SIEMENS

ACVATIX™

Intelligent Valve – 3-port control valve with integrated energy measurement

EXG.., EXF..

3-port control valve with integrated energy data acquisition for ventilation and air conditioning plants as well as precontrol circuits. Sensor-guided dynamic flow control.

- Threaded valves EXG4U10E..:
  - DN 15…50
  - Nominal volume flow 1.2…12 m^3/h
  - Externally threaded connection per ISO-228
- Flanged valves EXF4U20E..:
  - DN 65…100
  - Nominal volume flow 20…50 m^3/h
  - Flange connection per ISO 7005-1
- System integration in building control technology over BACnet IP
- System integration in building automation and control over Modbus RTU
- Supports the direct transfer to Siemens Building Operator
- Ultrasonic volume flow measurement at measuring accuracy ± 2 %
- Temperature measurement with paired immersion temperature sensors

Use

Intelligent Valves EXG.. and EXF.. are 3-port valves with volume flow, temperature and power measurement for heating, ventilation, and air conditioning plants.

The valve can be integrated as analog (DC 0/2...10 V or 4...20 mA) or digital (BACnet IP/ Modbus RTU) into the temperature control circuit. All process data (volume flow, power, primary flow and return temperature, etc.) can still be read out digitally even if integrated as analog.

The Intelligent Valve also has local limitation and optimization functions that support energy-efficient plant operation.

In addition to digital integration in the building automation and control system, integration in the cloud with the Siemens Building Operator app supports the building operator to operate and monitor the system as well as evaluate energy consumption.

The Intelligent Valve has 3 control functions:

- Dynamic control valve
- Flow temperature controller
- Outside temperature-dependent flow temperature controller

Volume flow limitation and energy acquisition are available at any time in all 3 control functions.

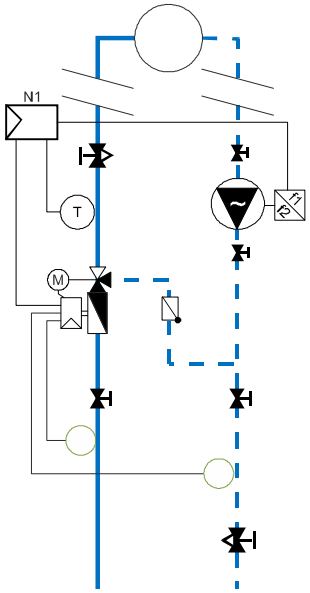
Intelligent Valve as **dynamic 3-port valve**

In this control function, the Intelligent Valve is part of a temperature control circuit and receives a setpoint from a superposed automation station that it interprets, depending on the control mode, as valve position, volume flow, or output and controls accordingly.

The example to the right depicts this based on a precontrol circuit for chilled ceilings.

Automation station [N1] control the flow temperature of the chilled ceiling circuit by demand and specifies the setpoint of 0…100 % on the Intelligent Valve. This can occur in analog (0…100 % = DC 0…10 V) form or else remotely over BACnet IP or Modbus RTU.

The Intelligent Valve follows this setpoint and sets, for example in volume flow control mode, the appropriate volume flow on port A.



Intelligent Valve as **flow temperature controller without outside air temperature sensor**

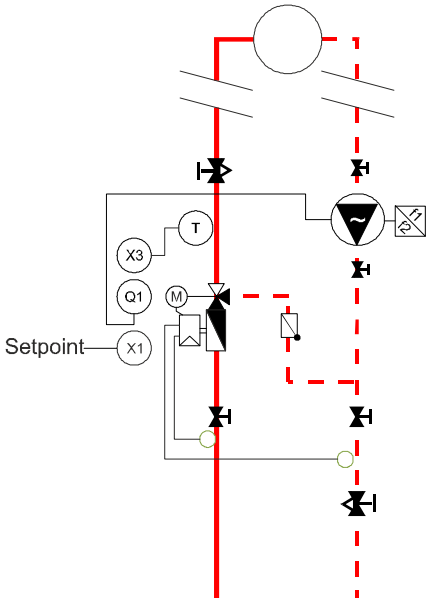
In this control function, the Intelligent Valve assumes the role of the automation station.

Using an auxiliary secondary flow temperature sensor [X3], it acquires the flow temperature and controls to the present temperature setpoint by adjusting the volume flow for port A and B.

Possible sensor types at [X3] are passive sensors with sensing elements LG-Ni-1000, DIN-Ni-1000 or Pt1000 (385/EU).

The temperature setpoint can be preset externally via BACnet IP and Modbus RTU or analog at [X1] (0...10 V = 0...100 °C).

The secondary pump is released by relais [Q1] as soon as the setpoint for secondary flow temperature is > 0 °C.



Intelligent Valve as **outside temperature-dependent flow temperature control**

The Intelligent Valve can control the valve in a heating group to a flow temperature based on the outside temperature. In this control function, the Intelligent Valve assumes the role of the automation station.

In outside temperature-dependent control, the flow temperature [X3] is assigned to the prevailing outside air temperature [X1] via the heating curve.

Possible sensor types at [X3] are passive sensors with sensing elements LG-Ni-1000, DIN-Ni-1000 or Pt1000 (385/EU), or active sensors (0...10 V = -50...50 °C).

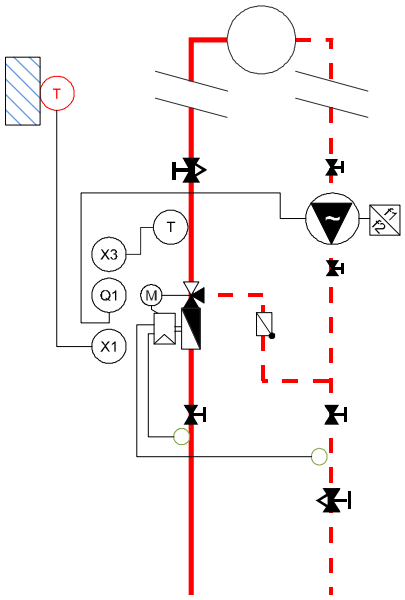
The secondary flow temperature sensor [X3] acquires the present flow temperature and the Intelligent Valve controls it to the determined flow temperature setpoint by adjusting the volume flow for port A and B.

Possible sensor types at [X3] are passive sensors with sensing elements LG-Ni-1000, DIN-Ni-1000 or Pt1000 (385/EU).

In addition to the heating curve, a weekly timeswitch can also preset the room operating mode (Comfort, Pre-Comfort, Economy, Protection).

The heating curve and the weekly scheduler are set in ABT Go.

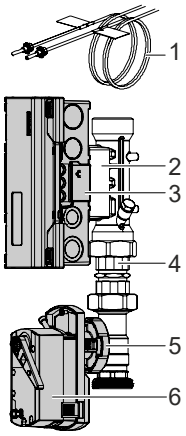
The heating circuit pump can be released or locked with relay [Q1].

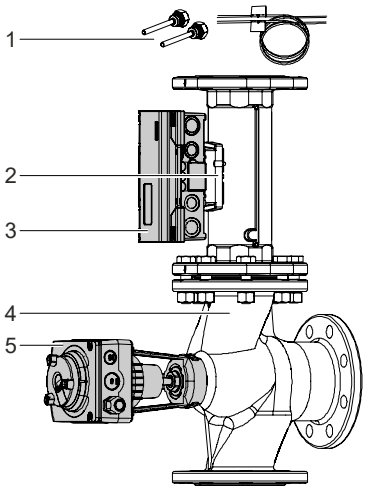


Basic design

The Intelligent Valve combines four main functions:

- Exact, continuous volume flow measurement with an ultrasonic flow sensor
- Precise temperature measurement using paired Pt1000 temperature sensors
- Precise volume control using a control valve with a high-resolution actuator
- Dynamic hydraulic balancing, power and energy calculations, storage of cumulated flow and energy data as well as network integration via a central control unit

EXG4U10E..			EXF4U20E..
	1	Temperature sensor pair (>DN 50 with protective pockets)	1
	2	Ultrasonic flow sensor	2
	3	Intelligent Valve controller – Sensor interface – Dynamic volume flow control – Power and energy measurement – Heat exchanger optimized – Storage of cumulated flow and energy data – Network integration	3
	4	Flow sensor/valve interface	-
	5	3-port valve	4
		Ball valve / Globe valve	
	6	High-resolution actuator	5



Volume flow is acquired continuously in the ultrasonic flow sensor and provided to the Intelligent Valve controller, where the controller applies it as the actual value for control or limitation by guiding the control valve position until the volume flow actual value for the applicable setpoint is achieved.

Control modes as dynamic control valve

The Intelligent Valve supports 3 control modes in this control function:

- Volume flow control
- Position control
- Output control

Volume flow limitation is active on all 3 control modes!

Volume flow control

In the basic configuration, the Intelligent Valve acts as the flow controller on port A. This control mode is referred to as volume flow control. The positioning signal is proportional to the volume flow of port A to be controlled (setpoint 0 % = closed; setpoint 100 % = $\dot{V}_{100}$). The setpoint range reflects new limit values (setpoint 0 % = $\dot{V}_{min}$, setpoint 100 % = $\dot{V}_{max}$), if volume flow limitation ($\dot{V}_{min}$ and/or $\dot{V}_{max}$) is activated.

It does not make sense to adapt the control characteristic on port A; as a result, the control characteristic should remain on the factory setting “linear”.

Position control

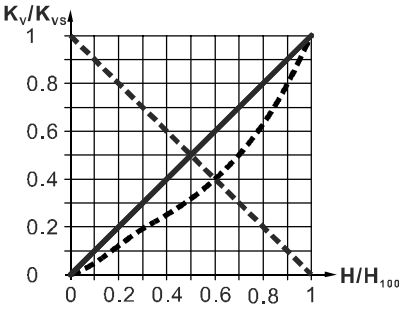
The control valve position is proportional to the setpoint (setpoint 0 % = closed; setpoint 100 % = H_{100}) – whereby the limitation to the applicable maximum volume flow ($\dot{V}_{100}$ or $\dot{V}_{max}$) remains active.

Dynamic volume flow control is inactive in position control mode. There is no electronic modification to the k_{VS} valve characteristic.

The k_{VS} valve characteristic curve is derived by combining the control valve or control ball valve characteristic and the resistance characteristic of the flow sensor.

This results in an equal percentage k_{VS} valve characteristic curve with a ngl 2.2 for valves with a threaded connection EXG.. (- - - - - -); the k_{VS} valve characteristic curve for flanged valves EXF.. is nearly linear (——————).

The characteristic curve in the through-port is linear (- - - - - -).



Output control

The design output is the reference variable. It is defined by:

- Design volume flow $\dot{V}_{max}$
- Design temperatures $T_{VL,\ design}$ and $T_{RL,\ design}$

Design output = c × design volume flow × difference of the design temperatures

$\dot{Q}_{design} \sim \dot{V}_{max} \times (T_{VL,\ design} - T_{RL,\ design})$

whereby $\dot{Q}_{max}$ is the output limitation in %, relating to the design output of the consumption (heat exchanger/precontrol circuit).

The setpoint for the output for control is interpreted by referencing the output limitation – (Y = 0…100 % $\dot{Q}_{max}$; 0 % = closed; 100 % = $\dot{Q}_{max}$),

The "Sizing" section provides a table of the output values for water at typical temperature differences (Sizing as dynamic control valve [→ 7]).

The volume flow maximum limitation ($\dot{V}_{100}$ or $\dot{V}_{max}$) also remains active in the output control mode. In output control, the dynamic volume flow control is inactive, since any undesired change in volume flow automatically results in a change in output, which is controlled anyway.

The flow characteristic curve is not relevant to output control.

Operating limits

Nominal volume flow and minimum required differential pressure

The Intelligent Valve has, as does any dynamic control valve, a nominal flow $\dot{V}_{100}$ by build design that may not be exceeded during operation. A minimum differential pressure (Δp_{min}) is required to achieve nominal volume flow; it is calculated from the Intelligent Valve k_{vs} value. In contrast to mechanical PICVs, the electronic volume flow control on the Intelligent Valve remains active below the minimum differential pressure – so that the network is always optimally balanced.

The Intelligent Valve supports different limitation functions:

- Volume flow maximum limitation in port A
- Volume flow minimum limitation in port A
- Output maximum limitation
- Return temperature min./max. limitation
- ΔT-limitation – limitation of the difference between the flow and return temperature

Volume flow maximum limitation

We recommend activating the volume flow maximum limitation if the design volume flow for the partial plant (heating coil/cooler/precontrol circuit) as controlled by the Intelligent Valve, is lower than the nominal flow of the Intelligent Valve. In volume flow control mode, the set volume flow $\dot{V}_{max}$ – which can be anywhere between 30...100 % of the nominal volume flow – is interpreted as the 100 % setpoint. It only serves as the limitation value in the other control modes.

Volume flow minimum limitation

The volume flow minimum limitation achieves a minimum flow through the controlled partial plant where this appears to be appropriate. The limitation is of course pressure independent so that there is no over or under-supply as the local differential pressure changes.

Output maximum limitation

In contrast to volume flow limitation, the output limitation adapts dynamically to the temperature distribution in the plant. As a consequence, output control is more suitable for critical users than volume flow limitation.

Return temperature min./max. limitation

Modern, high-efficiency output generators must have sufficient low/high return temperatures to achieve their output numbers/degree of efficiency. With Intelligent Valve, you can precisely limit the return temperature value as needed by the given plant.

A return temperature maximum limitation is available if the Intelligent Valve is used in a heating application; a return temperature minimum limitation is available in a cooling application.

The setting is made in two steps:

1. Enable the function
2. Set the limitation setpoint
   - Factory setting for maximum limitation = 40 °C; setting range = 0...100 °C
   - Factory setting for minimum limitation = 10 °C; setting range = 0...100 °C

ΔT-limitation

In system where the flow temperature cannot be maintained at a constant level – for example due high swings in load or insufficient generation capacity – limiting the difference between the flow and return temperature is an alternative to absolute return temperature limitation. ΔT-limitation ensures that the consumer is not supplied with more output than the consumer can process.

The setting is made in two steps:

1. Enable the function
2. Set the limitation setpoint
   - Factory setting ΔT-limitation = 6 °C; setting range = 0...40 °C

Not all limitations are available to each control mode. The following limitations are available based on control mode:

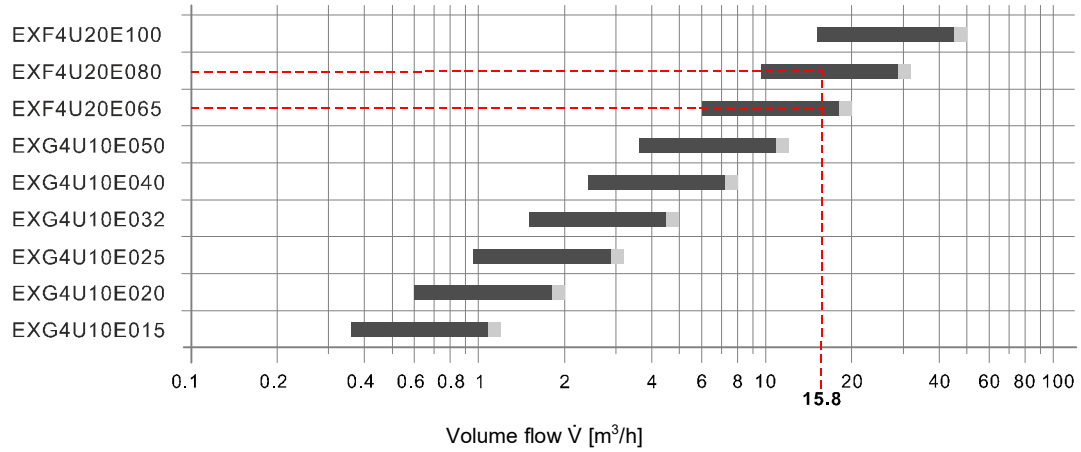
	Dynamic control valve			Flow temperature controller	Outside temperature-dependent heating circuit
	Position control	Volume flow control	Output control		
Setpoint	External				Internal
Volume flow maximum limitation	Always active				
Volume flow minimum limitation	Selectable				
Output maximum limitation	-	Always active	-		
Return temperature limitation	Selectable				
ΔT-limitation	Selectable				-

Sizing

Sizing as dynamic control valve

As a pressure-independent solution, it is generally easy to size the Intelligent Valve. If the volume flow is already a known variable, simply select the corresponding valve from the diagram below. The electronic volume flow controller ensures that the valves always achieve the specific nominal volume flow. The nominal volume flow cannot however be exceeded.

We recommend selecting the valves so that the maximum volume flow $\dot{V}_{max}$ must be preset to a value of 30...90 %. Just in case that a somewhat higher volume flow is required during installation than was originally calculated.



Volume flow $\dot{V}$ [m^3/h]

= Recommended design range that permits a subsequent increase in volume flow during the installation phase = 30…90 % of $\dot{V}_{100}$

= Maximum design range with no reserve to increase the volume flow = 90...100 % of $\dot{V}_{100}$

Example			
Required volume flow $\dot{V}_{max}$	**Intelligent Valve selection**		
15.8 m^3/h	EXF4U20E065:	$\dot{V}_{100}$ = 20 m^3/h	⇒ $\dot{V}_{max}$ = 79 %
	EXF4U20E080:	$\dot{V}_{100}$ = 32 m^3/h	⇒ $\dot{V}_{max}$ = 49 %

Maximum consumer output range at typical temperature differences:

Type	Stock number	DN	$\dot{V}_{100}$ [m^3/h]	$\dot{Q}$ [kW] at			
				ΔT 6 K	ΔT 10 K	ΔT 15 K	ΔT 20 K
EXG4U10E015	S55300-M111	15	1.2	8.4	13.9	20.9	27.8
EXG4U10E020	S55300-M112	20	2	13.9	23.2	34.8	46.4
EXG4U10E025	S55300-M113	25	3.2	22.3	37.1	56	74
EXG4U10E032	S55300-M114	32	5	34.8	58	87	116
EXG4U10E040	S55300-M115	40	8	56	93	139	186
EXG4U10E050	S55300-M116	50	12	70	116	174	232
EXF4U20E065	S55300-M117	65	20	139	232	348	464
EXF4U20E080	S55300-M118	80	32	223	371	557	742
EXF4U20E100	S55300-M119	100	50	348	580	870	1160

Sizing as flow temperature controller

As a rule, the output for transmission in this control function is available at the indicated primary design temperatures as design variables.

This information can be used to calculate the required plant design volume flow which then influences the valve selection. See Engineering example [→ 8].

Engineering example

Calculation basis

1. Determination of heating or cooling demand $\dot{Q}$ [kW]
2. Determination of temperature difference ΔT [K]
3. Calculation of volume flow

$$\dot{V}[m^3/h] = \frac{Q[kW] \times 3600[s]}{4190[kJ/kgK] \times \Delta T[K]}$$

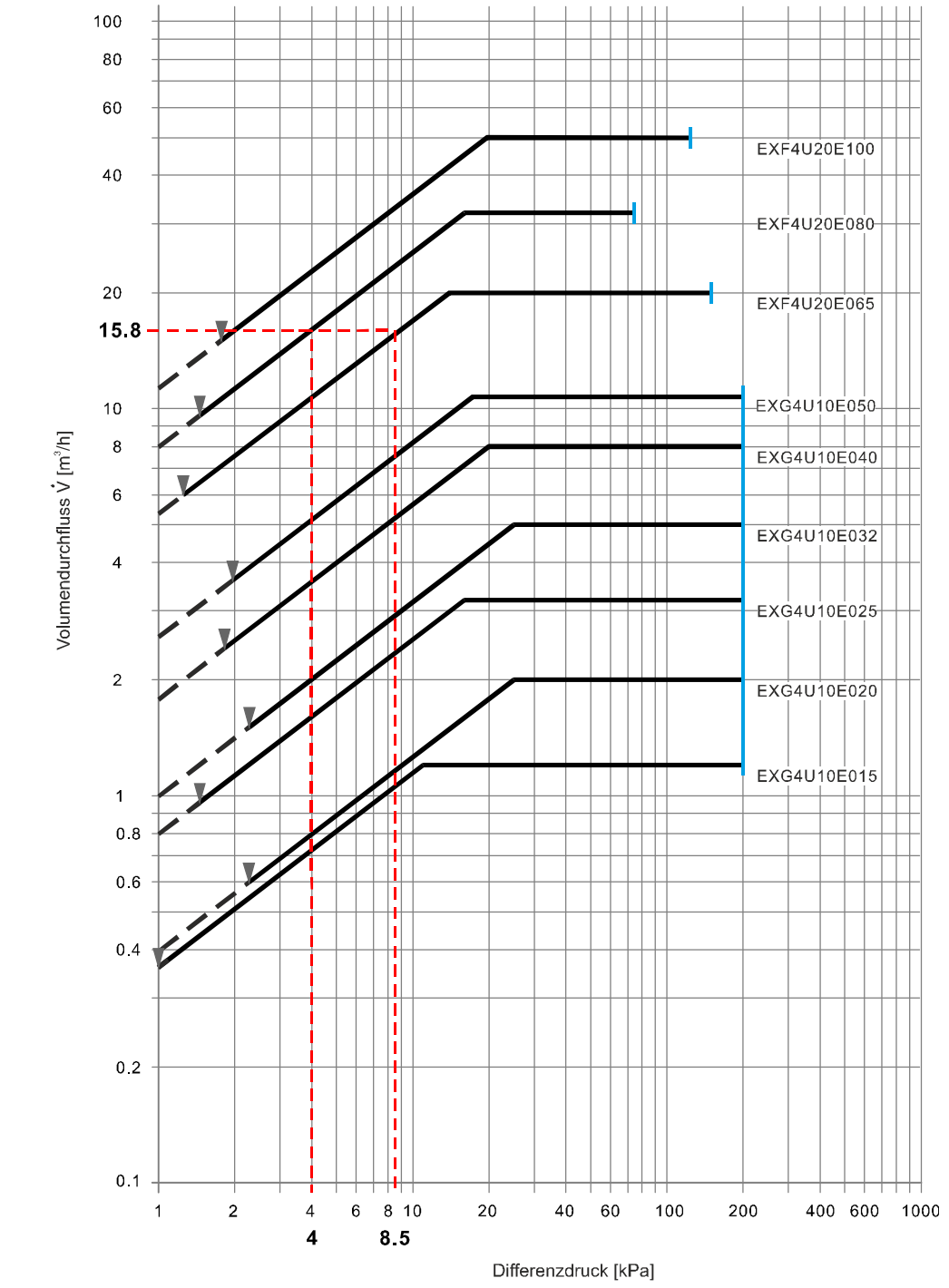
4. Select the suitable Intelligent Valve EX..

Example

1.	Heating/cooling power	$\dot{Q}$ = 110 kW
2.	Temperature difference	ΔT = 6 K
3.	Volume flow $\dot{V}[m^3/h] = \frac{110\ kW \times 3600\ s}{4190\ kJ/kgK \times 6\ K} = 15.8\ m^3/h$ Note: You can use the valve slider to determine volume flow.	
4.	Select EX.. Select the Intelligent Valve to operate at 90% of the nominal volume flow to allow for higher heating or cooling output as needed.	
	Selection:	EXG4U20E065 Δp_{min} = 8.5 kPa
		EXF4U20E080 Δp_{min} = 4 kPa
5.	Evaluate presetting	
	EXG4U20E065: 15.8 / 20 = 79 %	Optimum selection
	EXF4U20E080: 15.8 / 32 = 49 %	

Sizing diagram

You can rely on the k_{vs} value under Type summary (page Type summary [→ 10]) to determine the pressure drop at the requested maximum volume flow.



Calculated volume flow V̇	Intelligent Valve selection	Differential pressure [kPa]
15.8 m³/h	EXF4U20E065	8.5
	EXF4U20E080	4

Type summary

Threaded Intelligent Valve EXG4U10E..

Type	Stock number	DN	$\dot{V}_{100}$	$min\dot{V}_{max}$	Δp_{V100}	Δp_{V50}	Δp_{max}	$k_{VS,\ A\text{-}AB}$	$k_{VS,\ B\text{-}AB}$
			[m³ / h]		[kPa]			[m³ / h]	
EXG4U10E015	S55300-M111	15	1.2	0.36	11	3	200	3.7	4
EXG4U10E020	S55300-M112	20	2	0.6	25	6		4	5
EXG4U10E025	S55300-M113	25	3.2	0.96	16	4		8	8
EXG4U10E032	S55300-M114	32	5	1.5	25	6		10	12
EXG4U10E040	S55300-M115	40	8	2.4	20	5		18	18
EXG4U10E050	S55300-M116	50	12	3.6	15	4		26	30

		Operating voltage	Positioning signal	Positioning time	Fail-safe function
EXG4U10E015	S55300-M111	AC / DC 24 V	DC 0…10 V DC 2…10 V 4…20 mA	90 s	-
EXG4U10E020	S55300-M112				
EXG4U10E025	S55300-M113				
EXG4U10E032	S55300-M114				
EXG4U10E040	S55300-M115				
EXG4U10E050	S55300-M116				

Flanged Intelligent Valve EXF4U20E..

Type	Stock number	DN	$\dot{V}_{100}$	$min\dot{V}_{max}$	Δp_{V100}	Δp_{V50}	Δp_{max}	p_s	$k_{VS,\ A\text{-}AB}$	$k_{VS,\ B\text{-}AB}$
			[m³ / h]		[kPa]				[m³ / h]	
EXF4U20E065	S55300-M117	65	20	6	14	3	150	1500	55	63
EXF4U20E080	S55300-M118	80	32	9.6	16	4	75	1200	80	100
EXF4U20E100	S55300-M119	100	50	15	19	5	125	1600	113	160

		Operating voltage	Positioning signal	Positioning time	Fail-safe function
EXF4U20E065	S55300-M117	AC / DC 24 V	DC 0…10 V DC 2…10 V 4…20 mA	30 s	-
EXF4U20E080	S55300-M118				
EXF4U20E100	S55300-M119			120 s	

DN = Nominal size

$\dot{V}_{100}$ = Volume flow through a fully open valve

$min\dot{V}_{max}$ = The smallest possible preset volume flow through a fully open valve

Δp_{V100} = Required minimum differential pressure to guarantee nominal flow $\dot{V}_{100}$

Δp_{V50} = Pressure over the fully opened valve at 50 % of nominal flow

Δp_{max} = Maximum permissible differential pressure over the valve control path, valid for the entire positioning range of the valve-actuator unit

p_s = Permissible operational pressure

k_{VS} = Nominal flow value for cold water (5…30 °C) through a fully opened valve at a differential pressure of 100 kPa (1 bar)

Scope of delivery

The Intelligent Valve is supplied as a complete set consisting of:

EXG.. Threaded	EXF.. Flanged
Intelligent Valve controller	
Actuator	
Flow section (control ball valve VBG61.. and flow sensor are preinstalled)	Flow sensor AVF4E..
	Control valve VXF42..
Temperature sensor pair direct installation (order protective pockets separately)	Temperature sensor pair including protective pockets

The devices are supplied without fittings, mating flange, and gaskets.
Welding sleeves, e.g. WZT-G12, for protective pockets must be ordered separately!

Accessories/spare parts

Accessories

Type	Stock number	Description	
EZT-M40	S55845-Z231	Protective pockets, brass, for DN 15...50	DN 65...125 include protective pockets!
EZU-WA	S55845-Z234	Wall mount for Intelligent Valve controller	At high media temperatures (>90°C)
EZU-WB	S55845-Z236	Spacers for Intelligent Valve controller	For risk of condensation due to low media temperatures
EZU10-10060	S55845-Z237	Immersion temperature sensor pair Pt1000	PL Ø 6 x 105 mm, cable length 6 m
ALX15	S55845-Z174	Filter with internal threading, DN 15	Filter
ALX20	S55845-Z175	Filter with internal threading, DN 20	
ALX25	S55845-Z176	Filter with internal threading, DN 25	
ALX32	S55845-Z177	Filter with internal threading, DN 32	
ALX40	S55845-Z178	Filter with internal threading, DN 40	
ALX50	S55845-Z179	Filter with internal threading, DN 50	
QAC22		LG-Ni1000 outdoor sensor	Temperature sensor for the control functions ● Flow temperature control ● Outside temperature-dependent flow control
QAD22		Strap-on temperature sensor LG-Ni1000	
QAE2120..		Immersion temperature sensor LG-Ni1000, with protective pocket	

Fittings

Type	Stock number	Description	
ALG..3		Fitting set of 3 for 3-port valves	● 3 cap nuts ● 3 insert nuts ● 3 flat seals
ALG..3B	S55846-Z1..	Brass fittings	At media temperature up to 100 °C

Spare parts

Type	Stock number	Description
ASE4U10E	S55845-Z205	Intelligent Valve Controller for 3-port valves, series EXG4U.. and EXF4U..
AVG4E015VBG	S55845-Z250	3-port valve section PN 16 (control ball valve + flow sensor premounted) for Intelligent Valve EXG4U10E015, DN 15 with threaded connection, k_{vs} 3.7 m^3/h
AVG4E020VBG	S55845-Z245	3-port valve section PN 16 (control ball valve + flow sensor premounted) for Intelligent Valve EXG4U10E020, DN 20 with threaded connection, k_{vs} 4 m^3/h
AVG4E025VBG	S55845-Z246	3-port valve section PN 16 (control ball valve + flow sensor premounted) for Intelligent Valve EXG4U10E025, DN 25 with threaded connection, k_{vs} 8 m^3/h
AVG4E032VBG	S55845-Z247	3-port valve section PN 16 (control ball valve + flow sensor premounted) for Intelligent Valve EXG4U10E032, DN 32 with threaded connection, k_{vs} 10 m^3/h
AVG4E040VBG	S55845-Z248	3-port valve section PN 16 (control ball valve + flow sensor premounted) for Intelligent Valve EXG4U10E040, DN 40 with threaded connection, k_{vs} 18 m^3/h
AVG4E050VBG	S55845-Z249	3-port valve section PN 16 (control ball valve + flow sensor premounted) for Intelligent Valve EXG4U10E050, DN 50 with threaded connection, k_{vs} 26 m^3/h
AVF4E065	S55845-Z213	Ultrasonic flow sensor for Intelligent Valve DN 65 mounting length 300 mm, flanged DN 65, PN 16
AVF4E080	S55845-Z214	Ultrasonic flow sensor for Intelligent Valve DN 80 mounting length 300 mm, flanged DN 80, PN 16
AVF4E100	S55845-Z215	Ultrasonic flow sensor for Intelligent Valve DN 100 mounting length 360 mm, flanged DN 100, PN 16
ALF4E065	S55845-Z218	Control valve mounting set PN16 for Intelligent Valve DN 65 (EXF4U20E065), flanged
ALF4E080	S55845-Z219	Control valve mounting set PN16 for Intelligent Valve DN 80 (EXF4U20E080), flanged
ALF4E100	S55845-Z220	Control valve mounting set PN16 for Intelligent Valve DN 100 (EXF4U20E100), flanged
EZU10-2615	S55845-Z229	Temperature sensor pair Pt1000, DS M10x1, Ø 5.2 x 26 mm, cable length 1.5 m
EZU10-10025	S55845-Z230	Temperature sensor pair Pt1000, PL Ø 6 x 105 mm, cable length 2.5 m
EZT-S100	S55845-Z232	Protective pocket G ½ B", G ¼ B", stainless steel, Ø 6.2 x 92.5 mm, for temperature sensors Ø 6 x 105 mm
VXF42.65-63	S55204-V139	3-port globe valve DN 65, PN16, flanged for Intelligent Valve EXF4U20E65, k_{VS} 63
VXF42.80-100	S55204-V141	3-port globe valve DN 80, PN16, flanged for Intelligent Valve EXF4U20E80, k_{VS} 100
VXF42.100-160	S55204-V143	3-port globe valve DN 100, PN16, flanged for Intelligent Valve EXF4U20E100, k_{VS} 160
GLA161.9E/HR	S55499-D444	Rotary actuator for ball valves, AC/DC 24 V, 10 Nm, NSR, modulating 0…10 V Highly accurate positioning signal, only for use with Intelligent Valve EXG4U10E..
SAX61.03/HR	S55150-A142	Valve actuator 800 N, 20 mm stroke, AC/DC 24 V, modulating 0…10 V Highly accurate positioning signal, only for use with Intelligent Valve EXF4U20E.., DN 65 and DN 80
SAV61.00/HR	S55150-A146	Valve actuator 1600 N, 40 mm stroke, AC/DC 24 V, modulating 0…10 V Highly accurate positioning signal, only for use with Intelligent Valve EXF4U20E.., DN 100

Product documentation

Title	Content		Document ID
Intelligent Valve - Control valve with integrated energy data acquisition	Data sheet: Product description EXG.., EXF..		A6V12028437
Rotary actuators for ball values in combination with the Intelligent Valve controller	Data sheet: Product description GLA161.9E/HR		A6V11418678
Electromotive actuators in combination with the Intelligent Valve controller	Data sheet: Product description SAX61.03/HR, SAV61.00/HR		A6V11418660
Actuators SAX.., SAY.., SAV.., SAL.. for valves	Basic document: Comprehensive information on the new generation of SAX.., SAV.. actuators.		P4040
EVG../EXG../EVF../EXF..	Mounting instructions		A6V11449479
GLA161.9E/HR	Mounting instructions		A6V11418688
AVG4..VAG, AVG4..VBG	Mounting instructions		A6V11449852
AVF4..	Mounting instructions		A6V11478285
Intelligent Valve – Commissioning with ABT Go	Commissioning instructions: Step-by-step description to configure and commission with ABT Go		A6V11422293
Intelligent Valve – Engineering/Commissioning in Desigo	Engineering instructions: Step-by-step description of integration in Desigo PX plants		A6V11572317
Intelligent Valve – Modbus Registers	Description of Modbus registers for Intelligent Valve		A6V12547886
Intelligent Valve – BACnet Objects	List of BACnet objects for Intelligent Valve		A6V11757108
Intelligent Valve – Onboarding in Building Operator	Engineering instructions: Step-by-step description of integration in Siemens Building Operator		A6V11999683
Readme OSS "Intelligent Valve"	OSS document Open source software components, copyrights, licensing agreements	V1.2	A6V11676101
		V2.0	A6V12343374

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

http://siemens.com/bt/download

Notes

Safety notes

Comply with the following safety notes to protect life, limb, and property.

The safety notes in the document include the following elements:

- Symbol for hazard
- Signal word
- Type and source of hazard
- Consequences in the event the hazard occurs
- Measures or prohibitions to prevent the hazard

Symbol for hazard

	This is the symbol for hazard. It warns you of **Risks of injury**. Comply with all measures designated by this symbol to prevent injury or death.

Additional hazard symbols

These symbols indicate general hazards, type of hazard, possible consequences, measures and prohibitions, a sample of which is displayed in the following table:

 General hazard

 Potentially explosive atmospheres

 Voltage/electrical shock

 Laser light

 Battery

 Heat

Signal word

The signal word classifies the hazard as defined in the following table:

Signal word	Danger level
DANGER	'DANGER' identifies a dangerous situation, that **results directly in death or serious injuries**, if you do not avoid this situation.
WARNING	'WARNING' identifies a dangerous situation, that **can result in death or serious injuries**, if you do not avoid this situation.
CAUTION	'CAUTION' identifies a dangerous situation, that **can result in minor or moderate injuries**, if you do not avoid this situation.
Note	'*NOTE*' identifies a possible situation that may cause damage if not observed. '*NOTE*' does not reference possible injury.

Depiction of risk of injury

Notes on risk of injury is depicted as follows:

	⚠ **WARNING**
	Type and source of hazard Consequences in the event the hazard occurs ● Measures/prohibitions to prevent the hazard

DEPICTION for possible damage to property

Notes on possible damage to property is depicted as follows:

	***NOTICE***
	Type and source of hazard Consequences in the event the hazard occurs ● Measures/prohibitions to prevent the hazard

Safety

	**⚠ CAUTION**
	National safety regulations Failure to comply with national safety regulations may result in personal injury and property damage. ● Observe national provisions and comply with the appropriate safety regulations.

Qualified personnel

	***NOTICE***
	Qualified personnel! Improper installation may override safety measures that a lay person may not recognize. ● Specialized knowledge of heating and air conditioning plants is required for installation. ● Only properly trained personnel may install the equipment. ● Prevent access to lay persons, especially children.

Only persons who can reasonably be expected to reliably conduct the work may actually perform the tasks. Do not permit persons whose reactions may be impaired, for example, by drugs, alcohol, or medications to perform the tasks.

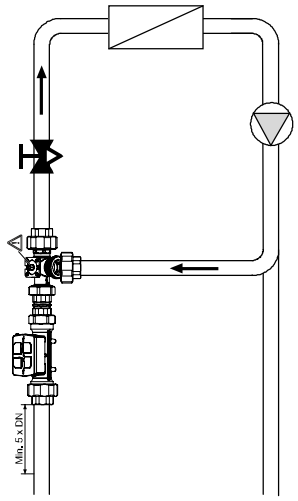
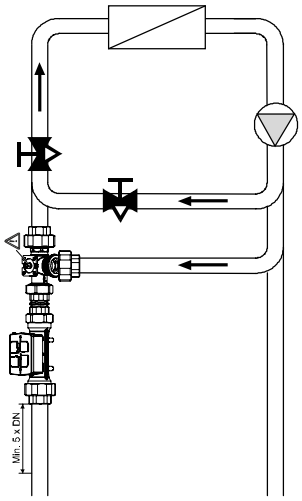
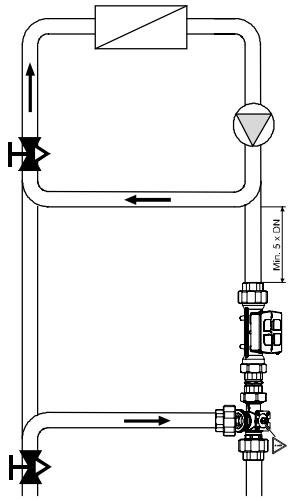
Heating specialist

Heating specialists are persons who are capable of performing the mechanical work on heating and air conditioning plants and to independently recognize and avoid hazards due to their technical training, knowledge and experience as well as their knowledge of applicable standards and regulations.

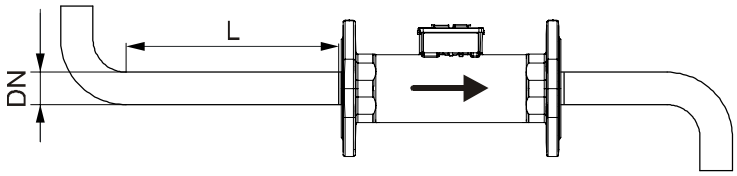
Heating specialists are specially trained for the work environment where they are active and know the relevant standards and regulations.

Engineering

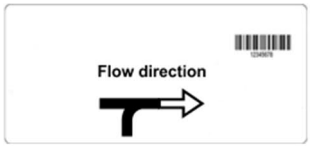
Intelligent Valves EXG.. and EXF.. can be used in 3 hydraulic circuits:

Mixing circuit.	Mixing circuit with set pre-mix	Injection circuit with 3-port valve
		

An unhindered inlet section of L ≥ 5 x DN must be maintained upstream of the flow sensor to guarantee the indicated measurement and control accuracy.

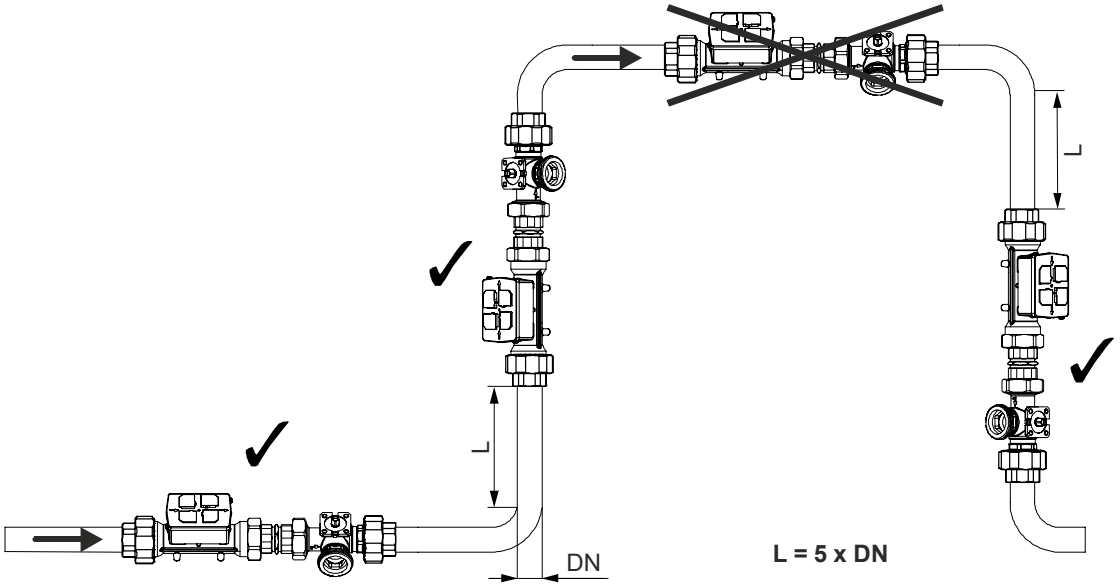


L ≥ 5 x DN

Valve	Symbol / flow direction EXG.. / EXF..	Flow in control mode		Valve stem	
		Input A / B	Output AB	SAX.. / SAV..: Retracts	SAX.. / SAV..: Extends
				GLA..: Clockwise rotation	GLA..: Counterclockwise rotation
Intelligent Valve		Variable	Constant	Port A closes	Port A opens

The indicated flow direction (arrow on the flow sensor and valve body) must be correct; the Intelligent Valve cannot otherwise be operated!

Do not install it at the highest point on the partial plant since air bubbles may otherwise collect in the flow meter. .

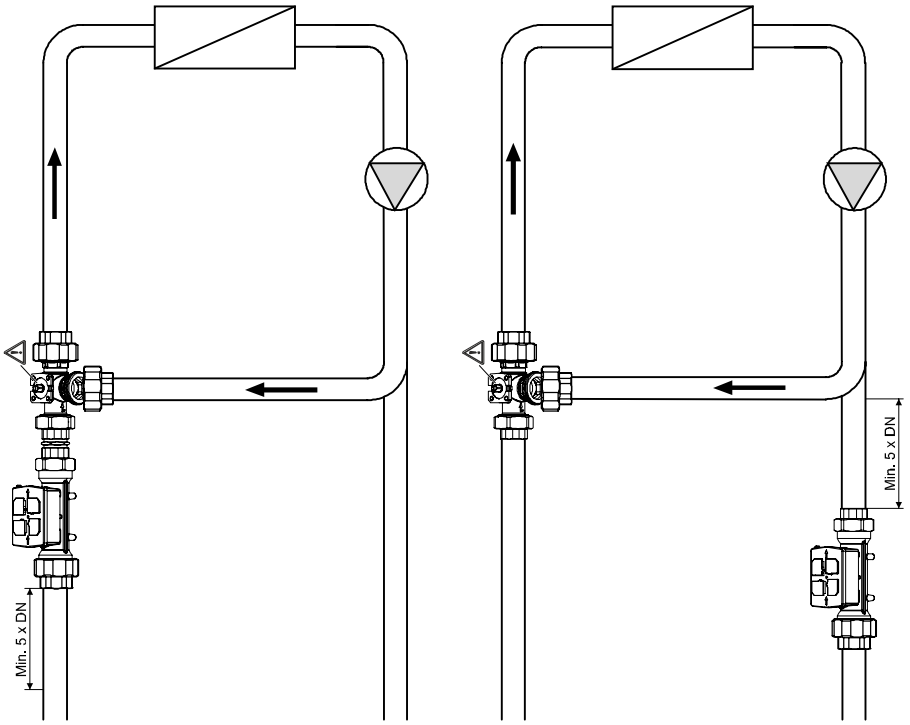


The rule is: Measure first, then control – in other words, the flow sensor must always be mounted upstream of the control valve in a compact installation.

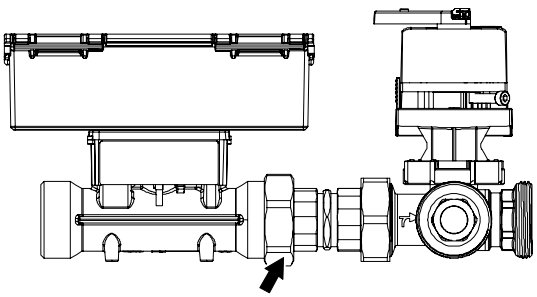
Symbol in catalogs and application descriptions	Symbol in diagrams
	There are no standard symbols for PICVs in the diagrams

We recommend installing a filter or strainer, e.g. ALX.., in the flow to the heat exchanger. This increases the reliability and life cycle of the Intelligent Valve.

The flow sensor and control valve can be installed separately:



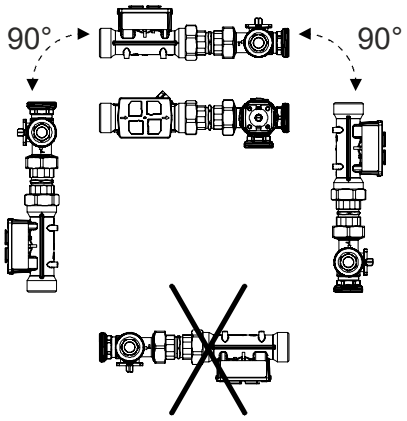
Threaded versions: In general, note that the torque of the threading is very high (75...500 Nm).

	Torque for fittings	
 Bonding DN 15, DN 32, and DN 50	DN 15	< 75 Nm
	DN 20	< 90 Nm
	DN 25	< 150 Nm
	DN 32	< 300 Nm
	DN 40	< 410 Nm
	DN 50	< 500 Nm

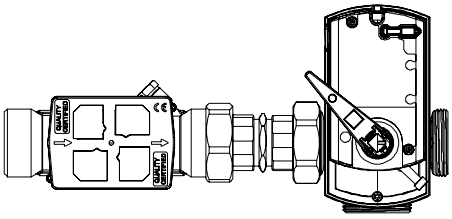
!	***NOTICE***
	DN 15, DN 32, and DN 50 Please note that the insertion part of the fitting is bonded to the flow sensor and cannot be removed! ● The fitting must remain on the flow sensor.

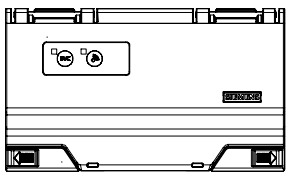
The Intelligent Valve is assembled at the mounting location. No adjustments, with the exception of configuring with the ABT Go app (see Commissioning [→ 20]) nor special tools are required. Separate mounting instructions are included with the valve and flow sensor.

Mounting positions



Mount the flow sensor in the return if the media temperatures exceed (>90 °C). If not possible, mount the Intelligent Valve controller remotely from the flow sensor and use the wall-mount plate EZU-WA.



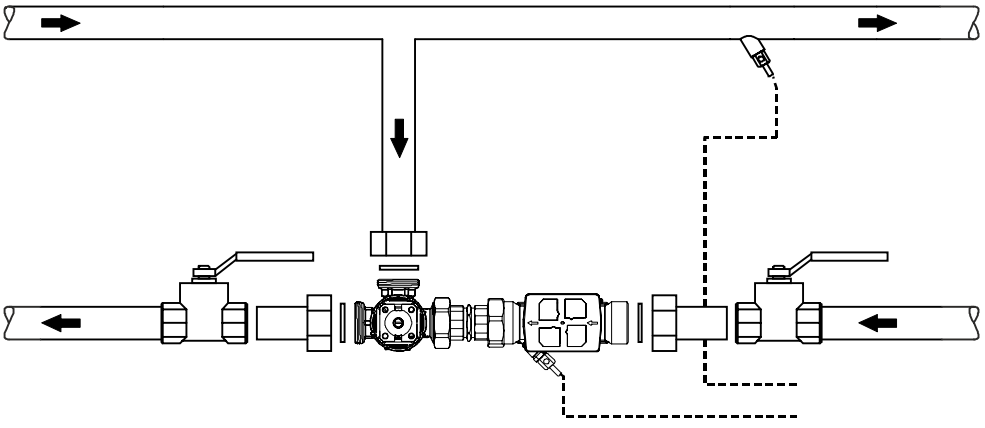


Mounting the temperature sensors

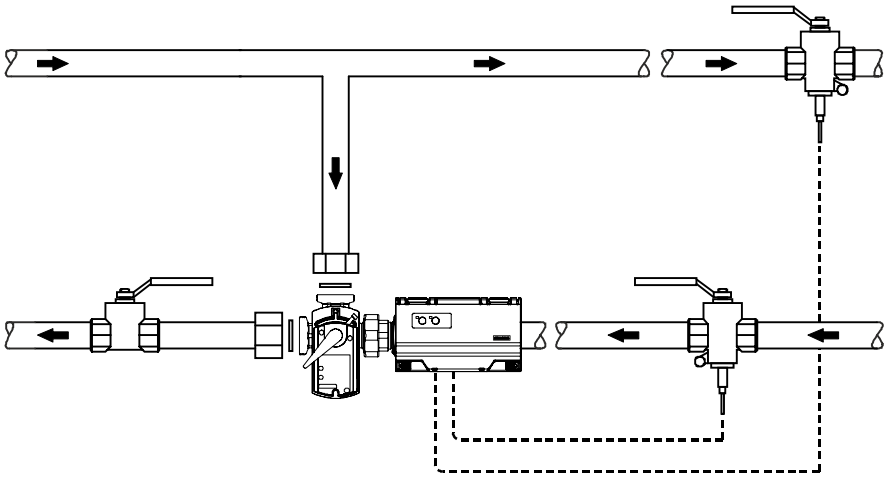
Threaded valves **EXG4U10E..**

The EXG.. threaded valves are supplied with direct immersion temperature sensors EZU10-2615.

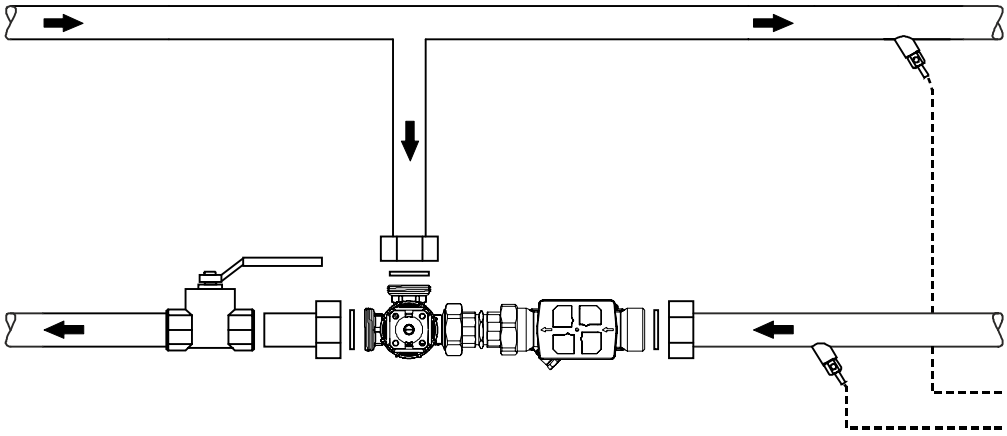
The sensors with the M10x1 threaded connection can be directly immersed in the flow sensor. The second temperature sensor is also directly immersed with the WZT-G10 welding sleeve (available as accessory).



As an alternative, the sensors can be immersed directly in off-the-shelf ball valves with integrated measuring points (e.g. Siemens WZT-K.. / Jumo 902442/11) or t-pieces (e.g. Jumo 902442/31).



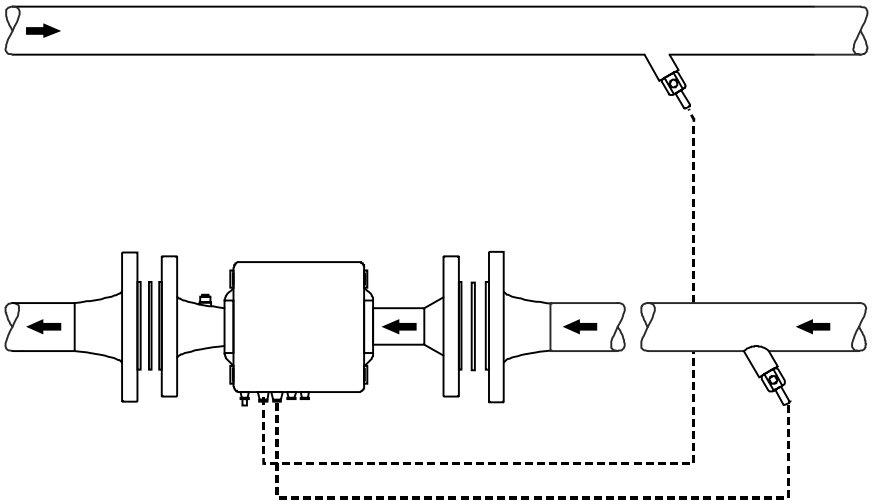
The brass protective pockets EZT-M40 are available for mounting with protective pockets.



Flanged valves **EXF4U20E..**

The EXF.. flanged valves include the temperature sensors EZU10-10025 for installing in the protective pockets EZT-S100 (also included).

Welding sleeves must be planned on the construction side (e.g. WZT-G12) – Installation example with protective pocket.



The device has only a simple user interface.

Siemens ABT Go app is used to actually commission the device.

ABT Go App (Version 3.3.1 or later)

The Siemens ABT Go app is available in iOS and Android versions in the corresponding app stores and can be used on smartphones and tablets. It connects directly over WLAN. The Intelligent Valve's own WLAN button activates the device's WLAN access point.

The following are the most important setting parameters for commissioning the Intelligent Valve:

Parameter	Value range	Description	Factory setting	Access level
Valve design	• 2-port valve. • 3-port valve	Selection for controlling a 2-port or 3-port valve. **Must be changed when using EXG4U10E.. or EXF4U20E..!**	2-port valve.	Measuring and control technician
Control function	• Dynamic control valve • Flow temperature controller • Outside temperature-dependent flow temperature controller	See Use [→ 2]	Dynamic control valve	Measuring and control technician
Control mode	• Volume flow control • Position control • Output control	See Control modes as dynamic control valve [→ 4]	Volume flow control	Measuring and control technician
$\dot{V}_{max}$	30...100 %	Maximum volume flow applicable to all control modes. It is used for hydraulic balancing of the consumer. Can be set in the ABT Go app in the units m^3/h, l/h, l/min or l/s.	Active 100 %	Installer
$\dot{V}_{min}$	2.5...20 %	Minimum volume flow applicable to all control modes. Can be set in the ABT Go app in the units m^3/h, l/h, l/min or l/s.	Inactive	Installer
Setpoint source	• Terminal • BACnet IP (remote) • Modbus RTU • local	Selection whether to interpret input X1 as the setpoint, whether it originates from a BACnet or Modbus RTU network or whether it is set (e.g. in the event of differential pressure control) locally to a fixed value.	Terminal	Measuring and control technician
Setpoint signal type	• 0...10 V • 2...10 V • 4...20 mA	Signal type pending at input X1	0...10 V	Measuring and control technician
Actual value parameter	• Position • Volume flow 0...V_{100} • Power • Primary flow temperature • Primary return temperature • Temperature difference flow/return	Selection whether the analog signal on output X2 represents the valve position or volume flow. In the event of volume flow, 0...V_{100} = 0...100 %.	Deactivated	Measuring and control technician
Actual value signal type	• 0...10 V • 2...10 V • 4...20 mA	Signal type pending at output X2	-	Measuring and control technician
Flow characteristics	• Linear • Equal percentage • Heat exchanger optimized	The flow characteristic flow can be selected in the volume flow control mode.	Linear	Measuring and control technician

User interface on the device

Service LED [1]

- Indicates the operating state (see table below)

Service button [2]

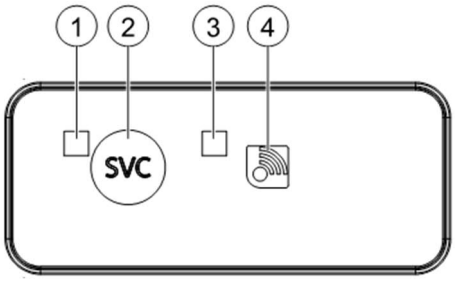
- Trigger wink
- Override setpoint and set $\dot{V}_{max}$ for 10 minutes (press for 3...6 s)
- Start flow test (press for 6...8 s)

Communication LED [3]

- Indicates the communication state (see table below)

WLAN button [4]

- Enable integrated WLAN Access Point for 10 min (press for ca. 0.5 s)

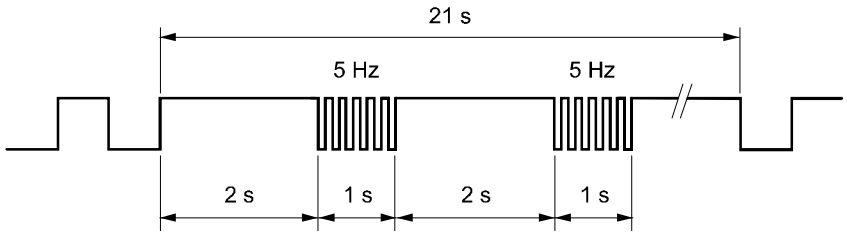


- Reset device to factory settings
  - Press both buttons ([2], [4]) at the same time for 10...15 s: The LEDs ([1], [3]) slowly flash orange for 10 s
    You can cancel the process during these 10 seconds by releasing the buttons.
  - After flashing for 10 s, the LEDs flash quickly for ca. 5 s and the reset is triggered by releasing the buttons.
  - The controller returns to normal operation without resetting if you continue to press the buttons.

!	***NOTICE***
	All configurations, network settings, commissioning parameters, and passwords are set to factory settings! ● This action cannot be cancelled nor reversed.

Service LED			SVC
Color	**Blinking pattern**		**Description**
	On	**Off**	
White	Continuous	-	Device starting up
Green	0.5 s	0.5 s	Device in configuration mode
	4.75 s	0.25 s	Normal operation
	0.25 s	0.25 s	Stop local forced control
Blue	0.5 s	0.5 s	Local forced control – Flow test
Yellow	0.5 s	0.5 s	Local forced control – Volume flow $\dot{V}_{max}$
Red	0.5 s	0.5 s	Fault input/output or component: ● Flow sensor – Wrong direction of flow – Air in sensor – Sensor connection faulty ● Temperature sensors – Damaged cable – Short circuit ● Actuator – Blocked – Faulty connection ● Setpoint input terminal – Faulty connection – Invalid signal
	2 s / 5 Hz	- / 5 Hz	Flashing to wink command for physical device identification [1)]
	Continuous	-	Fault
Orange	0.5 s	0.5 s	Reset to factory settings being prepared
	0.1 s	0.1 s	Reset to factory settings is triggered
-	-	-	Undervoltage

1)



Communication LED			
Color	**Blinking pattern**		**Description**
	On	**Off**	
-	-	-	● No communication ● Ethernet cable unplugged ● Device starting up
Blue	0.5 s	0.5 s	WLAN enabled
	Continuous	-	WLAN data transmission
Green	0.5 s	0.5 s	TCP/IP communications error – IP address not available
	Continuous	-	TCP/IP data transmission [1]
Purple	0.5 s	0.5 s	TCP/IP data transmission with Siemens Building Operator (Cloud)
Orange	Continuous	-	Modbus connected and configured – no data transmission via EIA-485
	0.5 s	0.5 s	Active communication via EIA-485
	0.5 s	0.5 s	Reset to factory settings being prepared [2]
	0.1 s	0.1 s	Reset to factory settings is triggered

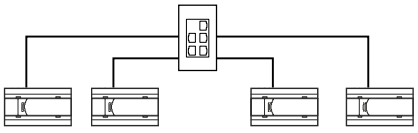
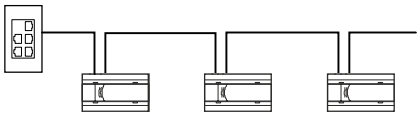
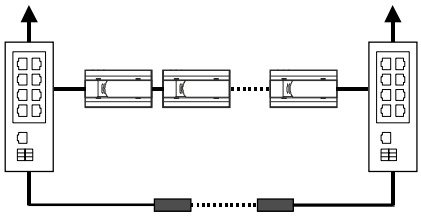
[1] With a daisy chain layout, it is only possible to check if a neighbour device is connected – the chain to the switch/router is not ensured and may even be broken.

[2] Applies only if SVC LED also flashes synchronously.

Network integration BACnet IP

The Intelligent Valve can be integrated over TCP/IP in a BACnet IP network.

The device supports:

● Star topologies	
● Line topologies (daisy chain)	
● Ring topologies – Note here that network switches with "Rapid Spanning Tree Protocol (RSTP)" are used.	

Up to 20 Intelligent Valves can be used in a BACnet segment.

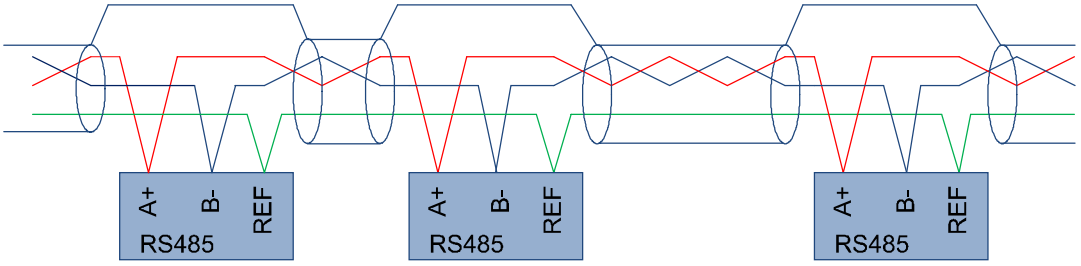
A complete list of supported BACnet data points is included in the document "Intelligent Valve – BACnet Objects" (Product documentation [→ 13]).

ABT Go app configures the network parameters (IP address, subsegment, etc.).

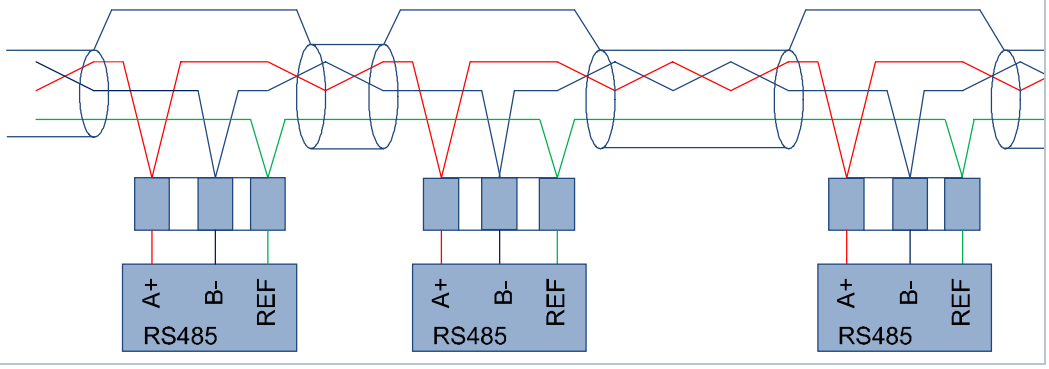
Network integration Modbus RTU

The Intelligent Valve can be integrated over EIA-485 in a Modbus RTU network. Although the RS485 standard is simple and well-proven, important requirements and experience must be taken into account. This starts with the selection of the topology:

- Best: Individual line
  - The best topology is a single line (line topology)m with the bus cable connected directly tot he individual devices (daisy chain). This type of connection has the fewest problems.



- Disadvantages of intermediate terminals
  - Connecting network devices via intermediate terminals and stub lines opens complicated paths for reflections and harmonics to the electrical signals. It is obvious that long and non-twisted intermediate lines increase the risk of interference.



Maintenance

Control valves EXF.. and EXG.. are maintenance free.

Disposal

The device is considered an electronic device for disposal in terms of the European Directive and may not be disposed of as domestic waste.

- Use only designated channels for disposing the devices.
- Comply with all local and currently applicable laws and regulations.

Warranty service

Intended use

⚠ WARNING

Intended use

Improper use can result in injury as well as damage to the product or plant.

- Siemens product may only be used with user cases set forth in the catalog and associated technical documentation.
- User-related technical data are only guaranteed in connection with the products listed in this document. Siemens rejects any and all warranties in the event that third-party products are used.
- Trouble-free and safe product operation presupposes transport, storage, setup, mounting, installation, commissioning, operation, and servicing as intended.
- You must comply with permissible ambient conditions. Comply with all notes in the associated documentation.

Exemption from liability

The content of this document was reviewed to ensure it matches the hardware and firmware described herein. Nevertheless, differences may occur so that we are unable to fully guarantee a complete match. The information provided in this document is reviewed on a regular basis and any required corrections are added to the next edition. We always welcome suggestions on how to improve documentation.

Directive on Radio Equipment

The device uses a harmonized frequency in Europe and also meets the requirements under the Directive on Radio Equipment (2014/53/EU, previously 1999/5/EC).

Open Source Software (OSS)

Software license overview

These devices use Open Source Software (OSS); see the OSS document on the specific controller type and VVS.

All Open Source Software components used in the product (to include copyrights and licensing agreement) are available at http://siemens.com/bt/download.

Firmware version	OSS document		Controller
	Document ID	Title	
FW01.18.xxxxx	A6V12343374	Readme OSS "Intelligent Valve", V2.0	ASE4U10E
FW01.17.xxxxx			
FW01.16.xxxxx	A6V11676101	Readme OSS "Intelligent Valve", V1.2	
FW01.15.xxxxx			
FW01.14.xxxxx			
FW01.13.xxxxx			

Cyber security disclaimer

Siemens provides a portfolio of products, solutions, systems and services that includes security functions that support the secure operation of plants, systems, machines and networks. In the field of Building Technologies, this includes building automation and control, fire safety, security management as well as physical security systems.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art security concept. Siemens' portfolio only forms one element of such a concept.

You are responsible for preventing unauthorized access to your plants, systems, machines and networks which should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place. Additionally, Siemens' guidance on appropriate security measures should be taken into account. For additional information, please contact your Siemens sales representative or visit https://www.siemens.com/global/en/home/company/topic-areas/future-of-manufacturing/industrial-security.html.

Siemens' portfolio undergoes continuous development to make it more secure. Siemens strongly recommends that updates are applied as soon as they are available and that the latest versions are used. Use of versions that are no longer supported, and failure to apply the latest updates may increase your exposure to cyber threats. Siemens strongly recommends to comply with security advisories on the latest security threats, patches and other related measures, published, among others, under https://www.siemens.com/cert/en/cert-security-advisories.htm.

Technical data

Dimensions and weight
See Dimensions [→ 37]

Power supply		EXG4U10E..	EXF4U20E.. DN 65…80	EXF4U20E.. DN 100
Operating voltage		AC 24 V ~ ±20 % (19.2...28.8 V ~) DC 24 V ⎓ ±20 % (19.2...28.8 V ⎓)		
Frequency		50/60 Hz		
Power consumption including connected field devices				
	Operation	5 W	6.25 W	8 W
	Normal position	2.7 W	3.5 W	3.5 W
	Sizing	8.5 VA	14 VA	16 VA
Power consumption ASE4U10E				
	Operation	3.5 W		
	Normal position	2 W		
	Sizing	6 VA (controller without actuator!)		
Internal fuse		Irreversible		
External fusing of supply line		• Fuse slow 6…10 A • Circuit breaker: Max. 13 A, type B, C, D per EN 60898 • Power source with current limitation of max. 10 A		

Interfaces	
Ethernet	Plugs: 2 x RJ45, screened Interface type: 100BASE-TX, IEEE 802.3 compatible Bitrates: 10/100 Mbps, autosensing Protocol: BACnet over UDP/IP
USB (2.0)	Plug: Micro-B Data rate: 1.5 Mbps and 12 Mbps No galvanic isolation to ground
L-bus	Baud rate: 2.4 kBaud Bus power: 10 mA Short-circuit proof Protection against faulty wiring at max. AC 24 V

Modbus RTU interface		
Interface type		EIA-485, galvanically isolated
Baud rates		9600 / 19200 / 38400 / 57600 / 115200 / 76800
	Default	19200
Internal bus termination		120 Ω, switchable with ABT Go
Internal bus polarization		270 Ω / 270 Ω – NOT switchable!
Cabling (only inside building)		3-core cable
	Length	Max. 1000 m (3300 ft)
	NOTICE	**The baud rate must be adapted to match the cable length.**
Protection		Short-circuit proof: protection against faulty wiring at AC 24 V
Maximum number of devices (nodes) in bus segment		31

Function data

Control valve		EXG4U10E..	EXF4U20E..
Nominal flow		See Type summary [→ 10]	
Adjustable flow as [%] of V_{100}		30...100 %	
Control accuracy		±5 %	
Permissible media		Chilled and hot water	
Medium temperature		1…120 °C	
Operating pressure p_s		1600 kPa	See Type summary [→ 10]
Differential pressure Δp_{max} / Δp_s		See Type summary [→ 10]	
Flow characteristic curve (Control mode "Volume flow control")		Linear	
Leakage rate			
	Throughport	Waterproof per EN 60534-4 L/1, improved class 4	0...0.03 % of k_{VS} value
	Bypass	< 1 % of k_{VS} value	0.5...2 % of k_{VS} value
Mounting position		Upright to horizontal	
Valve body		Brass	Cast iron
Blank flange		-	
Valve stem, seat, ball		Brass	Stainless steel
Stem sealing gland		EPDM	

Actuator	EXG4U10E..	EXF4U20E.. DN 65…80	EXF4U20E.. DN 100
	GLA161.9E/HR	SAX61.03/HR	SAV61.00/HR
Positioning time (at the specified nominal stroke)	90 s	30 s	120 s
Positioning force	-	800 N	1600 N
Nominal torque	10 Nm	-	
Nominal rotational angle	90°		
Nominal stroke	-	20 mm	40 mm

Flow measurement		EXG4U10E..	EXF4U20E..
Ultrasonic volume flow measurement		Yes	
Measuring accuracy		±2 % of present value between 25 % and 100 % of V_{100}	
Minimum flow measurement		1 % of V_{100}	
Material of measuring pipe			
	DN 15...50	Brass	-
	DN 65	-	Brass
	DN 80		Nodular cast iron EN-GJS-500
	DN 100...125		Brass

Temperature measurement		EXG4U10E..	EXF4U20E..
Measuring accuracy absolute temperature		±0.6 °C at 20 °C ±0.8 °C at 60 °C (Pt1000 EN60751, class B)	
Measuring accuracy temperature difference		±0.2 K at ΔT = 20 K	
Resolution		0.085 °C	
Prototype test certificate Module B per MID		A0445/2112/2007	DE-06-MI004-PTB011
Permissible operating pressure for direct immersion sensor		PN 16	-
Housing for direct immersion sensor DS M10x1, Ø 5.2 x 26 mm, cable length 1.5 m		Stainless steel	-
Protective pocket G ½ B", Ø 6.2 x 92.5 mm for temperature sensors Ø 6 x 105 mm			
	Permissible operational pressure	PN 25	
	Material	Brass	Stainless steel

Inputs

The inputs are protected against incorrect wiring AC/DC 24 V.

Setpoint signal input, analog (input X1) in control function "Dynamic control valve" representing 0...100 % in control function "Flow temperature controller" representing 3...100 °C			
Type	**Range (over range)**	**Resolution**	**Input resistance (R_{in})**
AI 0...10 V	0...10 V (-1...11 V)	1 mV	100 kΩ
AI 0...10 V	2...10 V (1...11 V)	1 mV	100 kΩ
AI 4...20 mA	4...20 mA (2...22 mA)	2.3 µA	< 460 Ω
Open connection: Negative voltage -3.1 V (line failure detection)			

Signal input, analog (input X1) in control function "Outside temperature-dependent flow temperature controller"			
Type	**Range (over range)**	**Resolution**	**Input resistance (R_{in})**
AI (LG-)Ni1000	-40...150 °C (-45...160 °C) -40...302 °F (-49...320 °F)	55 mK 0.099 °F	-
AI Pt1000 (385/EU)		85 mK (CIOR -50...400 °C) 0.153 °F	-
AI Ni1000 DIN		45 mK 0.081 °F	-
AI 0...10 V	0...10 V (-1...11 V)	1 mV DC 0.3...10 V = -47...50 °C	100 kΩ

Position feedback actuator, analog (Input U)			
Type	**Range (over range)**	**Resolution**	**Input resistance (R_{in})**
AI 0...10 V	0...10 V (-1...11 V)	1 mV	100 kΩ
Open connection: Negative voltage -3.1 V (line failure detection)			

Temperature measurement for power measurement, analog (Inputs B7, B26)		
Type	**Range (over range)**	**Resolution**
AI Pt1000 (385/EU)	-40...150 °C (-45...160 °C) -40...302 °F (-49...320 °F)	85 mK 0.153 °F

Temperature measurement, analog (Input X3) in control functions "Flow temperature controller" and "Outside temperature-dependent flow temperature controller"		
Type	**Range (over range)**	**Resolution**
AI Pt1000 (385/EU)	-40...150 °C (-45...160 °C) -40...302 °F (-49...320 °F)	85 mK 0.153 °F
AI (LG-)Ni1000		55 mK 0.099 °F
AI Ni1000 DIN		45 mK 0.081 °F

Voltage measurement, analog (Input X3) in control functions "Differential pressure controller"			
Type	**Range (over range)**	**Resolution**	
AI 0...10 V	0...10 V (-1...11 V)	1 mV	100 kΩ
AI 0...10 V standard	0...100 % (-10...110 %)	1 mV	
Open connection: Negative voltage -1.5 V, 8 µA (line failure detection)			

Flow measurement, digital (Input DU)
Use only the flow sensors specified in the data sheet.

Outputs

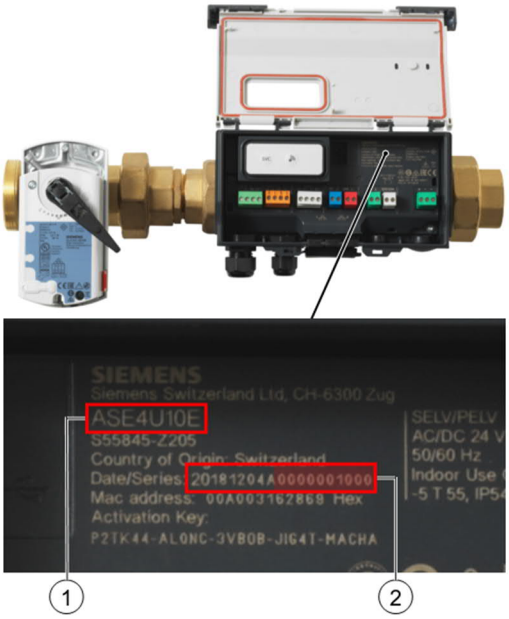
The outputs are protected against short circuiting and incorrect wiring AC/DC 24 V.

Position feedback, analog (output X2)			
Type	**Range (over range)**	**Resolution**	**Output current / output impedance**
AO 0...10 V	0...10 V (0...10.5 V)	11 mV	Max. 1 mA
AO 2...10 V	0...10 V (1...10.5 V)	11 mV	Max. 1 mA
AO 4…20 mA	4…20 mA (4…20 mA)	22 µA	< 650 Ω

Signal output actuator, analog (Output Y)			
Type	**Range (over range)**	**Resolution**	**Output current**
AO 0-10 V	0...10 V (0...10.5 V)	11 mV	Max. 1 mA

Switching output relay Q1 (connection terminals Q13, Q14)	
Type	Relay
Switching voltage	AC 24 V / DC 30 V
Permissible load current	100 mA

Supply for field devices (outputs V ≂)	
Output voltage	AC / DC 24 V
Permissible load current	10 A
Protection against overload	None

WLAN interface				
Interface type		Wireless access point		
Supported standards		IEEE 802.11b/g/n		
Frequency band		2.4 GHz		
WLAN channels		3		
Transmission power		17 dBm		
Distance (unobstructed field)		Min. 5 m (16 ft)		
Device pairing		Activation/deactivation with service button Automatic switch off after 10 minutes if no WLAN client is connected.		
Default SSID and WLAN password				
	SSID	<ASN>_<Series no.>		
		Example:  		
			[1]	ASN	ASE4U10E
			[2]	Date / series letter / **series no.**	20181204A**0000001000**
				SSID	**ASE4U10E_0000001000**
	Password	12345678 Password is preset and cannot be changed			

Conformity

Protection class		
Housing from vertical to horizontal (see Mounting [→ 18])		IP 54 as per EN 60529
Insulation class		As per EN 60730
	AC / DC 24 V	III

Ambient conditions		
Operation		as per EN 60721-3-3
	Climatic conditions	Class 3K5
	Mounting location	Indoors (weather-protected)
	Temperature (general)	-5...< 55 °C
	Humidity (non-condensing)	5...95 % r.h.
Transportation		as per EN 60721-3-2
	Climatic conditions	Class 2K3
	Temperature	-25...70 °C
	Humidity	< 95% r.h.
Storage		Per IEC 60721-3-1
	Climatic conditions	Class 1K5
	Temperature	-5...55 °C
	Humidity	5...95 % r.h.
Max. media temperature when mounted on valve		120 °C

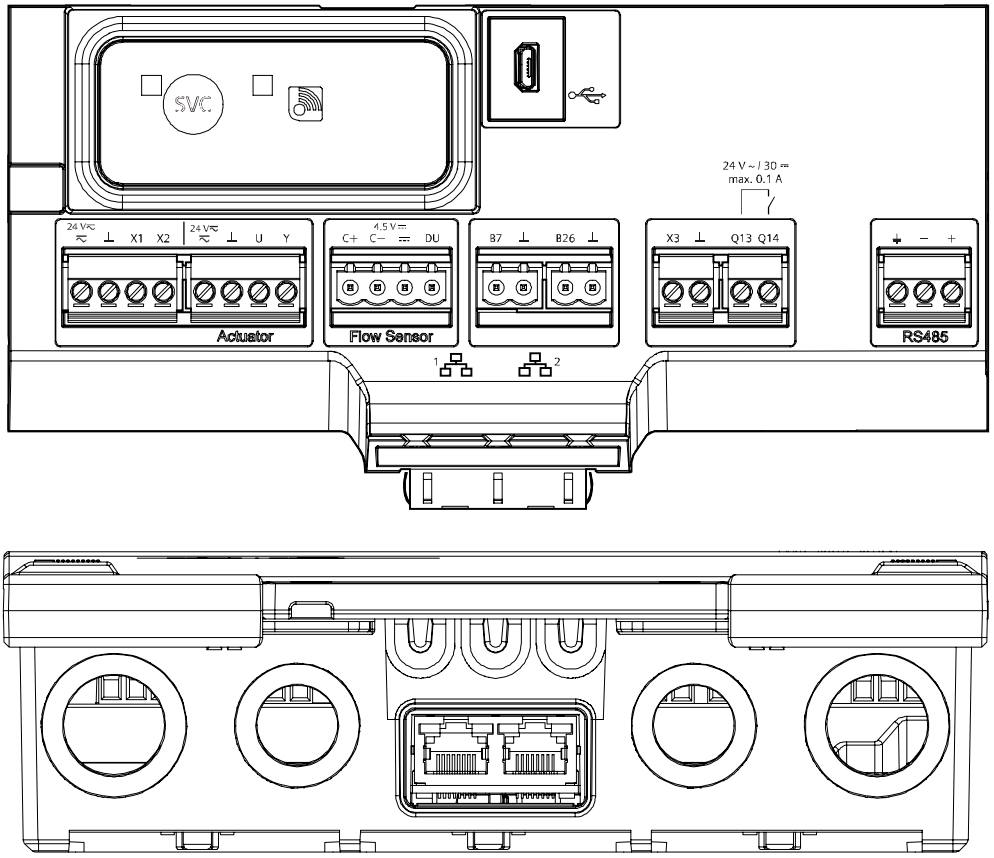
Directives, standards and approvals		
Product standards		EN 60730-x
Electromagnetic compatibility (field of use)		For residential, commercial, and industrial environments
EU conformity (CE)		
	EXG.. / EXF..	A6V11692721 [1)]
	ASE4U10E	A6V11664685 [1)]
	AVG4E..VBG / AVF4E..	A6V11692707 [1)]
	GLA161.9E/HR	A6V101082021 [1)]
	SAV61.00/HR	A6V10455624 [1)]
	SAX61.03/HR	A6V10321559 [1)]
	EZU10-..	A6V11692688 [1)]
RCM Conformity		
	EXG.. / EXF..	A6V11694334 [1)]
	ASE4U10E	A6V11692702 [1)]
	AVG4E..VAG / AVF4E..	A6V11692730 [1)]
	GLA161.9E/HR	A6V101082027 [1)]
	SAV61.00/HR	A6V10455626 [1)]
	SAX61.03/HR	A6V10402431 [1)]
WiFi		
	China	CMIIT ID 2020 DJ 3810
	Korea	KC R-R-S7M-ASE4U10E
	Singapore	Complies with IMDA Standards DB01752

Environmental compatibility		
The product environmental declarations below contain data on environmentally compatible product design and assessments (RoHS compliance, material composition, packaging, environmental benefit, and disposal).		
	ASE4U10E	A6V11684717 [1)]
	AVG4E..VBG	A6V11654066 [1)]
	AVF4E..	A6V11654064 [1)]
	ALF4E..	A6V11654081 [1)]
	EZU10-..	A6V11684742 [1)]
	GLA161.9E/HR	A6V101033533 [1)]
	SAV61.00/HR	A6V10450170 [1)]
	SAX61.03/HR	A6V10691442 [1)]
	VXF42..	CE1E4403en03 [1)]
	EZT..	A6V11684744 [1)]
	EZU-WA, EZU-WB	A6V11654200 [1)]

[1)] Documents can be downloaded at http://www.siemens.com/bt/download

Connection diagrams

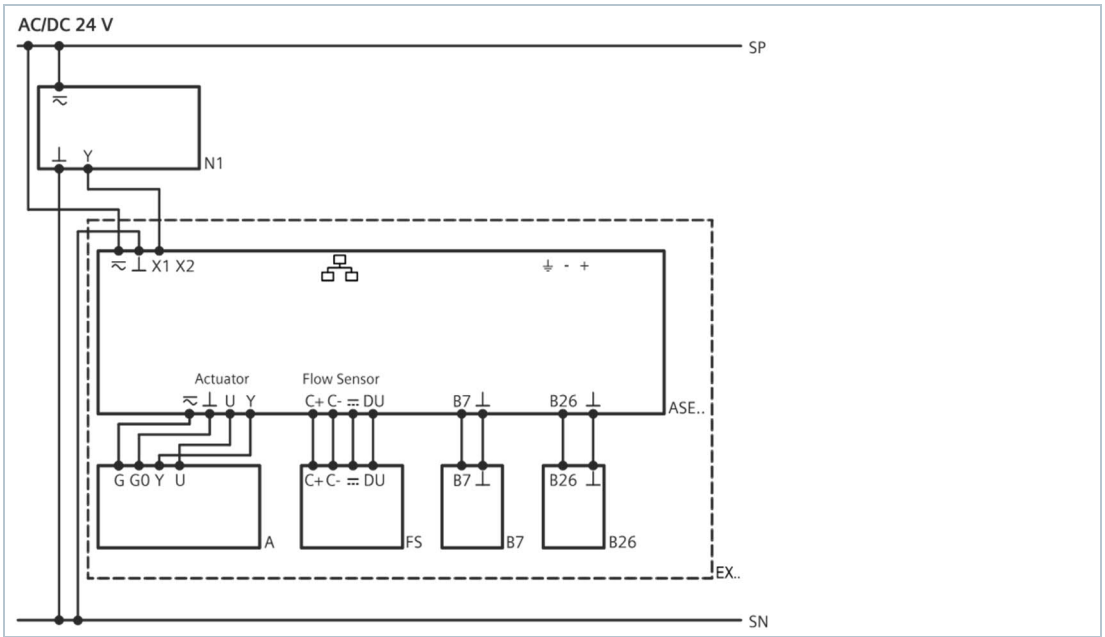
Connection terminals



Connecting thread	Description	Terminal
1, 2 Ethernet	2 x RJ45 interface for 2-port Ethernet switch	
	Power SELV/PELV AC/DC 24 V	≂
	System zero	⊥
	Setpoint input Intelligent Valve: DC 0/2...10 V; 4...20 mA (Passive or active temperature sensor in the control function "Outside temperature-dependent flow temperature controller")	X1
	Actual value output Intelligent Valve: DC 0/2...10 V; 4...20 mA	X2
USB	USB interface	
Actuator	Field supply AC 24 V for actuator	≂
	System zero	⊥
	Position feedback actuator DC 0...10 V	U
	Positioning signal actuator DC 0...10 V	Y
Flow sensor	L-bus potential	C+
	L-bus neutral (Galvanically insulated)	C-
	Power flow sensor (DC 4.5 V)	⎓
	Pulse input	DU
Inputs analog	Passive temperature input	B7
	System zero	⊥
	Passive temperature input	B26
	System zero	⊥
	Universal input (DC 0...10 V / passive temperature sensor input)	X3
	System zero	⊥
Outputs	Switching output AC 24 V; DC 30 V; 0,1 A	Q13
		Q14
RS485	EIA-485 interface (Modbus RTU) Supported from software version 1.18.xxxxx	⏚
		-
		+
Service	Service button	SVC
Display	Operation LED	
Com/WLAN	WLAN button	
Display	Communication LED	

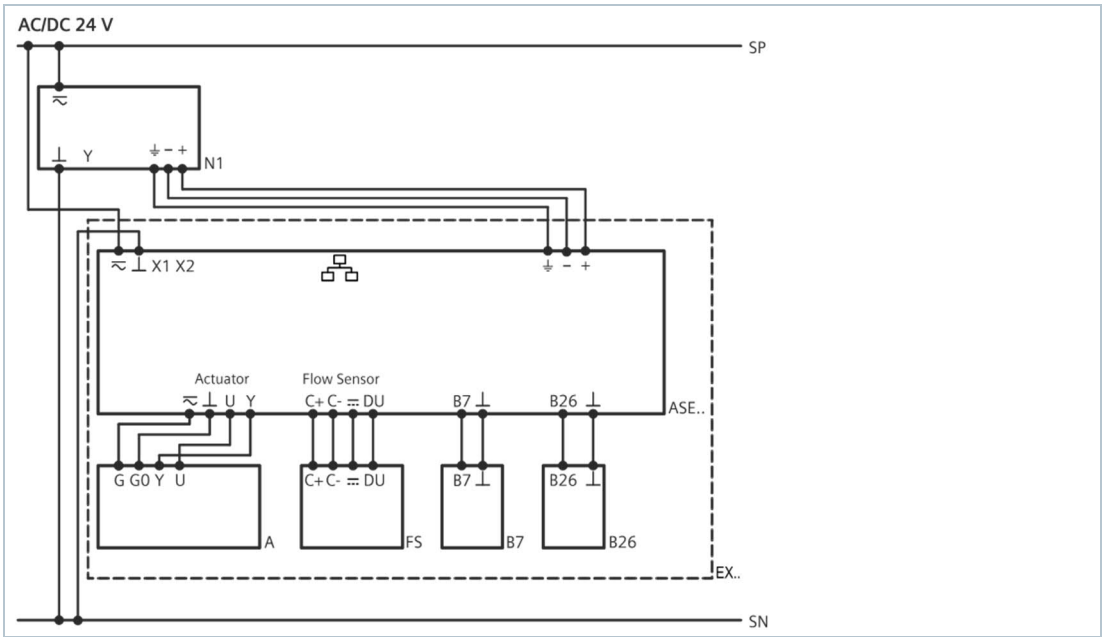
Connection diagram

For the control function “Dynamic control valve” – Setpoint source terminal



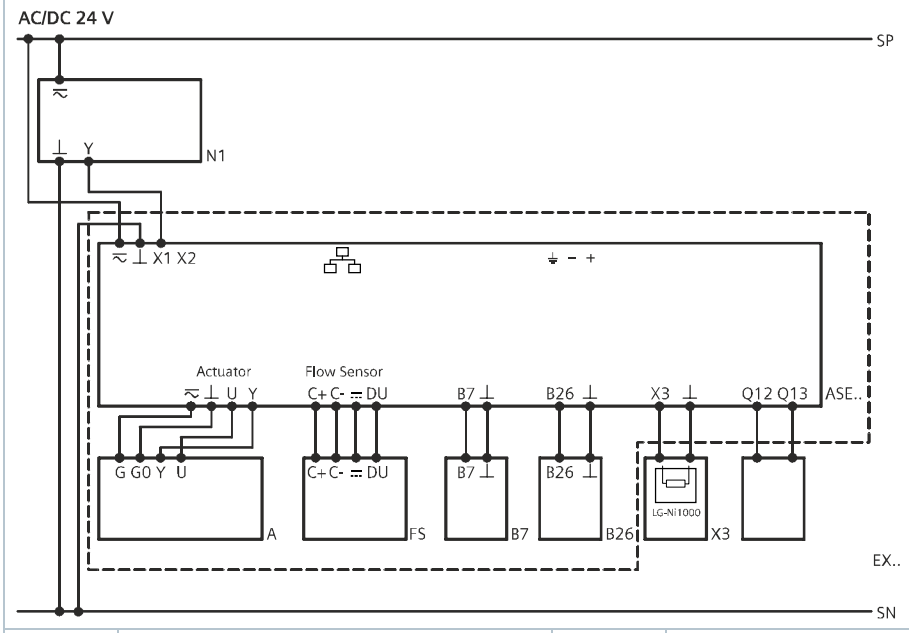
N1	Automation station	FS	Flow sensor
ASE..	Intelligent Valve controller	B7	Temperature sensor blue
A	Actuator (e.g. GLA161.9E/HR)	B26	Temperature sensor red

For the control function “Dynamic control valve” – Setpoint source Modbus



N1	Automation station	FS	Flow sensor
ASE..	Intelligent Valve controller	B7	Temperature sensor blue
A	Actuator (e.g. GLA161.9E/HR)	B26	Temperature sensor red

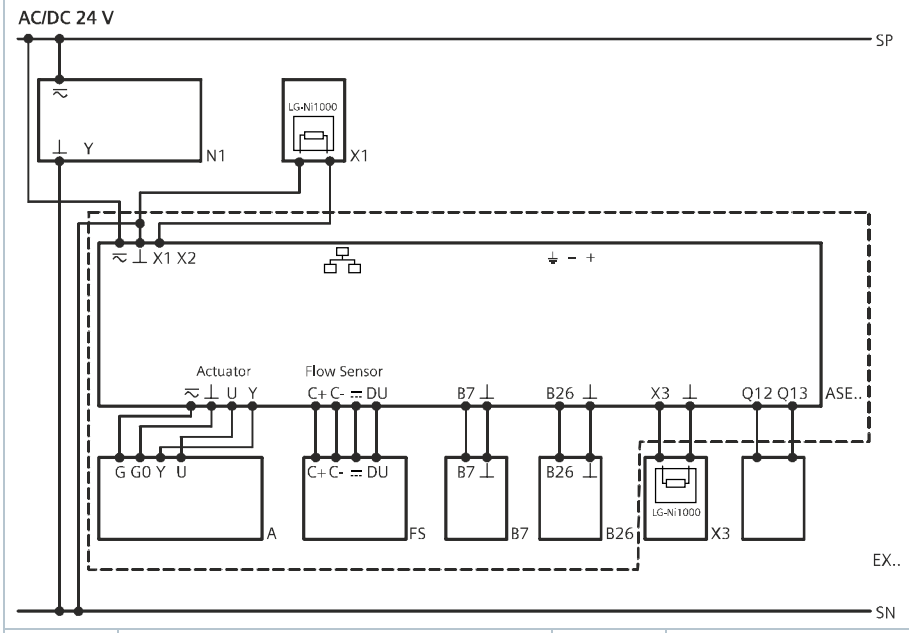
For the control function “Flow temperature controller” – Setpoint source terminal



N1	Automation station	B7	Temperature sensor blue
ASE..	Intelligent Valve controller	B26	Temperature sensor red
A	Actuator (e.g. GLA161.9E/HR)	X3	Temperature sensor, passive – secondary flow temperature (e.g. QAD26.220) [1]
FS	Flow sensor	Q12/Q13	Binary output for pump release

[1] Temperature sensors are not included; they have to be ordered separately.

For the control function “Outside temperature-dependent flow temperature controller”

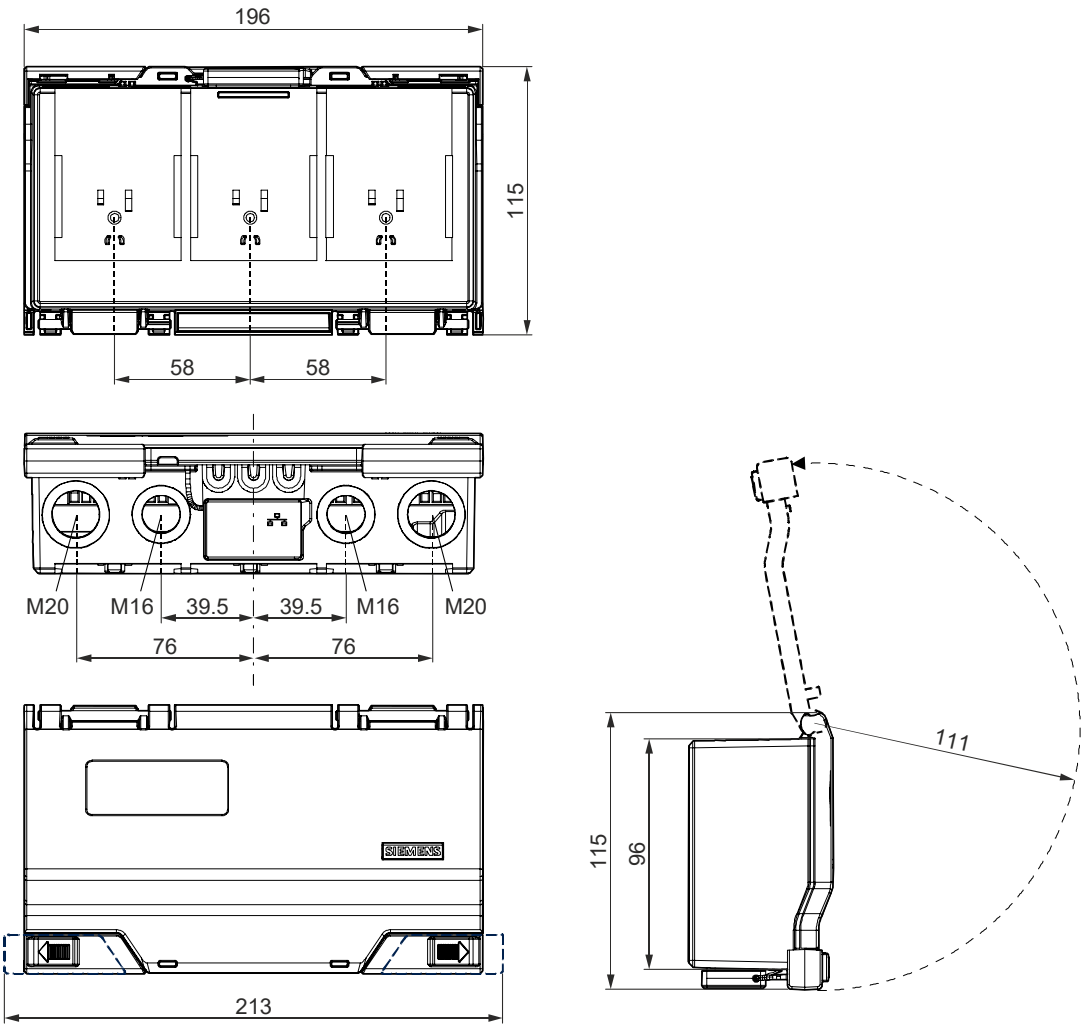


N1	Automation station	B26	Temperature sensor red
ASE..	Intelligent Valve controller	X1	Outside temperature sensor, passive (e.g. QAD22) or active (e.g. QAF3161) [1]
A	Actuator (e.g. GLA161.9E/HR)	X3	Temperature sensor, passive – secondary flow temperature (e.g. QAD26.220) [1]
FS	Flow sensor	Q12/Q13	Binary output
B7	Temperature sensor blue		

[1] Temperature sensors are not included; they have to be ordered separately.

Dimensions

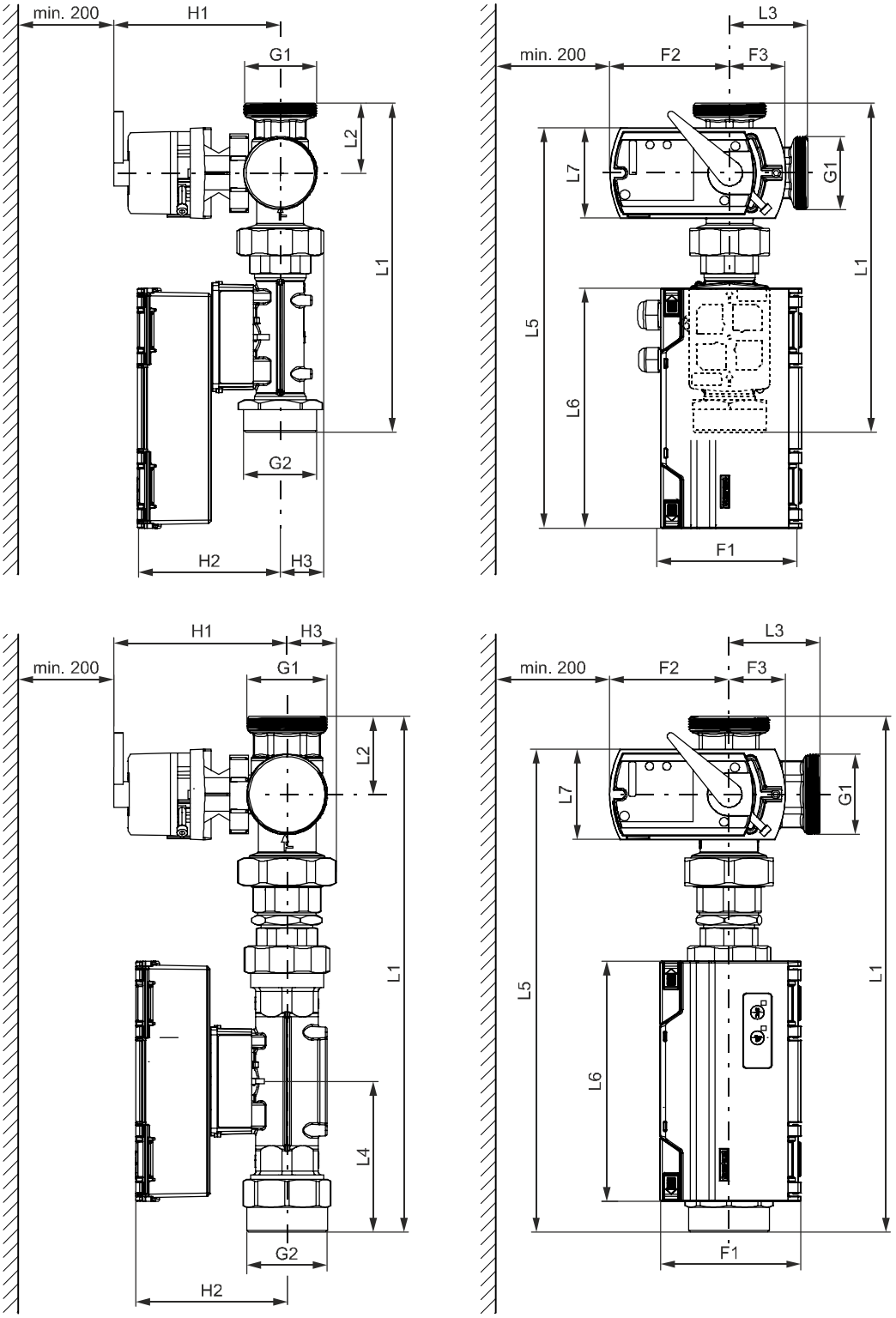
Intelligent Valve controller, ASE4U10E



Dimensions in mm

kg
0.5

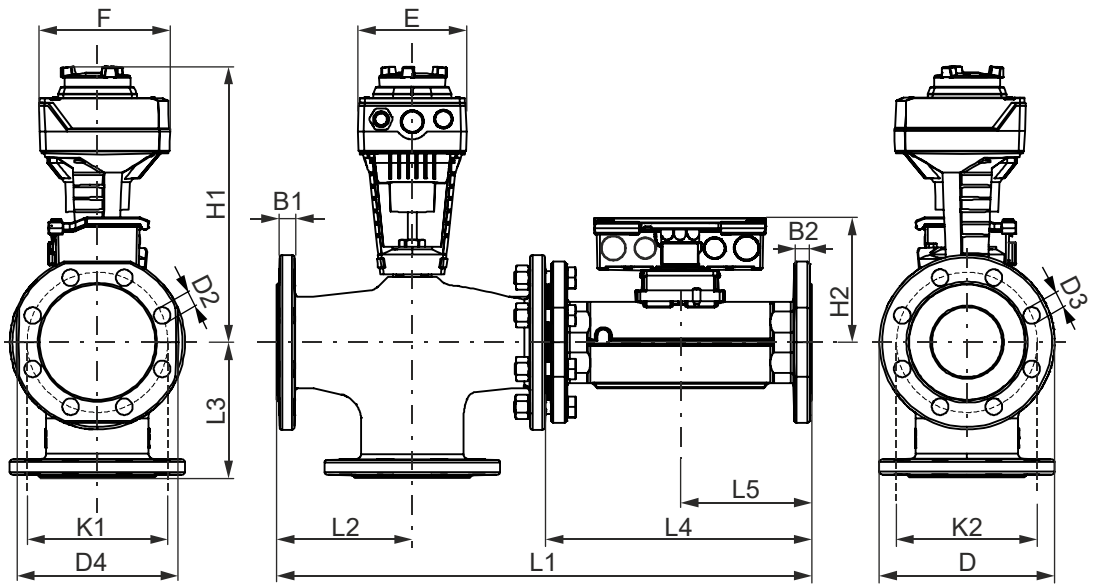
Threaded, EXG4U10E..



Dimensions in mm

Valve type	F1	F2	F3	G1	G2	H1	H2	H3	L1	L2	L3	L4	L5	L6	L7	kg
EXG4U10E015	115	98	46	G 1 B		130	110	21.5	232.5	43.5	44.15	115	321	196	78.5	2.5
EXG4U10E020				G 1¼ B			112	26	273	45	44.7	130	291			2.9
EXG4U10E025				G 1½ B		132.5	116	29	302		49.5	150	317			3.5
EXG4U10E032				G 2 B		136		35	254.5	50	63.7	145	320			3.7
EXG4U10E040				G 2¼ B		142	123	40.5	410	58	74.3	223	394.1			6.3
EXG4U10E050				G 2¾ B		155		49	358.5	62.5	82.1		340			7.0

Flanged, EX4U20E..

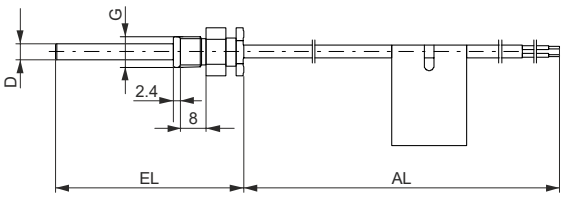


Dimensions in mm

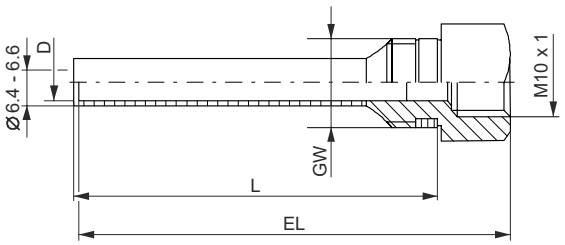
Valve type	B1	B2	D	D2	D3	D4	E	F	H1	H2	K1	K2	L1	L2	L3	L4	L5	kg
EXF4U20E065	17	19	184	18 (4x)	19 (4x)	170	124	150	316	136	145	145	591	145	145	300	150	30
EXF4U20E080	19	18	200	19 (8x)	19 (8x)	185				143	160	160	611	155	155			37.4
EXF4U20E100	20	23	220	19 (8x)		216			375	154	180	180	711	175	175	360	180	55.9

Temperature sensors EZU.., protective pockets EZT..

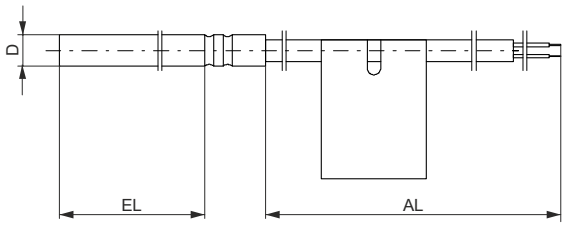
EZU10-2615



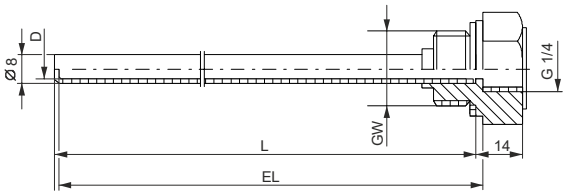
EZT-M40



EZU10-10025 / EZU10-10060



EZT-S100

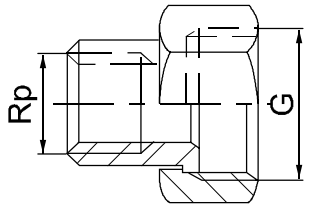


Dimensions in mm

Temperature sensors				
Type	D	EL	G	AL
EZU10-2615	5.2	26.5	M10x1	1500
EZU10-10025	6	92.5	-	2500
EZU10-10060				6000

Protective pockets					
Type	D	EL	L	GW	SW
EZT-M40	5.2	50	40	G ¼	17
EZT-S100	6.2	100	92.5	G ½	27

Fittings



For 3-port valves EXG4U10E.. (3-piece set)		G	Rp
Type	**Valve type**	**Inch**	
ALG153 / ALG153B	EXG4U10E015	G 1 B	Rp ½
ALG203 / ALG203B	EXG4U10E020	G 1¼ B	Rp ¾
ALG253 / ALG253B	EXG4U10E025	G 1½ B	Rp 1
ALG323 / ALG323B	EXG4U10E032	G 2 B	Rp 1¼
ALG403 / ALG403B	EXG4U10E040	G 2¼ B	Rp 1½
ALG503 / ALG503B	EXG4U10E050	G 2¾ B	Rp 2

- Valve side with cyclindrical threading per ISO 228-1
- Pipe side side with cyclindrical threading per ISO 7-1
- ALG..B fittings up to 100 °C medium temperature

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.
EXG4U10E015 S55300-M111	..A	EXF4U20E065 S55300-M117	..A
EXG4U10E020 S55300-M112	..A	EXF4U20E080 S55300-M118	..A
EXG4U10E025 S55300-M113	..A	EXF4U20E100 S55300-M119	..A
EXG4U10E032 S55300-M114	..A		
EXG4U10E040 S55300-M115	..A		
EXG4U10E050 S55300-M116	..A		

Model info	ASN=ASE4U10E; HW=0210
Firmware revision	09.54.12.07; APP=1.18.6462; SVS-300.6.SBC=15.00; ISC=01.00
Application software version	AAS-20:SU=SiUn; APT=HvacFnct34; APTV=2.111; APS=1

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