



Grünewald



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Company Profile

Our story dates back to 1976 when Grünewald GmbH was founded in Remscheid. From the very beginning, our focus has been on high-quality products with enduring quality and innovative technology.

In 2001 Lothar Schnickmann and Michael Wolf took over the management, leading to a significant phase for the company. The search for an optimal location led us to Hamm in Westphalia, where we found not only expansion opportunities but also excellent transportation connections. This strategic decision allowed us to optimize our production capacities, enhance our proximity to suppliers and shorten our response times.

Today we present ourselves as an experienced, innovative, flexible and dynamic company proudly distributing our products on an international level. Our portfolio includes measurement and control technology for explosion protection areas including flow rate, temperature, pressure, and level measurements as well as control systems and temperature switches.

A particular focus is on our customized solutions for the coal mining industry. Our measuring instruments and monitoring systems meet the highest standards, contributing to improved safety and efficiency in this demanding sector.



Experience Creates Trust

From a bold idea to a refined product of perfection.

Grünewald GmbH is distinguished by high-quality products that undergo continuous development in the field of measurement and control technology. This is made possible by a qualified team of experts utilizing state-of-the-art production methods, internal process optimization, premium raw materials and certified quality control.

By adhering to high customer requirements, we distribute our German-made products worldwide. Our extensive experience plays a crucial role in this. Continuous engagement with our customers and the feedback we receive fuel our innovation flexibility and demand-driven development.

Our strength lies in delivering precise measurement technology with long operational lifespans even under the most challenging conditions, including explosion protection areas.



- 1976** | Founding of Grünewald GmbH in Remscheid
- 2001** | Management takeover by Lothar Schnickmann and Michael Wolf
Cooperation with distributor in Poland
- 2002** | Expansion space acquired in Hamm
- 2003** | Certification acc. to ATEX 94/9/EC
- 2004** | Relocation of the entire operation to Hamm
- 2006** | Certification acc. to DIN EN ISO 9001:2000
Certification acc. to IECEx
- 2008** | Expansion of the production hall
Cooperation with distributor in Canada
Cooperation with distributor in Slovenia
Cooperation with distributor in South Africa
Cooperation with distributor in Turkey
- 2009** | Certification acc. to DIN EN ISO 9001:2008
Cooperation with distributor in China
- 2010** | Approval of GOST and RTN for Russia
Cooperation with distributor in Russia
Cooperation with distributor in the USA
- 2012** | MA approval for China
Cooperation with distributor in the Czech Republic
- 2014** | IECEx approval for Australia
- 2015** | MSHA approval for the USA
Cooperation with distributor in Australia
- 2016** | EAC Ex approval for Russia
Certification to ATEX 2014/34/EU
- 2018** | Certification acc. to DIN EN ISO 9001:2015
- 2019** | Cooperation with distributor in Vietnam
Cooperation with distributor in Iran
- 2020** | Change of sales strategy in Poland through local representatives
Cooperation with distributor in India
- 2021** | EAC Ex approval for Russia
- 2022** | MA approval for China



MAGIN-Ex[®]

Volume Flow

The **MAGIN-Ex[®]** series of flow meters is designed for flow measurement which can be integrated with additional measurements such as pressure and/or temperature. To enhance reliability, safety-critical circuits are redundantly designed.

The development of these devices incorporated modern technologies both in electronics and mechanical design, aiming to offer a modern and highly sophisticated measuring device for underground mining use. Due to the used processor electronics high measurement accuracy and fast response times are achieved and in accordance with the mechanical design a wide variety of configuration options can be realized. This allows you to customize your measuring device to suit your specific application.

The magnetic-inductive measuring method does not use any mechanical components for measurement acquisition, resulting in high reliability against issues such as contamination. According to Faraday's law of induction, a voltage is induced in the medium to be measured which moves within a magnetic field using two coils. This induced voltage is logarithmically proportional to the flow velocity and is transferred to the electronics via two side-mounted measuring electrodes. The flow volume is then calculated based on the nominal width. For these flow meters the flow direction is not relevant.

A prerequisite for this measuring principle is the use of conductive media such as water or liquids with water content. Oils cannot be measured with the **MAGIN-Ex[®]**. For oil flow measurement we offer the **SMALL-Ex[®]** ViscoFlow in our product range.

Our measuring devices are designed for use under very harsh and challenging environmental conditions. Thanks to their extremely robust construction and stainless steel housing, they can withstand very high mechanical stresses. They are intended for use in filled systems with liquid media.



MAGIN-Ex®
DN20 PN40

MAGIN-Ex®
DN50 PN40



MAGIN-Ex®

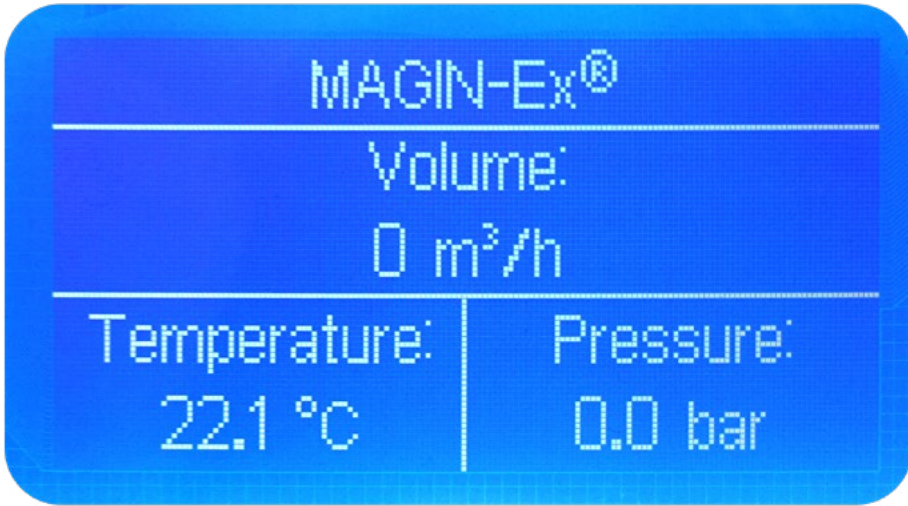
DN300 PN40



MAGIN-Ex®

DN150 PN40





MAGIN-Ex®
DISPLAY

MAGIN-Ex®
DN20 PN200



Technical Details

Marking:	<p>Group 1</p> <p>⊕ I M1 Ex ia I Ma ⊕ I M2 Ex ia [ib] I Mb (with CAN-Bus output signal) Ex ia I Ma Ex ia [ib] I Mb (with CAN-Bus output signal)</p> <p>Group 2</p> <p>⊕ II 2G Ex ia IIA T4 Gb ⊕ II 2G Ex ia [ib] IIA T4 Gb (with CAN bus output signal) Ex ia IIA T4 Gb Ex ia [ib] IIA T4 Gb (with CAN bus output signal)</p>
Certification:	BVS 13 ATEX E 061 IECEX BVS 13.0072
Environmental Temperature:	-50 to +80 °C
Housing Material:	Stainless steel
Nominal Width:	DN20 to DN200
Nominal Pressure:	up to 200 bar (depending on the nominal width)
Gauge Accuracy:	± 0.5 % in range of 10 % - 100 % of measuring end-value (higher accuracy on request)
Medium:	Water
Illuminated Display:	optional
Display:	l/min ; m ³ /h ; gpm (other units on request)
Output Signal:	5 - 15 Hz 0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, with min. 7.5 V supply) CAN-Bus Customer-specific output signals with intermediate sizes can be configured upon request.
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology

Nominal Current per Measuring System:

Output signal	without Display	with Display
Frequency	5 - 15 Hz	120 mA
Current	0 - 20 mA	120 - 140 mA
Current	4 - 20 mA	124 - 140 mA
Voltage	* - ** V	120 mA
CAN-Bus		160 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

MAGIN-Ex -

V /**/* / ** /*** * / *** * /*** /*** / ** / ** / ** / ** / * / * / * / * / *

Measuring Mode	Additional Measurement (optional)	Nominal Voltage	Measuring Range	Unit	Additional Measuring		Nominal Width	Nominal Pressure	Mechanical Connection	Electrodes Material	Functional Safety	Electrical Connection	Display	Sensors Adjustment	Port 1	Port 2	Port 3		
					Measuring Range	Unit													
V [Volume Flow]	P [Pressure] T [Temperature internal] T2 [Temperature external]	12 [12 V DC] E12 [12 V DC external]	*** [0-***]	L [l/min] cbm [cbm/h] gpm [gpm] % [%] *** [Special]	*** [0-***]	*** [Special]	*** [DN***]	*** [PN*** bar] p*** [PN*** psi]	G [BSP Female Thread] N [NPT Female Thread] TI [Titanium] F [Flange] O [Staple lock] ** [Special]	TI [Titanium] ** [Special]	SI [Functional Safety SIL/PL] KSI [without functional Safety SIL/PL]	MI2 [MI2-Connector] S [Souriau] L...m [cable with length in m] ** [System **]	A [with display] KA [without display]	KG [Compact Instrument] AS...m [Stepped sensor with length in m]	S0 [0-20 mA] S4 [4-20 mA] S... [*** mA] U... [*** V max. 10 V]	F [5-15 Hz] F*** [*** Hz] FA [5-15 Hz active] F***A [*** Hz active] *** [Special] GW [Contact for Boundary values]	C [CAN-Bus]		
																		Pressure	mb [mbar] b [bar] MPa [MPa] psi [psi] % [%] *** [0-***]
																		Pressure	*** [0-***]
																		Temperature	*** [Special]
																		Temperature	*** [0-***]
																		Temperature	*** [Special]
																		Temperature	*** [Special]
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																		Temperature	*** [Special]
																		Temperature	*** [Special]
																		Temperature	*** [Special]

Other types, connections, measuring ranges, etc. on request.

Examples: MAGIN-Ex-V/P/T/12/100L/40b/40C/025/40/G/TI/KSI/H/A/KG/S4
MAGIN-Ex-V/P/T/12/200cbm/40b/60C/150/40/F/TI/KSI/H/A/KG/S4
MAGIN-Ex-V/P/T/12/250L/40b/40C/032/40/G/TI/KSI/H/KA/KG/S4



SMALL-Ex[®] Volume Flow

The **SMALL-Ex[®]** series flowmeters are intrinsically safe devices designed for volume flow measurement. Additionally these meters can be equipped with integrated pressure and/or temperature measurement. They are intended for use in filled systems with water or emulsion. Depending on the design and application, these devices can be configured for system pressures up to 400 bar. For oil flow measurement we offer the **SMALL-Ex[®]** ViscoFlow series.

The volume flow meters can optionally be equipped with an illuminated display. Versions with integrated pressure and/or temperature measurement the flowmeter can have up to three displays. For better usability, a version with external sensors is also available. In this setup the sensors are housed in a separate enclosure and connected to the evaluation unit which can optionally include a display via a connecting cable.

The liquid medium to be measured flows through a defined housing bore in the **SMALL-Ex[®]** flow meters causing the turbine inside to rotate. The turbine is equipped with sealed magnets. These magnetic fields are detected by an inductive contactless sensor and evaluated by the electronics. For these flow meters the flow direction is not relevant.

The mechanical connection can be made via threads in various sizes Staple lock flange Victaulic system or SAE flange. Due to the design of the nominal sizes DN20 to DN32 multiple meters of this size can be connected to form a single unit.



SMALL-Ex[®]
DN20 PN200



SMALL-Ex[®]
DN25 PN100

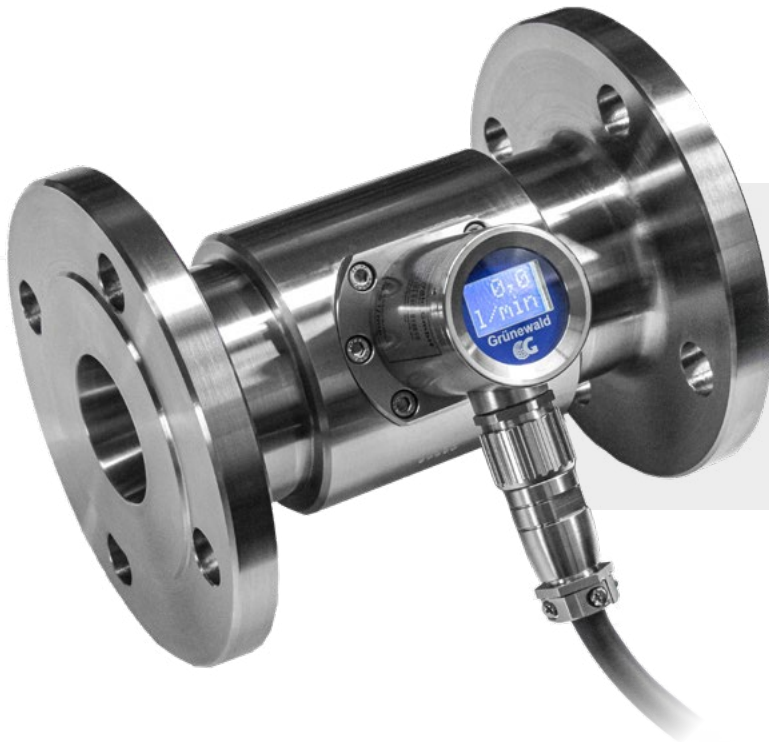
SMALL-Ex[®]

DN63 PN60



SMALL-Ex[®]

DN150 PN40



SMALL-Ex[®]
DN50 PN40



SMALL-Ex[®]
DN50 PN100

Technical Details

Marking:	<p>Group 1</p> <p>⊕ I M1 Ex ia I Ma ⊕ I M2 Ex ia ib I Mb (with CAN-Bus output signal) Ex ia I Ma Ex ib I Mb (with CAN-Bus output signal) PO Ex ia I Ma X PB Ex ib [ja Ma] I Mb X (with CAN-Bus output signal)</p> <p>Group 2</p> <p>⊕ II 2G Ex ia IIA T4 Gb Ex ia IIC T4/T6 Ga/Gb</p>
Certification:	<p>BVS 06 ATEX E005 X IECEX BVS 09.0056X IECEX TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)</p>
Environmental Temperature:	<p>-50 to +100 °C in group 1 -50 to +80 °C in group 2</p>
Housing Material:	Stainless steel, steel, brass (depending on variant)
Nominal Width:	DN20 to DN200
Nominal Pressure:	up to 450 bar (depending on the nominal width)
Gauge Accuracy:	± 0.5 % from end-value (higher accuracy on request)
Medium:	filtered water as well as emulsion
Illuminated Display:	optional
Display:	l/min ; m ³ /h ; gpm (other units on request)
Output Signal:	<p>5 - 15 Hz 0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, with min. 7.5 V supply) CAN-Bus Modbus RTU</p>
Nominal Voltage:	<p>12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology 24 V DC (14 - 26.6 V DC) 2-wiring-technology</p>

Nominal Current per Measuring System:

Output signal	without Display	with Display
Frequency	5 - 15 Hz	13 mA
Current	0 - 20 mA	13 - 33 mA
Current	4 - 20 mA	17 - 33 mA
Voltage	* - ** V	17 mA
CAN-Bus		30 mA
Modbus		30 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL-

V / ** / ** / *** ** / *** / *** / *** / * / ** / ** / ** / * / * / *

Measuring Mode	Design	Nominal Voltage	Measuring Range	Unit	Nominal Width	Nominal Pressure	Additional Measuring	Mechanical Connection	Electrical Connection	Display	Sensor Adjustment	Port 1	Port 2	Port 3
V [Volume Flow]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	L [l/min]	*** [DN***]	*** [PN*** bar]	**C [0-** °C]	G [BSP Female Thread]	B [PROMOS BN41.AT]	A [with Display]	KG [Compact Instrument]	SI0 [0-20 mA]	F [5-15 Hz]	C [CAN-Bus]
		E12 [12 V DC external]		cbm [cbm/h]			**F [0-** °F]	N [NPT Female Thread]	H [Harting]					
V [Volume Flow]	RG [Round Instrument]	16 [16 V DC]	*** [0-***]	G [gpm]	*** [DN***]	p*** [PN*** psi]	**b [0-** bar]	F [Flange]	S [Souriau]	KA [without Display]	AS...m [Stepped sensor with length in m]	SI4 [4-20 mA]	-	-
		E16 [16 V DC external]		% [%]			AF [ANSI Flange]	M12 [M12-connector]	SI... [*-** mA]					
V [Volume Flow]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	% [%]	*** [DN***]	p*** [PN*** psi]	**p [0-** psi]	O [Staple Lock]	L...m [Cable with length in m]	KA [without Display]	AS...m [Stepped sensor with length in m]	SI4 [4-20mA]	-	-
		*		VI [Victaulic]			** [System **]							
V [Volume Flow]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	*	*** [DN***]	p*** [PN*** psi]	**M [0-** MPa]	SAE [SAE Flange]	** [System **]	KA [without Display]	AS...m [Stepped sensor with length in m]	SI4 [4-20mA]	-	-
				[Special]			** [Special]	** [Special]						

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-V/RG/12/120L/025/40/O/H/A/KG/SI4

SMALL-V/RG/E12/400cbm/200/40/F/BL05m/A/AS10m/U1-10V



SMALL-Ex[®] ViscoFlow Volume Flow

The **SMALL-Ex[®]** series flowmeters are intrinsically safe devices designed for volume flow measurement of pure oils. Inside the flow meter a gear arrangement or spindles count rotations using an impulse sensor. Additionally, this device can be equipped with pressure and/or temperature measurement.

The flow rate is transmitted as an analog measurement value with a signal range of either 5 - 15 Hz, 0/4 - 20 mA ^{**} V (max. 10 V DC; with a power supply of at least 7.5 V DC) or CAN-Bus. An "impulse output" is also available, up to a maximum of 1 kHz, allowing the volume of oil to be counted as a defined quantity of oil flows through the device per impulse.

The oil flow meter can be used as a real-time display showing liters per minute or as a "counter" with impulse output. The oil flows through gears or spindles and a defined amount of oil passes per counting impulse. This makes the device independent of viscosity or temperature. The measured value can be output through any chosen signal and optionally displayed locally on an illuminated display.

This device is used in applications such as hydraulic systems up to 400 bar for measuring pump performance or in its impulse variant, for measuring the stroke of hydraulic cylinders.



SMALL-Ex[®]
DN40 PN315



SMALL-Ex[®]
DN25 PN315

SMALL-Ex[®]
DN15 PN315





SMALL-Ex[®]

DN10 PN315

Technical Details

Marking:

Group 1
 Ⓢ I M1 Ex ia I Ma
 Ⓢ I M2 Ex ia ib I Mb (with CAN-Bus output signal)
 Ex ia I Ma
 Ex ib I Mb (with CAN-Bus output signal)
 PO Ex ia I Ma X
 PB Ex ib [ja Ma] I Mb X (with CAN-Bus output signal)

Group 2
 Ⓢ II 2G Ex ia IIA T4 Gb
 Ex ia IIC T4/T6 Ga/Gb

Certification: BVS 06 ATEX E005 X
 IECEx BVS 09.0056X
 IECEx TSA 13.0023X
 MSHA 18-ISA 150004-0
 EAЭC RU C-DE.AA87.B.00727/21

Environmental Temperature: -50 to +100 °C in group 1
 -50 to +80 °C in group 2

Housing Material: Stainless steel, cast (depending on variant)

Nominal Width: DN15 to DN75

Nominal Pressure: up to 400 bar (depending on nominal width)

Gauge Accuracy: ± 0.5 % from end-value (higher accuracy on request)

Medium: Oil

Illuminated Display: optional

Display: l/min ; m³/h ; gpm (other units on request)

Output Signal: 5 - 15 Hz
 0 - 20 mA
 4 - 20 mA
 * - ** V (max. 10 V DC, with min. 7.5 V supply)
 Impulse
 CAN-Bus
 Modbus RTU
 Impulse output

Nominal Voltage: 12 V DC (7.5 - 14.0 V DC) 3-wiring-technology
 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology
 24 V DC (14 - 26.6 V DC) 2-wiring-technology

Nominal Current per Measuring System:

Output signal	without Display	with Display
Frequency	5 - 15 Hz	13 mA
Current	0 - 20 mA	13 - 33 mA
Current	4 - 20 mA	17 - 33 mA
Voltage	* - ** V	17 mA
CAN-Bus		30 mA
Modbus		30 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL-

V / ** / ** / *** ** / *** / *** / *** / ** / ** / ** / ** / * / * / *

Messart	Bauform	Nennspannung	Messbereich	Einheit	Nennweite	Nenndruck	zusätzliche Messung	Mechanischer Anschluss	Elektrischer Anschluss	Display Anzeige	Sensorik Anordnung	Port 1	Port 2	Port 3
V [Volume Flow]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	L [l/min]	*** [DN***]	*** [PN*** bar]	**C [0-** °C]	VG [BSP Female Thread]	B [PROMOS BN41..AT]	A [with Display]	KG [Compact Instrument]	SI0 [0-20 mA]	F [5-15 Hz]	C [CAN-Bus]
		E12 [12 V DC external]		cbm [cbm/h]			**F [0-** °F]		H [Harting]					
V [Volume Flow]	RG [Round Instrument]	16 [16 V DC]	*** [0-***]	G [gpm]	*** [DN***]	p*** [PN*** psi]	**b [0-** bar]	VO [Staple Lock]	M12 [M12-Connector]	KA [without Display]	AS...m [stepped sensor with length in m]	SI... [*-** mA]	F* [Pulse Output]	PM [Modbus RTU]
		E16 [16 V DC external]		% [%]			**p [0-** psi]		V** [Special]					
V [Volume Flow]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	L [l/min]	*** [DN***]	*** [PN*** bar]	**C [0-** °C]	VG [BSP Female Thread]	H [Harting]	KA [without Display]	KG [Compact Instrument]	SI4 [4-20 mA]	-	-
				cbm [cbm/h]			**F [0-** °F]		S [Souriau]					
V [Volume Flow]	RG [Round Instrument]		*** [0-***]	G [gpm]	*** [DN***]	p*** [PN*** psi]	**b [0-** bar]	VO [Staple Lock]	M12 [M12-Connector]	KA [without Display]	AS...m [stepped sensor with length in m]	SI4 [4-20 mA]	-	-
				% [%]			**p [0-** psi]		V** [Special]					
V [Volume Flow]	RG [Round Instrument]		*** [0-***]	*	*** [DN***]	p*** [PN*** psi]	**M [0-** MPa]	V** [Special]	L...m [cable with length in m]	KA [without Display]	AS...m [stepped sensor with length in m]	SI4 [4-20 mA]	-	-
				% [%]			**p [0-** psi]		V** [Special]					

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-V/RG/12/16L/010/400/VG/L03m/A/KG/F

SMALL-V/RG/16/70L/020/315/250b/VO/H/KA/KG/SI4



DA/DAK

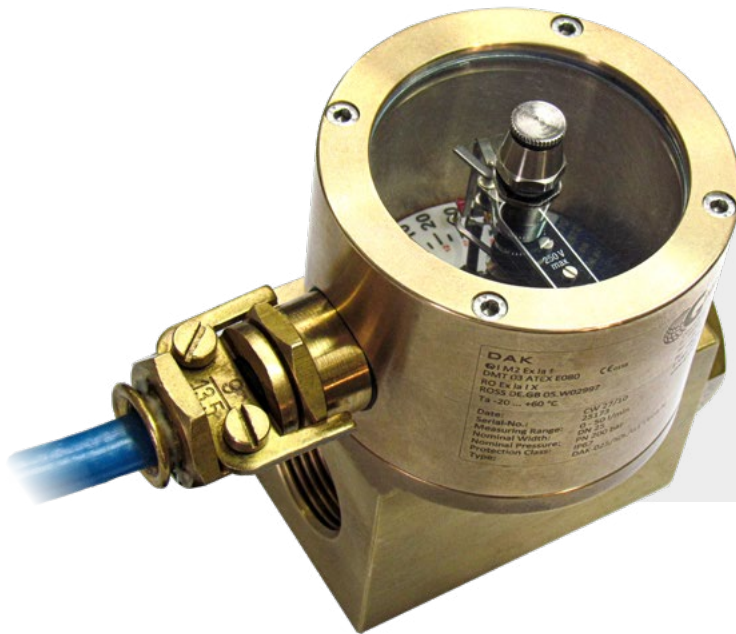
Volume Flow

The intrinsically safe flow indicators type **DA** and type **DAK** are designed for monitoring water or emulsion in closed and filled systems, regardless of installation position. The flow rate is displayed as an analog indication.

The **DA** flowindicator are solely for optical flow rate indication. They provide a visual representation of the flow without additional monitoring capabilities.

The **DAK** flowindicator are equipped with an integrated limit contact for monitoring purposes. The contact sensor, attached to a solid brass housing, features a readable flow scale. Using the supplied key, the desired switch-on or switch-off point can be continuously adjusted across the entire measuring range from the outside.

Additionally, the type **DAK** flow indicator can be equipped with various electrical connections and circuits, such as resistors for line monitoring, to meet specific application requirements.



DAK
 DN25 PN200



DA
 DN25 PN200

DA
DN50 PN40



DAK
DN150 PN40




DAK
DN32 PN100



DAK
DN50 PN40

Technical Details

Marking:	Group 1  I M2 Ex ia I Mb PB Ex ia I Mb X
Certification:	DMT 03 ATEX E 080 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)
Environmental Temperature:	-50 °C to +80 °C
Housing Material:	Brass MS58 / Red Brass RG7
Nominal Width:	DN25 to DN200
Nominal Pressure	up to 200 bar (depends on nominal width)
Gauge Accuracy:	3 % from end-value
Medium:	water as well as emulsion
Display:	l/min ; m ³ /h ; gpm (other units on request)
Nominal Voltage:	0 - 24 V DC
Circuit Durability:	2.0 A at 0 - 12 V 1.0 A at 12 - 24 V

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

DA / *** / *** *** / **

Type	Nominal Width	Measuring Range	Unit	Mechanical Connection
DA [DA]	*** [DN***]	*** [0-***]	L [l/min] cbm [cbm/h] % [%] * [Special]	G** [BSP Female Thread] O [Staple Lock] S [Sandwich] ** [Special]

Other types, connections, measuring ranges, etc. on request.

Examples: DA-080/100cbm/O
DA-050/40cbm/G2"

DAK / *** / *** *** / ** / ** / *

Type	Nominal Width	Measuring Range	Unit	Mechanical Connection	Electrical Connection	Control Form
DAK [DAK]	*** [DN***]	*** [0-***]	L [l/min] cbm [cbm/h] % [%] * [Special]	G** [BSP Female Thread] O [Staple Lock] S [Sandwich] ** [Special]	E** [Insertion through fixed wire max. 30 m] P [PROMOS BN41..AT] H [Harting] S [Souriau] ** [System **]	N [Without circuit] E [Resistor circuit] D [Light emitting diode / LED] DD [Anti parallel diode] P [PROMOS-circuit] S [Siemens end element]

Other types, connections, measuring ranges, etc. on request.

Examples: DAK-025/120L/G1"/E10/N
DAK-025/50L/G1"/P/P
DAK-150/180cbm/S/E03/DD
DAK-032/200L/G1¼"/SF/E



SMALL-Ex[®] Pressure

The **SMALL-Ex[®]** series comprises intrinsically safe pressure measurement devices. These devices can be operated in any installation position and are suitable for both liquid and gaseous media. The pressure transducer includes a piezoresistive pressure sensor with temperature compensation.

The round housing form can optionally be equipped with a self-illuminating display. Due to its design, the in-line housing form is generally available without a display. For enhanced usability the device can be configured with external sensors. In this configuration the sensors are housed in a separate enclosure and connected to the evaluation unit which can optionally be equipped with a display via a connecting cable.

The mechanical connection can be made via threads in various sizes or the Staple Lock system.

The housing of the **SMALL-Ex[®]** devices is made of stainless steel, which increases mechanical durability, allowing them to be used in almost any environment.



SMALL-Ex[®]
Pressure



SMALL-Ex[®]
Pressure

SMALL-Ex®
Pressure



SMALL-Ex®
Pressure



SMALL-Ex[®]



Pressure



SMALL-Ex[®]

Pressure

Technical Details

Marking:	Group 1  I M1 Ex ia I Ma Ex ia I Ma PO Ex ia I Ma X
	Group 2  II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb
Certification:	BVS 06 ATEX E005 X IECEx BVS 09.0056X IECEx TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)
Environmental Temperature:	-50 to +100 °C in group 1 -50 to +80 °C in group 2
Housing Material:	Stainless Steel
Sensor:	piezo-resistive pressure transducer
Measuring Range:	up to 1000 bar
Gauge Accuracy:	± 0.5 % from end-value (higher accuracy on request)
Medium:	fluid and gaseous medium
Illuminated Display:	optional
Display:	mbar, bar, Pa, kPa, MPa, psi, t (other units on request)
Output Signal:	5 - 15Hz 0 - 20mA 4 - 20mA * - ** V (max. 10 V DC, at min. 7.5 V power supply) CAN-Bus Modbus RTU
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology 24 V DC (14 - 26.6 V DC) 2-wiring-technology

Nominal Current per Measuring System:

Output Signal	without Display	with Display
Frequency	5 - 15 Hz	10 mA
Current	0 - 20 mA	10 - 30 mA
Current	4 - 20 mA	14 - 30 mA
Voltage	* - ** V	14 mA
CAN-Bus		27 mA
Modbus		27 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

P / ** / ** / *** * / ** / ** / ** / ** / ** / * / *

Measuring Mode	Design	Nominal Voltage	Measuring Range	Unit	Mechanical Connection	Electrical Connection	Display	Sensors Adjustment	Port 1	Port 2	Port 3	
P [Pressure]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	mb [mbar]	G1 [G 1/4 A BSP]	B [PROMOS BN41.AT]	A [with Display]	KG [Compact-Instrument]	S10 [0-20 mA]	F [5 - 15 Hz]	C [CAN-Bus]	
		E12 [12 V DC external]										
		16 [16 V DC]										
	E16 [16 V DC external]											
IL [In-Line-Instrument]	12 [12 V DC]	16 [16 V DC]	M [MPa]	O [Staple Lock]	M12 [M12-connector]	L...m [Cable with length in m]	- [no display possible]	- [no stepped sensor possible]	U...- [*..** V max. 10 V]	PM [Modbus RTU]		
P [Pressure]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	mb [mbar]	G1 [G 1/4 A BSP]	B [PROMOS BN41.AT]	KA [without Display]	KG [Compact-Instrument]	S14 [4-20 mA]	-	-	
												b [bar]
												p [psi]
	M [MPa]											
IL [In-Line-Instrument]	M12 [M12-connector]	L...m [Cable with length in m]	- [no display possible]	- [no stepped sensor possible]	*** [System **]							

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-P/RG/12/60b/O/H/A/AS05m/S14/C
 SMALL-P/RG/E12/1000p/O/HL10m/A/KG/S14
 SMALL-P/IL/12/40M/G1/B/U1-10V



SMALL-Ex[®]

Differential Pressure

The differential pressure measuring device is designed for both liquid and gaseous media and can be installed in any position. The pressure transducer includes a piezoresistive pressure sensor with temperature compensation.

There are various versions available for the differential pressure measurement device.

The standard version consists of one pressure measurement device without a display and one with a display. The display shows the differential pressure between the two measurement points and transmits it for control purposes.

The special version consists of two pressure measurement devices with displays. One display shows the differential pressure between the two measurement points and transmits it for control. The other display shows the system pressure at the measurement point and also transmits it for control.



SMALL-Ex[®]
Differential Pressure



SMALL-Ex[®]
Differential Pressure

SMALL-Ex[®]
Differential Pressure



SMALL-Ex[®]
Differential Pressure





SMALL-Ex[®]
Differential Pressure

SMALL-Ex[®]
Differential Pressure



Technical Details

Marking:	Group 1  I M1 Ex ia I Ma Ex ia I Ma PO Ex ia I Ma X
	Group 2  II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb
Certification:	BVS 06 ATEX E005 X IECEx BVS 09.0056X IECEx TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)
Environmental Temperature:	-50 to +100 °C in group 1 -50 to +80 °C in group 2
Housing Material:	Stainless Steel
Sensor:	piezo-resistive pressure transducer
Measuring Range:	up to 700 bar system pressure
Gauge Accuracy:	± 0.5 % from end-value (higher accuracy on request)
Medium:	fluid and gaseous medium
Illuminated Display:	optional
Display:	mbar, bar, Pa, kPa, MPa, psi (other units on request)
Output Signal:	5 - 15Hz 0 - 20mA 4 - 20mA * - ** V (max. 10 V DC, at min. 7.5 V power supply)
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology

Nominal Current per Measuring System:

Output Signal	without Display	with Display
Frequency	5 - 15 Hz	64 mA
Current	0 - 20 mA	64 - 84 mA
Current	4 - 20 mA	68 - 84 mA
Voltage	* - ** V	68 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

P / ** / ** / *** * / *** ** / ** / * / ** / ** / ** / *

Measuring Mode	Design	Nominal Voltage	System Pressure		Differential Pressure		Mechanical Connection	Electrical Connection	Display	Sensors Adjustment	Port1	Port 2								
			Measuring Range	Unit	Measuring Range	Unit														
P [Pressure]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	mb [mbar]	*** [0-***]	mb [mbar]	G1 [G 1/4 A BSP]	B [PROMOS BN41.AT]	A [with display for differential pressure]	KG [Compact Instrument]	SI0 [0-20 mA]	F [15 - 15 Hz]								
		E12 [12 V DC external]		b [bar]		b [bar]							G2 [G 1/2 A BSP]	H [Harting]	2A [with display for system pressure and differential pressure]	SI4 [4-20 mA]				
		16 [16 V DC]		p [psi]		p [psi]											G3 [G 3/4 A BSP]	S [Souriau]	M12 [M12-Connector]	SI...m [stepped sensor with length in m]
		E16 [16 V DC external]		M [MPa]		M [MPa]														
	** [Special]	** [Special]	** [Special]	** [System **]	KA [without display]															

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-P/RG/12/350b/20bD/O/HL10m/2A/SI4/C
 SMALL-P/RG/E12/10M/1MD/G2/L05m/A/KG/F
 SMALL-P/RG/16/1000p/200pD/G1/2A/AS10m/U1-10V



SIMPL-Ex[®] Pressure

The **SIMPL-Ex[®]** series pressure measurement devices are specifically designed for use in shield support systems. Their ingenious yet simple construction provides high robustness, making them suitable for use in existing equipment at a low price level. These are customized mass-produced products manufactured to high standards.

Utilizing modern technology in electronics, based on the proven electronics of the **SMALL-Ex[®]** series, the **SIMPL-Ex[®]** devices employ a processor for signal evaluation instead of conventional potentiometers. Calibration is performed using specially developed software. The goal of developing these devices was to achieve and ensure high measurement accuracy and repeatability. The measurement devices are not affected by temperature variations and their solid stainless-steel construction offers high vibration resistance.

The combination of experience, electronics, design and the use of high-quality components and materials significantly enhances operational safety, making these devices ideal for use in harsh environments such as water or hydraulic systems.

For electrical connections, choose from various connectors like SKK24, CONM4, M12, Harting, Hirschmann or a cable entry with a lead. If you prefer another connector or need a specific standard connector, we can assess its feasibility. For output signals, options include a current output (0 - 20 mA or 4 - 20 mA) or a voltage output (e.g., 0.5 - 4.5 V or 0.4 - 2.0 V). For mechanical connections, options include threads like G1/2A BSP or NPT, Staple Lock and various other mechanical connections.

Receive your customized measuring device or a replacement device for your existing system tailored to your specific requirements.



SIMPL-Ex[®]

Pressure



SIMPL-Ex[®]

Pressure



SIMPL-Ex[®]

Pressure

SIMPL-Ex[®]

Pressure



Technical Details

Marking:	Group 1  I M1 Ex ia I Ma Ex ia I Ma
Certification:	IBExU 13 ATEX 1110X IECEX IBE 13.0039
Environmental Temperature:	-50 to +100 °C
Housing Material:	Stainless Steel
Sensor:	piezo-resistive pressure transducer
Measuring Range:	up to 1000 bar
Gauge Accuracy:	± 2.0 % from end-value (higher accuracy on request)
Medium:	fluid and gaseous medium
Output Signal:	0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, at min. 7.5 V power supply)
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology

Nominal Current per Measuring System:

Output Signal	Nominal Current	
Current	0 - 20 mA	9 - 29 mA
Current	4 - 20 mA	13 - 29 mA
Voltage	*..** V	9 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SIMPL-Ex -

P / ****** / ******* ***** / ****** / ****** / *******

Measuring Mode	Nominal Voltage	Measuring Range	Unit	Mechanical Connection	Electrical Connection	Port
P [Pressure]	12 [12 V DC]	*** [0 - ***]	b [bar]	G1 [G 1/4 A BSP]	S24 [SKK24-connector]	SI0 [0-20 mA]
			p [psi]	G2 [G 1/2 A BSP]	M12 [M12 Sensor-connector]	
	M [MPa]		G3 [G 3/4 A BSP]	H [Harting]	SI4 [4-20 mA]	
	** [Special]		O [Staple Lock]	S [Souriau]	SI..-.. [*..** mA]	
			** [Special]	L..m [cable with length in m]	U..-.. [*..** V max. 10 V]	
				V [Valve connector]		
				** [System **]		

Other types, connections, measuring ranges, etc. on request.

Examples: SIMPL-Ex-P/12/600b/O/S24/U0,5-4,5V
SIMPL-Ex-P/12/600b/O/V/SI4
SIMPL-Ex-P/12/450b/G2/M12/SI4



SMALL-Ex[®] Temperature

The **SMALL-Ex[®]** series comprises intrinsically safe devices designed for temperature measurement or as a special variant for use as temperature switches. These devices can be operated in any installation position. They are designed for use in systems with liquid or gaseous media as well as surfaces. Temperature measurement is performed using a Pt1000 resistance sensor housed within the device.

The round housing form is optionally available with an illuminated, while the in-line housing form is generally available without a display due to its design. For enhanced usability, we offer the round housing form with external sensors. In this setup, the sensors are housed in a separate enclosure and connected to the evaluation unit, which can optionally be equipped with a display, via a connecting cable. Additionally, we offer a special variant designed for use as temperature switches, such as in conveyor belt systems.

The mechanical connection can be made using an adjustable stainless-steel compression fitting via threads in various sizes or a mounting flange. For systems with a pressure of more than 100 bar, the use of an additional thermowell is necessary. As a special variant, the round housing form with remote sensors can have its measuring range extended to a maximum of 200 °C.

The housing of the **SMALL-Ex[®]** devices is made of stainless steel, which increases mechanical durability, allowing them to be used in almost any environment.

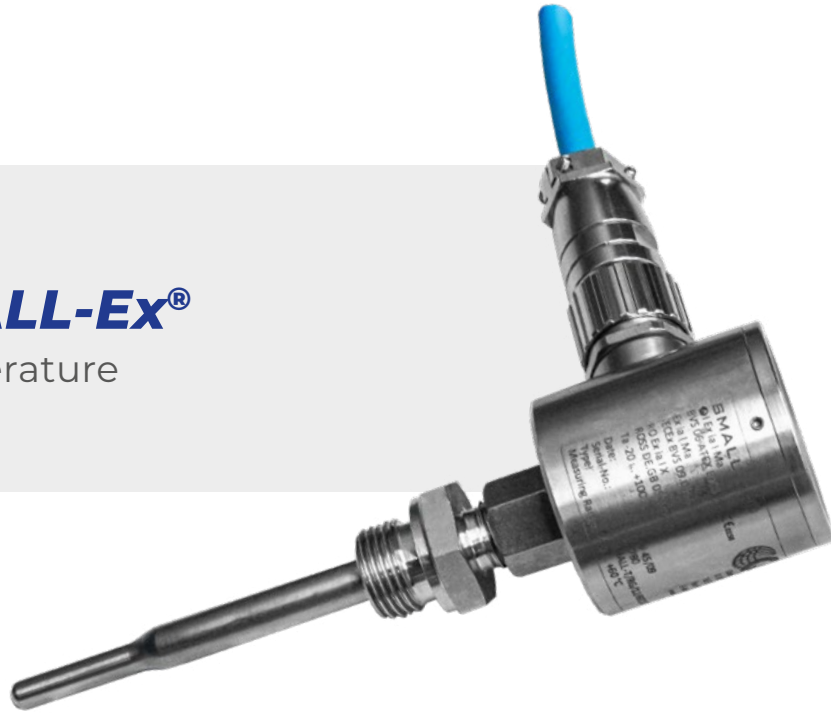


SMALL-Ex[®]
Temperature



SMALL-Ex[®]
Temperature

SMALL-Ex[®]
Temperature



SMALL-Ex[®]
Temperature



SMALL-Ex[®]
Temperature



SMALL-Ex[®]
Temperature

Technical Details

Marking:	<p>Group 1</p> <p>⊕ I M1 Ex ia I Ma ⊕ I M1 Ex ib I Mb (with CAN-Bus output signal) Ex ia I Ma Ex ib I Mb (bei CAN-Bus Ausgangssignal) PO Ex ia I Ma X PB Ex ib [ja Ma] I Mb X (with CAN-Bus output signal)</p> <p>Group 2</p> <p>⊕ II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb</p>
Certification:	<p>BVS 06 ATEX E005 X IECEX BVS 09.0056X IECEX TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)</p>
Environmental Temperature:	<p>-50 to +100 °C in group 1 -50 to +80 °C in group 2</p>
Housing Material:	Stainless Steel
Sensor:	Pt1000 Resistance sensor
Gauge Accuracy:	± 1.0 % from end-value (higher accuracy on request)
Medium:	fluid, gaseous medium and surfaces
Illuminated Display:	optional
Display:	°C or °F (other on request)
Output Signal:	<p>5 - 15 Hz 0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, at min. 7.5 V power supply) CAN-Bus Modbus RTU</p>
Nominal Voltage:	<p>12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology 24 V DC (14 - 26.6 V DC) 2-wiring-technology</p>

Nominal Current per Measuring System:

Output Signal	without Display	with Display
Frequency	5 - 15 Hz	10 mA
Current	0 - 20 mA	10 - 30 mA
Current	4 - 20 mA	14 - 30 mA
Voltage	* - ** V	14 mA
CAN-Bus		27 mA
Modbus		27 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

T / ** / ** / *** * / ** / ** / ** / ** / ** / * / * / *

Measuring Mode	Design	Nominal Voltage	Measuring Range	Unit	Mechanical Connection	Probe Length	Electrical Connection	Display	Sensors Adjustment	Port 1	Port 2	Port 3					
T [Temperature]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	C [°C]	G1 [G 1/4A BSP]	50 [50 mm]	B [PROMOS BN41.AT]	A [with Display]	KG [Compact Instrument]	S10 [0-20 mA]	F [5 - 15 Hz]	C [CAN-Bus]					
		E12 [12 V DC external]					H [Harting]										
		16 [16 V DC]					S [Souriau]						KA [without Display]	AS...m [stepped sensor with length in m]	SI4 [4-20 mA]		
	IL [In-Line-Instrument]	E16 [16 V DC external]					** [Special]	F [Flange]	M12 [M12-connector]				- [no display possible]	- [no stepped sensor possible]	SI... [*..** mA]	U... [*..** V max. 10 V]	PM [Modbus RTU]
		12 [12 V DC]						L...m [cable with length in m]									
		16 [16 V DC]						** [System **]									
T [Temperature]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	C [°C]	G1 [G 1/4A BSP]	50 [50 mm]	B [PROMOS BN41.AT]	KA [without Display]	KG [Compact Instrument]	SI4 [4-20 mA]	-	-					
							IL [In-Line-Instrument]						H [Harting]				
													S [Souriau]	AS...m [stepped sensor with length in m]			
	IL [In-Line-Instrument]							F [Flange]	M12 [M12-connector]				- [no display possible]	- [no stepped sensor possible]			
							200 [200 mm]	L...m [cable with length in m]									
							** [*** mm]	** [System **]									

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-T/RG/12/60C/G2/100/H/A/KG/F
 SMALL-T/RG/12/80C/G2/150/B/A/AS05m/SI4/C
 SMALL-T/IL/12/80C/G2/100/L05m/U1-10V



SMALL-Ex[®] Thermo Switch

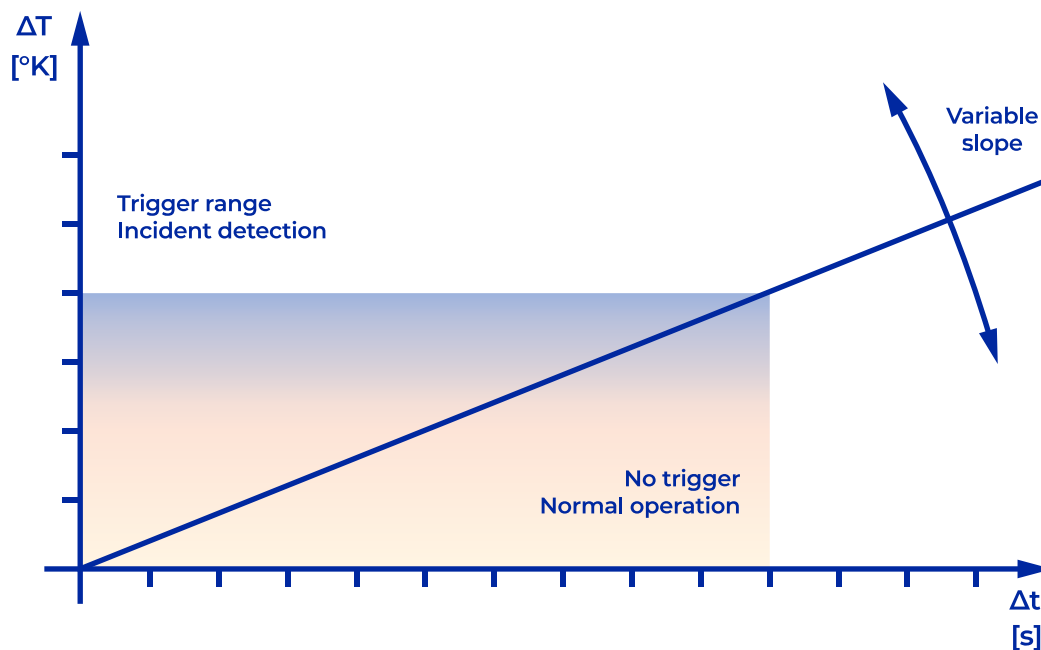
The **SMALL-Ex[®]** temperature monitoring device is designed for use under extremely harsh and challenging environmental conditions. Its highly robust construction with a stainless-steel housing allows it to withstand very high mechanical stresses. These devices are intended for applications such as conveyor systems, bearing monitoring or controlling oil temperatures (cooling fluids).

The mechanical connection can be made either via a flange plate or threads in various sizes. Electrical connections can be made through a connector in various approved designs or a cable connection of variable lengths. If you prefer a specific connector or need a particular standard connector, we can evaluate its feasibility.

The device optionally features an illuminated display for easy on-site temperature reading. A patented variant of the **SMALL-Ex[®]** device detects the temperature slope and compares it with manufacturer-defined temperature gradients, such as those occurring at the sidewall of a conveyor belt during startup. The ambient temperature level is irrelevant for detection and does not affect the evaluation.

Patent No: **DE 10 2009 033 009**

In this temperature switch, a typical differential temperature setting is 20 °K and a differential time setting is 10 seconds. This means that a temperature change of more than 20 °K within less than 10 seconds indicates a misalignment of the conveyor belt. As long as the temperature increase does not exceed the set value and the time does not fall below the set duration, the system is operating under normal conditions.



In normal operation, the device sends a constant signal, for example 5 mA (or 7 Hz). If a dangerous temperature rise is detected the device sends for example 19 mA (or 14 Hz). The danger is detected within the measuring device itself, not in the downstream control system. Additionally a warning temperature (e.g. 40 °C) is indicated by a signal such as 12 mA (or 10 Hz) and a maximum temperature (e.g. 60 °C) is indicated by a signal such as 17 mA (or 13 Hz). These values are adjustable and can be preset.

To ensure the switching reliability of the device, a self-test is performed by restarting the device, during which an alternating signal, such as 9 mA (or 9 Hz) and 15 mA (or 12 Hz), is transmitted for a set time interval. This self-test occurs at each restart and can be manually triggered on-site or externally.

An alternative monitoring and transmission method is also available. In normal operation the device sends a "1" signal. If a dangerous temperature rise is detected the device sends a "0" signal.

Using a magnetic switch, the self-test can be manually conducted from the outside or the device can be reset if the limit value has been exceeded.

SMALL-Ex[®]
Thermo Switch



SMALL-Ex[®]
Thermo Switch





SMALL-Ex[®]
Thermo Switch



SMALL-Ex[®]
Thermo Switch

Technical Details

Marking:	Group 1  I M1 Ex ia I Ma Ex ia I Ma PO Ex ia I Ma X
	Group 2  II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb
Certification:	BVS 06 ATEX E005 X IECEx BVS 09.0056X IECEx TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21
Environmental Temperature:	-50 to +100 °C in group 1 -50 to +80 °C in group 2
Housing Material:	Stainless Steel
Sensor:	Pt1000 Resistance sensor
Gauge Accuracy:	± 1,0 % from end-value (higher accuracy on request)
Medium:	fluid, gaseous medium and surfaces
Illuminated Display:	optional
Display:	°C or °F (other on request)
Output Signal:	Hz mA
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology

Nominal Current per Measuring System:

Output Signal		without Display	with Display
Frequency	Hz	10 mA	20 mA
Current	mA	10 - 30 mA	20 - 40 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

TS / ****** / ****** / ******* ***** / ****** / ******* / ****** / ****** / ****** / ****** / ****** / *****

Measuring Mode	Design	Nominal Voltage	Measuring Range	Unit	Mechanical Connection	Probe Length	Electrical Connection	Display	Sennors Adjustment	Port 1	Port 2
TS [Temperature]	RG [Round Instrument]	12 [12 V DC]	** [0-***]	C [°C]	G2 [G 1/2 A BSP]	50 [50 mm]	B [PROMOS BN41.AT]	A [with Display]	KG [Compact Instrument]	SI* [mA]	F* [Hz]
		E12 [12 V DC external]				H [Harting]					
		16 [16 V DC]				S [Souriau]					
		E16 [16 V DC external]				M12 [M12-connector]					
		** [*** mm]				L...m [cable with length in m]					
			** [Special]	** [Special]	** [System **]	KA [without Display]	AS...m [stepped sensor with length in m]				

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-TS/RG/12/60C/F/B/A/KG/F*

SMALL-TS/RG/12/100C/G2/L05m/KA/SI*



SMALL-Ex[®] Level Measuring

The **SMALL-Ex[®]** level measurement devices are designed for monitoring the height and fill levels of liquid media in non-pressurized tanks or containers. These devices can also be equipped with integrated temperature measurement. They are intended for use in systems filled with liquid media. Measurement accuracy depends on the media's temperature and viscosity, and these parameters are compensated accordingly.

The piezoresistive pressure transducer is integrated at the bottom of the probe tube or, in the version without a probe tube, within the threaded insert. This design allows monitoring and measurement of tanks or containers of various sizes.

Level measurement can be performed using a probe tube inserted from the top or side of the container or as a screw-in device without a probe tube for measurement at the tank bottom. Depending on the application, versions with a straight probe tube as well as 75° or 90° bent probe tubes are available. The mechanical connection can be made via threads in various sizes or a mounting flange.

The device can optionally be equipped with an illuminated display. For better usability, the device can also be configured with external sensors. In this configuration the sensors are housed in a separate enclosure and connected to the evaluation unit, which can optionally be equipped with a display, via a connecting cable. When the level measurement device is flange-mounted, the display can be constructed to tilt forward by 90°.

If the level measurement device is equipped with integrated temperature measurement, both measurements can be displayed alternately at timed intervals while both measurement signals are continuously transmitted for control purposes. For the version with a probe tube, the measurement range is constructively between 300 mm and 1200 mm. Additionally a capillary tube of up to 20 meters can be used.



SMALL-Ex[®]

Level

SMALL-Ex[®]

Level



SMALL-Ex[®]

Level



SMALL-Ex[®]

Level








SMALL-Ex[®]
Level



SMALL-Ex[®]
Level

Technical Details

Marking:	Group 1  I M1 Ex ia I Ma  I M1 Ex ib I Mb (with CAN-Bus output signal) Ex ia I Ma Ex ib I Mb (with CAN-Bus output signal) PO Ex ia I Ma X PB Ex ib [ja Ma] I Mb X (with CAN-Bus output signal)
	Group 2  II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb
Certification:	BVS 06 ATEX E005 X IECEx BVS 09.0056X IECEx TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)
Environmental Temperature:	-50 to +100 °C in group 1 -50 to +80 °C in group 2
Housing Material:	Stainless Steel
Sensor:	piezo-resistive pressure transducer with temperature compensation
Gauge Accuracy:	± 0.5 % from end-value (higher accuracy on request)
Medium:	fluid medium, e.g. water, emulsion, oil
Illuminated Display:	optional
Display:	mm ; m ; % ; ft (other units on request)
Output Signal:	5 - 15 Hz 0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, at min. 7.5 V power supply) CAN-Bus Modbus RTU
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology 24 V DC (14 - 26.6 V DC) 2-wiring-technology

Nominal Current per Measuring System:

	Output Signal	without Display	with Display
Frequenz	5 - 15 Hz	10 mA	20 mA
Strom	0 - 20 mA	10 - 30 mA	20 - 40 mA
Strom	4 - 20 mA	14 - 30 mA	24 - 40 mA
Spannung	* - ** V	14 mA	24 mA
CAN-Bus		27 mA	37 mA
Modbus		27 mA	37 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

N / ****** / ****** / ******* ****** / ******* / ****** / ****** / ****** / ****** / ****** / ****** / ***** / *****

Measuring Mode	Design	Nominal Voltage	Measuring Range	Unit	Additional Measuring	Mechanical Connection	Electrical Connection	Display	Sensor Adjustment	Port 1	Port 2	Port 3		
N [Level]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	mm [mm construction with probe tube]	**C [0-** °C for construction with internal temperature measuring]	construction with probe tube	B [PROMOS BN41..AT]	A [with Display]	KG [compact instrument]	SI0 [0-20 mA]	F [5 - 15 Hz]	C [CAN-Bus]		
		E12 [12 V DC external]		mb [mm construction without probe tube]		G [BSP male thread]							H [Harting]	SI4 [4-20 mA]
		16 [16 V DC]		m [m]		F [Flange]							S [Souriau]	SI...m [*-** mA]
		E16 [16 V DC external]		ft [ft]	**F [0-** °F for construction with internal temperature measuring]	construction without probe tube	M12 [M12-connector]	KA [without Display]	AS...m [stepped sensor with length in m]	U...m [*-** V max. 10 V]		PM [Modbus RTU]		
				% [%]		G2 [G 1/2 A BSP]	L...m [cable with length in m]							
				* [Special]		G3 [G 3/4 A BSP]	** [System **]							
N [Level]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	mm [mm construction with probe tube]	**C [0-** °C for construction with internal temperature measuring]	construction with probe tube	H [Harting]	A [with Display]	KG [compact instrument]	SI4 [4-20 mA]	-	-		
				mb [mm construction without probe tube]		F [Flange]							S [Souriau]	
				m [m]		** [Special]							M12 [M12-connector]	KA [without Display]
				ft [ft]	**F [0-** °F for construction with internal temperature measuring]	construction without probe tube	L...m [cable with length in m]							
				% [%]		G2 [G 1/2 A BSP]	** [System **]							
				* [Special]		G3 [G 3/4 A BSP]								
						** [Special]								

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-N/RG/12/300mm/G/B/A/AS08m/SI4/C
 SMALL-N/RG/12/50mb/G3/L10m/KA/KG/SI4
 SMALL-N/RG/12/160mb/G2/H/A/KG/F
 SMALL-N/RG/12/350mm/60C/G/L10m/A/KG/SI4



SMALL-Ex[®] Level Measuring Differential Pressure

This special version of the **SMALL-Ex[®]** level measurement devices is designed for use in containers that may be pressurized. Two pressure sensors separately monitor the fill level and the internal pressure in the container. This ensures accurate level measurement regardless of tank venting or pressurization, up to a maximum of 1 bar.

The measurement principle is based on a pressure sensor installed in the probe tube that measures the fill level in the container. In containers subject to pressure fluctuations, such as those caused by insufficient venting, liquid backflow or other influences, an overpressure can develop, which distorts the measurement value. To compensate for these external pressure fluctuations acting on the liquid, the device uses an additional pressure sensor that measures these fluctuations and compensates them internally. The internal communication via the data bus constantly recalculates the level depending on the ambient pressure.

As an additional option, the measured internal pressure of the container/tank can be transmitted as an output signal. This measurement method enables highly accurate level measurement under challenging conditions.





SMALL-Ex[®]
Differential Pressure



SMALL-Ex[®]
Differential Pressure

Technical Details

Marking:	Group 1  I M1 Ex ia I Ma Ex ia I Ma PO Ex ia I Ma X
	Group 2  II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb
Certification:	BVS 06 ATEX E005 X IECEx BVS 09.0056X IECEx TSA 13.0023X MSHA 18-ISA 150004-0 EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)
Environmental Temperature:	-50 to +100 °C in group 1 -50 to +80 °C in group 2
Housing Material:	Stainless Steel
Sensor:	piezo-resistive pressure transducer with temperature compensation
Gauge Accuracy:	± 1 cm from end-value (higher accuracy on request)
Medium:	fluid medium, e.g. water, emulsion, oil
Illuminated Display:	optional
Display:	mm ; m ; % ; ft (other units on request)
Output Signal:	5 - 15 Hz 0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, at min. 7.5 V power supply)
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology

Nominal Current per Measuring System:

Output Signal	without Display	with Display
Frequency	5 - 15 Hz	64 mA
Current	0 - 20 mA	64 - 84 mA
Current	4 - 20 mA	68 - 84 mA
Voltage	* - ** V	68 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

N / ****** / ****** / ******* ****** / ******* / ****** / ****** / ****** / ****** / ****** / ****** / *****

Measuring Mode	Design	Nominal Voltage	Measuring Range	Unit	Additional Measuring	Mechanical Connection	Electrical Connection	Display	Sensor Adjustment	Port 1	Port 2		
N [Level]	RG [Round Instrument]	12 [12 V DC]	*** [0-***]	mm [mm construction with probe tube]	**C [0-** °C for construction with internal temperature measuring]	G [BSP male thread]	B [PROMOS BN41..AT]	A [with Display]	KG [compact instrument]	SI0 [0-20 mA]	F [5 - 15 Hz]		
		E12 [12 V DC external]		mb [mm construction without probe tube]			**F [0-** °F for construction with internal temperature measuring]					H [Harting]	
		16 [16 V DC]		m [m]	F [Flange]		S [Souriau]					KA [without Display]	SI4 [4-20 mA]
		E16 [16 V DC external]		ft [ft]	** [Special]		M12 [M12-connector]					AS...m [stepped sensor with length in m]	SI..-.. [*-** mA]
				% [%]	D [measurement in tanks without constant pressure equalisation]		L...m [cable with length in m]					U..-.. [*.** V max. 10 V]	
	* [Special]			** [System **]									

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-N/RG/12/500mm/D/80C/F/L10m/A/KG/SI4



SMALL-Ex[®]

Inclination Measuring

The inclinometer from the **SMALL-Ex[®]** series is a device designed to measure the tilt angle on machines.

It was developed for use on mining machinery such as road headers, shearers, drill rigs, continuous miners and other equipment. Due to the use of appropriate materials (stainless steel), it is extremely robust and specifically engineered for the demanding conditions encountered on mining machinery.



SMALL-Ex[®]
Inclination





SMALL-Ex[®]
Inclination

Technical Details

Marking:	Group 1  I M1 Ex ia I Ma Ex ia I Ma PO Ex ia I Ma X
	Group 2  II 1/2 Ex ia IIC T4/T6 Ga/Gb Ex ia IIC T4/T6 Ga/Gb
Certification:	BVS 06 ATEX E005 X IECEx BVS 09.0056X IECEx TSA 13.0023X EAЭC RU C-DE.AA87.B.00727/21 MA applies to a subset of the devices series (further information available)
Environmental Temperature:	-50 to +100 °C in group 1 -50 to +80 °C in group 2
Housing Material:	Stainless Steel
Sensor:	capacitive liquid sensor
Gauge Accuracy:	± 1.0 % from end-value (higher accuracy on request)
Illuminated Display:	optional
Display:	° (degree) or % (percent) other units on request
Output Signal:	5 - 15Hz 0 - 20 mA 4 - 20 mA * - ** V (max. 10 V DC, at min. 7.5 V power supply) CAN-Bus Modbus RTU
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology 24 V DC (14 - 26.6 V DC) 2-wiring-technology

Nominal Current per Measuring System:

Output Signal		1-Axis		2-Axis	
		without Display	with Display	without Display	with Display
Frequency	5 - 15 Hz	11 mA	21 mA	22 mA	42 mA
Current	0 - 20 mA	11 - 31 mA	21 - 41 mA	22 - 62 mA	42 - 82 mA
Current	4 - 20 mA	15 - 31 mA	25 - 41 mA	30 - 62 mA	50 - 82 mA
Voltage	* - ** V	16 mA	26 mA	32 mA	52 mA
CAN-Bus		28 mA	38 mA	56 mA	76 mA
Modbus		28 mA	38 mA	56 mA	76 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

TS / ** / ** / *** *** / * / *** / ** / ** / ** / * / *

Measuring Mode	Design	Nominal Voltage	X-Axis		Y-Axis		Mechanical Connection	Electrical Connection	Display	Sensor Adjustments	Port 1	Port 1	Port 1
			Measuring Range	Unit	Measuring Range	Unit							
TS [Inclination]	RG [Round Instrument]	12 [12 V DC]	*** [+/-***]	° [Degree]	° [Degree]	F [Flange]	M12 [M12-connector]	A [with Display]	KG [compact instrument]	S10 [0-20 mA]	F [5 - 15 Hz]	C [CAN-Bus]	PM [Modbus]
		E12 [12 V DC external]		% [Percent]	% [Percent]								
		16 [16 V DC]		* [Special]	* [Special]								
		E16 [16 V DC external]											
TS [Inclination]	RG [Round Instrument]	24 [24 V DC]	*** [0-***]	° [Degree]	° [Degree]	F [Flange]	M12 [M12-connector]	KA [without Display]	KG [compact instrument]	S14 [4-20 mA]	-	-	
				% [Percent]	% [Percent]								
				* [Special]	* [Special]								

Other types, connections, measuring ranges, etc. on request.

Examples: SMALL-TS/RG/12/X70Y70/F/M12L03m/KA/KG/C
 SMALL-TS/RG/12/X40Y40/F/M12L10m/KA/KG/S14
 SMALL-TS/RG/12/X70/F/M12L10m/KA/KG/S14
 SMALL-TS/RG/12/X70Y70/F/M12L10m/A/KG/S14



SMALL-Ex[®] Strain Gauge

Designed for measuring tensile and/or compressive forces and in various applications such as conveyor systems, monorails, and chain tensioning systems, among others, this device offers versatility by accurately measuring both tensile and compressive forces as needed.

Constructed from stainless steel, it is specifically designed for underground use, ensuring exceptional stability and durability. The device features a conventional mechanical connection suitable for shackles, with the option for alternative thread connections and customized solutions. Additionally, various output signals and electrical connections, with or without display, can be tailored to meet specific customer requirements.



SMALL-Ex[®] Strain Gauge




SMALL-Ex[®]
Strain Gauge



SMALL-Ex[®]
Strain Gauge



Technical Details

Marking:	Group 1  I M1 Ex ia/ib I Ma/Mb Ex ia/ib I Ma/Mb PO Ex ia Ma X
Certification:	BVS 06 ATEX E 005 X IECEx BVS 09.0056X IECEx TSA 13.0023X EA3C RU C-DE.AA87.B.00727/21
Environmental Temperature:	-50 to +100 °C at group 1
Housing Material:	Stainless Steel
Measuring Range:	bis zu 50 kN, 100 kN, 200 kN, 400 kN
Gauge Accuracy:	± 0.5 % from end-value (higher accuracy on request)
Display:	t, kN [Kilonewton]; other on request
Illuminated Display:	optional
Output Signal:	5 - 15 Hz 0 - 20mA 4 - 20mA * - ** V (max. 10 V DC, at min. 7.5 V power supply) CAN-Bus Modbus RTU
Nominal Voltage:	12 V DC (7.5 - 14.0 V DC) 3-wiring-technology 16 V DC (9.6 - 16.1 V DC) 3-wiring-technology

Nominal Current per Measuring System:

Output Signal	without Display	with Display
Frequency	5 - 15 Hz	10 mA
Current	0 - 20 mA	10 - 30 mA
Current	4 - 20 mA	14 - 30 mA
Voltage	* - ** V	14 mA
CAN-Bus		27 mA
Modbus		27 mA

The manufacturer reserves the right to make changes that serve technical progress while maintaining normative and certified specifications.

Model Key

SMALL -

TS / ** / ** / *** ***/ ** / *** / ** / *** / ** / * / *

Measuring mode	Design	Nominal Voltage	Measuring Range	Unit	Mechanical Connection	Electrical Connection	Display	Sensor Adjustment	Port1	Port 2	Port 3
TS [Strain Gauge]	RG [Round Design]	12 [12 V DC] 16 [16 V DC]	*** [0-***]	kN [kN] t [tons] ** [special]	G... [Thread Male **x**] E [Eyelet] ** [Special]	H [HARTING] S [SOURIAU] L..m [Cable with Length in m] M12 [M12] ** [System **]	A [with Display] KA [without Display]	KG [Compact-Design]	SI0 [0-20 mA] SI4 [4-20 mA] SI..-.. [*-** mA] U..-.. [*-**V max. 10 V]	F [5-15 Hz]	C [CAN-Bus] PM [Modbus RTU]

Examples: SMALL-TS/RG/12/50kN/E/M12L10m/A/KG/SI4
SMALL-TS/RG/12/10t/E/HL05m/KA/KG/C

Other types, connections, measuring ranges, etc. on request.

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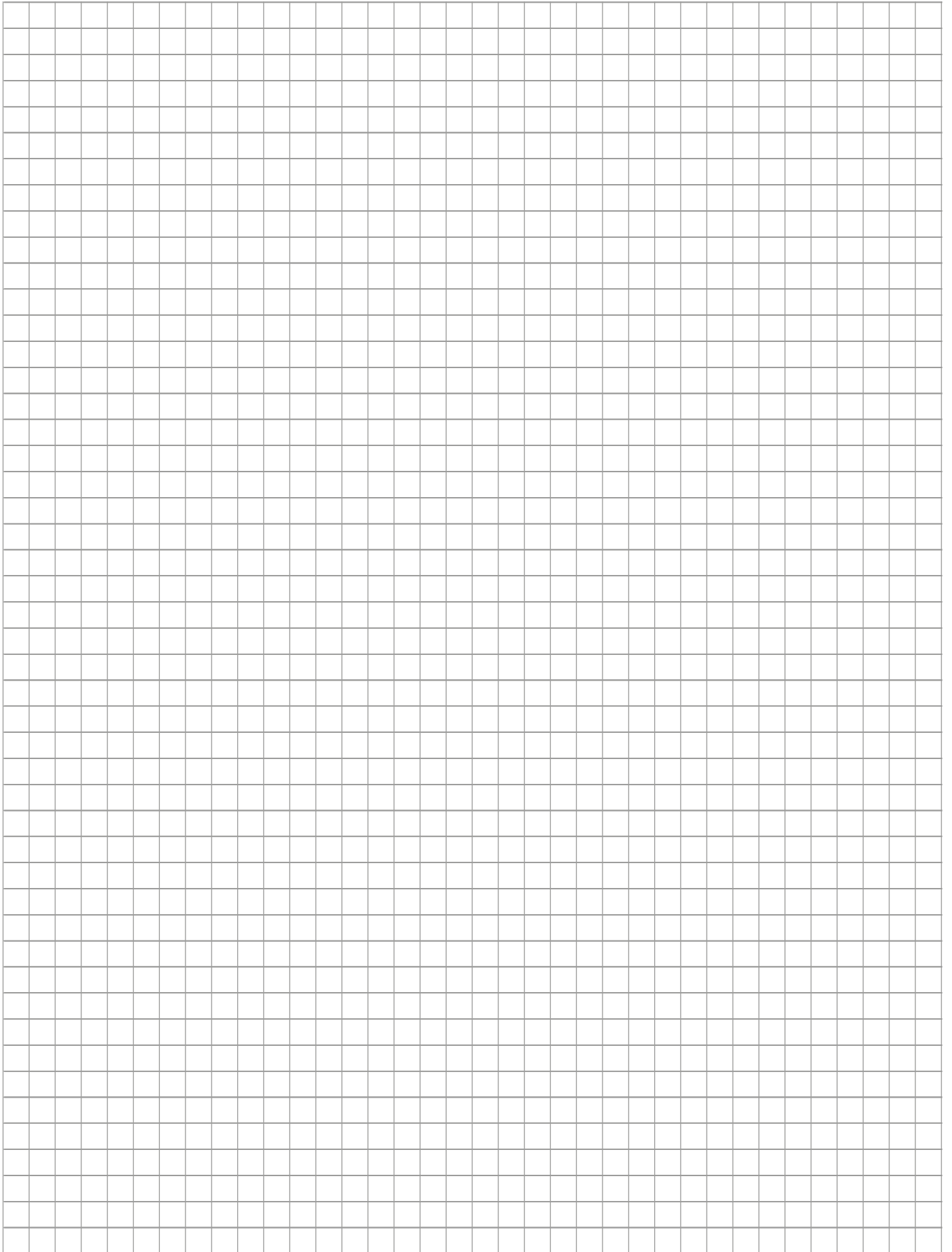
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KEEP
THE
FACE

