

UVC 106: Dynamic flow control system with 6-way ball valve, eValveco

How energy efficiency is improved

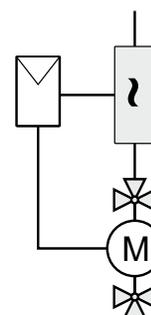
The SAUTER eValveco flow control system is the energy-efficient solution for variable flow control

Features

- Pressure-independent variable flow control
- Integrated flow measurement with feedback
- Easy integration into every building management system
- Variable flow rate setpoint for heating and cooling modes
- For climate ceilings with changeover (4-pipe)



UVC106MF0*5



Technical data

Electronic power supply

Power supply	24 V~, ±20%, 50 Hz
Power consumption during operation	3 W (4 VA)
Power consumption when idle	1.5 W (2 VA)
Peak inrush current	5 A [3 ms]
Input signal	X _S : 0...10 V= (0.17 mA), split-range 0.5...4.5 V= heating 5.5...9.5 V= cooling R _i ≥ 60 kΩ
Feedback signal ¹⁾	X _i : 0...10 V= (max. 2 mA)
Feedback signal resolution	Approx. 100 mV

Parameters

Setpoint adjustment	Analogue (Y ₁) or via Modbus
Type of sensor	TTM ultrasonic sensor, no moving parts
Unit of measurement ²⁾	[m ³ /h], l/s, l/min, gpm (UK), gpm (US)
Measuring accuracy	±3% of actual value
Minimum controllable flow ³⁾	3 l/h
Readiness for operation	3...5 minutes after switching on
Valve and actuator	
Nominal pressure	PN16
Differential pressure Δp ⁴⁾	Max. 2 bar (200 kPa)
Medium ⁵⁾	Water (glycol-free)
Temperature of medium	5...90 °C
Leakage rate in % of K _{Vs}	0.001 %
Control characteristic	Equal-percentage (factory setting) or linear

Interfaces and communication

Bus connector	STP cable, 1 × double twisted
BMS integration	
Protocol	Modbus/RTU, slave
Connection ⁶⁾	RS-485, double twisted cable (with shared lead)
Cable type	Shielded 2-core cable, STP or FTP
Baud rate ⁷⁾	9600, 19200, 38400 baud
Terminating resistor	At both ends 120 Ω

Construction

Power cable	PVC cable, 7 × 0.5 mm ² (length 1 m)
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¹⁾ In relation to the measured actual flow

²⁾ Unit in []: Factory setting

³⁾ In relation to the measured actual flow

⁴⁾ No minimum differential pressure required

⁵⁾ In accordance with VDI 2035 sheet 2

⁶⁾ Not electrically isolated

⁷⁾ Factory setting: 38400 baud, 8 data bits, even parity, 1 stop bit



Housing material	Flow sensor: ABS Actuator: Flame retardant plastic 6-way ball valve: CW617N Flow meter: CW617N
Connection	DN 15 ISO228/1: 5 × G $\frac{1}{2}$ " + 1 × G $\frac{3}{4}$ " DN 25 ISO228/1: 6 × G1"

Ambient conditions	
Admissible ambient temperature	10...45 °C
Admissible storage temperature	-20...50 °C
Admissible ambient humidity	Max. 85% rh, non-condensing

Standards and directives	
Type of protection ⁸⁾	IP54 (EN 60529), horizontal
CE conformity according to	EMC Directive 2014/30/EU EN 61000-3-2 (2014) EN 61000-3-3 (2013) EN 61000-6-1 (2007) EN 61000-6-3 (2007) (A1: 2011 / AC: 2012)
	PED 2014/68/EU Fluid group II, no CE label

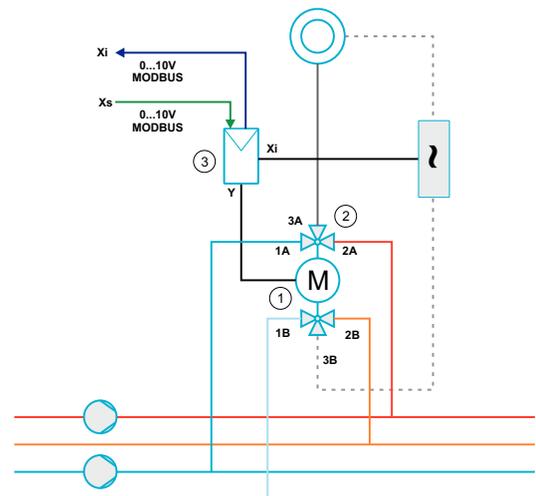
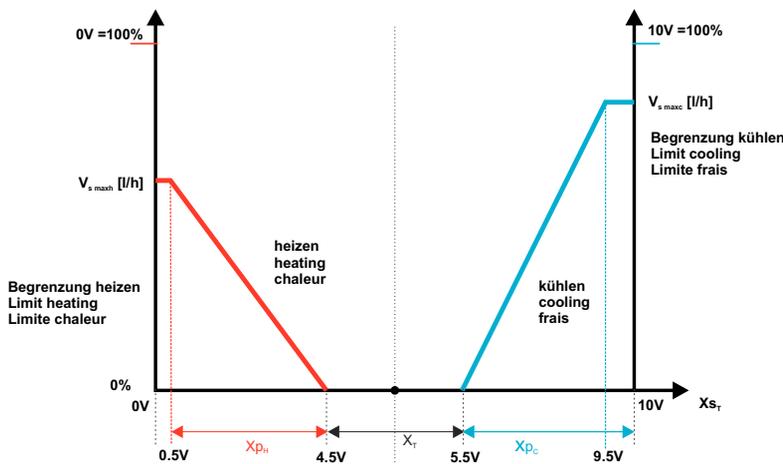
Overview of types				
Type	Description	Flow range	K _{vs} value	Weight
UVC106MF015	Electronic flow control valve with 6-way ball valve, DN 15	0...1400 l/h	1.4 m ³	2.5 kg
UVC106MF025	Electronic flow control valve with 6-way ball valve, DN 25	0...2500 l/h	2.5 m ³	4 kg

Description of operation

The eValveco (UVC 106) dynamic electronic flow control valve is used in variable flow HVAC systems. It is designed for climate ceilings or fan coil units with a switchover between heating and cooling mode (4-pipe systems).

The system is used for automatic hydronic balancing in the full and partial load ranges, and for real-time flow control. It thus replaces a static balancing valve and a control valve or ball valve.

The UVC 106 receives a setpoint from the external room-temperature controller. This setpoint can be specified as an analogue value (0...10 V) or digitally as Modbus. In order to allow specification of a setpoint via a room operating unit, a split-range unit signal for regulating the heating sequence (0.5...4.5 V) and the cooling sequence (5.5...9.5 V) is required.



⁸⁾ See fitting instructions P1000xxxx

The setpoint from the room-temperature controller is converted into a flow setpoint in the UVC 106 (3). The integrated ultrasonic flow meter has no moving parts and continuously measures the actual flow rate. The internal control loop adjusts the flow rate independently of pressure fluctuations (e.g. in the partial load range) via the position of the regulating ball valve (2) via the ball valve actuator (1) until the measured flow rate corresponds to the required setpoint. This ensures maximum comfort with minimum energy consumption for the user.

The maximum flow setpoints for the heating and cooling modes are set separately using Modbus parameters.

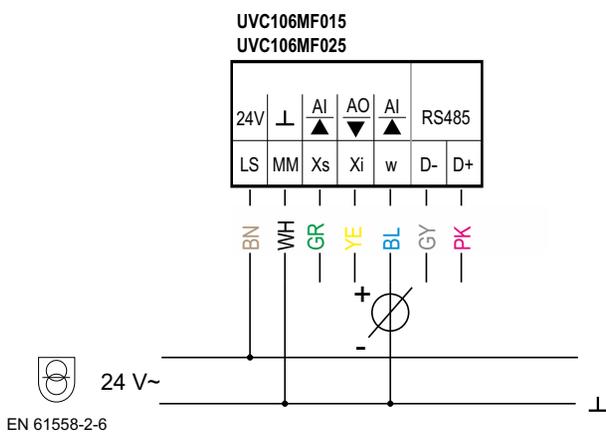
- \dot{V}_{maxC} : maximum flow rate for the cooling
- \dot{V}_{maxH} : maximum flow rate for the heating

For rinsing the system, 0.5 V can be specified for the heating sequence and 9.5 V for the cooling sequence. This opens the ball valve completely.

An analogue or digital output signal can be used for function monitoring or feedback to the building management system.

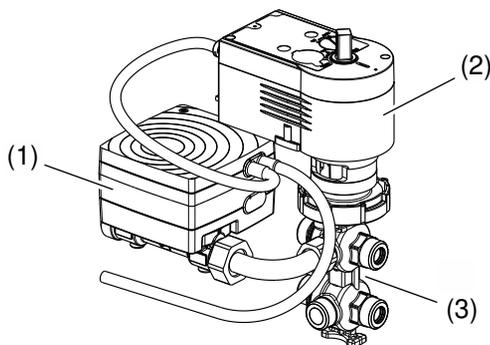
Volume flow limitation

The system provides parameters for minimum and maximum volume flow limits. The limitation ensures that the flow does not go over or under these values in any operating case. The system completely opens or closes the ball valve as long as the minimum or maximum value is not reached. This means the position of the ball valve always depends on the prevailing system pressure.



System structure

The dynamic flow control system consists of three main components:



- (1) Flow measuring unit
- (2) Rotary actuator for the 6-way ball valve
- (3) 6-way ball valve

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the "Description of operation" section.

All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Improper use

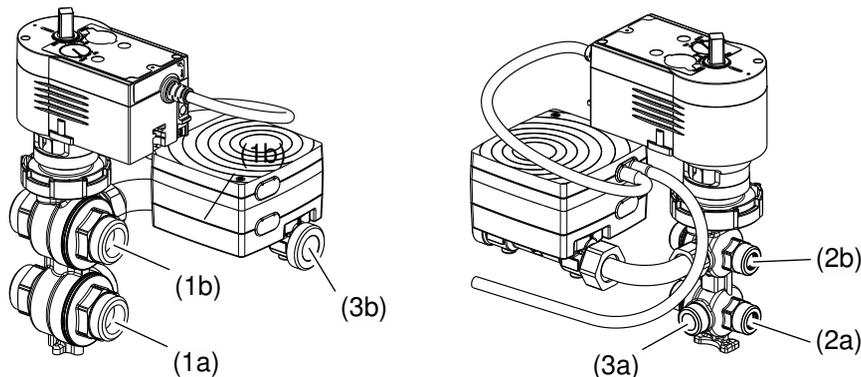
The dynamic flow control system is designed for the dynamic flow control in control circuits with water (glycol-free). It is not permitted to fit it outdoors or modify it.

The eValveco flow control system does not meet the conformity requirements of the Measuring Instruments Directive 2014/32/EU.

The system is not suitable for use in drinking water systems according to the directives 98/83/EC and 2015/1787/EU.

Engineering and fitting notes

Supply and return of the UVC 106



	Supply	Return
Cooling 	1a	1b
Heating 	2a	2b
Terminating elements	3a	3b

Pressure relief function

These 6-way ball valves are equipped with an internal pressure relief function. A change in the media temperature (closed valve position, 45°) in the heated/chilled ceiling can cause positive pressure or negative pressure. This could possibly damage the heated/chilled ceiling. The pressure relief function prevents this damage because the pressure in the heated/chilled ceiling is balanced with the pressure via the supply line of sequence 1 (heating sequence).

Note



The following must be considered when checking the pressure: When the consumer is connected the pressure check can be carried out at a 0° or 90° angle of rotation of the 6-way ball valve. In the 45° middle position it must be considered that the consumer is loaded with pressure via sequence 1 (heating sequence). This is caused by the pressure relief function integrated in the 6-way ball valve.

Without a connected consumer the test medium flows via sequence 1 (heating sequence) in the 45° position (6-way ball valve closed). This is caused by the pressure relief function integrated in the 6-way ball valve. It is possible to check the circuits separately. In the 90° position sequence 1 (heating sequence) can be checked and in the 0° position sequence 2 (cooling sequence). Before the sequence changeover, the circuit already checked must be made pressure-free. Or the connections to the consumer must be closed for the duration of the pressure check.

With the 6-way ball valve, the system can be modified to a 4-pipe system.

The UVC 106 receives a setpoint from the room operating unit via a control signal (split range 0...10 V). This setpoint is converted internally for the flow rate setpoint. The integrated flow meter continuously measures the actual flow rate. The internal control loop adjusts the position of the control valve until the measured flow rate corresponds to the required setpoint.

The eValveco electronic flow control valve regulates the flow rate independently of potential pressure fluctuations in the system in the direction of a specific setpoint. The flow rate is defined by an external

analogue control signal (0...10 V) that is generally output by a room operating unit. This split-range signal is used to control the heating (0.5...4.5 V) and the cooling (5.5...9.5 V).

Error handling

Self-test

When it is switched on, the device performs a self-test and checks the program and data memory. If one of these checks fails, an error bit is set depending on the type of error. This can be read via Modbus.



CAUTION!

If the system is operated outside the valid temperature range, it cannot achieve its guaranteed accuracy. This may result in irreparable damage to the product. If the water temperature is outside the valid temperature range, warning bit "b0" is set to 1. The warning bit is deleted as soon as the temperature is back in the specified range.

► Always operate the system within the valid temperature range.



Note

If the required setpoint is between the closed ball valve position and the smallest possible opening, the controller alternately opens and closes the ball valve. In this case, the mean volume flow corresponds to the setpoint.

Error

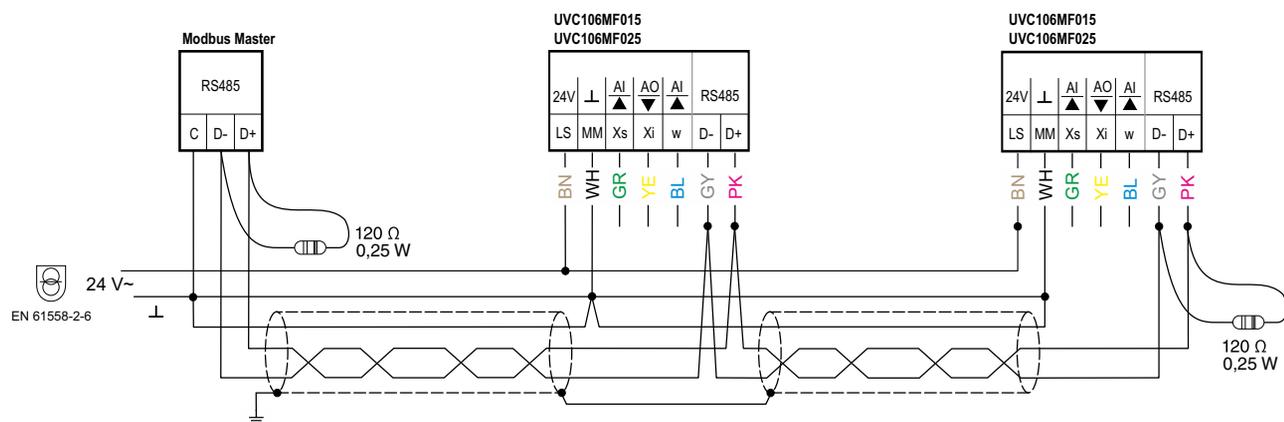
In the event of a system error, the following information is provided:

- b0: Error in CRC check during boot process.
- b1: EEPROM area error while booting.
- b2: Invalid variable: This bit is set when a variable outside the valid range is entered. It is reset as soon as the variable is entered in the correct range.
- b3: Conflict on changeover switching: This bit is set if Y_{1h} and Y_{1c} are both higher than their respective minimum values Y_{1minh} and Y_{1minc} .
- b4 and b5: unused, reserved for future use

Modbus

The system is equipped with an RS-485 Modbus interface. All the Modbus parameters are listed in the manual P100017780.

RS-485 bus connection



The max. admissible bus length depends on the cable type used and the correct termination with terminating resistors. In general, a 2-wire shielded cable with twisted wire pairs must be used. Use of one of the following cable types is recommended:

- Lapp cable UNITRONIC® BUS LD 2170204
- Lapp cable UNITRONIC® BUS LD FD P 2170214
- Belden 9842
- Belden 3106A
- Belden 3107A

Observe the correct polarity of all signals. The cable shield of the entire bus line must be connected continuously, and connected to protective earth as directly as possible at one location. The cable

length is max. 8 cm in order to achieve optimum resistance to interference. The shielding is to be earthed in the plant as follows:

- Shielding earthed at one end is suitable for protection from electrical interference, e.g. from overhead power lines, static charges etc.
- Shielding earthed at both ends is suitable for protection from electromagnetic interference, e.g. from frequency converters, electric motors, coils etc.

CAUTION!



Faulty wiring can result in damage to the device.

- ▶ Connect all devices in a network to the same power supply.
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For Ethernet CAT-5 cables and J-Y(ST)Y cables, a bus length of up to 500 m is possible. The length of the bus line is limited by the following parameters:

- Number of connected devices
- Cross-section of cable used

In the case of RS-485 interfaces, the bus wiring must follow line topology. Star, tree or branch topologies are not recommended. The devices do not have internal terminating resistors. Therefore, a terminating resistor of 120 Ω (0.25 W) must be connected at the start and end of the bus line, parallel to the D+/D- data lines.

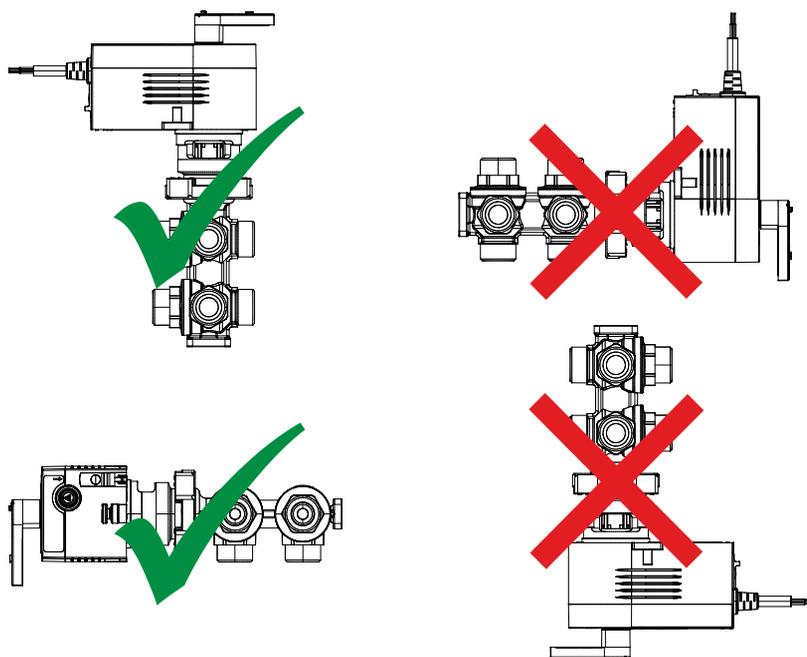
Fitting position

CAUTION!

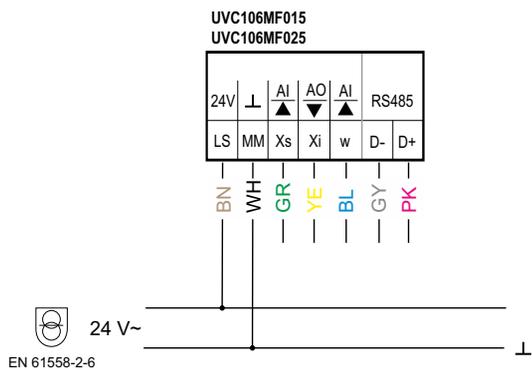


Condensate or dripping water entering the actuator can damage it.

- ▶ Do not fit the 6-way ball valve in a suspended position.
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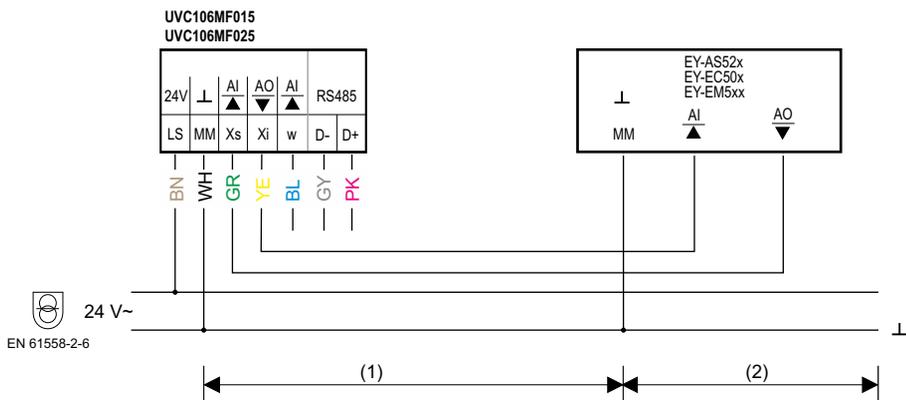


Connection diagram



Type	Function	Colour
LS	24 V~	Brown (BN)
MM	Power supply ground	White (WH)
Xi (actual value)	0...10 V	Yellow (YE)
Xs (setpoint)	0...10 V	Green (GR)
w (setpoint shift)	0...10 V	Blue (BL)
Modbus RS-485	D-	Grey (GY)
Modbus RS-485	D+	Pink (PK)

Connection diagram: Application with analogue actual value and setpoint

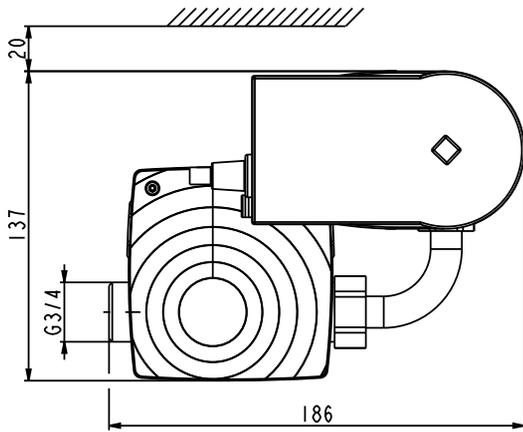
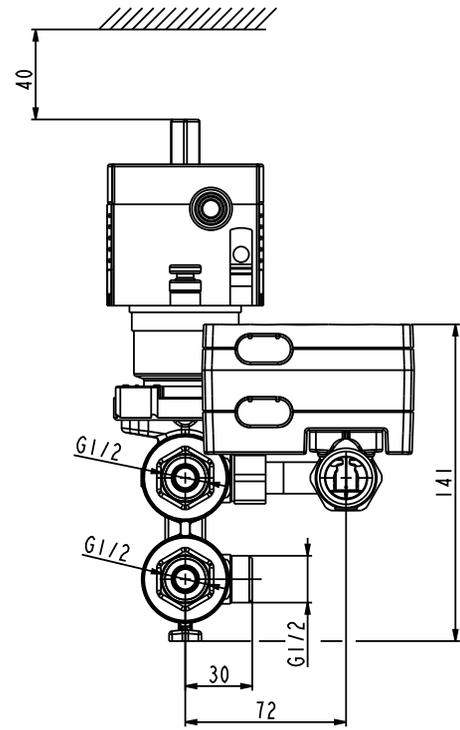
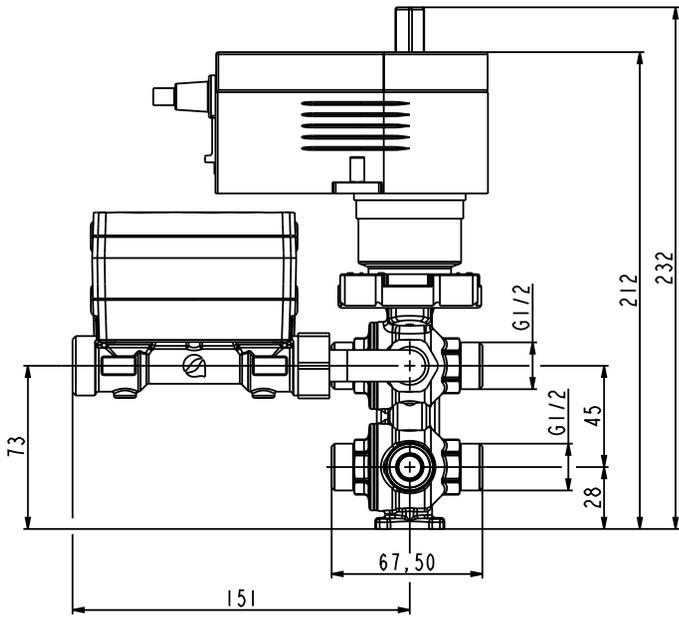


- (1) Components with distance to power source
- (2) Power source close to the controller

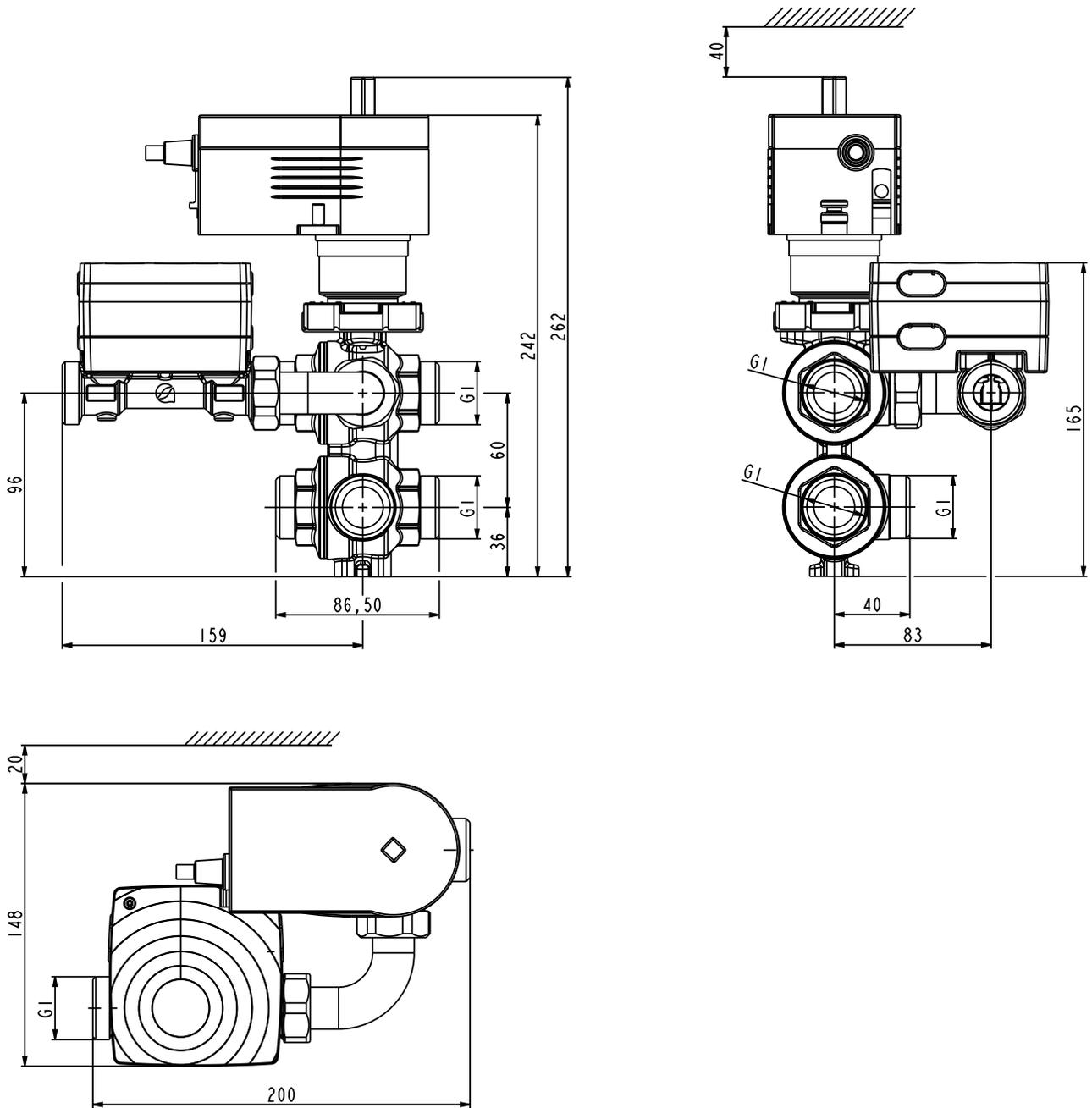
Dimension drawings

All dimensions in millimetres.

UVC106MF015



UVC106MF025



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