 50	134	96	Min 40
DXMB2C020	383	na	na	130	143		3/4"	118	Min 50	120	97	Min 40
DXMB3C020	387	36	37	130	143		3/4"	118	Min 50	120	97	Min 40
DXMB2C025	410	na	na	129	145	1"	3/4"	121	Min 50	120	97	Min 40
DXMB3C025	419	43	45	129	145	1"	3/4"	121	Min 50	120	97	Min 40
DXMB2C032	431	na	na	132	151	1 1/4"	3/4"	125	Min 50	120	97	Min 40
DXMB3C032	442	50	53	132	151	1 1/4"	3/4"	125	Min 50	120	97	Min 40
DXMB2C040	498	na	na	144	168	1 1/2"	1 1/4"	130	Min 50	120	97	Min 40
DXMB3C040	502	55	57	144	168	1 1/2"	1 1/4"	130	Min 50	120	97	Min 40
DXMB2C050	513	na	na	143	181	2"	1 1/4"	143	Min 50	120	101	Min 40
DXMB3C050	529	66	69	144	181	2"	1 1/4"	143	Min 50	120	104	Min 40

14. Item reference numbers

DXMB	2	D	025	C	1	1	1	7	2	1	
SERIES					VERSION						
											***dynamx*™ Series flow-control valves**
DXMB											**DXMB** *dynamx*™ Modular
											Number of ports
	2										**2** 2-port flow-control valve
	3										**3** 3-port flow-control valve (mixing)
											Mounting
		D									**D** threaded, female ISO7/1
											Size (DN)
			015								**015** DN15
			020								**020** DN20
			025								**025** DN25
			032								**032** DN32
			040								**040** DN40
			050								**050** DN50
											Function
				C							**C** standard flow-control functionality
											Power supply
					1						**1** AC/DC 24 Volt
											Version
						1					**1** standard version
											User interface
							1				**1** with integrated Bluetooth® communication
											Bus-communication
								7			**7** with *MultiProtocol* comm [1], RS485 isolated
											ΔT measurement
									2		**2** with ΔT measurement (T_{am1} + T_{am2})
											Cable length
										1	**1** standard cable length (PVC)

[1] *MultiProtocol* : MODBUS RTU and BACnet MSTP

15. Overview

Type	DN [mm]	V_5 [l/h]	V_{10} [l/h]	V_{20} [l/h]	Δp_s [kPa]	U_v [Volt]	Y_1 [Volt]	Sensors: Flow	Sensors: Di	Sensors: ΔT	Ctrl: Flow	MultiProtocol: Bluetooth	MultiProtocol: BACnet/IP	MultiProtocol: MODBUS	MultiProtocol: BACnet
						AC/DC 24 V	0..10Vdc		3x						
2-port version		*Design flow at Δp* 5kPa	10kPa	20kPa											
▲ **DXMB2D015C.111721**	15	728	1.029	1.456	1.400	●	●	●	-	●	●	●	-	●	●
▲ **DXMB2D020C.111721**	20	1.285	1.817	2.569	1.400	●	●	●	-	●	●	●	-	●	●
▲ **DXMB2D025C.111721**	25	1.820	2.573	3.639	1.400	●	●	●	-	●	●	●	-	●	●
▲ **DXMB2D032C.111721**	32	2.356	3.332	4.712	1.000	●	●	●	-	●	●	●	-	●	●
▲ **DXMB2D040C.111721**	40	3.354	4.743	6.708	800	●	●	●	-	●	●	●	-	●	●
▲ **DXMB2D050C.111721**	50	4.472	6.325	8.944	600	●	●	●	-	●	●	●	-	●	●
3-port version		*Design flow at Δp* 5kPa	10kPa	20kPa											
▲ **DXMB3D015C.111721**	15	728	1.029	1.456	-	●	●	●	-	●	●	●	-	●	●
▲ **DXMB3D020C.111721**	20	1.285	1.817	2.569	-	●	●	●	-	●	●	●	-	●	●
▲ **DXMB3D025C.111721**	25	1.820	2.573	3.639	-	●	●	●	-	●	●	●	-	●	●
▲ **DXMB3D032C.111721**	32	2.356	3.332	4.712	-	●	●	●	-	●	●	●	-	●	●
▲ **DXMB3D040C.111721**	40	3.354	4.743	6.708	-	●	●	●	-	●	●	●	-	●	●
▲ **DXMB3D050C.111721**	50	4.472	6.325	8.944	-	●	●	●	-	●	●	●	-	●	●

Legend

DN	valve size	**V_5**	design flow at Δp 5kPa	**Di**	digital input
Δp_s	maximum close-off differential pressure	**V_{10}**	design flow at Δp 10kPa	**ΔT**	water temperature difference
	Bluetooth® for wireless commissioning	**V_{20}**	design flow at Δp 20kPa		

▲ standard
△ on request (min. quantities and/or longer lead times may apply, please contact us)