Ambiductor AB
Flow & Energy Analysis Systems

Ambiductor HEAT 2

Compact energy meter for most applications

Applications

Heat or cooling metering on both primary and secondary thermal energy systems. The meter is certified according to MID for billing. Available in all sizes up to DN400.

Also available for measuring open systems, such as warm water and warm water circulation.

Characteristics

- Compact ultrasonic meter for heating and cooling
- Certified accuracy class 2 acc. EN1434
- Environmental class C for industrial use
- M-bus communication as standard. Wireless M-bus, Modbus, and BACnet as option
- 2 pulse in/outputs as option
- 2 flow sensor inputs for open system metering
- 2 pressure sensor inputs för monitoring or energy calculations
- Battery 11 years or 230V supply
- Dynamic measuring range 1: 100 (alternatively 1: 250)

Strengths

- Static measurement without moving parts - insensitive to particles
- Accurate heat measurement in both cooling and heating systems
- Cost-effective remote reading of 2 pulsed water meters via M-bus
- Versatile data storage
- All mounting directions possible
- High IP class
- Advanced alarm management

Intended use

Ambiductor HEAT 2 is a compact ultrasonic meter for measuring thermal energy in water. It fits most applications where you need to measure heat or cold, approved in accordance with the Measuring Instruments Directive (MID) 2014/32/EU.

Meters for billing must be validated within a time period specified by local legislation.

DN15-50 does not need straight pipe lines. DN65-100 needs 5xDN upstream and 3xDN downstream. Straight pipes are always preferable.

Function and measurement principle

The meter consists of:

- One ultrasonic flow sensor that measures flow
- Two paired temperature sensors Pt500 for measuring flow and return temperature
- One calculator that calculates thermal energy. It can be mounted on the flow meter or on the DIN rail on the wall

Power = Flow rate x ($T_{hot\ side}$ -$T_{cold\ side}$) x k

(where k is the specific heat factor, adjusted by temperature and medium)

Ambiductor HEAT 2 is equipped with optical reading head with EN 1434 M-bus protocol.

Communication

Ambiductor HEAT 2 has as standard M-bus and 2 pulsin / outputs. See Options below for other options.

M-bus communication is set up via the service menu using the two main buttons.

Options

The following options are available today.

2- or 4-wire temperature sensors

The meter can be supplied with either 2- or 4-wire temperature sensors. Ambiductor standard is 4-wire.

Advanced applications

The meter can be used for open systems etc. See below.

Pressure metering

A built-in pressure sensor gives a possibility to monitor the static pressure in the pipe. Also usable as an extra flow sensor.

Tarif function, billing of low temperature difference

Energy is calculated as normal, but also energy above and under a fixed reference temperature in the return pipe. Used for lowering the return pipe to avoid energy leakage.

Options

Apart from M-bus, the following communication is available.

- M-bus/CL/RS-232 and 2 pulse outputs
- M-bus/CL/RS-232 and 2 analog outputs
- RS-232
- RS-485
- Built-in radio transmitter RF 868MHz
- Modbus
- BACnet

Hardware options include:

- IP67 (included in some software options)
- PN25 (in flanged version)
- Customer-specific labeling

Alarm management and status

The meter shows the operating status including all alarms for temperature sensors, flow sensors and the calculator.

Presented both in display and by bus.

Data logger

The meter has a data logger that stores:

- up to 110 days (3,5 months) hourly values
- up to 1024 days (33 months) daily and monthly values

The archive is stored for 33 months. Values are kept even without power supply for at least 12 years.

All stored data can be read by a computer using a bus.

Technical data

Available sizes

	Flow rate			Connection	Length (mm)	Nom. pressure PN (bar)	Pressure drop at qp (kPa)	Weight (kg)
	Nom. qp (m^3/h)	Max qs (m^3/h)	Min qi (m^3/h) *					
DN15 qp0,6	0,6	1,2	0,0006 (0,024)	G20/G¾"	110	16	7	1
	0,6	1,2	0,0006 (0,024)	G25/G1" (även DN20)	190	16	0,9	
DN15 qp1,5	1,5	3,0	0,006 / 0,015 (0,06)	G20/G¾"	110 (även 165)	16	17,1	
	1,5	3,0	0,006 / 0,015(0,06)	G25/G1" (även DN20)	190	16	5,8	
	1,5	3,0	0,015 (0,06)	G25/G1"	130	16	7,2	
DN20 qp2,5	2,5	5,0	0,01 / 0,025 (0,1)	G25/G1"	130	16	19,8	
	2,5	5,0	0,01 / 0,025 (0,1)	G25/G1" (även DN20)	190	16	9,4	
DN25 qp3,5	3,5	7,0	0,035 (0,14)	G32/G1¼" (även DN25, DN32)	260	16	4	3
DN25 qp6,0	6,0	12	0,024 / 0,006 (0,24)	G32/G1¼" (även DN25, DN32)	260	16	10	3
DN40 qp10	10	20	0,04 / 0,10 (0,4)	G50/G2" (även DN40)	300	16	18	4
DN50 qp15	15	30	0,06 / 0,15 (0,6)	Fläns DN50	270	16	12	10
DN65 qp25	25	50	0,1 / 0,25 (1)	Fläns DN65	300	16	20	13
DN80 qp40	40	80	0,16 / 0,4 (1,6)	Fläns DN80	350	16	18	15
DN100 qp80	60	120	0,24 / 0,6 (2,4)	Fläns DN100	350	16	18	18
DN150 qp140	140	280	6,4	Fläns DN150		16	5	
DN200 qp550	550	1100	11	Fläns DN200		16	5	

*) Values in parenthesis are for application U1L and U2L.

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Classification

Specification	Data
Metrological class	2014/32/EU class 2 acc. EN 1434
Mechanical class	M1 acc. 2014/32/EU
Electric class	E2 acc. 2014/32/EU
Environmental class	C (industry)
Protection class	IP 65 (IP 67)

Energy calculator

Specification	Data
Power supply	11 years battery Li-SOCl$_2$ or external power supply
Communication	M-bus (optional Modbus, CL, radio etc.)
Pulse input/output	2 programmable in/out
Energy units	kWh, MWh, GJ, Gcal
Cable length between flow sensor and calculator	3...100 m
Display	8-digit LCD with symbols
Decimals/units, volume	Volume: 00000.001 m³
Decimals/units, energy	<6 m³/h: 00000001 kWh ≥6 m³/h: 00000.001 MWh optional 00000.001 Gcal optional 00000.001 GJ

Extra pulse input for open systems

Specifikation	Data
Pulse type	1 pc active or passive pulse
Pulse value	Programmable
Max voltage for active pulses	2,5...3,7 V
Min voltage for active pulses	0...0,7 V
Resistance using power from internal battery	2 MΩ
Resistance using external power source	10 kΩ

Temperatures

Specification	Data
Ambient temperature	Calculator: +5...55 °C (condensation free) Flow sensor: -30...55 °C Relative humidity: max 93%
Medium temperature	0....180 °C
Mounted calculator on flow sensor	Up to 90 °C (otherwise 130 °C)
Temperature range, calculator	0...180 °C
Temperature difference	2...150 K
Temperature sensors	Pt500 according to EN60751
Cable lengths, temp sensors	4-wire: 10...100 m 2-wire: 3...5 m
Resolution, temperatures	0,01 °C

Tryckgivare

Specifikation	Data
Pressure inputs	2 pcs
Analog input, programmable	0...5 mA, 0...20 mA, 4...20 mA
Low pressure threshold, programmable	0...2500 kPa
High pressure threshold, programmable	100 ... 2500 kPa
Relative pressure accuracy	not more than ±0,25% of high pressure threshold

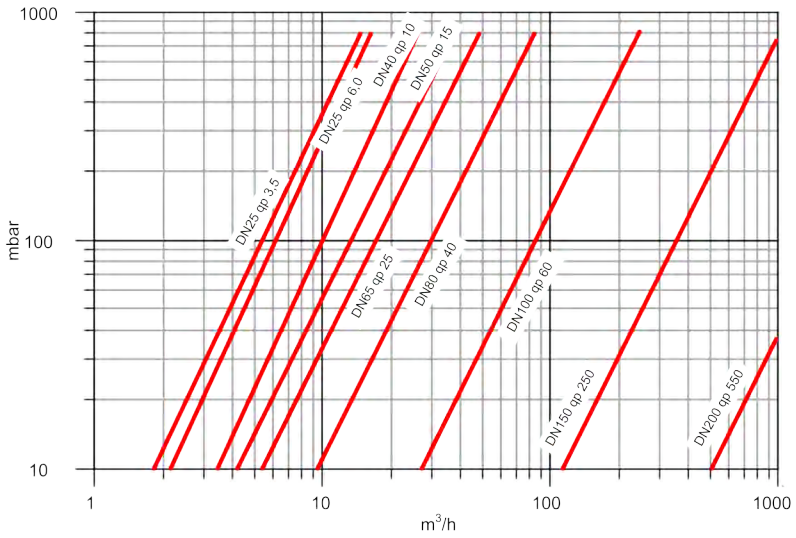
Pulse in/outputs (optional)

Specification	Data
Number of in/outputs	2
Unit, pulse input	m³
Pulse value, pulse input	Programmable
Pulse input type	IB by LST EN1434-2
Max frequency pulse input	3 Hz
Max voltage pulse input	3.6 V
Type, pulse output	Open collector
Voltage/current, pulse output	Up to 20mA and 50V
Pulse length, pulse output	100 ms at normal mode (1.6 ms at test mode)
Pulse values	Programmable

Accuracy

Error tolerance acc. EN 1434 class 2

Pressure drop



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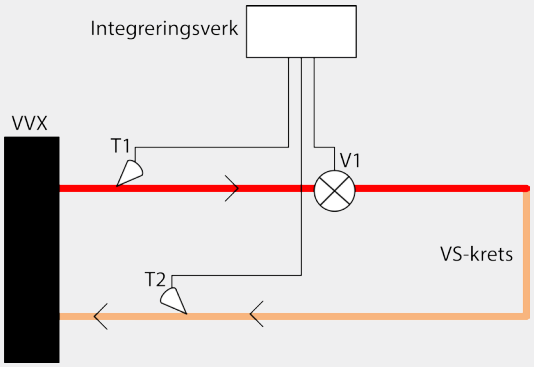
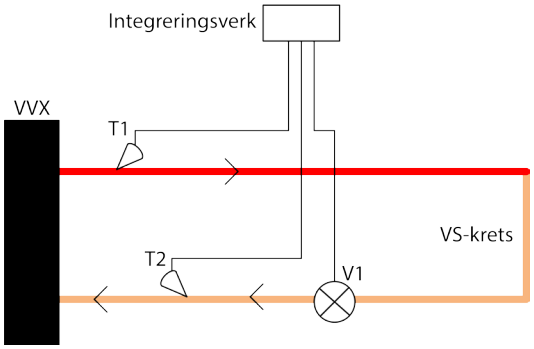
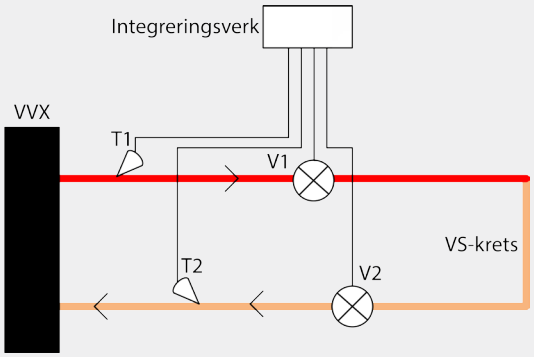
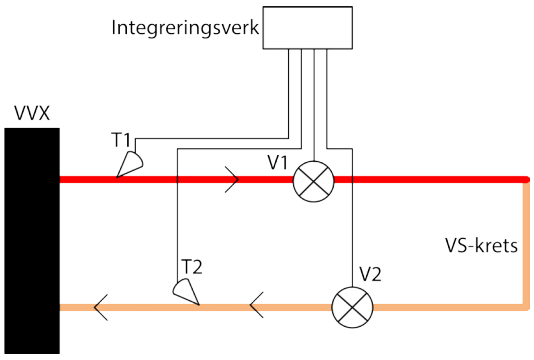
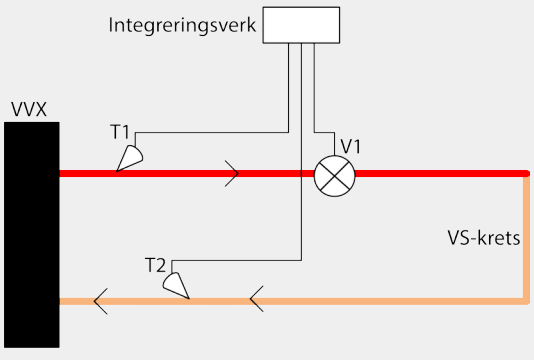
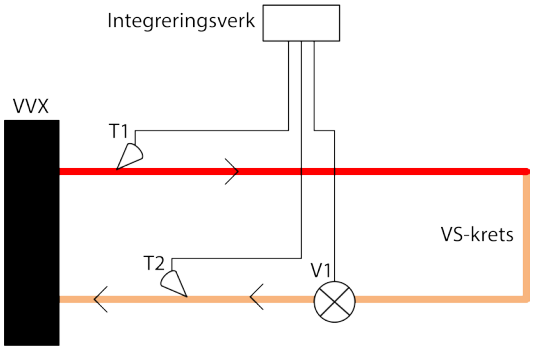
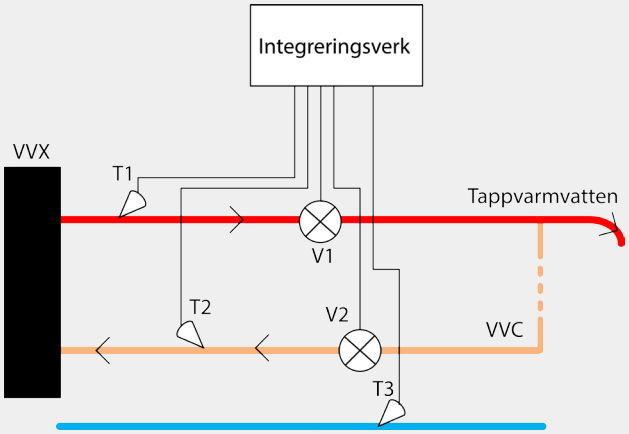
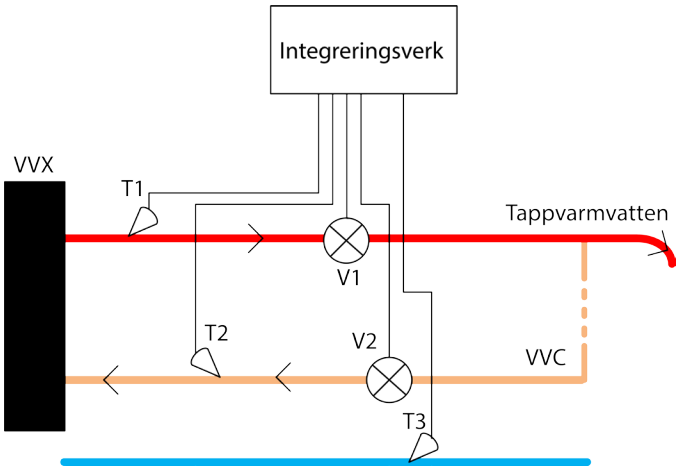
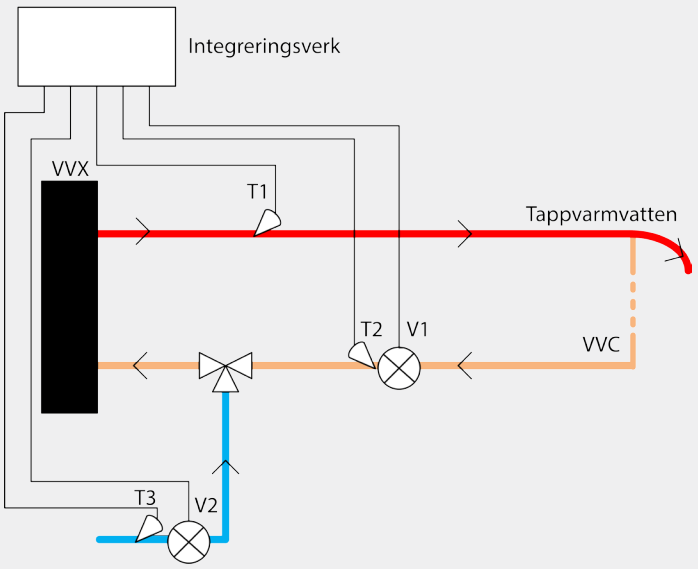
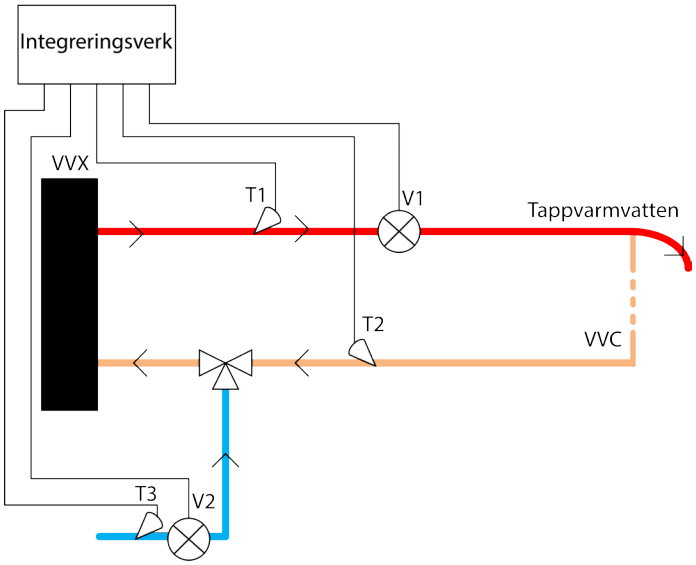
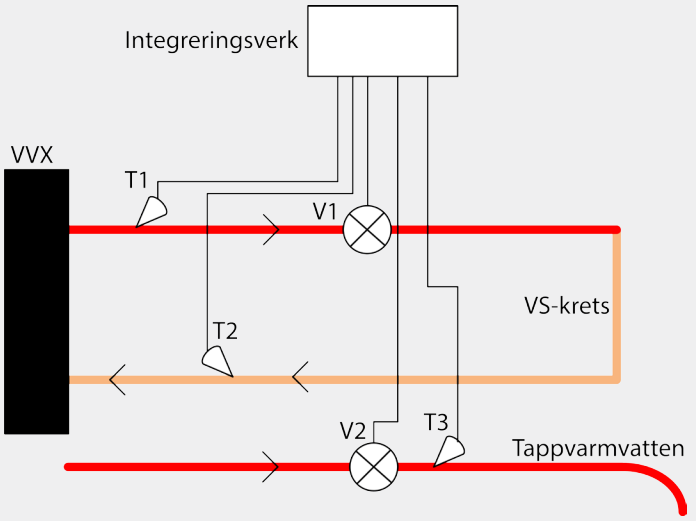
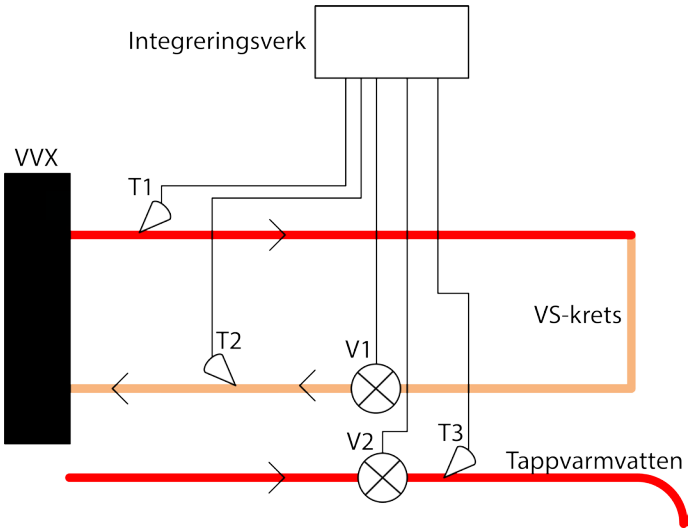
Energiapplikationer

Application	Principle drawing
HEATING AND/OR COOLING IN CLOSED SYSTEMS:	
U1 = Heat metering in supply pipe Measuring thermal energy Components: • 1 pcs flow sensors • 2 pcs temperature sensors • Energy calculator Calculations: • E=V1*ρ1*(T1-T2)	
U2 = Heat metering in return pipe Measuring thermal energy Components: • 1 pcs flow sensors • 2 pcs temperature sensors • Energy calculator Calculations: • E=V1*ρ2*(T1-T2)	
U1F = Heat metering/leakage detection in supply pipe (Twin-E) Measuring thermal energy Components: • 2 pcs flow sensors • 2 pcs temperature sensors • Energy calculator Calculations: • E=V1*ρ1*(T1-T2)	
U2F = Heat metering/leakage detection in return pipe (Twin-E) Measuring thermal energy Components: • 2 pcs flow sensors • 2 pcs temperature sensors • Energy calculator Calculations: • E=V2*ρ2*(T1-T2)	
U1L = Heat and cooling metering in supply pipe (BDE) Measuring thermal energy Components: • 1 pcs flow sensors • 2 pcs temperature sensors • Energy calculator Calculations: • ∑E = E1 + E2 • När T1>T2: E1=V1*ρ1*(T1-T2), E2=0 • När T1<T2: E2=V1*ρ1*(T2-T1), E2=0	

Application	Principle drawing
U2L = Heat and cooling metering in return pipe (BDE) Measuring thermal energy Components: • 1 pcs flow sensors • 2 pcs temperature sensors • Energy calculator Calculations: • ∑E = E1 + E2 • När T1>T2: E1=V1*ρ2*(T1-T2), E2=0 • När T1<T2: E2=V1*ρ2*(T2-T1), E2=0	
HEATING IN OPEN OR CLOSED SYSTEMS:	
A * = Warm water/warm water circulation measurement (alternate method) Measuring warm water circulation losses and supplied energy for warm tap water without access to cold water supply Components: • 2 pcs flow sensors • 3 pcs temperature sensors • Energy calculator Calculations: • ∑E=E1-E2 • E1=V1*ρ1*(T1-T3) • E2=V2*ρ2*(T2-T3)	
A1 * = Warm water/warm water circulation measurement Measuring warm water circulation losses and supplied energy for warm tap water without access to cold water supply Components: • 2 pcs flow sensors • 3 pcs temperature sensors • Energy calculator Calculations: • ∑E=E1+E2 • E1=V2*ρ2*(T1-T2) • E2=(V1*ρ1-V2*ρ2)*(T1-T3)	
A2 * = Warm water/warm water circulation measurement (primary) Measuring warm water circulation losses and supplied energy for warm tap water with access to cold water supply Components: • 2 pcs flow sensors • 3 pcs temperature sensors • Energy calculator Calculations: • ∑E=E1+E2 • E1=V1*ρ2*(T1-T2) • E2=V2*ρ3*(T1-T3)	

Application	Principle drawing
A4 * = Warm water/warm water circulation measurement Measuring warm water circulation losses and supplied energy for warm tap water without access to warm water circulation Components: • 2 pcs flow sensors • 3 pcs temperature sensors • Energy calculator Calculations: • ∑E=E1+E2 • E1=(V1*ρ1-V2*ρ3)*(T1-T2) • E2=V2*ρ3*(T1-T3)	
KOMBINERADE VÄRME- OCH VARMVATTENSYSTEM	
U1A3 ** = Heat metering in supply and warm water Measuring thermal energy and energy consumption in warm tap water Components: • 2 pcs flow sensors • 3 pcs temperature sensors • Energy calculator Calculations: • ∑E=E1+E2 • E1=V1*ρ1*(T1-T2) • E2=V2*ρ3*(T3-T4) • (T4 är fast programmerad)	
U2A3 ** = Heat metering in return and warm water Measuring thermal energy and energy consumption in warm tap water Components: • 2 pcs flow sensors • 3 pcs temperature sensors • Energy calculator Calculations: • ∑E=E1+E2 • E1=V1*ρ2*(T1-T2) • E2=V2*ρ3*(T3-T4) • (T4 är fast programmerad)	

*) MID-certification valid only for measurement in closed systems. Open systems use a type approval but cannot certify according to MID 2004/22/EC. Open systems is accoding to "Rules on accounting of thermal energy and amount of heat-conveying liquid", Official Gazette:1999, No 112-3270".

**) MID-certification valid only for measurement in closed systems. Open systems use a type approval but cannot certify according to MID 2004/22/EC.

Ordering details

E2 - 02 1 4 2 - 72 - 00 - 2 3 1 - E2 1 1 1 - 1 4 2 4

No mounting kit

Pockets included

Temp sensors	Code		Code
None, 2-wire	**1**	PL-6 Pt500, 2-wire	**3**
None, 4-wire	**2**	PL-6 Pt500, 4-wire*	**4**

Pressure class	Code		Code
PN16*	**1**	PN25	**2**

Protection class	Code		Code
IP65*	**1**	IP67 (incl. U1L/U2L)	**2**

Unit	Code		Code
MWh*	**1**	GJ	**2**
Gcal	**3**	kWh	**4**

Certification	Code		Code
MID*	**1**	No MID (over DN100)	**2**

EU-directive

Communication	Code		Code
None	**0**	M-bus/RS-232/CL, analog	**4**
M-bus*	**1**	M-bus/RS-232/CL, digital	**5**
RS-232	**2**	Modbus RTU	**6**
RS-485	**3**	MiniBus	**7**
		wireless M-bus	**8**

Temperature sensor cable length

m	Code		Code		Code		Code		Code
3*	**01**	10	**03**	20	**05**	60	**07**	100	**09**
5**	**02**	15	**04**	40	**06**	80	**08**	Ingen kabel	**00**

Flow sensor cable length

m	Code		Code		Code		Code		Code
3*	**01**	10	**03**	20	**05**	60	**07**	100	**09**
5	**02**	15	**04**	40	**06**	80	**08**	Ingen kabel	**00**

Permanent flow qp for 2nd flow sensor

See table below:	No 2nd sensor*	**00**

Permanent flow qp / length / connection for 1st flow sensor

m³/h / mm / connect.	Code		Code		Code
0,6 / 110 / G20	**01**	2,5 / 190 / DN20	**38**	25 / 300 / DN65	**72**
0,6 / 190 / G25	**31**	3,5 / 260 / G32	**41**	40 / 300 / DN80	**82**
0,6 / 190 / DN20	**35**	3,5 / 260 / DN25	**43**	60 / 360 / DN100	**92**
1,5 / 110 / G20	**03**	3,5 / 260 / DN32	**45**	100 / 350 /DN125	**x**
1,5 / 165 / G20	**11**	6,0 / 260 / G32	**42**	150 / 500 / DN150	**94**
1,5 / 130 / G25	**21**	6,0 / 260 / DN25	**44**	250 / 500 / DN200	**x**
1,5 / 190 / G25	**33**	6,0 / 260 / DN32	**46**	400/ 600 / DN250	**x**
1,5 / 190 / DN20	**37**	10 / 300 / G50	**51**	560 / 500 / DN300	**x**
2,5 / 130 / G25	**22**	10 / 300 / DN40	**52**	750 / 550 / DN350	**x**
2,5 / 190 / G25	**34**	15 / 270 / DN50	**61**	950 / 600 /DN400	**x**

Power supply	Code		Code
Battery 3,6 V	**1**	230 V*	**2**

Temp sensor type, (range)	Code		Code
2-wire sensor, (2 ... 150) K	**22**	2-wire sensor, (3 ... 150) K	**23**
4-wire sensor, (2 ... 150) K	**42**	4-wire sensor, (3 ... 150) K*	**43**

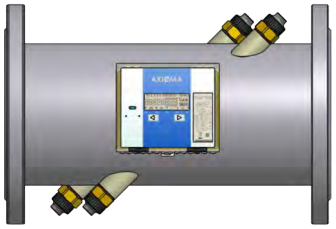
Dynamic range (qp/qi)	Code		Code
100 (25 for appiication U1L and U2L)*	**2**	250	**4**

Application	Code		Code		Code		Code		Code
U1	**01**	U1F	**04**	A	**08**	A2	**12**	U1A3	**16**
U2*	**02**	U2F	**05**	A1	**10**	A4	**14**	U2A3	**17**

*) Standard on stock meters.

Exemple: Threaded DN15-40

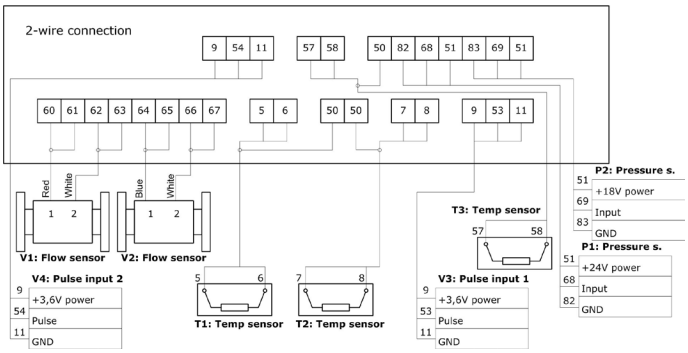
Flanged DN20-100 brass



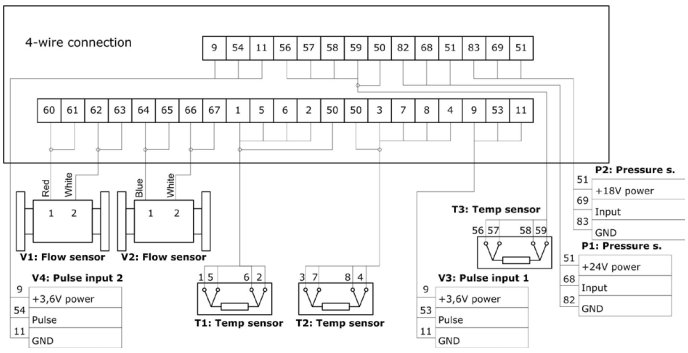
Flanged DN125-400 steel, 2-beam without MID-certificate

Wiring diagram

2-wire connected temperature sensors



4-wire connected temperature sensors



Dimensions

For dimensional drawings, see operation instructions.

About Ambiductor

Ambiductor focus in the following areas:

- Internet-of-Things through Lora products
- Energy meters
- Water meters
- Oil meters and meters for industrial liquids
- Smart metering / data collection

Ambiductor is an engineering company with many years of experience in metering technology, automation and remote reading. Our customers experience a high level of service and wide range of application solving.

See instructional videos and assembly guides on www.ambiductor.se/support

Disclaimer!

If there is any inconsistency between this version and the original document, the original document will prevail.

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Version 19a