CE

ifm electronic

Operating instructions
Control monitor

UK

efector300®

VS2000 Exi
PTB 01 ATEX 2075

706169 / 01 07 / 2013

Contents

1 Preliminary note

1.1 Symbols used

▶ Instructions

→ Cross-reference

Important note
Non-compliance can result in malfunction or interference.

2 Safety instructions

2.1 Particularities of these instructions

- They cover all units of the type VS2000 Exi. The only difference between the individual units is the type of supply voltage which is indicated on the type label of the unit.
- They are part of the unit. They contain information about the correct handling of the product.
  - ▶ Read them before use to familiarise yourself with operating conditions, installation and operation.
  - ▶ Follow the safety instructions. The operating instructions are intended for authorised persons according to the EMC and low voltage directives.

2.2 Other important notes

- The unit must only be installed, connected and put into operation by a qualified electrician as during the installation dangerous voltages may be exposed. The safe function of the unit and the plant is only guaranteed when installation is correctly carried out.
- Be careful when handling the connected unit. This is only allowed by qualified personnel due to the protection rating IP 20.
- The design of the unit corresponds to the protection class II except for the terminal blocks. Protection against accidental contact (finger-touch to IP 20) for qualified personnel is only guaranteed if the terminal screw has been completely screwed in. For this reason the unit must always be installed in a control cabinet which can only be opened with a tool, for pollution degree 2 and overvoltage category II.
- In case of malfunction of the device or uncertainties always contact the manufacturer! Tampering with the device can seriously affect the safety of operators and machinery. This is not permitted and leads to an exclusion of liability and warranty.

3 Functions and features

The VS2000 Exi control monitor is designed to work with flow sensors of intrinsically safe design Ex"i". The unit meets the requirements of the standards EN 60079-0:2009 and EN 60079-11:2012 (intrinsic safety "i").

The explosion group indicated on the unit as well as special conditions have to be taken into account according to EC type examination certificate PTB 01 ATEX 2075.

Marking:

Ex II (1) G [Ex ia Ga] IIC

- The unit provides intrinsically safe voltage supply for the sensors, evaluates the signals from the sensors and signals whether a preset flow value has been reached:

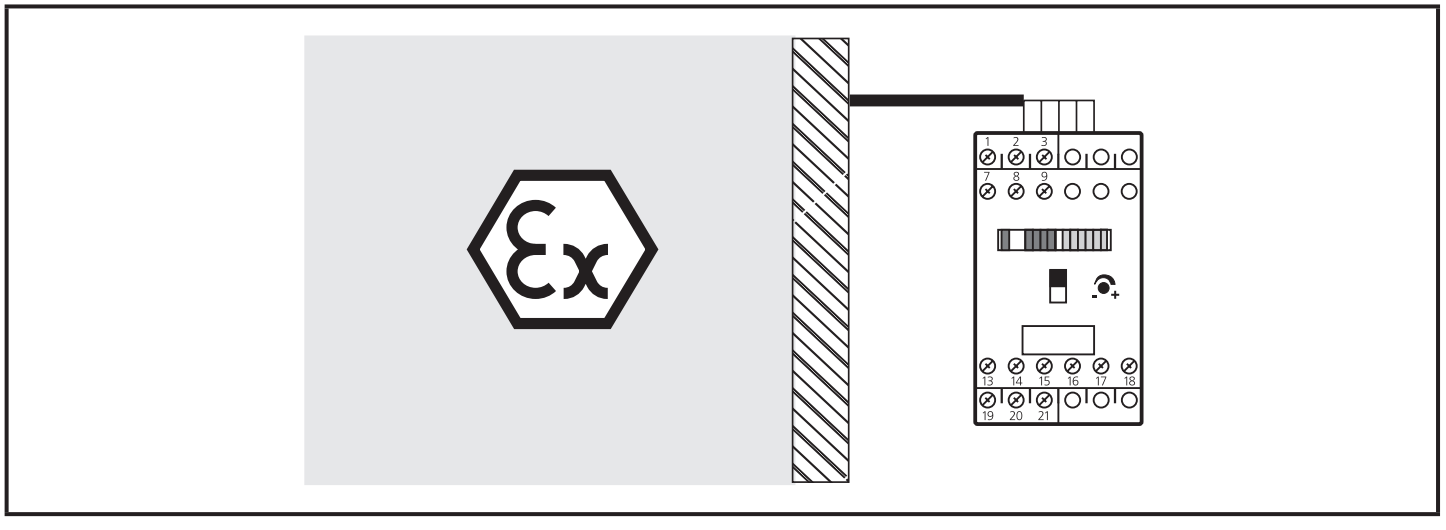
flow above the preset value	output relay is energised
flow below the preset value	output relay is deenergised

- Flows of either liquids or gases can be monitored.
- In addition the VS2000 Exi monitors the sensor cable: In the case of wire break and short circuit the monitoring relay deenergises, the red LED is on.

4 Installation

4.1 Evaluation unit

The VS2000 Exi must be mounted outside the Ex zone.



- ▶ Install the unit in a control cabinet which can only be opened with a tool, for pollution degree 2 and overvoltage category II, to guarantee protection against accidental contact with dangerous contact voltages and against atmospheric influences.
- ▶ Ensure that the control cabinet was installed in accordance with local and national rules and regulations.
- ▶ Mount the unit on a DIN rail.
- ▶ Mount the unit vertically and leave enough space between the unit and the top and bottom of the control cabinet to enable air circulation and to avoid excessive heating.

Take into account the internal heating of all units when mounting several units side by side. The ambient temperature for the individual unit must not exceed the permissible value of +60°C.

In this case adhere to the distances between the units. The following applies to identical VS2000 Exi units:

- distance = 0 mm when operated with U_{NOM} (→ 10 Technical data).
- distance = at least 10 mm when operated with U_{NOM} +10%.

For units from other companies the permissible distance is to be determined by measurements.

Prevent the penetration of conductive or other dirt during installation and wiring.

4.2 Sensors

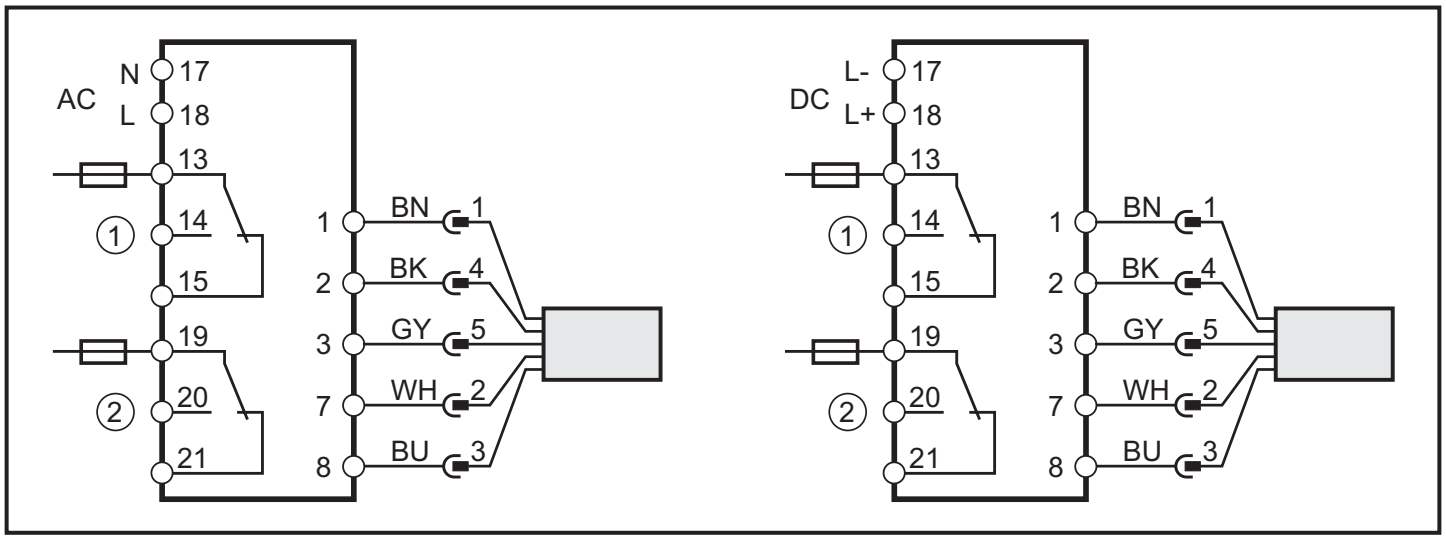
- ▶ Observe the notes in the installation instructions enclosed to the sensor.

5 Electrical connection

The unit must be connected by a qualified electrician:

- ▶ Disconnect the plant from the mains supply before wiring!
- ▶ Check if the relays are connected to voltages of external power supplies.
- ▶ Always observe the rules and regulations for the installation and operation of electrical equipment in hazardous areas.

5.1 Terminal connection



1: Flow monitoring
2: Wire monitoring

Core colours for flow sensors of type SFxxxx:
BN = brown, BU = blue, BK = black, WH = white, GY = grey

5.2 Voltage supply (power)

- AC voltage:
  According to Technical data / Type label ± 10 % at the terminals 18 (L) and 17 (N), frequency range 47...63 Hz.
- DC voltage:
  24 V DC ± 10 %, at the terminals 18 (+) and 17 (-).

5.3 Connection of the sensors

Max. permissibe values of the control circuits for SN2301 ... SN2304:

	in protection rating intrinsic safety [Ex ia Ga] IIC and [Ex ia Ga] IIB		
Voltage	Uo = 15.8 V DC		
Current	Io = 92 mA / Ie = 47.2 mA		
Power	Po = 680 mW		
	in protection rating intrinsic safety		
	[Ex ia Ga] IIC	[Ex ia Ga] IIB	[Ex ia Ga] IIB
External inductance	1 mH	1 mH	5 mH
External capacitance	185 nF	1.6 µF	885 nF

Max. permissibe values of the control circuits for SR2301:

	in protection rating intrinsic safety [Ex ia Ga] IIC and [Ex ia Ga] IIB		
Voltage	Uo = 15.8 V DC		
Current	Io = 84 mA / Ie = 38.5 mA		
Performance	Po = 680 mW		
	in protection rating intrinsic safety		
	[Ex ia Ga] IIC	[Ex ia Ga] IIB	[Ex ia Ga] IIB
External inductance	1 mH	1 mH	5 mH
External capacitance	205 nF	1.7 µF	935 nF

To prevent negative effects on the functions caused by noise voltages, sensor cables and load cables should be laid separately (max. length of the sensor cable: 100 m):

- ▶ Always adhere to the maximum permissible values for the external inductance and capacitance.

5.4 Output relay

- Flow monitoring: terminals 13, 14, 15.
- Wire monitoring: terminals 19, 20, 21.
- Switching capacity: max. 250 V AC, 4 A.

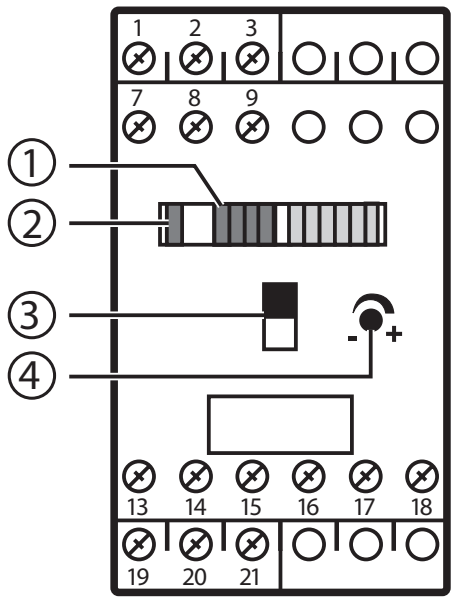
The current must be externally limited to these values by taking appropriate measures.

▶ External interference suppression of inductive loads is required.

▶ Insert a miniature fuse according to IEC 60127-2 Sheet 1 (≤ 5 A fast acting).

▶ Position the fuse outside of the hazardous area.

6 Settings



1	Row of LEDs - red LED lights: flow below the switch point - yellow LED lights: relay energised, flow has reached the switch point - green LED lights: flow above the switch point
2	LED red: lights in case of wire break or short circuit
3	Selector switch medium (liquid/gas)
4	Setting potentiometer for switch point

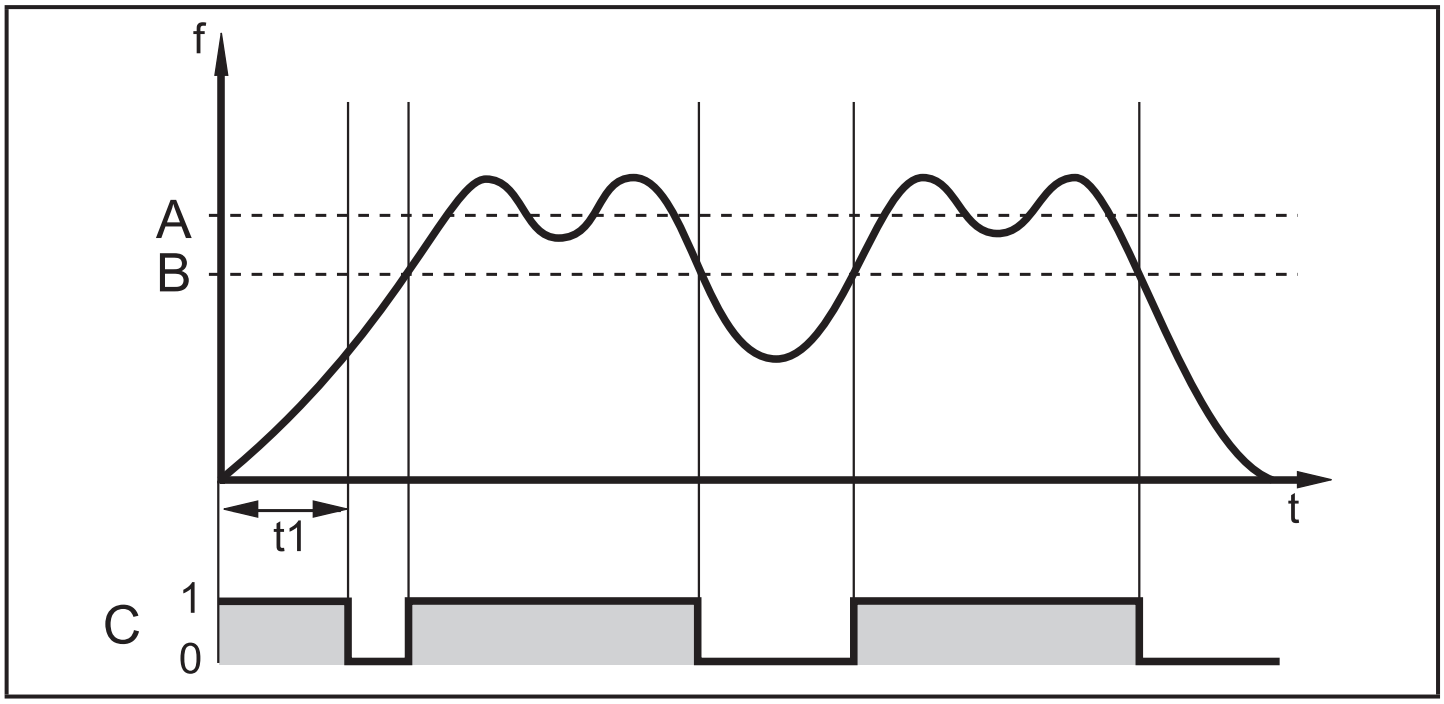
Always adhere to the following order of installation:

▶ Set the selector switch (3) to liquid or gaseous media: = liquid , = gaseous.

▶ Switch on the operating voltage. After the power-on delay time (approx. 30 s) has elapsed the unit is ready for operation (during this time flow may be indicated).

▶ To set the preset flow and keep it constant: Turn the setting potentiometer (4) until one green LED lights. The farther the green LED lit is away from the yellow LED, the safer is the adjustment (excess gain for flow or temperature fluctuations).

7 Function diagram (flow monitoring)



A = requested flow; B = switch point; C = output relay
t1 = power-on delay time

8 Set-up / Operation

▶ After mounting, wiring and setting check the safe functioning of the unit.

In case of wire break or short circuit of the sensor cable the relay "wire monitoring" is de-energised and the red LED lights. After rectification of the fault the switching amplifier is again ready for operation.

9 Maintenance, repair and disposal

If used correctly, no maintenance and repair measures are necessary. Recommendation:

▶ Check the safe functioning of the unit after a short circuit.

Only the manufacturer is allowed to repair the unit.

For disposal:

▶ After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

10 Technical data

	SN2301	SN2302	SN2303	SN2304	SR2301
Electrical design	AC				DC
Operating voltage	230 V	110 V	200 V	240 V	24 V
Voltage tolerance	± 10%				
Power/current consumption	5 VA				125 mA
Ambient temperature	-20 ... +60°C				
Protection terminals	IP 20				
Protection housing	IP 40				
Housings	plastic (noryl)				
Connection	15 terminals max. 2 x 2.5 mm^2				
Output	Relays				
Contact rating	max. 4 A (250 V AC, cos φ ≥ 0.7); 0.2 A (250 V DC); 4 A (24 V DC)				