

Operating Instructions

Transducers UFA / UVA integrated in vane wheel sensors or vortex probes VA40 with connection housing AS80

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1 Safety Symbols



Warning!

Failure to observe the instructions can result in serious injury and damage to property!



Important notice!

Non-observance can result in serious damage to the equipment or restriction in performance!



2 Safety Instructions

Danger to life, risk of injury and damage to material or property.
Read the Operating Instructions carefully before initial operation.
Observe general safety precautions as well as those included in various sections of these Operating Instructions.

Hazard risks:

- non-observance of the Operating and Safety Instructions
- modifications to the device by the customer
- handling the device outside the specified operating conditions
- handling the transducers outside the specified operating conditions
- use of unsuitable power supplies and peripheral devices
- improper use of the device

Prevention of voltage hazards:

- use only the dedicated adapter plug for the mains supply
- make sure that the PC is correctly connected to the mains (earthed safety socket, earthing) when using a USB connection
- when connecting analog outputs or inputs to peripheral devices make sure that these are correctly connected to the mains (earthed safety socket, earthing)

Danger when installing the sensors in pressurized pipelines:

- sensors for use in pressurized pipelines are to be inserted or retracted only in depressurized conditions; non-observance may result in serious injuries to personnel
- when installing or removing under pressure, the appropriate protective equipment must be used, e.g. ball valve and probe guide pieces with chain guard or spindle probe guide pieces



3 Intended Use

Transducers UFA and UVA are instruments for measuring flow velocity and flow rate:

UFA for use with vane wheel flow sensors FA or FAR and measuring tubes FA Di or FAR Di and UVA for use with vortex flow sensors VA40 and measuring tubes VA Di. These instruments are designed for industrial Application. The AS80 is an aluminium housing in protection class IP65.

The manufacturer is not liable for damage caused by improper use and/or non-compliance with the regulations.

Do not carry out any structural modifications to the transducers.

Always follow the instructions on the type plate, especially the information regarding supply voltage.



4 Operating Safety

All steps described below must be carried out by qualified personnel only!

Please read the Operating Instructions carefully before unpacking the equipment!

Safety can only be guaranteed if the equipment is operated in accordance with the regulations. Improper handling can result in serious injury and damage to property.


5 Scope of Delivery


- Transducer UFA or UVA integrated in the connection housing of the FA or VA flow sensors
- Operating Instructions Flow Sensor FA or Va,
data sheet flow sensor FA or VA with integrated transducer UFA or UVA
- CD-ROM with PC configuration software UCOM (optional)
- Programming adapter GO 070 / RS232 for PC connection COM port (optional)
- USB adapter in addition to programming adapter GO 070 / RS232 (optional)
- Cable socket GO 070


Please check that everything listed in the Delivery Note / Technical Data Sheet is included in the delivery.

5.1 Description, Type Plates

One of the following type plates (or similar) can be found on the connection housing:

VA Flow Sensor / UVA PS: 3 bar S.No.: va40 1196 E100 °C T _{amb} : -40...+80°C T _{medium} : -20...+100°C Power ❶ 0 VDC ❷ +24 VDC Output ❸ GND ❹ \llcorner ❺ 4...20 mA RS232 ❻ RxD ❼ TxD www.hoentzsch.com 	e129/088
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FA Flow Sensor / UFA PS: 6 bar S.No.: md03 7377 350 °C T _{amb} : -40...+80°C T _{medium} : -40...+350°C Power ❶ 0 VDC ❷ +24 VDC Output ❸ GND ❹ \llcorner ❺ 4...20 mA RS232 ❻ RxD ❼ TxD www.hoentzsch.com 	e129/116
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FA Di Flow Sensor / UFA PS: 10 bar S.No.: ms20 1157-18 100°C Di: 18,2 mm T _{amb} : -40...+80°C T _{medium} : -20...+100°C Power ❶ 0 VDC ❷ +24 VDC Output ❸ GND ❹ \llcorner ❺ 4...20 mA RS232 ❻ RxD ❼ TxD www.hoentzsch.com 	e129/123
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VA Flow Sensor	: vortex flow sensor VA40
FA Flow Sensor	: vane wheel flow sensor
FA Di Flow Sensor	: vane wheel measuring tube
UVA	: transducer for vortex sensors VA
UFA	: transducer for vane wheel sensors FA
PS	: max. permissible pressure
S.No.	: serial number with max. temperature of the medium
Di	: inside diameter Di of the measuring tube
T _{amb}	: ambient air temperature range -40...+80 °C -30...+80 °C, only for type VA40/21,3 ... GK ... ZG10 sensors -5...+50 °C, with 'LCD display' option
T _{medium}	: temperature range of medium

Pin assignment of cable socket GO 070:

Power	1	: 0 VDC	= supply voltage 0 VDC
	2	: +24 VDC	= supply voltage +24 VDC
Output	3	: GND	= reference potential
	4	: \llcorner	= digital output open-collector (internally connected to GND)
	5	: 4...20 mA	= current output 4-20 mA
RS232	6	: RxD	= serial interface
	7	: TxD	= serial interface
		(GND)	= reference potential

6 Technical Specifications

6.1 Conformity with Standards

Transducers UFA / UVA are manufactured according to the best available technology, are safe and reliable and comply with the relevant regulations, EU directives and standards.



6.2 Storage Conditions

Storage conditions: -30 to +70 °C



6.3 Operating Conditions

Ambient air temperature
of connection housing
when in use

: -40 ... +80 °C
-30 ... +80 °C, only for type VA40/21,3 ... GK ... ZG10 sensors

with optional LCD display

: -5 ... +50 °C

protection class

: IP65

mounting attitude

: no restrictions

6.4 Housing and Connection

protection class

: housing IP65

material

: aluminium

external dimensions

: L/W/H = 80/80/60 mm

connection

: cable socket GO 070 with terminals
for strands with cross-section 0.25 ... 1.0 mm²

6.5 Electrical Data

**Supply voltage,
mains supply**

24 V DC (20 ... 27 V DC), power < 3 W

The mains supply is electrically isolated from the UFA/UVA outputs.

Analog output

: 4 ... 20 mA = 0 ... x m/s (or m³/h)
4 ... 20 mA = -x ... 0 ... +x m/s (or m³/h) with FAR
function configurable.
Terminal value x configurable / resistance max. 400 Ohm

Digital output

: (open-collector transistor), max. 50 mA / 27 V DC,
configurable as limit value v, quantity pulse or
±direction of flow (see under 8 Functional Description)

RS232 interface : for connection with PC programme UCOM
(see under 8 Functional Description)
9600 Baud, 8Bit, no parity, 2 stop bits, Xon/Xoff

Accessible by unscrewing the housing cover:

Connection for optional LCD display : flat ribbon cable with 10-pin cable socket
Do not plug in or out when live!

6.6 Measurement Uncertainty

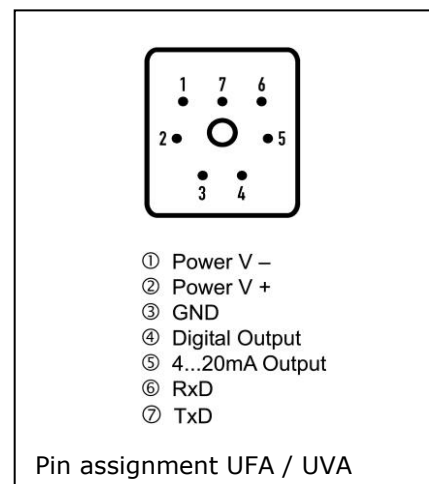
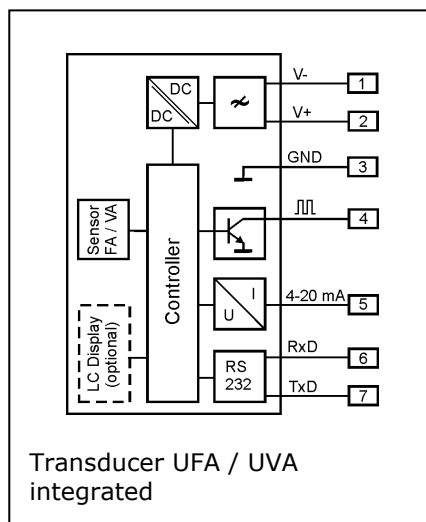
Recording the measurement frequency (at 1000 Hz) : <0.1%
Analog output (terminal value) : <0.15%
Linearity error : <0.1%
Temperature coefficient : <20 ppm/K (at 25 °K temperature difference equivalent to <0.05%)



7 Installation

The current European Specifications for Assembly, the recognised standards of good practice and this Operating Instructions apply.

7.1 Block Diagram and Pin Assignment





7.2 Wiring Diagrams

Electrical connection must be carried out according to the appropriate wiring diagram.
Faulty connection can cause damage to the electronics.

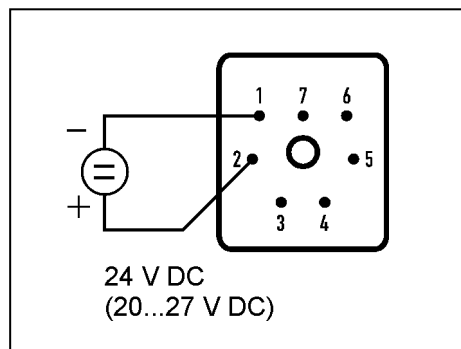
Do not install or wire up the transducer under mains voltage. **Non-compliance can cause damage to the electronics.**

In this connection and depending on the configuration of the equipment, one of the following wiring diagrams must be taken into account. Wiring diagrams for measuring systems in customer-specific design will be supplied separately.

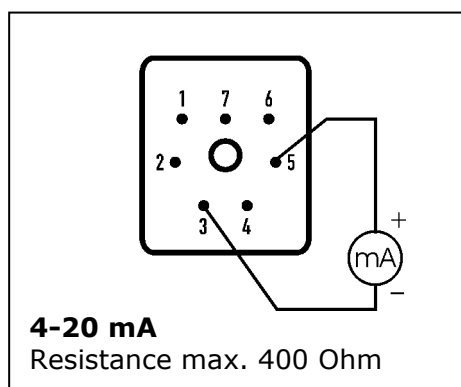


7.2.1 Power supply

Before connecting please check that the power supply is within the specification.
The type plate with all relevant information can be found on the connection housing of the flow sensor.



7.2.2 Analog output v

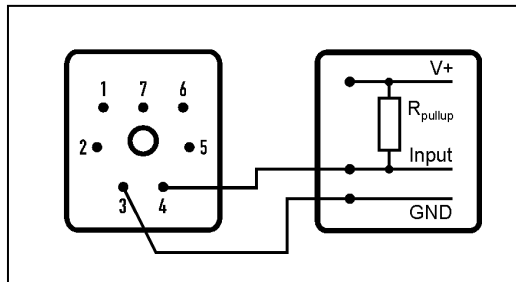


The terminal value of the analog output can be configured with the PC software UCOM via the RS232 interface. The factory-programmed values can be found in the accompanying documents.

7.2.3 Digital output (open-collector-transistor)

The digital output is an open-collector transistor output, internally connected to GND.

The function of the digital output and the corresponding setting parameter are configurable using the UCOM software via the RS232 interface. The factory-programmed settings can be found in the parameter printout.



The reference potential terminal (3) of the UFA/UVA is connected to the GND terminal of the data logging. The open-collector transistor output (4) is connected to the input of the data logging, to which a pull-up resistor for internal supply voltage of the data logging must be connected (with 24 V as a rule 5...10 kOhm).

The limit values for the digital output are: max. 50 mA / max.27 VDC.

Note: If the same voltage source is used for the UFA/UVA as for the internal supply for the data logging, then the electrical isolation between the supply voltage and the UFA/UVA outputs is deactivated.

7.2.4 RS232 interface



Fig. 1: Programming adapter GO 70 / RS232 for UCOM software, connector PC Sub-D 9-pin, adaptor plug 230 VAC/24VDC and USB adapter

To connect the RS232 interface, plug the programming adapter into the UFA/UVA. The transducer is powered by the adapter.

Connection to a PC is via a COM port or with an optional USB adapter.

7.2.5 Optional LCD display



Fig. 2: optional LCD in the housing cover

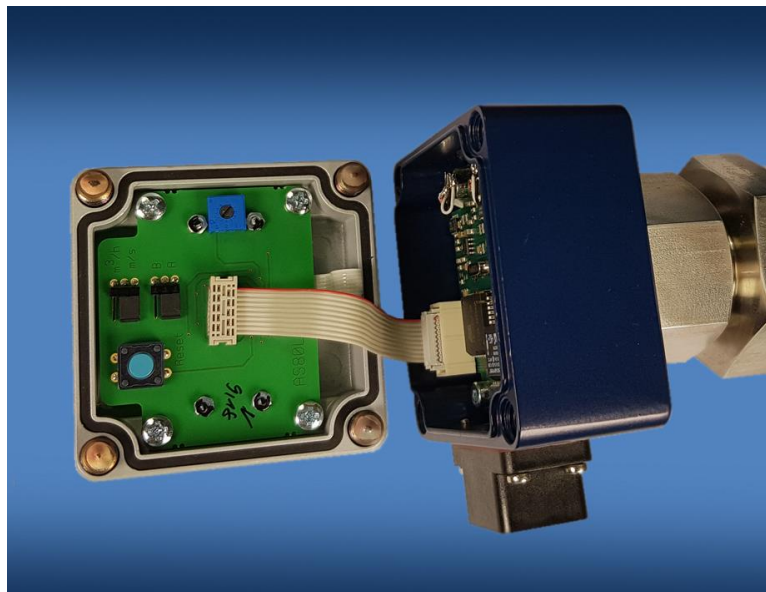


Fig. 3: LCD connection with cover open

The flat ribbon cable with the 10-pin connector should not be plugged in or out when live! Risk of damage to equipment!

Visible are the potentiometer for the LCD display, the reset button for the quantity counter, the jumpers m/s-m³/h and A-B (see under 8 Functional Description).

8 Functional Description

UFA transducers are designed for connecting to vane wheel probes FA and FAR (directional sensing) and vane wheel measuring tubes FA Di and FAR Di (directional sensing) for measuring flow velocity or flow rate of air/gases and water/liquids.

UVA transducers are designed for connecting to vortex sensors VA for measuring flow velocity or flow rate of air/gases.

The signal frequency generated from the flow sensor is converted to a linear **analog output signal 4-20 mA**. The analog terminal value is configurable.

When logging directional sensing data, the zero point can be selected in the middle of the analog range, or display of flow direction takes place with the aid of the digital output:

for FA and FAR*:	4 ... 20 mA	=	0 ... x m/s (or m ³ /h)
for FAR:	4 ... 12 ... 20 mA	=	-x ... 0...+x m/s (or m ³ /h)
for VA:	4 ... 20 mA	=	0 ... x m/s (or m ³ /h)

* for FAR sensors configuration of the digital output (see under): \pm direction of flow

The actual velocity / actual flow rate can be converted to standard velocity / standard flow rate by entering the parameters 'temperature' and 'pressure'. Working temperature and pressure should be constant.

A **digital output** (open-collector transistor) can be configured for **1 of 3** different **functions**:

1. as **limit value** for the flow velocity or flow rate:
flow velocity < or = limit value: open-collector transistor inactive
flow velocity > limit value: open-collector transistor active
2. as **quantity pulse for** quantity measurement:
max. pulse repetition frequency 1 Hz per unit of volume,
configurable, e.g. 1 pulse per 1, 10 or 100 (norm)-m³ or (norm)-litre
pulse duration 0.5 s (with FAR sensors: configurable for '+' or '-' amounts)
3. as **\pm direction of flow** ** (FAR sensors only):
+direction: open-collector transistor inactive
- direction: open-collector transistor active
** analog output (see above) is then absolute value of flow only, without direction

Self diagnosis according to NAMUR NE43:

No error : analog output = 4 mA (flow velocity = 0)
or analog output > 4 mA (flow velocity > 0)

Error : analog output < 3.6 mA

Monitoring of power supply, data logging, sensor interface, parameter settings (see under 16 Troubleshooting)

PC serial port RS232

for changing calibration data and setting parameters.

Connect programming adapter GO 070 (optional) to the UFA/UVA transducer, then plug in the adapter.

Connect sub-D to the PC RS232 socket.

If PC connection is via USB, then an optional available USB / RS232 interface converter must be inserted.

Changes to the settings can now take place after starting the PC programme UCOM (optional) (see under 9 Settings).



11 Operation

(see under 6.3 Operating conditions)
(see under 6.5 Electrical Data)



12 Shut-down, Dismantling

Before disconnecting the cable, please ensure that the supply voltage is switched off.



13 Inspection

see under 8 Functional Description, Self diagnosis



14 Maintenance

Only use cleaning agents which dry without leaving any residue and which are compatible with the housing materials.
Any repair work is to be carried out solely by Höntzsch GmbH & Co. KG.

15 Meaning of LEDs on the circuit board

LED	Description
LED red on	parameter error
LED yellow on	sensor error

16 Troubleshooting

Fault	Cause	Troubleshooting
analog output = 0 mA	no power supply	check connecting cable, measure voltage at connecting terminals
	transducer electronics faulty	return to factory
analog output = error (<3.6 mA)	parameter error	check parameter using UCOM software, save new checksum (or return to factory)
	transducer electronics faulty	return to factory
analog output = 4 mA, no measured value	sensor contaminated	clean sensor according to instructions
	profile factor set at 0.000	set profile factor to relevant nominal diameter and sensor type
measured value too low	sensor contaminated	clean sensor according to instructions
	profile factor setting too low	set profile factor to relevant nominal diameter and sensor type
	input/output section too short	change sensor position, improve flow conditions with a flow rectifier
	rotational flow	reposition sensor in flow direction, install flow rectifier
	vortex VA sensors: reduced acoustic coupling in the sensor elements as a result of intense vibration or powerful impact	return sensor to factory for performance test
	burden at current output is greater than specified in the Technical Data Sheet resulting in correct output values in the lower range and no longer increasing values at the top end of the measuring range	reduce resistance
	incorrect scaling of analog output	check setting and amend if necessary
measured value too high	profile factor set too high	set profile factor to relevant nominal diameter and sensor type
	EMC problem	see reference to electromagnetic compatibility (EMC)

17 Returns

When returning sensors, these should be cleaned thoroughly according to the instructions. A hazard warning or declaration of no objection must be supplied for substances which have been in contact with the sensor or possibly infiltrated the cavities in the sensor. If adhesion of hazardous substances cannot be ruled out, then detailed safety measures to be taken when handling the equipment must be itemised.

18 Disposal

The customer should assume the duty to dispose of the equipment at his own expense and according to statutory provisions (e.g. ElektroG in Germany).

19 Replacement Parts

Integrated transducers UFA /UVA have no replacement parts.
An electronic self-restoring fuse is used.

20 Declaration of Conformity, Declaration of Incorporation

We Höntzsch GmbH & Co. KG
 Gottlieb-Daimler-Str. 37
 D-71334 Waiblingen

bearing sole responsibility, hereby declare that the product

Transducer UFA / UVA in AS80 housing

referred to in this declaration, is in conformity with the following standards or normative documents:

Provisions of the Directive	Reference and date of issue
2014/30/EU: Electromagnetic Compatibility	EN 61000-6-4 EN 61000-6-2
2014/68/EU: Pressure Equipment Directive	
2006/42/EC: Safety of Machinery	
Safety requirements for electrical equipment for measurement, control, and laboratory use	EN 61010



Waiblingen, 14.01.2021

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Subject to alteration

Safety Manual

- Probes VA40 ... ZG7 with integrated transducer UVA in AS80 housing
- Measuring tubes VA Di ... ZG1 with integrated transducer UVA in AS80 or AS102 housing
- Probes VA40 ... ZG8 Ex-d with integrated transducer UVA-Ex-d in Ex-d flameproof housing
- Measuring tubes VA Di ... ZG1 Ex-d with integrated transducer UVA-Ex-d in Ex-d flameproof housing



VA40 ... ZG7



VA40 ... ZG8 Ex-d



VA DI ... ZG1



VA DI ... ZG1 Ex-d

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1 Safety Symbols



Warning! Failure to observe the instructions can result in serious injury and damage to property!



Important notice! Non-observance can result in serious damage to the equipment or performance restriction!

2 Operating Safety



All steps described below must be carried out by qualified personnel only!

Please read the Operating Instructions carefully before unpacking the equipment!

Safety can only be guaranteed if the equipment is operated in accordance with the regulations. Improper handling can result in serious injury and damage to property.

The Safety Manual is only effective in connection with the relevant Operating Instructions or Instruction Manual for Ex-instruments.

3 Planning / Layout



3.1 Ex-application



Approved appliances only are to be used for applications in potentially explosive atmospheres. Special attention should be paid to Instruction Manual UVA-Ex-d.



3.2 Choice of Installation Location

The place of installation must be chosen with care to optimise measurement accuracy. For tips refer to the Operating Instructions.



3.3 Safety Instrumented Systems according IEC 61508 SIL 1, SIL 2 and SIL2/SC3 (SIL 3 with 1oo2)

Requirements:

- Operation in Low Demand Mode
- The analog output values ≥ 21 mA and ≤ 3.6 mA are diagnosed as faults by the subsequent control unit; the process goes into safe mode.
- Safety functions cannot be implemented with the digital output, as no fault tracking can be effected via this output.
- A measurement error of less than 10 % of the measured value has no impact on the safety function.
- The efficiency of the equipment must be checked at regular intervals by repeated inspection.

4 Scope of Delivery

Please check that everything listed in the Technical Data Sheet is included in the delivery.
Also look out for potential small parts such as screw sets, seals, etc.

For use in 'Safe Applications (SIL 1, SIL 2 und SIL 3 in 1oo2)' the device must have a SIL logo on the **electronics housing and the SIL conformity must be confirmed in the Technical Data Sheet.**

5 Conformity with Standards

In addition, the following standards apply for the functional safety:

DIN EN 61508 Part 1 to Part 7:

Functional safety of electrical/electronic/programmable electronic safety-related systems

DIN EN 61511 Part 1 to Part 3:

Functional safety - Safety instrumented systems for the process industry sector

The flow measuring equipment complies with DIN EN 61508 Part 1 to Part 7 and may be used in safety instrumented systems according to DIN EN 61511 Part 1 to Part 3

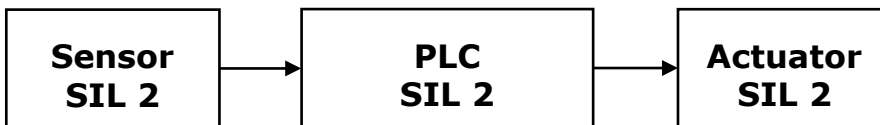
6 Abbreviations and Definitions

Abbreviation	Designation	Definition
	Functional Safety	Describes the part of the safety of a system that depends on the correct function of the safety-related (sub-) systems and external equipment for risk minimisation.
SIL	Safety Integrity Level	To assess electrical / electronic / programmable electronic (E/E/PE) systems relating to the reliability of the safety functions. From the target level arises the safety-directed design principle, which must be observed to reduce the risk of failure. SIL 4 = highest level, SIL 1 = lowest level.
SIS	Safety Instrumented System	Safety instrumented system for carrying out one or more safety instrumented functions. A SIS consists of sensor(s), logic system and actuator(s).
	Mission Time	Mission time of the failure mode and effects analysis
PFDG/PFD _{avg}	Average Probability of Failure on Demand	Averaged probability of failure on demand of the safety function
PFS _{avg}	Average Probability of Fail Safe	Averaged probability of causing a spurious trip of the process
OK		Probability product is running without any failures
FMEA	Failure Mode and Effects Analysis	Failure mode and effects analysis
	Mode of operation	- operation in low demand mode, whereby the demand on the safety-related system is no more than once a year and not greater than the double frequency of the repeat test - operation in high demand or continuous mode, whereby the demand on the safety-related system is more than once a year or greater than the double frequency for the repeat test
SFF	Safe Failure Fraction	Fraction of safe failures relating to the total average failure rate
HFT	Hardware Fault Tolerance	The capability of a functional unit to continue the execution of a demanded function in case of faults or deviations
FIT	Failure In Time	1 FIT = 1 failure per 10 ⁹ hours
λ	Failure rate	sd =safe detected su =safe undetected dd =dangerous detected du =danger undetected
MTTF	Mean Time To Failure	s = safe d = dangerous
1oo2 SIL 3 (SC 3)	1oo2 SIL 3 by redundancy setup, systematic capability (SC 3)	Two identical devices are suitable for SIL 3 in architecture 1oo2. Each device can perform the safety function.
DC	Diagnostic Coverage	s = safe d = dangerous

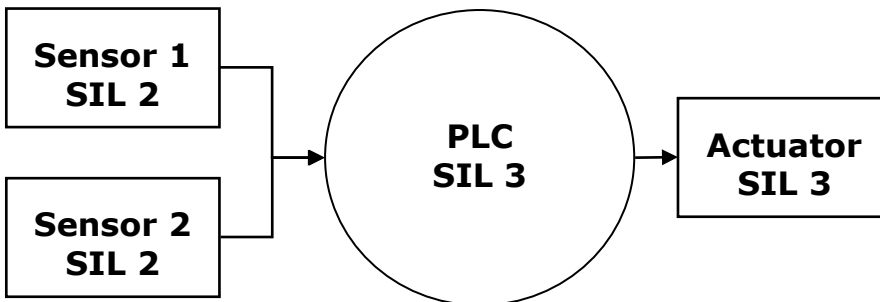
7 Safety Instrumented System (SIS)

A safety instrumented system generally consists of the three subsystems – input subsystem (sensor), Logic subsystem (PLC) and output subsystem (actuator). The average probability of failure on demand PFDG/PFD_{avg} is usually distributed over the subsystems as follows:

Single-Channel SIS in 1oo1



Multi-Channel SIS in 1oo2



8 Average Probability of Failure on Demand (PFDavg)

This table indicates the attainable Safety Integrity Level (SIL) subject to average probability of failure on demand. The specified failure boundaries here are effective for a safety function in low demand mode.

Safety Integrity Level (SIL)	PFD _{avg} (low demand mode)
4	$\geq 10^{-5}$ bis $< 10^{-4}$
3	$\geq 10^{-4}$ bis $< 10^{-3}$
2	$\geq 10^{-3}$ bis $< 10^{-2}$
1	$\geq 10^{-2}$ bis $< 10^{-1}$

9 Safety Integrity of the Hardware

This table indicates the attainable Safety Integrity Level (SIL) for Type B devices (according to IEC61508-2) subject to Safe Failure Fraction (SFF) and the Hardware Fault Tolerance (HFT):

Safe Failure Fraction (SFF)	Hardware Fault Tolerance (HFT)		
	0	1 (0)*	2
< 60%	not allowed	SIL 1	SIL 2
60% to < 90%	SIL 1	SIL 2	SIL 3
90% to < 99%	SIL 2	SIL 3	SIL 4
≥ 99%	SIL 3	SIL 4	SIL 4

* With proof of operational reliability according to IEC / EN 61511 for SIL 1 to SIL 3

The certified equipment complies with SIL 2 with a systematic capability of SC3 according to IEC 61508 route 2. Deployment according to IEC 61511 for SIL 1 and SIL 2 in 1oo1 and for SIL3 in 1oo2 configurations.

10 Initial Operation

Initial operation is described in the respective Operating Instructions. For Ex-applications the respective Instruction Manual must also be observed.

11 Behaviour during Operation and in case of Failure

Behaviour during operation and in case of failure is described in the respective Operating Instructions.

12 Periodic Testing

12.1 Safety Checks

The safety function of the entire safety loop must be checked regularly in accordance with IEC 61508/61511. Check intervals are determined when calculating the individual safety loop.

12.2 Performance Check

The proper functional operability of the flow measuring device must be checked regularly at least every 5 years. This can only be carried out by the manufacturer. In the case of unfavourable operating conditions shorter proof test intervals may be determined by the user.

13 Repairs

Defective devices should be returned to Höntzsch service and repairs department, preferably with a detailed breakdown of type of failure and possible reasons.

14 Safety-related Characteristics

Extract from Reliability Study No. 2266.465.1 Version 1 - Vortex Sensors

Properties:

Device Type: B
Mode of operation: low demand mode
Hardware fault tolerance: 0

Table 1 - Results FMEDA at +55 °C

Properties	VA40 ... ZG7 VA40 ... ZG8 Ex-d VA Di ... ZG1 VA Di ... ZG1 Ex-d		
	FMEDA	Proven In Use	90% Confidence
Safe failure rate	248	40	62
Safe detected failure rate	0	n.a.	n.a.
Safe undetected failure rate	248	n.a.	n.a.
Dangerous failure rate	56	5.7	18
Dangerous detected failure rate	34	n.a.	n.a.
Dangerous undetected failure rate	22	n.a.	n.a.
DC	61%	n.a.	n.a.
Safe failure fraction	93%	n.a.	n.a.
MTTFd [years]	1768		

Notes:

Failure rates are in FIT 10⁻⁹/h.

Confidence interval according to IEC 61508 route 2h.

IEC 61508 requires a minimum DC of 60% for Type B products for route 2h, 2s.

Table 2 - Results PFDG Calculations (1oo1)

	VA40 ... ZG7 VA40 ... ZG8 Ex-d VA Di ... ZG1 VA Di ... ZG1 Ex-d				
	1	2	5	10	20
Years	1	2	5	10	20
PFDG	9.8E-05	1.95E-04	4.9E-04	9.7E-04	2E-03
%SIL 2	1%	2%	5%	10%	20%
PFSavg			9.7E-05		

MRT, MTTR 8h

Table 3 - Results PFDG Calculations (1oo2)

	VA40 ... ZG7 VA40 ... ZG8 Ex-d VA Di ... ZG1 VA Di ... ZG1 Ex-d				
Years	1	2	5	10	20
PFDG	5.7E-06	1.12E-05	2.77E-05	5.52E-05	1.10E-04
%SIL 2	1%	2%	5%	10%	20%

MRT, MTTR 72h, β 5% (common cause)

Summary results

The proven in use analysis demonstrates that the hardware of the Vortex Sensors VA40 ... ZG7/ZG8 and VA Di ... ZG1/Ex-d are corresponding with SIL 2 safety properties according to IEC 61508, route 2h and route 2s SIL 3 in 1oo2 configuration.

15



Certificate of compliance
Product



Holder Höntzsch GmbH, Waiblingen, Germany

Compliant Item Vortex Sensors VA40 ... ZG7 and VA40 ... ZG8
Vortex Sensors VA Di...ZG1 and VA Di...ZG1 Ex-d

Basis of Certification IEC 61508:2010

Certification Include(s) Safety requirements specification
 Hardware requirements
 Reliability requirements
 Software requirements
 Basic safety
 User documentation

Functional Safety Data

Safety function: See report
Mode: Low demand
Type: B
HFT: 0
Hardware compliance route: 2_H
Systematic compliance route: 2_S
Systematic capability: SC3
Failure rates (FIT): SD=0, SU=248, DD=34, DU=22
Safe failure fraction: 93%
Diagnostic coverage: 61%
Fit for use up to: SIL 3
Fit for use up to: STL 5

Certification Results Risknowlogy certifies that the above Compliant Item meets the requirements of the Basis of Certification for the selected assessment(s). The Risknowlogy report 2266.465.1 are an integral part of this certificate.

Certificate Number 2266.465.2

Issue Date 2019-06-09

Expiry Date After modification of Compliant Item

Certifier Dr. Michel Houtermans



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Subject to alterations

Instruction Manual Flow Sensors Category 3G and 3D



Failure to comply with the specifications of the operating manual can result in an explosion.

1 Apparatus

- Vane wheel flow sensors FA and measuring tubes FA Di with integrated or separate evaluation unit and optional integrated temperature probe Pt100
- Vortex flow sensors VA40 and measuring tubes VA Di with integrated or separate evaluation unit and optional integrated temperature probe Pt100
- Thermal flow sensors TA10 and measuring tubes TA Di with integrated or separate evaluation unit

This apparatus is designed for measuring the flow velocity and flow rate of gases in areas in which category 3G or 3D equipment is required.

During normal operation within the boundaries of the technical specifications the equipment is safe and does not generate sparks. Provision for self-heating does not need to be made in the case of vane wheel and vortex sensors. This also applies to thermal sensors in category 3G. The maximum additional surface temperature for category 3D areas is 135 °C.

Do not use the sensors

- in areas in which category 1G or 2G apparatus is required
- in areas in which category 1D or 2D apparatus is required



2 Safety Precautions

2.1 General

Hazard risks:

- modifications to the device by the customer
- handling the device outside the specified operating conditions
- handling the sensors outside the specified operating conditions
- improper use of the equipment

Danger when installing the sensors in pressurized pipelines:

- sensors for use in pressurized pipelines are to be inserted or retracted only in depressurized conditions; non-observance may result in serious harm to personnel
- when installing or removing under pressure, the appropriate protective equipment must be used, e.g. ball valve and probe guide pieces with chain guard or spindle probe guide pieces

The medium container for the measurement gases must be insulated in a way that it is ensured that the electronics housing of the apparatus does not assume a higher temperature than the aforementioned maximum ambient temperature. The radiation and convection heat has to be considered also.

2.2 Use in potentially explosive atmospheres

Danger when use of the device in potentially explosive atmospheres:

- The flow sensors may only be used in areas specified for category 3G (zone 2) or category 3D (zone 22) apparatus.
- The apparatus is to be connected to the local equipotential bonding system according to the currently valid regulations. The earth terminal is designed for cross-sections of 1,5 ... 4 mm². Use a cable lug. The torque for fixture to the earth terminal must amount to 2 ... 3 Nm.
- If severe variations in temperature are to be expected, the device should be left to adapt to the ambient temperature for at least one hour before use to avoid problems with condensation.
- The housing cover may only be opened and connection cables may only be connected or disconnected after the supply voltage has been disconnected.
- Instrument sensors with a separate evaluation unit may only be connected or disconnected when voltage-free. Protect the connection cables against opening.
- Before starting measurement in an explosive atmosphere, check whether the housing cover has been screwed down correctly.
- Mechanical shocks are to be avoided.
- Damaged instruments must not be used. This also applies to damage on the housing.
- The connection cable used must be approved for the temperature range of the evaluation electronics as a minimum.
- Any covering of dust on the electronic housing may not exceed 5 mm.
- Only the manufacturer's cable glands ducts included in the scope of delivery or permitted, identical cable glands may be used.
- TA10C sensors may only be operated with a connection cable supplied by Höntzsch.
- **The electronic housing** must be protected from strokes and shocks.

Category 3G and category 3D vane wheel flow sensors FA and vortex flow sensors VA listed in chapter 1 are to be used solely in areas in which the ambient temperature range **for the electronic housing** does not exceed -20 to +50 °C. For sensors with integrated LCD display the ambient temperature range is limited from -5 to +50 °C. Consult the information in the appendant technical documentation.

Category 3G and category 3D thermal flow sensors TA listed in chapter 1 are to be used solely in areas in which the ambient temperature range **for the electronic housing** does not exceed -20 to +50 °C.

Category 3G apparatus listed in chapter 1 is to be used solely in areas with the temperatures marked on the type plate for the measuring medium and ambient atmosphere and for the maximum permissible overpressure.

The maximum permissible **surface temperature** for vane wheel and vortex sensors in category 3D areas is the maximum temperature of the medium and for thermal sensors 135 °C in addition to the maximum temperature of the medium. The maximum permissible temperature of the medium can be checked on the type plate and corresponding technical documents.

VAT and FT probes may be used in category 3G or 3D solely with a Höntzsch-approved evaluation unit specifically for these probes. Other combinations and categories are not permissible. Always check that the sensor is connected correctly. A wrongly connected sensor can increase the risk of explosion.

3 Technical Data

Marking: **CE**  **II 3 G**

Explosion protection: vane wheel sensors FA and vortex sensors VA

Ex ec IIC T6 Gc X

Explosion protection: thermal sensors TA

Ex ec IIC T4 Gc X

Marking: **CE**  **II 3 D**

Explosion protection: vane wheel sensors FA and vortex sensors VA

Ex tc IIIC TX Dc X

Explosion protection: thermal sensors TA

Ex tc IIIC T135°C Dc X

X: There are certain special factors to be observed for applications in explosive atmospheres (see chapter 2.2)

3.1 Electrical Data

For power supply, power input, current consumption, refer to the details on the type plate and corresponding technical documents.



4 Installation

The current European Specifications for Assembly, the recognised standards of good practice and this Instruction Manual apply.

We recommend a cable with a 4 ... 6 mm² cross section for connection to the earth terminal. Use a cable lug.

The earth terminal must be tightened with a torque of 2 ... 3 Nm.



5 Cleaning / Maintenance

Sensors should be cleaned at regular intervals.

Any other maintenance or repair work is to be carried out solely by Höntzsch GmbH & Co. KG.

Declaration of Conformity, Declaration of Incorporation Category 3G and 3D for

- Vane wheel flow sensors FA and measuring tubes FA Di with integrated or separate evaluation unit and optional integrated temperature probe Pt100
- Vortex flow sensors VA40 and measuring tubes VA Di with integrated or separate evaluation unit and optional integrated temperature probe Pt100
- Thermal flow sensors TA10C and measuring tubes TA Di with integrated or separate evaluation unit

We, Höntzsch GmbH & Co. KG
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bearing sole responsibility, hereby declare that the above-mentioned products referred to by this declaration are in conformity with the following standards or normative documents:

Provisions of the Directive	Reference and date of issue
2014/34/EU: Equipment and Protective Systems in Potentially Explosive Atmospheres	EN 60079-0: 2018 EN 60079-7: 2015 EN 60079-31: 2014
2014/30/EU: Electromagnetic Compatibility	EN 61000-6-4: 2007 + A1: 2011 EN 61000-6-2: 2006 + Corrigendum 1: 2011
2014/68/EU: Pressure Equipment	



Waiblingen, 25.06.2021

Jürgen Lempp / Managing Director

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