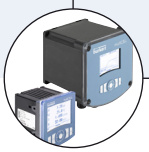
FLUXER
FLOOD CONTROL

bürkert
FLUID CONTROL SYSTEMS

Flow transmitter to use on Inline sensor-fitting for hazardous areas II 1 G/D - II 3 GD

- Flowmeter with NAMUR or NPN/PNP output signal
- Mounting, dismounting of electronics by a Quarter-Turn
- Protection- Ex:
  - Intrinsically safe (ignition protection type i) certified NAMUR version for use in Zone 0, 1, 2 - Gas (G) or 20, 21, 22 - Dust (D)
  - non-sparking (ignition protection type nA) certified NPN/PNP version for use in Zone 2 - Gas (G) or 22 - Dust (D)

Type SE30 can be combined with…



Type 8619
multiCELL -
transmitter/controller

Type 8611
eCONTROL -
Universal controller

Type 8025
Flow transmitter or
remote batch controller

Intrinsic safety barrier
with NAMUR input

The flow transmitter SE30 Ex for continuous flow measurement is especially designed for use in neutral, slightly aggressive, solid-free liquids, in hazardous environments.

The complete flowmeter is made up of an electronic module and a measuring element, either a sensor fitting S030 with PVDF paddle-wheel or a sensor fitting S077, quickly and easily connected together by a Quarter-Turn.

The electronic module detects the paddle-wheel (S030) or oval gear (S077) rotation, modulates the current of the power supply line according to NAMUR standard or produces an NPN/PNP output signal (depends on model). To operate the NAMUR signal, an intrinsic safety barrier should be connected to the flowmeter SE30 Ex.
The connection to another device in the safe area depends on the used flowmeter model.

General data	
Compatibility[1]	with sensor fittings S030 or S077 (see corresponding data sheet)
Materials	
Housing, cover	PC (NPN/PNP version) PPS (NAMUR version) glass fibre reinforced
Cable plug	PA with silicone seal (NAMUR version), NBR seal (NPN/PNP version)
Wetted parts materials	Sensor fitting using restriction see “Safety instructions - Notice of ATEX instructions”, page 6
Sensor fitting S030[1]	
Body	Brass, stainless steel, PVDF
Paddle-wheel	PVDF
Axis and bearings	Ceramics
Seal	FKM
Sensor fitting S077[1]	
Body	Aluminium, stainless steel
Rotor	PPS, aluminium, stainless steel
Shaft	Stainless steel
Seal	FKM (EPDM or PTFE on request)
Electrical connection	
NAMUR version	Cable plug Form A acc. to EN 175301-803 (supplied)
NPN/PNP version	Cable plug Form A acc. to EN 175301-803 with 5 or 12 m cable (not supplied)
Voltage supply cable	0.5…1.5 mm² cross section, 5…8 mm diameter; shielded, max. 50 m length; line impedance <50 Ω
Environment	
Ambient temperature	0…+60 °C *(+5 °F...+140 °F)* (operating and storage)
Relative humidity	≤80 %, without condensation

[1] **Refer to the rubric “Safety instructions - Notice of ATEX instructions”, page 6 to choose the appropriate sensor fitting for the area of application**

Electrical data	
Power supply[2]	8…15 V DC (NAMUR version, from connected intrinsic safety barrier) 12…36 V DC (NPN/PNP version)
Current consumption with sensor	max. 7 mA (NAMUR version); 30 mA (NPN/PNP version)
Output	Depends on the device model and application area: - 2-wire current modulation according to NAMUR (0.5 or 2.5 mA) - NPN/PNP (I_{max} < 100 mA max., 0…300 Hz, duty cycle ½)
Reversed polarity of DC	Protected
Complete device data (sensor fitting + electronic module)	
Pipe diameter S030 sensor fitting S077 sensor fitting	 DN06…DN65 DN15…DN50
Measuring range S030 sensor fitting S077 sensor fitting	 0.5…1200 l/min (velocity 0.3…10 m/s) 2…350 l/min (viscosity > 5 cps) 3…300 l/min (viscosity < 5 cps)
Fluid temperature max.	80 °C *(176 °F)*
Fluid pressure max. S030 sensor fitting S077 sensor fitting	 PN10 (PVDF), PN16 (stainless steel, brass - PN40 on request) 55 bar (for DN15…DN25) / 18 bar (for DN40…DN50) / 10 bar (for flange version)
Viscosity S030 sensor fitting S077 sensor fitting	 300 cSt. max / 1 % max. pollution 1 Pa.s max (higher on request)
Measurement deviation[3] S030 + Electronics SE30 Ex Teach-In (via remote transmitter) Standard K factor S077+ Electronics SE30 Ex	 ±1 % of Reading[4] (at the teach flow rate value) ±2.5 % of Reading[4] ±0.5 % of Reading
Linearity	±0.5 % of F.S.*
Repeatability S030 sensor fitting S077 sensor fitting	 ±0.4 % of Reading[4] ±0.3 % of Reading[4]
Standards, directives and certifications	
Protection class (according to EN 60529)	IP67 with connector plugged-in and tightened
Standards and directives CE	The applied standards, which verify conformity with the EU Directives, can be found on the EU Type Examination Certificate and/or the EU Declaration of conformity (if applicable)
Pressure	Complying with Article 4, Paragraph 1 of 2014/68/EU directive**
ATEX	see “Safety instructions - Notice of ATEX instructions”, page 6
NAMUR	EN 60947-5-6

[2] Refer to the rubric “Safety instructions - Notice of ATEX instructions”, page 6 to choose the supply adapted to the area of application

[3] = “measurement bias” as defined in the standard JCGM 200:2012

[4] Under reference conditions i.e. measuring fluid = water, ambient and water temperature = 20 °C (68 °F), while maintaining the minimum inlet and outlet distances and the appropriate internal diameter of the pipes.

* F.S. = Full scale (10 m/s)

** The device conforms to Article 4, Paragraph 1 of the Pressure Equipment Directive 2014/68/EU under the following conditions:

- **Device used on a pipe** (PS = maximum admissible pressure; DN = nominal diameter of the pipe).

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.c.i	DN ≤ 25
Fluid group 2, Article 4, Paragraph 1.c.i	DN ≤ 32 or PS*DN ≤ 1000
Fluid group 1, Article 4, Paragraph 1.c.ii	DN ≤ 25 or PS*DN ≤ 2000
Fluid group 2, Article 4, Paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 or PS*DN ≤ 5000

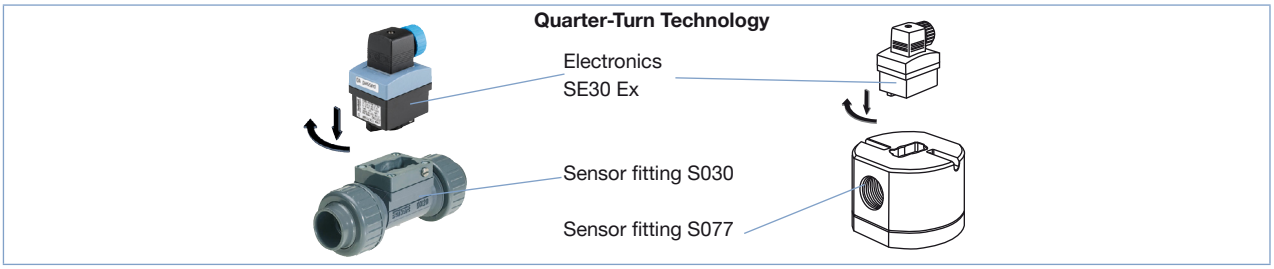
This table is independent of the chemical compatibility of the material and fluid.
Please make sure the device materials are compatible with the fluid.

Design and principle of operation

The flowmeter is built up with an electronic module SE30 Ex associated to a sensor fitting S030 or S077 respectively with integrated measurement paddle-wheel or oval gear. This connection is made by means of a Quarter-Turn.

When liquid flows through the pipe, the paddle-wheel or of the oval gear of the sensor-fitting turns. This rotation produces a measuring signal in the electronic module.
For the NAMUR version, the electronic module modulates the current of the 2-wire supply line according to NAMUR standard. The modulated frequency of this signal is proportional to the flow rate. This signal is converted, by the connected type NAMUR intrinsic safety barrier, into a frequency signal on its open collector output. The electrical connection of the flowmeter is made via a cable plug (Type 2508 - supplied).
For the NPN/PNP version, the generating signal, which frequency is proportional to the flow rate, can be displayed or processed directly. The electrical connection of the flowmeter is made via a cable plug with 5 or 12 m cable (Type 2513 - not supplied, has to be ordered separately)

A conversion coefficient (K factor, available in the instruction manual of the sensor fitting S030 or S077), specific to each pipe (size and material) enables the conversion of this frequency into a flow rate.

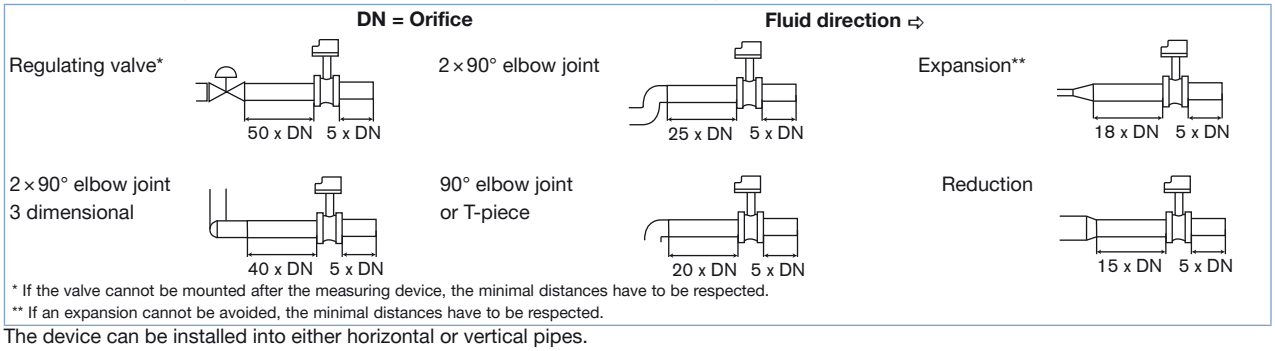


Installation into S030 sensor fitting

The SE30 Ex electronics can easily be installed into any Bürkert Inline sensor fitting system S030 with integrated PVDF paddle-wheel.

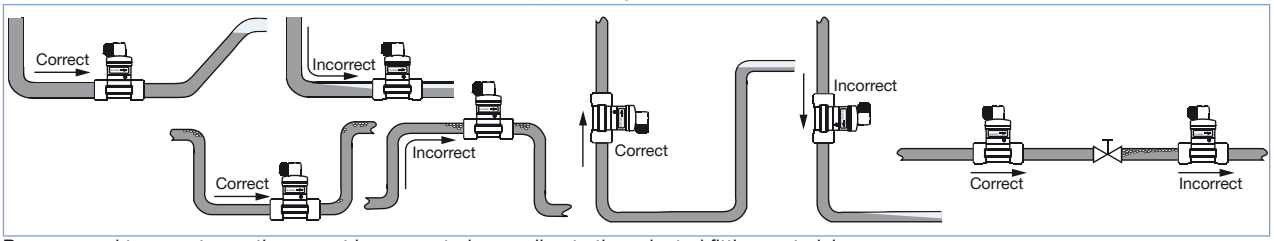
Minimum straight upstream and downstream distances must be observed. According to the pipe's design, necessary distances can be bigger or use a flow conditioner to obtain the best accuracy.
For more information, please refer to EN ISO 5167-1.

EN ISO 5167-1 prescribes the straight inlet and outlet distances that must be complied with when installing fittings in pipe lines in order to achieve calm flow conditions. The most important layouts that could lead to turbulence in the flow are shown below, together with the associated prescribed minimum inlet and outlet distances.
These ensure calm, problem-free measurement conditions at the measurement point.



* If the valve cannot be mounted after the measuring device, the minimal distances have to be respected.
** If an expansion cannot be avoided, the minimal distances have to be respected.

The device can be installed into either horizontal or vertical pipes.
Important criteria for this are; ensure that the measurement pipe is fully filled and that the measurement pipe is air bubble free.

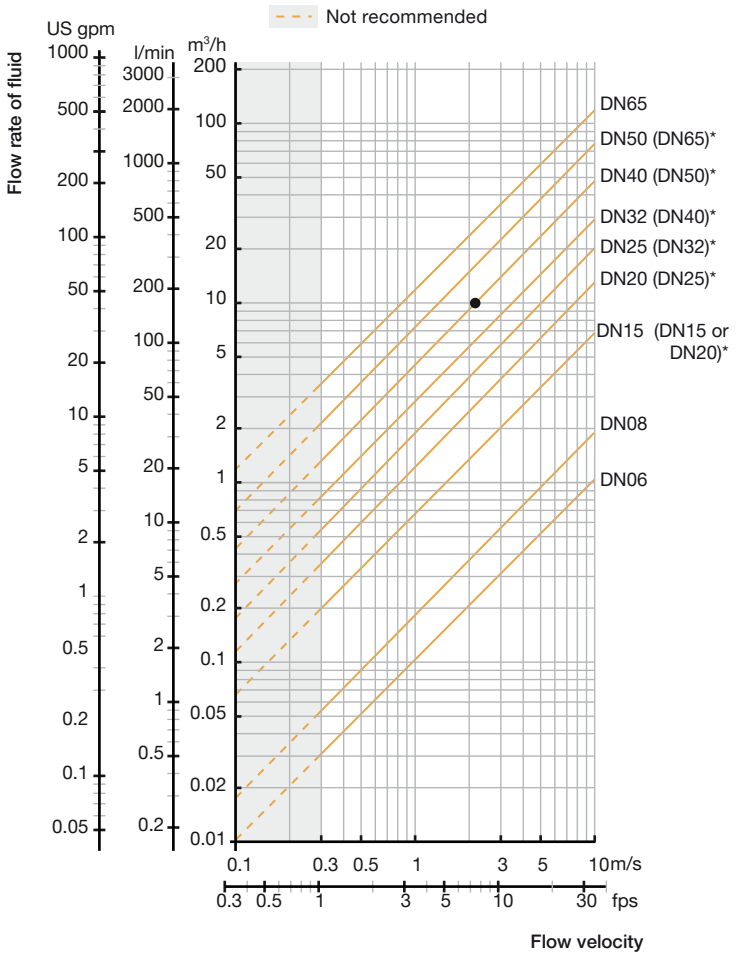


Pressure and temperature ratings must be respected according to the selected fitting material.
The suitable pipe size is selected using the diagram Flow rate/Velocity/DN.
The flowmeter is not designed for gas and steam flow measurement.

Diagram flow rate/velocity/DN

Example:
- Flow rate: 10 m³/h
- Ideal flow velocity: 1…3 m/s

For these specifications, the diagram indicates a pipe size of DN40 [or DN50 for (*) mentioned sensor fittings]

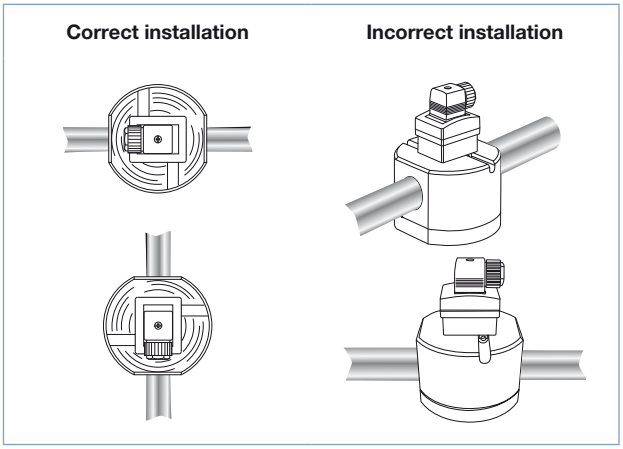


*** for following fittings with:**
- external threads acc. to SMS 1145
- weld ends acc. to SMS 3008, BS 4825-1/ASME BPE/DIN 11866 series C or DIN 11850 series 2/DIN 11866 series A/DIN EN 10357 series A
- Clamp acc. to SMS 3017, BS 4825-3/ASME BPE or DIN 32676 series A

Installation into S077 sensor fitting

The sensor fitting can be installed in any orientation as long as **the rotor shafts are always in a horizontal plane** (see figures opposite).

The pipe must be filled with liquid and free from air bubbles. Avoid air purge of the system which would cause damages and to prevent damage from dirt or foreign matter, we strongly recommend the installation of a 250 µm strainer as close as possible to the inlet side of the meter.



Overview of hazardous areas depending on SE30 Ex flowmeter models (according to ATEX)

This equipment can be installed in some potentially explosive atmospheres (surface industries) and is in compliance with the 2014/34/EU ATEX directives.	Equipment for explosive atmospheres (surface industries) - GROUP II					
	Very high level of protection		High level of protection		Normal level of protection	
	Gas Zone 0 Explosive atmospheres present continuously, long periods or frequently	**Dust Zone 20** Explosive atmospheres present continuously, long periods or frequently	**Gas Zone 1** Explosive atmospheres are likely to occur	**Dust Zone 21** Explosive atmospheres are likely to occur	**Gas Zone 2** Explosive atmospheres are unlikely to occur or present only infrequently and for a short period only	**Dust Zone 22** Explosive atmospheres are unlikely to occur or present only infrequently and for a short period only
CATEGORY 1 **SE30 Ex - NAMUR II 1 G/D** **(Article no. 552901)** EEx ia IIC T6 - IP6X T80 °C associated with PVDF, brass, stainless steel or aluminium sensor fittings	to use with intrinsic safety barrier with NAMUR input* 					
CATEGORY 3 **SE30 Ex - II 3 GD - NPN/PNP** **(Article no. 552353)** Ex nA IIC T4 Gc Ex tc IIIC T135 °C Dc IP6X associated with PVDF, brass, stainless steel or aluminium sensor fittings	**Not to be used**		**Not to be used**		**to use with a 12...36 V supply source**	

* **Note:** The open circuit voltage for the NAMUR input must be included between 8 and 15 V.

Safety instructions - Notice of ATEX instructions

The appropriate SE30 Ex model is dependent of the installation environment.

Model SE30 Ex NAMUR (Article no. 552901) Group II - Category 1 for potentially explosive zones of gas (0, 1 and 2) and dust (20, 21 and 22)

- **ATEX marking identification and ATEX installation zones**

CE 0102 ⟨Ex⟩ II 1 GD Ex ia IIC T6
Ex iaD 2O IP6X T80 °C
ambient T: 0 °C ≤ Ta ≤ 60 °C
LCIE 04 ATEX 6070 X

- **Special conditions for a safe use**

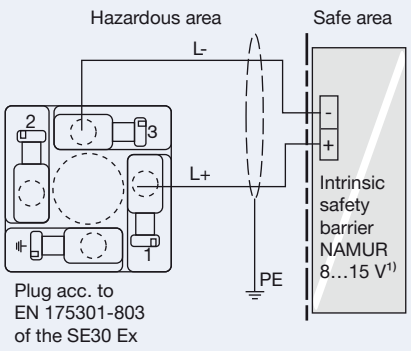
The device is intrinsic safety certified and may be installed in potentially explosive atmospheres: zones 0, 1 or 2 and zones 20, 21 or 22.

The connector can only be connected to certified intrinsic safety equipment.
This combination must be compatible with intrinsic safety rules (see electrical safety data in the table under the adjacent connection diagram).

The ambient temperature of use must always be between these limits: from 0…+60 °C.

Compatible mechanical assembly and fluid connections:

Use PVDF, brass, stainless steel or aluminium sensor fitting only.
Any other connection is prohibited.



Earth the shielding of the cable on side of the measuring exploitation

1) Use an appropriate power supply which complies with the following electrical specifications

Electrical safety data	
Ui	≤ 15 V
Ii	≤ 50 mA
Pi	≤ 188 mW
Ci	≤ 1.2 nF
Li	≈ 0

Safety instructions - Notice of ATEX instructions

Model SE30 Ex NPN/PNP (Article no. 552353) Group II - Category 3 for potentially explosive zones of gas (2) and dust (22)

• ATEX marking identification and ATEX installation zones

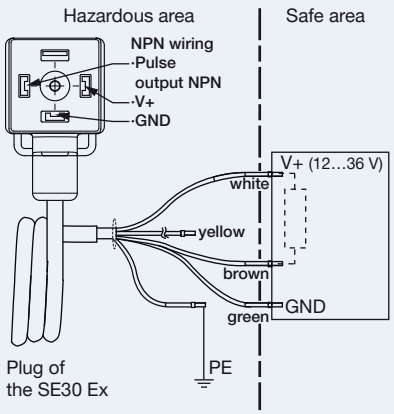
CE 0102 Ⓔx II 3 GD
Ex nA IIC T4 Gc
Ex tc IIIC T135 °C Dc IP6X
ambient T: 0 °C ≤ Ta ≤ 50 °C
INERIS 04 ATEX 3015X

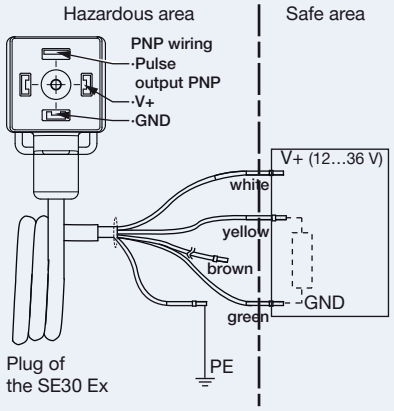
• Special conditions for a safe use

The device is ATEX certified and may be installed in potentially explosive atmospheres: zones 2 or 22.

The connector may be connected to a 12…36 V supply source.

The ambient temperature of use must always be between these limits: from 0…+50 °C.





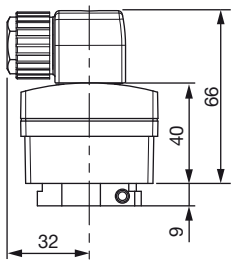
⚠ Compatible mechanical assembly and fluid connections:

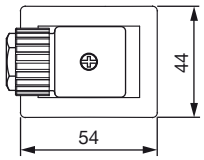
PVDF, brass, stainless steel, aluminium sensor fittings can be used. Any other connection is prohibited.

Electrical safety data on power supply line (L+/L-)	
U max.	36 V
I max.	30 mA
P max.	108 mW

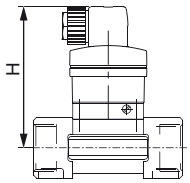
Dimensions [mm]

Electronics SE30 Ex - Version NAMUR with cable plug (supplied)



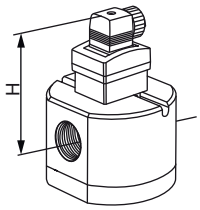


Mounted on S030 sensor fitting



DN	H
06	96
08	96
15	101
20	98
25	98
32	102
40	106
50	112
65	112

Mounted on S077 sensor fitting

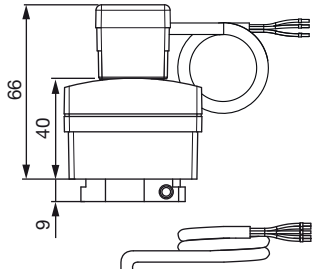


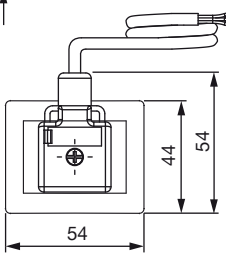
DN	H
15	87
25	96
40	108
50	118
80	168
100	184

DN15 DN25 DN40 DN50 DN80
Threaded connection

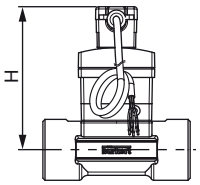
DN15 DN25 DN40 DN50 DN80
Flanged connection

Electronics SE30 Ex - Version NPN/PNP with cable plug* with 5 or 12 m cable (not supplied))



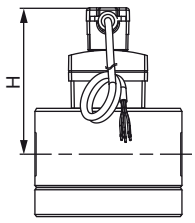


Mounted on S030 sensor fitting



DN	H
06	96
08	96
15	101
20	98
25	98
32	102
40	106
50	112
65	112

Mounted on S077 sensor fitting



DN	H
15	87
25	96
40	108
50	118
80	168
100	184

DN15 DN25 DN40 DN50 DN80
Threaded connection

DN15 DN25 DN40 DN50 DN80
Flanged connection

*** NOTE:**
Cable plug Type 2513 has to be ordered separately.
The cable output is **always oriented perpendicularly** to the pipe.

Ordering chart for complete flow transmitter Type SE30 Ex

A complete flowmeter consists of:
- a transmitter Type SE30 Ex
- an Inline sensor fitting Type S030 or S077 (Refer to corresponding data sheet - has to be ordered separately)

Transmitter Type SE30 Ex - for sensor fitting Type S030 or S077 (to be ordered separately)

Specifications	Voltage supply	Outputs	Electrical connection	Article no.
SE30 Ex - NAMUR II 1 G/D for explosive gas and dust environments: zones 0, 1 or 2 and 20, 21 or 22	8…15 V DC - via an intrinsic safety barrier with NAMUR input*	NAMUR current modulation - 2-wire	1 cable plug EN 175301-803	552901
SE30 Ex - II 3 GD for explosive gas and dust environments: zones 2 or 22	12…36 V DC	NPN/PNP	1 cable plug EN 175301-803	552353

* The open circuit voltage for the NAMUR input must be included between 8 and 15 V.

Ordering chart - spare parts for flow transmitter Type SE30 Ex (has to be ordered separately)

Specifications	Article no.
Cable plug Form A acc. to EN 175301-803 with blue cable gland and silicone seal (Type 2508) for NAMUR version	167526
Cable plug Form A acc. to EN 175301-803 with 5 m cable and NBR seal (Type 2513) for NPN/PNP version The cable output is **always oriented perpendicularly** to the pipe.	565558
Cable plug Form A acc. to EN 175301-803 with 12 m cable and NBR seal (Type 2513) for NPN/PNP version The cable output is **always oriented perpendicularly** to the pipe.	565559

Safety barrier

- 2 or 4 channels, intrinsic safety digital inputs: proximity detectors NAMUR, contacts…
- Rail mount on hat profile 35 mm
- All connections by removable screw terminals

Specifications	
Digital inputs	Each of the 4 x intrinsic safety inputs can be configured independently for a contact or a proximity detector NAMUR as per DIN 19234
Intrinsic safety inputs	Proximity detector NAMUR as per DIN 19234 or free potential contacts, relays, pressure or temperature switches or push buttons in hazardous area.
Non intrinsic safety recopy outputs Collector cut-off power	According to the type of sensor and the chosen logic: a green LED on the front panel displays a free-potential contact for each channel without common wire. 15 V - 60 mA - 0.9 VA - 350 Hz
Selection of the sensor type	Inductive / capacitive intrinsic safety certified NAMUR proximity detector or free-potential contacts.
Selection of the logic	By a mini-DIP choice of active proximity switches or when contact is NO (Normally Open) or NC (Normally Closed).
Fault detector	For all inputs configured as NAMUR, all models are provided with fault detector (broken line or short-circuit). In faulty case, the green front LED switches off, the contact of the defective channel opens and the red LED corresponding to the defective channel switches on. Other channels are not affected.
Power supply	24 V DC ±10 % 230 V AC ±10 % 1 front panel yellow LED is “ON” when supply is active
Consumption	5 VA

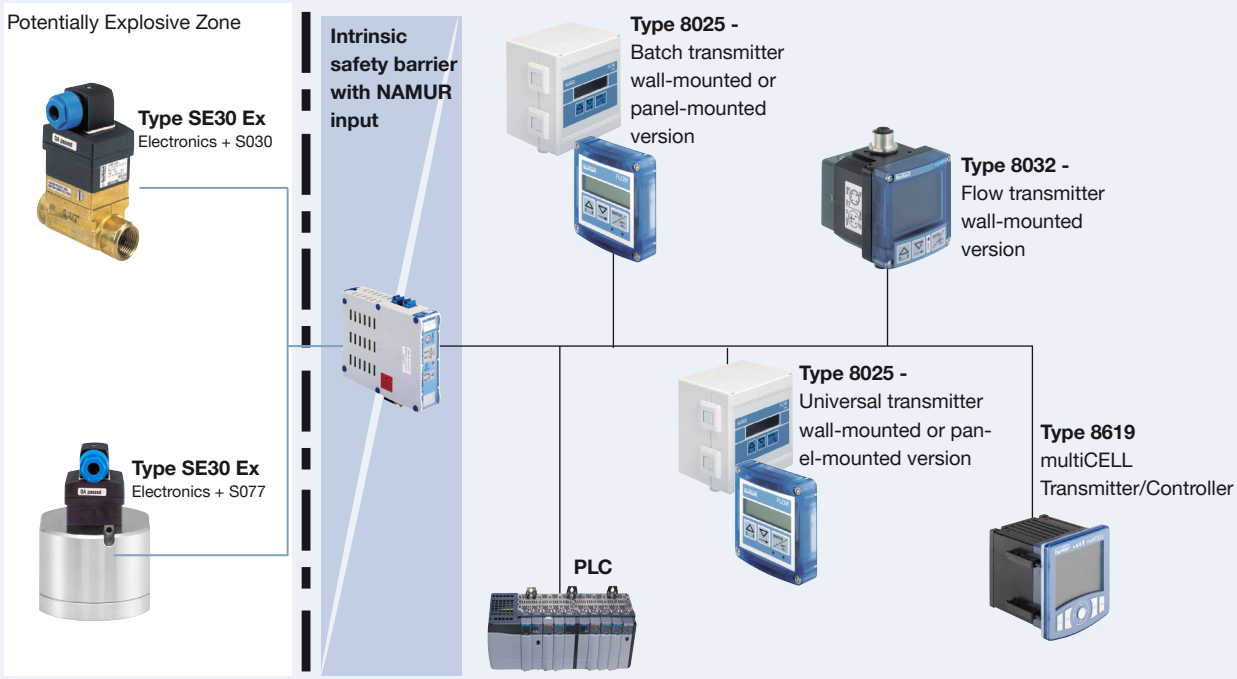
Specifications (continued)	
Connections	All connections by removable screw terminals. Supply distribution by means of a flat cable from one unit to the next one.
Classification for explosive areas	Intrinsic safety associated apparatus. It must be installed in safe area and connected to materials installed in zone 0, 1 or 2 - Gas (G) or in zone 20, 21 or 22 - Dust (D) Classification according to 2014/34/EU ATEX directives: Ⓔx I/II (M1)/(1) G/D [EEx ia] IIC Safety parameters see EC-type certificate LCIE 00ATEX 6034X
Ambient Temperature Operating Storage	 -20…+60 °C -20…+50 °C (recommended) -40…+80 °C
Dimensional and mechanical	Housing for symmetrical DIN rail (hat profile 35 mm as per standard NFC63015 / EN50022) Depth:120 mm ; Height: 90…145 mm overall including space for cables; Width on rail: 29.5 mm.; minimal distance between rails: 180 mm.
Installations conditions Mounting on DIN rail: Mounting inside a cabinet:	 must take into account thermal dissipation and risk of overheating generated by housings installed side by side. In case of a high concentration inherent safety barrier, we recommend to leave a free space of 10 mm between each group of 8 units (horizontal rail) and between each group of 4 units (vertical rail). It is recommended to close the electrical cabinet and to ensure a circulation of fresh air even by means of an air conditioner to keep the inside temperature at the level compatible with the recommended operating temperature among the units.

Ordering chart intrinsic safety barrier

Classifications for explosive areas	Voltage supply	Outputs	Number of channels	Article no.
2014/34/EU ATEX directives Ⓔx I/II (M1)/(1) G/D [EEx ia] IIC	24 V DC	open collector, 15 V, 60 mA	2, with NAMUR input	553456
		open collector, 15 V, 60 mA	4, with NAMUR input	553457
	230 V AC	open collector, 15 V, 60 mA	2, with NAMUR input	553458
		open collector, 15 V, 60 mA	4, with NAMUR input	553459

Interconnection possibilities of the complete flowmeter Type SE30 Ex with other Bürkert products

SE30 Ex with marking II 1 G/D (NAMUR version)



SE30 Ex with marking II 3 GD (NPN/PNP version)