Effective January 1st, 2018

Oppermann® Regelgeräte

OPP-SOR®

OPP-PRO®

KRM®

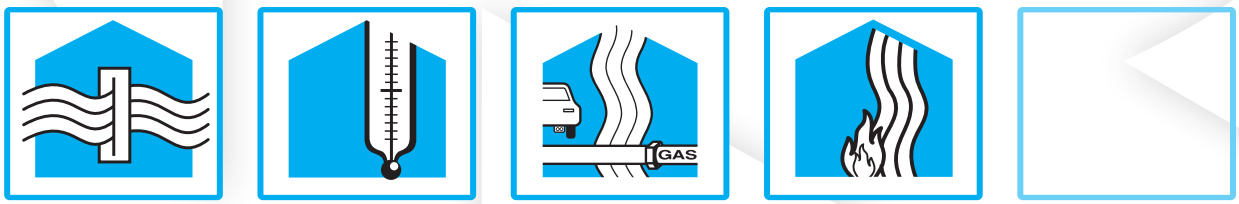
OPP-SENS®

OPP-ROOM®

Reliability and Innovation "Made in Germany"

SENSO

Catalogue price list 2018



SENSOR TECHNOLOGY | GAS WARNING DEVICES | FIRE PROTECTION

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Catalogue price list 2018

Dear Partners,
Dear Customers,

I am pleased to introduce you to a number of novelties in the 2018 Oppermann catalogue price list:

Presenting itself in a new look, this year's edition boasts many novelties and products across our three product areas **SENSOR TECHNOLOGY, GAS WARNING DEVICES** and **FIRE PROTECTION**.

Allow me to draw your attention to the following products in particular: As of now, all **OPP-SENS®** transmitters are equipped with **Oppermann Safecabling®** as a standard feature. This innovative reverse polarity protection solution comes at no extra cost to our customers. Equally new is the time and money saving option of the M-12-BUS-SET which allows you to plug & play at the level of Modbus & BACnet field devices.

Our **OPP-ROOM®** room sensor range has been extended by a complete line of attractively priced CO_2 temperature transmitters. Here we offer you a wide selection equipped with the options humidity, brightness, presence detection as well as Modbus and BACnet.

Last but not least I would like to draw your attention to our new electromechanical safety temperature limiter and temperature monitor, which we have added to our product range in response to repeated requests from our customers. Here, too, we hope to impress you with an ingenious twist in the detail work.

Our new oxygen gas sensors stand out within the line **OPP-SOR®** gas warning systems for their very competitive price-performance ratio. A beautifully innovative solution for individual alarms awaits you in our gas warning system GWA M 3.6 for cold room monitoring. And our HUB solution for the conversion of star-type CO monitoring systems for underground garages to bus-communicative gas sensors and control centers offers significant advantages to facility operators.

We hope our new catalogue price list will serve you as a source of inspiration and enjoyment as you work through it.

With best wishes,

Yours Heike Dirmeier
Managing Director

Oppermann Regelgeräte – for comfort and safety in your buildings.

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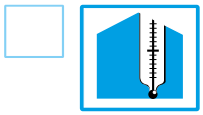
Sensors PG1 Technology for ventilation and air conditioning

Note: Pricing of OPP-ROOM® air quality sensors in PG1 (article discount group 23) follows a different discount structure.

Sensors PG2 Temperature and humidity sensors



Note: Another discount structure applies to the OPP-SENS® (article discount group 22) and OPP-ROOM® (article discount group 23) product ranges and to section 2!

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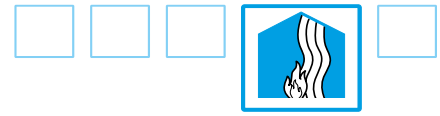
Gas and CO warning devices PG3
OPP-SOR®

Fire protection PG4
OPP-PRO®



Pricing terms: local Value-Added Tax will be added
Delivery: ex works, packaging will be added
Payment conditions: 10 days 2 % discount, 30 days net
Minimum order: 80.00 Euro net
We charge a flat handling fee of EUR 30.00 if the minimum order value is not met.

ADG = Article discount group
PG = Product group

Reference list sensors
excerpts

Audi AG Ingolstadt
Audi Neubau Ingolstadt „Gebäude H6“
Auswärtiges Amt Berlin
BASF Rheinufer Süd Ludwigshafen
BMW Regensburg und München
Daimler AG Esslingen-Mettingen
Daimler AG Untertürkheim
Das GERBER Stuttgart
Ernst Strüngmann Institute Frankfurt/Main
Flughafen Frankfurt / Main
Flughafen Hamburg
Flughafen München
Fourty Four Düsseldorf
Gemalto München
GENO-Haus Stuttgart
Mainzero Frankfurt / Main
MK8 Microsoft München
Mondelez Bad Fallingbostel
Otto Gebäude 10 Hamburg
Staatliche Berufsschule Dachau
TAO-Gebäude Uni Bayreuth
Thales Ditzingen
Vivantis Klinikum Friedrichshain

© Genohaus Stuttgart

*The Geno House in Stuttgart is the hallmark of the Württemberg Cooperatives Organisation. Part of the modernization of the 17-floor office building involved installing intelligent Modbus-compatible **OPP-SENS®** sensors from Oppermann and integrating a DDC system from Saia.*


© FOM Real Estate, Heidelberg

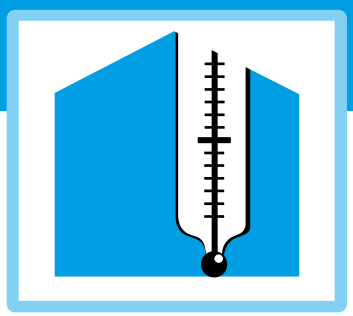
*The corporate headquarters of Thales Deutschland GmbH in Ditzingen was completed in 2014. The Modbus-interface allowed the **OPP-SENS®** sensors from Oppermann to be seamlessly integrated into the DDC automation systems from Schneider and Wago.*


© die developer / Cadman

*The "Forty Four" office building in Düsseldorf evolved from a vacant commercial property built in the 1970s. Monitoring the central ventilation systems of the fully refurbished building's 21,000 m² of office space are Oppermann's BACnet-based **OPP-SENS®** differential pressure sensors.*

Modbus

*Intelligent bus-compatible **OPP-SENS**® Modbus sensors from Oppermann control the air-conditioning systems at GERBER in Stuttgart. The GERBER shopping center opened its doors on September 23, 2014. Approximately 113,000 spectators attended the grand opening. About 25,000 square meters of retail space, 86 stores and restaurants are distributed over three levels and a shopping window front that stretches for almost one kilometer: this is the GERBER shopping center in the center of Stuttgart city. About 25,000 shoppers are expected to come and go on a daily basis.*



Reference list gas and CO warning devices
excerpts

BayWa AG München
Bremer Landesbank Hamburg
Daimler AG Stuttgart
Eurotower Frankfurt / Main
Flughafen München
Fraport Frankfurt / Main
IKEA Wetzlar
Joseph-Pschorr-Haus München
Kassenärztliche Vereinigung FFM
Kassenärztliche Vereinigung Hamburg
Leuchtenbergring München
LBBW Wohntürme Friends München
Lurup Zentrum Hamburg
MK6 Katharina Paulus Berlin
Höffner Möbelgesellschaft Berlin
Netzquartier 50 Hertz Berlin
Neue Messe Stuttgart
New Office Stuttgart
Olympiapark München
Porsche Exclusivrestaurant Stuttgart
Porsche Leipzig
Porschezentrum München
Schwabinger Tor München
Skyline Stuttgart
Skyline Plaza Frankfurt / Main
Skyline Tower München
Stadtwerke Wolfsburg AG
Tiefgarage Ischgl
Tiefgarage Opernplatz Frankfurt / Main
Turm-Carree Frankfurt / Main
VW Crafter Polen

© Ischgl - Visualisierung Fa. Blickfang

*The Ischgl parking lounge has impressive dimensions: the entire building has a length of 200 meters, a height of 20 meters, and provides 600 parking spaces. An underground garage monitor (TGÜ) from Oppermann with bus-compatible **OPP-SOR®** gas sensor ensures the safety of ski guests in Ischgl away from the slopes.*


© VW Nutzfahrzeuge

*Volkswagen Crafter plant in Wrzesnia (Poland). Inaugurated in 2016, the Wrzesnia plant extends over an area of 220 hectares (more than 300 football pitches). With a workforce of 3,000 employees and an annual output of up to 100,000 vehicles it is VW's largest manufacturing plant outside of Germany. The entire premises is equipped with Oppermann **OPP-SOR®** gas sensors and gas warning systems for ensuring adherence to statutory occupational exposure limits and monitoring for gas leakage.*

© FMG Dr. Werner Hennies

© FMG Dr. Werner Hennies

*Bus-compatible Oppermann CO alarm systems of type **OPP-SOR**® ensure the safety of 35 million air passengers annually in the parking garages at the Munich airport on a surface of 35 football pitches.*

Reference list fire protection / smoke protection
excerpts

CLOUD №7 Stuttgart
Daimler AG Düsseldorf
Deutsches Museum München
Residenzschloss Dresden
EZB Frankfurt / Main
FC Bayern Campus München
Funkhaus Köln
HVB Tower München
Justizvollzugskrankenhaus Asperg
Justizzentrum Bochum
Klinikum Altmühlfranken Gunzenhausen
Klinikum rechts der Isar München
Klinikum Stuttgart
Kröpke-Center Hannover
Kulturpalast Dresden
Lautenschlager Areal Stuttgart
LVR Klinikum Düren
Messehalle 12 Frankfurt
Milaneo Stuttgart
MK8 Microsoft München
Opel Powertrain Rüsselheim
Pädagogische Hochschule Ludwigsburg
Porsche-Arena Stuttgart
Praunheimer Werkstätten Frankfurt
Quartier Q6/Q7 Mannheim
Richard Wagner Museum Bayreuth
Schauspielhaus Dresden
ZDF Sendezentrum 2 Mainz


© Klinikum rechts der Isar der TU München

The medical center of Munich University of Technology on the right banks of the Isar river consists of roughly 50 buildings of varying construction type. The ventilation systems are monitored by bus-compatible KRM-Mod duct smoke detectors, which are tied into the Desigo-GLT central building control system from Siemens via DDC stations.


© ZDF

The ZDF broadcast center in Mainz is home to 3SAT, Arte, and ZDFKultur. The ventilation ducts in the building with a useful floorspace of 11,000 square meters are monitored by KRM duct smoke detectors with display unit from Oppermann, which are tied into the Desigo Insight central building control system from Siemens.


© CLOUD N°7 GmbH

*Its height of 61 meters makes CLOUD №7 Stuttgart's tallest inner-city residential building. On the first seven of its altogether 18 floors the building accommodates a hotel of the Steigenberger Group, on top of which are laid out 50 rental flats, 19 freehold flats and a 500 square meter penthouse. Ensuring the fire protection of the building's central ventilation systems are Oppermann **KRM®** duct smoke detectors.*

© ECE, Milaneo, Stuttgart

© ECE, Milaneo, Stuttgart

***KRM®** duct smoke detectors from Oppermann monitor the ventilation systems at the largest shopping center in Stuttgart, the 43,000 square meter Milaneo, which opened its 200 shops on October 9th, 2014. 134,000 visitors made their way to the opening of the Milaneo, and more than 1 million guests had visited by October17th.*

Approvals, Awards and Memberships

Approvals

Memberships

MEMBER OF ASHRAE BACnet INTEREST GROUP EUROPE

Mitglied im Fachverband Gebäude-Klima e. V.

VDMA Mitglied Member

ProKlima *Mitglied*

Awards

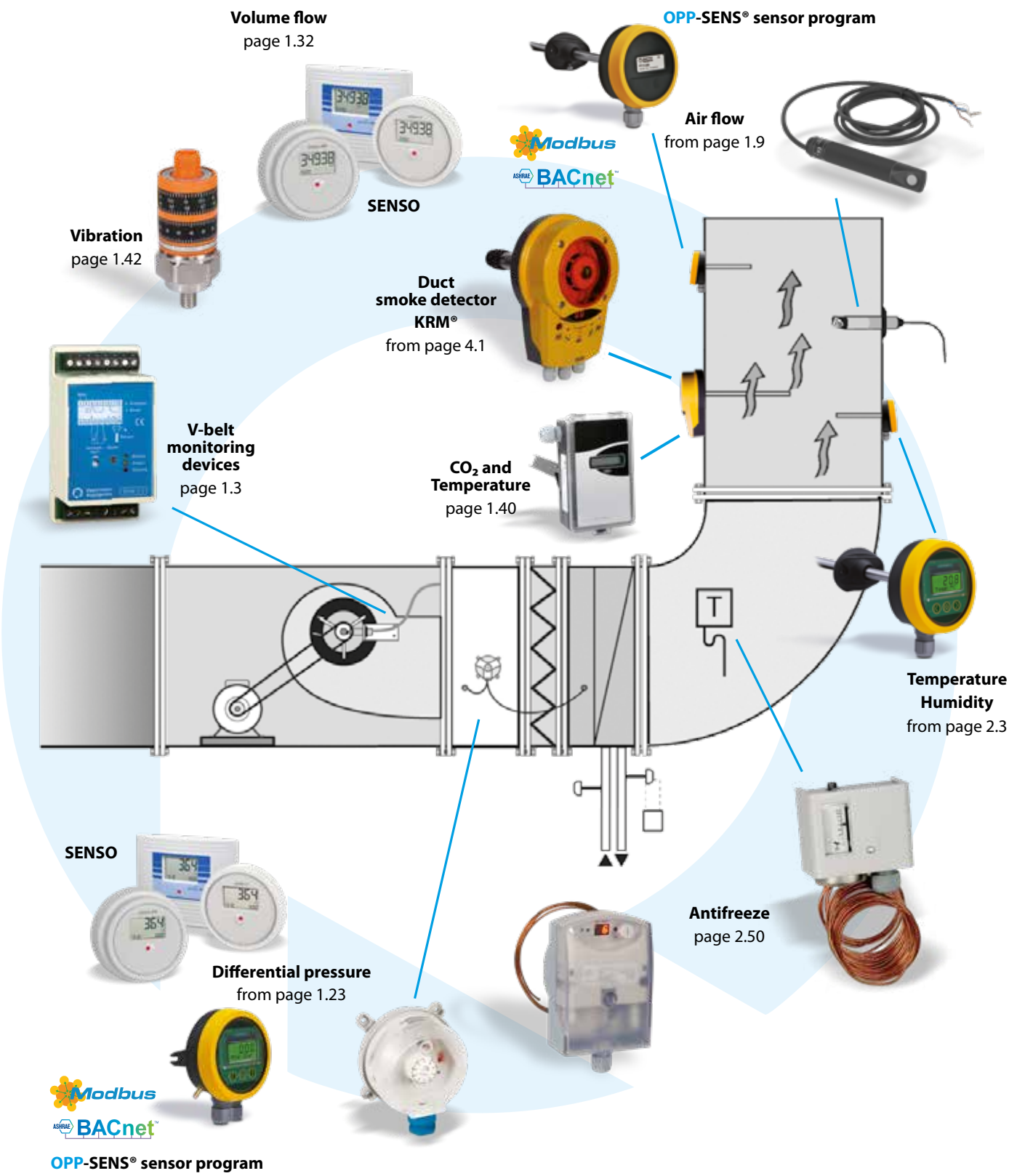
Thank you for the LüKK Trust Prize in the following categories:

- MSR Components (**OPP-SENS®** and **OPP-ROOM®**)
- Fire Protection Components and Systems (**KRM®**)

Introduced in 2017, The Trust Prize of the ventilation, air conditioning and refrigeration industry (LüKK) is awarded to companies who are rated as particularly trustworthy by their customers. This award has come to us from you, our customers, acting as the jury.
Thank you for your show of confidence in us!

Let us convince you of our innovative, high quality and excellent products!

Sensors PG1 Technology for ventilation and air conditioning



Typenschlüssel **OPP-SENS®** Sensorikprogramm
Type designation **OPP-SENS®**

XX - XXXX - XX - XXX - X

Produktgruppe | Product group

FT	Flow / Temperature | Luftstrom / Temperatur
H	Humidity | Feuchte
HT	Humidity / Temperature | Feuchte / Temperatur
HTa	Absolute Humidity / Temperature | absolute Feuchte / Temperatur
HTx	Enthalpy, Humidity / Temperature | Enthalpie, Feuchte / Temperatur
IO	I/O-Module | I/O-Modul
M	Measuringtransmitter | Messumformer
P	Pressure | Druck
PV	Pressure / Volumetric flow rate | Druck / Volumenstrom
T	Temperature | Temperatur
TA	Temperature Average | Temperatur Mittelwert
VT	Volumetric flow rate / Temperature | Volumenstrom / Temperatur

Typ / Übertragung | Type / Transmission

T	Transmitter | 4 – 20 mA oder 0 – 10 V umschaltbar
TC	Transmitter Current | 4 – 20 mA
TV	Transmitter Voltage | 0 – 10 V
T5P	Transmitter 5-Point-Calibration | 4 – 20 mA oder 0 – 10 V umschaltbar
TC5P	Transmitter Current 5-Point-Calibration | 4 – 20 mA
MOD	Modbus-Transmitter
BAC	BACnet-Transmitter

KP10
NI1000
NI1000LG
NTC1,8
NTC10
NTC10AN
NTC10C
NTC10KB
NTC20
PT100
PT100_1/3D
PT100CLA
PT1000
PT10001/3D
PT1000CLA

Passive sensors | passive Sensoren
Characteristics and Terms
see page 2.56

Anwendungsbereich | Application

I	Immersion | Eintauchfühler
CO	Contact | Anlegefühler
OUT	Outside | Außenfühler
S	Surface | Oberflächenmontage
C6x45	Cable | Kabelfühler Hülse 6 x 45 mm
C6x80	Cable | Kabelfühler Hülse 6 x 80 mm
C6x130	Cable | Kabelfühler Hülse 6 x 130 mm
C6x180	Cable | Kabelfühler Hülse 6 x 180 mm
C6x230	Cable | Kabelfühler Hülse 6 x 230 mm
W16	Water < 16 bar | Wasser < 16 bar
AD1	Air Differential < 1 kPa | Differenzdruck Luft < 1 kPa
AD4	Air Differential < 4 kPa | Differenzdruck Luft < 4 kPa

Parameter

Length | Länge in mm oder m

AI	Analog Input | Analogeingang
DI	Digital Input | Digitaleingang
...SI	Silicone | Silikon
...TE	Teflon

Optionen | Options

D	Display | Anzeige
G	Galvanic Isolation | Galvanische Trennung
3W	3-Wire | 3-Leiter
4W	4-Wire | 4-Leiter
...s	Special | Sonderfühler

V-belt monitoring devices

V-belt monitoring devices
with start-up bridging
LED-display for start-up, operation and failures
2 floating switching contacts 3 A, 250 V
Housing with click-in base for installation on mounting rail
Protection class: IP 40
Dimensions: 48 x 96 x 60 mm (L x W x D)

Shut-down speed [rpm]	Unlocking	Analogue output	Voltage	Data sheet no.	Type	Item no.	ADG	Euro/pc.
100 fixed	external	-	230 V	10101	**EKW 2.2.1**	100 393	01	**126.50**
100 fixed	external	-	24 V AC	10101	**EKW 2.2.2**	100 395	01	**126.50**
100 – 6,000	internal / external	-	230 V	10102	**EKW 2.3.1**	100 397	01	**151.00**
100 – 6,000	internal / external	-	24 V AC	10102	**EKW 2.3.2**	100 403	01	**151.00**
100 – 6,000	internal / external	0 – 10 V	230 V	10102	**EKW 2.3.1 A1**	100 401	01	**203.50**
100 – 6,000	internal / external	0 – 10 V	24 V AC	10102	**EKW 2.3.2 A1**	100 407	01	**203.50**
100 – 6,000	internal / external	4 – 20 mA	230 V	10102	**EKW 2.3.1 A2**	100 402	01	**203.50**
100 – 6,000	internal / external	4 – 20 mA	24 V AC	10102	**EKW 2.3.2 A2**	100 408	01	**203.50**
100 – 1,000	none	-	230 V	10103	**EKW 2.7.1**	100 409	01	**113.50**
100 – 1,000	none	-	24 V AC	10103	**EKW 2.7.2**	100 411	01	**113.50**
< 100	none	0 – 10 V	24 V AC	10104	**EKW 2.8.2 A1**	100 415	01	**151.00**
< 100	none	4 – 20 mA	24 V AC	10104	**EKW 2.8.2 A2**	100 416	01	**151.00**
100 – 1,000	internal / external	-	230 V	10105	**EKW 3.2.1 Set***	100 417	01	**134.00**
100 – 1,000	internal / external	-	24 V AC	10105	**EKW 3.2.2 Set***	100 418	01	**134.00**

* includes sensor SN-Z2, holding angle HWN and hose tape

Holding angles and hose tape in a set for installation on:

very small fans < 1.5 kW — **HWK** — 100 932 — 01 — **13.50**

small to medium fans < 7 kW — **HWN**** — 100 937 — 01 — **12.50**

large fans < 22 kW — **HWL** — 100 934 — 01 — **40.00**

large fans with pillow block bearing — **HWS** — 100 939 — 01 — **40.00**

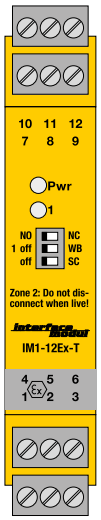
Data sheet no. 10501

**standard types

ADG = Article discount group

V-belt monitoring devices

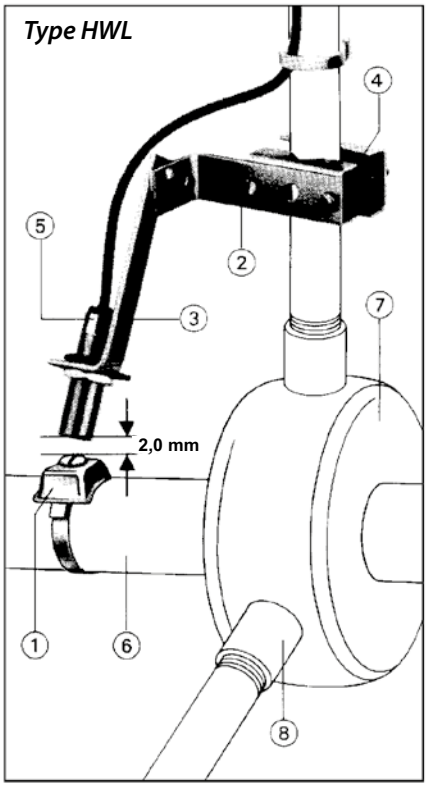
	Type	Item no.	ADG	Euro/pc.
Sensors				
to register the rotation of fans				
with 3 m cable, protection class: IP 67,				
Display of control condition via LED, contactless output,				
Transistor with max. switching hysteresis of 2 mm,				
Ambient temperature -25 – +80 °C				
Two wire sensor (Standard)	**SN-Z2****	101 616	01	**49.00**
Length 40 mm, ø = 18 mm				
EX-Sensor	**Namur**	101 253	01	**98.00**
Spare parts for old equipment/				
three wire sensors:				
Length 40 mm, ø = 18 mm	**SNSa**	101 614	01	**54.50**
3 wire				
Length 60 mm, ø = 18 mm,	**SNLa**	101 613	01	**54.50**
3 wire				
Data sheet no. 10501	**standard types			



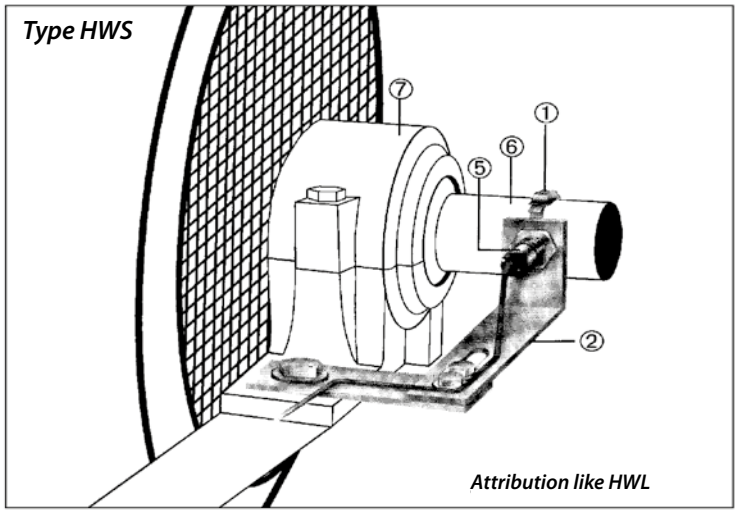
EX switch amplifier Allstrom	**IM1-12Ex-T**	100 946	01	**319.50**
Together with a Namur sensor for the application of the electronic v-belt monitor in the EX area, zone 2.				
Application fields: [Exia] IIC / IIB and Ex nA nC [nL] IIC / IIB T4				
One channel. Intrinsically safe control circuit with monitoring of wire breakage and short-circuit.				
In case of error, all outputs are switched off.				
The EX amplifier with transistor output is interconnected between the Namur sensor and the EKW.				
LED with two colours to visualise the switching condition (yellow) and the disturbance (red). Green LED to indicate the operating state.				
Supply voltage: 20 – 250 V AC/20 – 125 V DC (40 – 70 Hz)				
Power input: ≤ 3 W				
Switching voltage: ≤ 30 V DC				
Switching current: ≤ 50 mA				
Protection class: IP 20				
Dimensions: 18 x 104 x 110 mm (L x W x D)				
EX authorisation according to the certificate of conformity: TÜV 04 ATEX 2553				
Data sheet no. 10162				

Installation examples of holding angles and sensors of the electronic V-belt monitoring devices

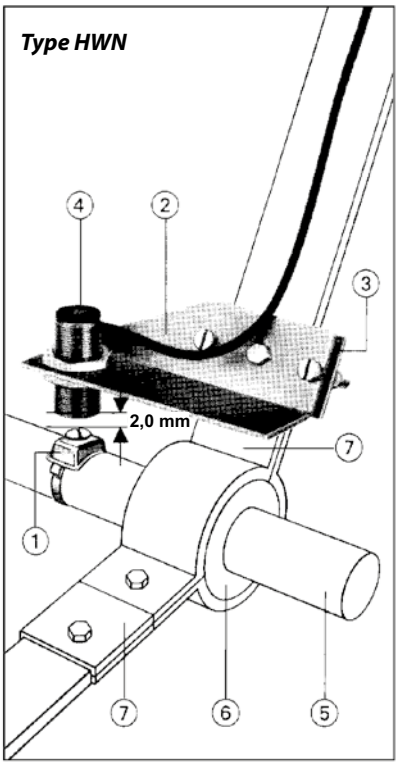
Specification type HWL
for fans with round steel bearing mountings



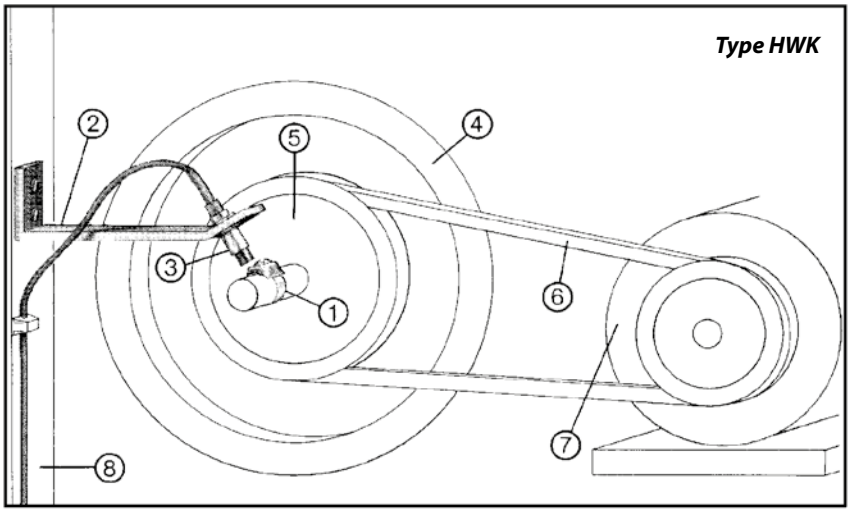
Specification type HWS
for very large fans, from approx. 22 kW



Specification type HWN
for small and medium fans,
up to approx. 7 kW



Specification type HWK
for very small fans, up to approx. 1.5 kW



Flow sensors water

Flow sensor (monitor)
mechatronic measuring principle with spring supported piston and inductive sensor (for mounting directly into the channel – flow principle)
LED indicator for flow
Binary output signal (normally open contact)
Switching points continuously adjustable
Maintenance-free, usable up to 25 bar,
Medium temperature: 0 – 85 °C
Fast response time: ≤ 10 ms
Accuracy: ± 5 % of full scale
Supply voltage: 24 V DC (-15 % / +10 %)
via M12 plug connector (Coupler)
Protection class: IP 67

Setting range l/min	Hysteresis l/min	Pressure loss bar	Connection	Type	Item no.	ADG	Euro/pc.
				SBY			
1…15	0.2…1	0.05…0.2	G 3/4	**SBY332**	101 465	01	**257.00**
1…25	0.5…2	0.2…0.75	G 3/4	**SBY333**	101 466	01	**257.00**
2…50	1…3	0.25…0.8	G 3/4	**SBY334**	101 467	01	**257.00**
5…100	3…6	0.1…0.9	G 1	**SBY346**	101 468	01	**291.00**
20…200	5…10	0.1…0.2	G 1 1/2	**SBY357**	102 644	01	**386.00**

Data sheet no. 15510

Suitable accessories for SBY

M12 plug connector, coupler, angled				
2 m cable, 4-pole, PVC	**M12-KU-w-2m**	103 461	01	**15.50**
5 m cable, 4-pole, PVC	**M12-KU-w-5m**	100 435	01	**19.50**
10 m cable, 4-pole, PVC	**M12-KU-w-10m**	103 265	01	**24.50**

M12 plug connector, coupler, straight				
2 m cable, 4-pole, PVC	**M12-KU-g-2m**	103 462	01	**15.50**
5 m cable, 4-pole, PVC	**M12-KU-g-5m**	100 433	01	**19.50**
10 m cable, 4-pole, PVC	**M12-KU-g-10m**	100 434	01	**24.50**

Data sheet no. 15506

Flow sensors water

	Type	Item no.	ADG	Euro/pc.
 **Flow switch** for liquid or gaseous media Compact design with relay output (3 A, 250 V AC / 30 V DC) **Programmable normally open / break contact element** Setting range 0.03 – 3 m/s (liquids) or 2 – 30 m/s (gases) Pressure-proof up to 300 bar Medium temperature: -25 – +80 °C Sensor material V4A 10 LED, 3-coloured for function display Voltage: 90 – 240 V AC Electrical port ½" UNF connector Connection of medium M18 x 1.5 for adapter G½ A **Data sheet no. 15504**	**OPSI 5006**	101 282	01	**405.00**
 **Adapter G½ A** M18 x 1.5 Material: V4A **Data sheet no. 15504**	**OP E 40096**	101 278	01	**34.00**
 **UFN connector ½" angled form** with 5 m PUR-cable, 4 x 0.34 mm² Protection class: IP 67 Material: TPU **Data sheet no. 15504**	**OP E 11248**	101 276	01	**35.00**
 **UNF connector ½" straight** with 5 m PUR-cable, 4 x 0.34 mm² Protection class: IP 67 Material: TPU **Data sheet no. 15504**	**OP E 11250**	101 277	01	**35.00**

Flow sensors water

		Type	Item no.	ADG	Euro/pc.
	**Flow sensor (transmitter)** for liquid media up to 80 °C Compact design with **output 4 – 20 mA** (max. 22 mA, 500 Ohm) Setting range 0.03 – 3.0 m/s Pressure-proof up to 300 bar Medium temperature: -25 – +80 °C Sensor material V4A 10 LED, 2-coloured for function display Voltage 20 – 36 V DC Electrical port M12-connector (Coupler) Water-sided port M18 x 1.5 for G½ A adapter **Data sheet no. 15505**	**OPSI 5004**	101 281	01	**384.50**
	**Adapter G½ A** M18 x 1.5 Material: V4A **Data sheet no. 15505**	**OP E 40096**	101 278	01	**34.00**
	Suitable accessories for OPSI 5004				
	**M12 plug connector, coupler, angled**				
	2 m cable, 4-pole, PVC	**M12-KU-w-2m**	103 461	01	**15.50**
	5 m cable, 4-pole, PVC	**M12-KU-w-5m**	100 435	01	**19.50**
	10 m cable, 4-pole, PVC	**M12-KU-w-10m**	103 265	01	**24.50**
	**M12 plug connector, coupler, straight**				
	2 m cable, 4-pole, PVC	**M12-KU-g-2m**	103 462	01	**15.50**
	5 m cable, 4-pole, PVC	**M12-KU-g-5m**	100 433	01	**19.50**
	10 m cable, 4-pole, PVC	**M12-KU-g-10m**	100 434	01	**24.50**
	Data sheet no. 15506				

Flow sensors air

	Type	Item no.	ADG	Euro/pc.
				
Air flow monitor 230 V AC	**SL 101.1**	101 603	01	**94.00**
Air flow monitor 24 V AC	**SL 101.2**	101 604	01	**94.00**
Air flow monitor 24 V DC	**SL 101.3**	101 605	01	**94.00**
with mounting flange for installation in ventilation ducts Optical indicator of the operating conditions (start-up – operation – failure) via LED. Calorimetric measuring principle. **1 floating normally open contact** The threshold value can be set infinitely by a potentiometer. **Setting range: 1 – 10 m/s.** If the threshold value is undershot, the relay drops out. Maximum immersion depth: 120 mm Ambient temperature: -10 – +50 °C Protection class: IP 54 Breaking capacity of the relay contact: 3 A / 250 V Terminal cable: 2 m, 4 x 0.5 mm² **Data sheet no. 11101**				
				
Air flow monitor 230 V AC	**RLSW 6.1.1**	101 453	01	**237.00**
Air flow monitor 24 V AC/DC	**RLSW 6.1.5**	101 454	01	**237.00**
Compact device for on-site installation and with separate air flow sensor with mounting flange for installation in ducts. Calorimetric measuring principle. **With compensation of temperature and sensor rupture protection.** **2 floating switching contacts. Internal reset push-button.** **The following parameters can be set** via potentiometer: Flow speed: 0.2 – 15 m/s Switching hysteresis: 1 – 10 % Start-up bridging: 15 – 120 s Switch-off delay: 2 – 20 s When applying the operating voltage the air flow monitor is activated. If the adjusted flow speed is reached within the startup bridging the flow monitoring relay connects and e.g. unlocks the humidification. If the flow speed is not reached the alarm relay connects. If during operation the flow speed comes under the adjusted value, the flow relay connects after expiring the switch-off delay. Maximum immersion depth of the sensor: 120 mm Protection class sensor: IP 67 Protection class housing: IP 65 Medium temperature: -10 – +80 °C Ambient temperature: 0 – +60 °C Protection class: IP 54 Breaking capacity of the relay contacts: 10 A / 250 V Terminal cable of sensor: 1.8 m, 3 x 0.5 mm² **Data sheet no. 11201**				
				
Air flow transducer 24 V DC	**SL 520 1.3A**	101 607	01	**262.50**
with mounting flange for installation in ventilation ducts Visual indication of operating status through LED Calorimetric measuring principle. **1 analogue output 0 – 10 V (not linear – please see data sheet).** **Setting range: 2 m/s = 1 V – 20 m/s = 10 V** Maximum immersion depth: 120 mm Ambient temperature: -10 – +50 °C Protection class: IP 54 Terminal cable: 2 m, 4 x 0.5 mm² **Data sheet no. 11102**				

OPP-SENS®
Air flow temperature transmitter

Type	Item no.	ADG	Euro/pc.
FT...	See following page	See following page	See following page

OPP-SENS® Air flow temperature transmitter for the measurement of air flow in ducts, with adjustable mounting for adjusting the depth of immersion.
The microprocessor technology guarantees a constant linear output, even at low air speeds.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast, display (temperature, flow or alternating) and temperature unit can be set via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:

0 – 2 m/s	0 – 2.5 m/s	0 – 4 m/s
0 – 5 m/s	0 – 6 m/s	0 – 8 m/s
0 – 10 m/s*	0 – 12 m/s	0 – 15 m/s
0 – 20 m/s		***factory setting**

Temperature measurement range:	0 – 50 °C
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-20 – 100 °C**
Supply voltage:	24 V AC/DC
Output air flow:	0 – 10 V or 4 – 20 mA switchable or bus
Output temperature:	0 – 10 V or 4 – 20 mA switchable or bus
Nominal size:	ø 10 mm stainless steel sleeve
Mounting:	Air duct flange F-10 (included)
Housing:	IP 65 including seal Plastic grey/yellow
Cable gland:	M16
Teminals:	Spring terminals 0.2 – 1.5 mm²

OPP-SENS®
Air flow temperature transmitter

	Type	Item no.	ADG	Euro/pc.
Immersion length 50 – 190 mm:				
Analog-transmitters (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**FT-T-I-200**	102 840	01	**140.00**
with display	**FT-T-I-200-D**	102 846	01	**190.00**
Modbus Transmitter (Modbus RTU)				
without display*	**FT-MOD-I-200**	102 847	01	**165.50**
with display	**FT-MOD-I-200-D**	102 851	01	**215.50**
BACnet Transmitter (MS/TP)				
without display*	**FT-BAC-I-200**	102 915	01	**165.50**
with display	**FT-BAC-I-200-D**	102 916	01	**215.50**
Immersion length 200 – 400 mm:				
Analog-transmitters (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**FT-T-I-400**	102 910	01	**154.00**
with display	**FT-T-I-400-D**	102 911	01	**204.00**
Modbus Transmitter (Modbus RTU)				
without display*	**FT-MOD-I-400**	102 912	01	**180.50**
with display	**FT-MOD-I-400-D**	102 913	01	**230.50**
BACnet Transmitter (MS/TP)				
without display*	**FT-BAC-I-400**	102 917	01	**180.50**
with display	**FT-BAC-I-400-D**	102 918	01	**230.50**

Data sheet no. 11400

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once.
The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

OPP-SENS® parameter programming tool — **PROG-MOD-01** — 103 641 — 22 — **97.00**

For fast programming of Modbus parameters.
Matches all **OPP-SENS®** Modbus transmitters.
The parameter programming tool is plugged into the electronic circuit board with a ribbon cable and a reverse-polarity-proof connector, and is operational without adjustment (auto-adapt). For programming purposes, the transmitter must have its own power supply.
Transmitters can be quickly configured for Modbus use with the parameter programming tool. Once a basic setting has been selected, only the Modbus address must be entered and transferred. The baud rate and parity, etc. are automatically programmed based on the selection. This process saves time compared to programming parameters via display. The parameter programming tool can be used to sequentially program several sensors, which are then sealed with the standard lid and placed back into service.

Data sheet no. 20914

OPP-SENS®
Volume flow temperature transmitter

OPP-SENS® Volume flow temperature transmitter for the measurement of air flow in ducts, with adjustable mounting for adjusting the depth of immersion.
Via the optional display, the transmitter can be configured so that the flow volume in m^3/h is shown in flow volume speed as m/s. The size of the duct and a correction factor can also be set via the display. The microprocessor technology guarantees a constant linear output, even at low air speeds.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast, display (temperature, flow or alternating) and temperature unit can be set via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

Volume flow measurement range:
0 – 9,999 m^3/h, parameterizable via correction factors

10 measurement ranges can be set using the rotary switch:
Volume flow mode:
0 – 250 m^3/h 0 – 500 m^3/h 0 – 1,000 m^3/h 0 – 2,000 m^3/h
0 – 3,000 m^3/h 0 – 4,000 m^3/h **0 – 5,000 m^3/h***0 – 6,000 m^3/h
0 – 7,500 m^3/h 0 – 9,999 m^3/h ***factory setting**

Air flow mode:
0 – 2 m/s 0 – 2.5 m/s 0 – 4 m/s
0 – 5 m/s 0 – 6 m/s 0 – 8 m/s
0 – 10 m/s 0 – 12 m/s 0 – 15 m/s
0 – 20 m/s

Temperature measurement range:	Factory setting 0 – 50 °C, optional display between -50 and 100 °C can be set
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-20 – 100 °C**
Supply voltage:	24 V AC / DC
Output volume- / air flow:	0 – 10 V or 4 – 20 mA switchable or bus
Output temperature:	0 – 10 V or 4 – 20 mA switchable or bus
Nominal size:	ø 10 mm stainless steel sleeve
Duct cross-section max:	600 x 600 mm or ø 600 mm
Mounting:	Air duct flange F-10 (included)
Housing:	IP 65 including seal, Plastic grey / yellow
Cable gland:	M16
Teminals:	Spring terminals 0.2 – 1.5 mm^2

Type	Item no.	ADG	Euro / pc.
VT...	See following page	See following page	See following page

OPP-SENS®
Volume flow temperature transmitter

	Type	Item no.	ADG	Euro/pc.
Immersion length 50 – 190 mm:				
Analog-transmitters (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**VT-T-I-200**	103 492	01	**202.00**
with display	**VT-T-I-200-D**	103 493	01	**252.00**
Modbus Transmitter (Modbus RTU)				
without display*	**VT-MOD-I-200**	103 494	01	**228.50**
with display	**VT-MOD-I-200-D**	103 495	01	**277.50**
BACnet Transmitter (MS/TP)				
without display*	**VT-BAC-I-200**	103 496	01	**228.50**
with display	**VT-BAC-I-200-D**	103 497	01	**277.50**
Immersion length 200 – 400 mm:				
Analog-transmitters (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**VT-T-I-400**	103 498	01	**216.50**
with display	**VT-T-I-400-D**	103 499	01	**266.50**
Modbus Transmitter (Modbus RTU)				
without display*	**VT-MOD-I-400**	103 500	01	**243.00**
with display	**VT-MOD-I-400-D**	103 501	01	**293.00**
BACnet Transmitter (MS/TP)				
without display*	**VT-BAC-I-400**	103 502	01	**243.00**
with display	**VT-BAC-I-400-D**	103 503	01	**293.00**

Data sheet no. 11401

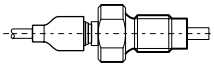
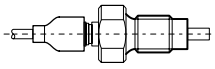
BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once.
The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

Accessories Flow sensors air

		Type	Item no.	ADG	Euro/pc.
	**Threshold switch** to convert analogue input signals in 2-point-signals Frame for installation on 35 mm DIN-installation rails in control consoles. Input: 0 – 10 V DC < 0.2 mA Output: relay with change-over contact, 230 V, 10 A Protection class: IP 20 Dimensions: 22.5 x 77 x 52.5 mm (L x W x D) Power supply: 24 V AC/DC, 1 VA Threshold value setting: via potentiometer Hysteresis: 0.2 – 1 V adjustable **Data sheet no. 14201**	**RY 1-U**	101 459	01	**27.50**
	**Clocked power supply** transforms 24 V AC/DC to other DC-voltage Input: 24 V AC/DC Output (adjustable by jumpers): 10 V DC, max 1.0 A 12 V DC, max 1.0 A 16 V DC, max 1.0 A 18 V DC, max 1.0 A 24 V DC, max 1.0 A Dimensions: 49 x 92 x 62 mm (L x W x D) Protection class: IP 20 **Data sheet no. 14201**	**JY**	100 968	01	**76.50**

Flow sensors EX

	Type	Item no.	ADG	Euro/pc.
 	**Flow sensor** ATEX-approval group II, category 2G, housing made of V4A, connection to separate evaluation electronics, equipment indicator ⟨Ex⟩ II 2 G EEx ia IIC T4 Gb, based on the calorimetric principle the flow sensor can be used for the monitoring of liquid and gaseous media, pressure-proof up to 30 bar. Protection class: IP 67 Temperature class T4, 6 m junction cable TPE-S, 5 x 0.34 mm² Medium temperature: -20 °C – +70 °C Measuring range: 3 – 300 cm/s, liquid medium, 200 – 2,000 cm/s gaseous medium, thread G½ A ATEX-certificate: DMT 03 ATEX E091 **Data sheet no. 12101**	**SF 321A**	101 596	01	**335.00**
	**Flow sensor** ATEX-approval group II, category 1/2G, zone 0/zone 1, housing made of V4A. Connection to separate evaluation electronics, equipment indicator ⟨Ex⟩ II 1/2 G EEx ia IIC T4 Ga/Gb4, based on the calorimetric principle the flow sensor can be used for the monitoring of liquid and gaseous media, pressure-proof up to 300 bar. Protection class: IP 67 Temperature class T4, 6 m junction cable TPE-S, 5 x 0.34 mm² Medium temperature: -20 °C – +60 °C, Measuring range: 3 – 300 cm/s, liquid medium, 200 – 2,000 cm/s gaseous medium, thread G½ A ATEX-certificate: DMT 03 ATEX E090X **Data sheet no. 12101**	**SF 311A**	101 595	01	**567.50**
	**Evaluation electronics 230 V AC** **Evaluation electronics 24 V DC** Electronic evaluation VS2000 Exi and amplifier for connecting flow sensors ⟨Ex⟩ with relay output for airflow and line monitoring with ATEX approval Group II, Category (1) G, PTB 01 ATEX 2075. The setting of the threshold value for gaseous and liquid media is done by slide controls and potentiometers. The current state is displayed by a 11-digit LED. The sensor and power supply circuit are DC-isolated from each other. The evaluation electronics and the connecting line are monitored for wire break and short-circuit. Either if the threshold value is undershot or in case of wire break or short-circuit the accompanying monitoring relay drops out. Breaking capacity of the relay contacts: 4 A/250 V AC Frame with click-in base for installation on mounting rail Protection class: IP 40 Dimensions: 45 x 78 x 120 mm (L x W x D) **Data sheet no. 12150**	**SN 2301.1** **SR 2301.3**	101 611 101 622	01 01	**737.50** **737.50**

Differential pressure transmitter water

Differential pressure transmitter water
To measure differential pressure in containers for non-corrosive media. Inclusive wall mounting.

Supply voltage:	24 V AC/DC
Measurement range:	see below
Output:	0 – 10 V or 4 – 20 mA
Temperature range:	-20 – 70 °C
Water-side Ports:	Ermeto screw connection for 8 mm copper pipe (on-site)
Protection class:	IP 65
Max. pressure:	16 bar
Error margin:	< 2.5 % of the max. measured range
One-sided max. allowed loads:	PWD-1.0 / 2.5: 5 bar PWD-4.0 / 6.0: 12 bar
Housing:	Plastic grey
Electrical contact:	via M12 plug connector (Coupler)

Note:
replaces VPEL

	Type	Item no.	ADG	Euro/pc.
Measuring range: 0 – 1.0 bar/0 – 2.5 bar (selectable)	**PWD-1.0/2.5**	103 373	01	**385.00**
Version with display (D)	**PWD-1.0/2.5-D**	103 374	01	**429.00**
Measuring range: 0 – 4.0 bar/0 – 6.0 bar (selectable)	**PWD-4.0/6.0**	103 375	01	**385.00**
Version with display (D)	**PWD-4.0/6.0-D**	103 376	01	**429.00**

Data sheet no. 13208

Suitable accessories for PWD

M12 plug connector, coupler, angled

2 m cable, 4-pole, PVC	**M12-KU-w-2m**	103 461	01	**15.50**
5 m cable, 4-pole, PVC	**M12-KU-w-5m**	100 435	01	**19.50**
10 m cable, 4-pole, PVC	**M12-KU-w-10m**	103 265	01	**24.50**

M12 plug connector, coupler, straight

2 m cable, 4-pole, PVC	**M12-KU-g-2m**	103 462	01	**15.50**
5 m cable, 4-pole, PVC	**M12-KU-g-5m**	100 433	01	**19.50**
10 m cable, 4-pole, PVC	**M12-KU-g-10m**	100 434	01	**24.50**

Data sheet no. 15506

Valve block for PWD
To isolate the PWD from the water loop e.g. for zero setting adjustment, bleeding air from sensor line and valve block (only VB4) or for repair/maintenance purposes.
Material: brass. Water/process port: G1/4 inside thread
Nominal pressure: PN40.
Hand wheels removable/sealable for securing.
Other process ports and materials on request.

Configured with air bleed valve 4-way lock	**PWD-VB4ms**	103 945	01	**307.00**

Data sheet no. 13208

OPP-SENS® Pressure transmitter water

OPP-SENS® Pressure Transmitter
for the measurement of pressure in containers for non-corrosive materials (for example, for water and air).
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting andcontrast can be set via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:

0 – 2 bar	0 – 2.5 bar	0 – 4 bar	0 – 5 bar
0 – 6 bar	0 – 8 bar	0 – 10 bar	0 – 12 bar
0 – 14 bar	**0 – 16 bar***	***Factory settings**	

Power supply:	
2-wire	24 V DC
3-wire / Modbus / BACnet	24 V AC / DC
Outputs:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or bus
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-25 – 85 °C**
Water-side Ports:	G½ A
Housing:	IP 65 including seal Plastic grey / yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm²
Long-term stability:	± 0.08 bar (EN 60770-1)
Error margin:	± 0.2 bar ± 2 % of the measurement range

	Type	Item no.	ADG	Euro / pc.
	P...			
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**P-TC-W16**	102 868	01	**178.50**
with display**	**P-TC-W16-D**	103 027	01	**228.50**
Current- / Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**P-T-W16**	102 866	01	**178.50**
with display	**P-T-W16-D**	102 867	01	**228.50**
Modbus Transmitter (Modbus RTU)				
without display*	**P-MOD-W16**	103 031	01	**204.00**
with display	**P-MOD-W16-D**	103 028	01	**254.00**
BACnet Transmitter (MS/TP)				
without display*	**P-BAC-W16**	103 030	01	**204.00**
with display	**P-BAC-W16-D**	103 029	01	**254.00**

Data sheet no. 13300
BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once.
The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).
** Display on the 2-wire models are not illuminated.

OPP-SENS® Differential pressure Volume flow transmitter air

OPP-SENS® Differential pressure
Volume flow transmitter air
for measuring pressure differential and volume flow of non-combustible and non-aggressive gases and air.
With manual zero point setting.
Selectively configurable from 0 – 1,000 Pa and 0 – 4,000 Pa, depending on desired accuracy.
Adjustable linear or square root extraction output of pressure differential on analog transmitters (factory setting: linear).
The data is always transmitted as individual registers in the bus version.
The volume flow is calculated by entering a correction factor k.
Output as linear output signal or via bus.
Volume flow measurement range: 0 – 99,000 m^3/h.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting andcontrast can be set via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 pressure sensor ranges selectable with rotating switch:

Version AD1 (0 – 1,000 Pa):

0 – 100	0 – 200	0 – 300	0 – 400
0 – 500	0 – 600	0 – 700	0 – 800
0 – 900	**0 – 1,000 Pa***	***Factory setting**	

Version AD4 (0 – 4,000 Pa):

0 – 400	0 – 800	0 – 1,200	0 – 1,600
0 – 2,000	0 – 2,400	0 – 2,800	0 – 3,200
0 – 3,600	**0 – 4,000 Pa***	***Factory setting**	

Power supply:	
2-wire	24 V DC
3-wire / Modbus / BACnet	24 V AC / DC
Outputs:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or bus
Burst pressure AD1:	15 kPa
Burst pressure AD4:	40 kPa
Perm.	
Ambient temperature:	-20 – 70 °C
Perm.	
Medium temperature:	**-5 – 65 °C**
Error Margin:	±1 % of sensor range limit value at -5 – 65 °C
Housing:	IP 65 including seal Plastic grey / yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm^2

Type	Item no.	ADG	Euro / pc.
PV...	See following page	See following page	See following page

OPP-SENS® Differential pressure Volume flow transmitter air

	Type	Item no.	ADG	Euro/pc.
Version AD1: sensor range 0 – 1,000 Pa				
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**PV-TC-AD1**	103 926	01	**155.00**
with display**	**PV-TC-AD1-D**	103 927	01	**205.00**
Current-/Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**PV-T-AD1**	103 928	01	**155.00**
with display	**PV-T-AD1-D**	103 929	01	**205.00**
Modbus Transmitter (Modbus RTU)				
without display*	**PV-MOD-AD1**	103 930	01	**182.00**
with display	**PV-MOD-AD1-D**	103 931	01	**231.50**
BACnet Transmitter (MS/TP)				
without display*	**PV-BAC-AD1**	103 932	01	**182.00**
with display	**PV-BAC-AD1-D**	103 933	01	**231.50**
Version AD4: sensor range 0 – 4,000 Pa				
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**PV-TC-AD4**	103 934	01	**155.00**
with display**	**PV-TC-AD4-D**	103 935	01	**205.00**
Current-/Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**PV-T-AD4**	103 936	01	**155.00**
with display	**PV-T-AD4-D**	103 937	01	**205.00**
Modbus Transmitter (Modbus RTU)				
without display*	**PV-MOD-AD4**	103 938	01	**182.00**
with display	**PV-MOD-AD4-D**	103 939	01	**231.50**
BACnet Transmitter (MS/TP)				
without display*	**PV-BAC-AD4**	103 940	01	**182.00**
with display	**PV-BAC-AD4-D**	103 941	01	**231.50**

Data sheet no. 13301

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once.
The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

Attention: please order together with the desired air-conditioning kit (straight or right-angle) for the connection (see next catalog page).

Accessories: **OPP-SENS®** Differential pressure Volume flow transmitter air

		Type	Item no.	ADG	Euro/pc.
	**Clima-set straight** consisting of: 2 duct connection nipples plastic type 6551 with fastening screws, 2 m PVC hose ø 6 mm. **Data sheet no. 13101**	**6555**	102 631	01	**4.50**
	**Clima-set angled** consisting of: 2 duct connection nipples metal type 6552, 2 rubber feedthroughs type 6553, 2 m PVC hose ø 6 mm. **Data sheet no. 13101**	**6550**	102 627	01	**6.50**
	**Duct connection nipples, plastic – spare part** **Data sheet no. 13101**	**6551**	102 628	01	**1.00**
	**Duct connection nipples, metal without rubber feedthrough – spare part** **Data sheet no. 13101**	**6552**	102 629	01	**2.00**
	**Rubber feedthroughs for duct connection nipples, metal** **(Type 6552) – spare part** **Data sheet no. 13101**	**6553**	102 630	01	**1.00**
	**Weather protection** Stainless steel For devices and sensors of the series **OPP-SENS®**, DD..., and HT-TGÜ Dimensions: 120 x 140 x 75 mm (W x H x D) **Data sheet no. 20902**	**WTS**	102 405	01	**21.00**

Accessories: OPP-SENS®
M12-BUS-SET

OPP-SENS® M12-BUS-SET.
The Oppermann M12-BUS-SET is an optional accessory available for all **OPP-SENS® Modbus- or BACnet transmitters.**

Please specify this add-on option in your purchase order if desired.

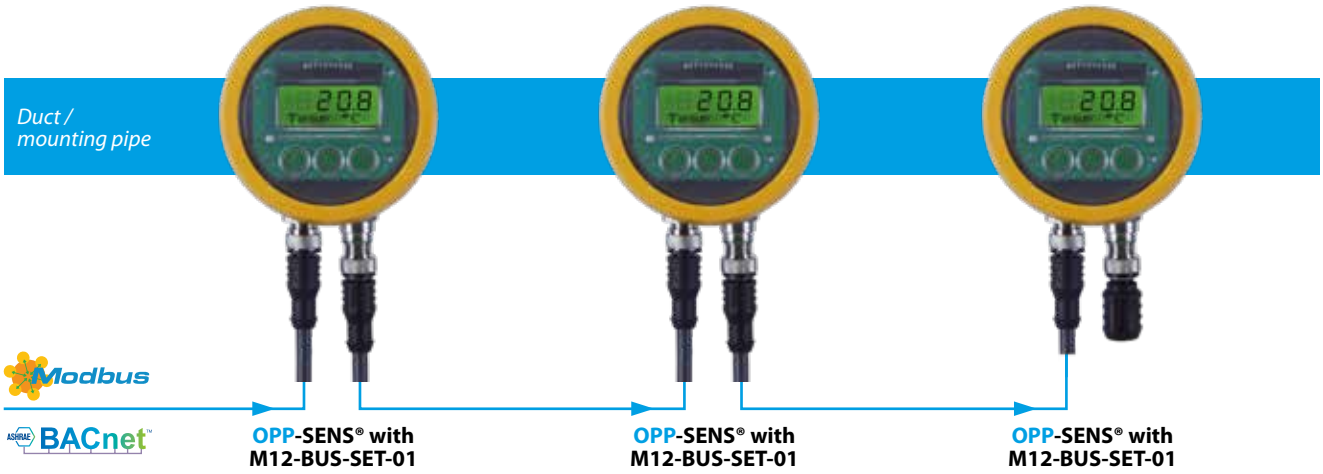
For this option, the factory pre-harnesses the bus transmitters for the connector and replaces the cable grommets with premium M12 connectors. In addition to the power supply, these also supply the plug-in ready bus cable and screen.
Bus transmitters are quickly and reliably connected to each other with the cable and connector accessory product line. This dramatically reduces the on-site assembly effort and minimizes the risk of wiring errors and the on-site effort to isolate defects.
Plug-and-play as your advantage.

Supplied scope:
– 1 x metal input connector M12-BUS
– 1 x metal output coupling M12-BUS
– Assembly input connector and output coupling
– Connection of 5 x leads with core ferrule (24V+, GND, BUS A, BUS B, screen) for output coupling
– Connection of 5 x leads with core ferrule (24V+, GND, BUS A, BUS B, screen) for input connector
– Function check

Data sheet no. 20920

Type	Item no.	ADG	Euro/pc.
M12-BUS-SET-01 NEW	104 139	22	**29.50**

M12-BUS-SET for OPP-SENS® Modbus or BACnet transmitter



Accessories: OPP-SENS®
M12-BUS-SET

		Type	Item no.	ADG	Euro/pc.
	Oppermann M12 accessories				
	**Starter cable M12-BUS** Connects the DDC to the first transmitter 5 x lead with core ferrule, 2 m cable 5 leads, screened, 1 x M12 coupling	NEW **M12-BUS-START-2M**	104 135	22	**20.00**
	**Interface cable M12-BUS** For interconnecting transmitters or as extension cable. Cable 5 leads, screened, 1 x M12 coupling, 1 x M12 connector				
	Cable, length 0,5 m	NEW **M12-BUS-CON-0,5M**	104 130	22	**23.50**
	Cable, length 1 m	NEW **M12-BUS-CON-1M**	104 131	22	**24.50**
	Cable, length 2 m	NEW **M12-BUS-CON-2M**	104 132	22	**27.50**
	Cable, length 5 m	NEW **M12-BUS-CON-5M**	104 133	22	**36.00**
	Cable, length 10 m	NEW **M12-BUS-CON-10M**	104 134	22	**50.00**
	**Wall cable M12-BUS** Connects transmitter through wall, etc. onto customer-installed box 5 x lead with core ferrule, 2 m cable 5 leads, screened, 1 x M12 connector	NEW **M12-BUS-EXT-2M**	104 136	22	**20.00**
	**Protective cap M12-BUS** Termination cap (dust protection) for last transmitter. Fits on M12 coupling.	NEW **M12-BUS-CAP**	104 138	22	**1.50**
	**Termination connector M12-BUS-120 ohm** Termination cap (dust protection) for last transmitter – includes 120 ohm terminating resistor. Only required if the internal add-in resistor in the **OPP-SENS®** is not used. Fits on M12 coupling.	NEW **M12-BUS-120Ω**	104 137	22	**14.00**

Data sheet no. 20920

Oppermann Safecabling® NEW

What is Oppermann Safecabling®?

Oppermann Safecabling® represents Oppermann's latest generation of **OPP-SENS®** transmitters (analog and bus version) with complete internal reverse polarity protection.

We have all seen this happen at the construction site: for instance the power supply and measurement output are inadvertently reversed. Or the power supply is wired to the bus. Until now this has meant „certain death" for the transmitter. We have now put an end to this!

All Oppermann **OPP-SENS®** transmitters displaying the Oppermann Safecabling® logo are reverse polarity proof and can deal with all sorts of wiring errors without being damaged. Only 230 V or a lightning strike can continue to negatively impact the transmitter.

A true innovation that will win you over! Finally an end to defects and complaints due to installations defects and wiring errors. And all of this at no surcharge!

OPP-SENS® transmitters with Oppermann Safecabling are identifiable by the SC logo:

Differential pressure indicator air

	Type	Item no.	ADG	Euro/pc.
Differential pressure indicator, individual packaging EV Complete unit (without fastening angles) for vertical installation, consisting of: Differential pressure indicator and clima-set straight type 6555	**DD .. EV**	s. table	01	**31.00**
Option: all types available with golden contacts for low voltage	**DD .. SG-EV**	on request	01	**31.00**
Option: all types available with silicone-free membranes	**DD .. SF-EV**	on request	01	**31.00**
Option: all types available with golden contacts for low voltage and silicone-free membranes	**DD .. SG-SF-EV**	on request	01	**31.00**
Option: all types in multi-packaging (MV), 30 pieces per cardboard box	**DD .. MV**	on request	01	**28.50**

To monitor air and non-flammable and non-aggressive gases
1 floating change-over contact.

Visible setting knob with target value scale. 2 pressure sockets to connect 6 mm PVC hose.
Maximum working pressure: 50 mbar
Output: floating change-over contact
Vertical installation without fastening angles is possible.
Data sheet no. 13101

Type (Pressure range)	Item no.	Measuring range		Directly set differential gap
		from	to	
DD-80-EV	100 112	20 Pa	200 Pa	10 Pa
DD-84-EV	100 127	30 Pa	400 Pa	15 Pa
DD-83-EV	100 136	50 Pa	500 Pa	20 Pa
DD-85-EV	100 157	200 Pa	1,000 Pa	100 Pa
DD-86-EV	100 171	500 Pa	2,500 Pa	150 Pa
DD-87-EV	100 178	1,000 Pa	5,000 Pa	250 Pa

Please note the changed type descriptions.

Order examples for options:
DD-80-SG-EV: Measuring range 20 – 200 Pa with golden contacts in individual packaging
DD-84-SG-SF-EV: Measuring range 30 – 400 Pa with golden contacts and silicone-free membranes in individual packaging
DD-83-SF-MV: Measuring range 50 – 500 Pa with silicone-free membranes in multi-packaging

Differential pressure indicator air

	Type	Item no.	ADG	Euro/pc.
	**DD .. EV - ATEX**	s. table	01	**127.50**

Differential pressure indicator, individual packaging ATEX

Complete unit (without fastening angles) for vertical installation, consisting of:
Differential pressure monitor and clima-set straight type 6555.

ATEX-test certificate: BVS 06 ATEX E 141 X

To monitor air and gases in **EX range zone 1/2 (only gases, no dust)** 1 floating change-over contact
Visible setting knob with target value scale.
2 pressure sockets to connect 6 mm PVC hose.
Maximum working pressure: 50 mbar
Output: floating change-over contact
Vertical installation without fastening angles is possible.
Data sheet no. 13102

Type (Pressure range)	Item no.	Measuring range		Directly set differential gap
		from	to	
DD-80-EV-ATEX	100 114	20 Pa	200 Pa	10 Pa
DD-84-EV-ATEX	100 128	30 Pa	400 Pa	15 Pa
DD-83-EV-ATEX	100 139	50 Pa	500 Pa	20 Pa
DD-85-EV-ATEX	100 160	200 Pa	1,000 Pa	100 Pa
DD-86-EV-ATEX	100 172	500 Pa	2,500 Pa	150 Pa
DD-87-EV-ATEX	100 179	1,000 Pa	5,000 Pa	250 Pa

Please note the changed type descriptions.

	Type	Item no.	ADG	Euro/pc.
	**ExL-IRU 1**	100 440	01	**165.50**

Universal switching amplifier
for 2-point signals with inherently safe circuit to connect passive floating sensors. To transfer signals from the EX area to the safe area.
Installation on standard rails

ATEX test certificate:	PTB 02 ATEX 2195
Supply voltage:	24 V AC / DC
Inputs:	Namur contact
Output:	14 EPU, timing element

Data sheet no. 14202

Differential pressure transmitter air

Differential pressure transmitter
with manual zero point adjustment
Complete unit (without fastening angles) for vertical installation, consisting of:
Differential pressure monitor and clima-set straight type 6555.

2 measuring ranges,
Output signal: **switchable root extracting / linear**
Output: 0 – 10 V or 4 – 20 mA adjustable (3-Wire)
or 4 – 20 mA linear (2-Wire)
with additional npn open collector switching output
Dimensions: ø 85 x 58 mm (L x W), protection class: IP 54
Voltage supply 18 – 30 V AC, 16 – 32 V DC (3-Wire)
or 18 – 30 V DC (2-Wire)
Data sheet no. 13251

Type	Item no.	ADG	Euro/pc.
DDS-MR984xx			
without LED display	**DDS-MR984.5.....3.K.0**	s. table	01	**145.00**
with LED display	**DDS-MR984.5.....3.K.1**	on request	01	**178.50**
... = Code for pressure range see sample table below			

Type (Pressure range)	Item no.	Measuring range 1	Measuring range 2	Overpress. safety	Cracking pressure
DDS-MR984.5.**X**.3.K.0	100 255	± 50 Pa	-	20 kPa	40 kPa
DDS-MR984.5.**W**.3.K.0	103 434	± 100 Pa	-	20 kPa	40 kPa
DDS-MR984.5.**M**.K.0	103 209	± 150 Pa	-	20 kPa	40 kPa
DDS-MR984.5.**N**.K.0	100 265	± 250 Pa	-	20 kPa	40 kPa
DDS-MR984.5.**S**.K.0	100 268	± 1,000 Pa	-	20 kPa	40 kPa
DDS-MR984.5.**2**.3.K.0	100 249	0 – 100 Pa	0 – 250 Pa	20 kPa	40 kPa
DDS-MR984.5.**3**.3.K.0	100 250	0 – 250 Pa	0 – 500 Pa	20 kPa	40 kPa
DDS-MR984.5.**4**.3.K.0	100 251	0 – 500 Pa	0 – 1,000 Pa	20 kPa	40 kPa
DDS-MR984.5.**5**.3.K.0	100 254	0 – 1 kPa	0 – 2,5 kPa	40 kPa	70 kPa
DDS-MR984.5.**7**.3.K.0	100 256	0 – 5 kPa	0 – 10 kPa	60 kPa	120 kPa
DDS-MR984.5.**9**.3.K.0	100 258	0 – 25 kPa	0 – 50 kPa	300 kPa	500 kPa
DDS-MR984.5.**B**.3.K.0	100 247	0 – 100 kPa	0 – 250 kPa	1.2 MPa	2 MPa
DDS-MR984.5.....3.**2.0**	on request	2-wire 4 – 20 mA, no switching output, no display possible			

All 3-wire versions also available with display.

Please note the changed type descriptions.

Type designation

Type
- M 2 or 1 measuring range (depending on type), manual zero adjustment
- A 2 measuring ranges, automatic zero adjustment
- Q 8 measuring ranges, automatic zero adjustment

Cable screw joint M16

Measuring range, see pressure range table

Measuring unit Pa

K= Standard features: Output signal 0 – 10 V or 4 – 20 mA.
Output switchable lin. / rad. With npn-switching output.
2 = 2-wire 4 – 20 mA. Without switching output. Without display. lin. / rad. switchable.

Display
- 0 without display
- 1 with LED display

DDS-MR984.5._.3.K.1
DDS-AR984.5._.3.K.1
DDS-QR984.5.4.3.K.1

Differential pressure transmitter air

	Type	Item no.	ADG	Euro/pc.
Differential pressure transmitter with automatic point zero adjustment 1 or 2 measuring ranges (Code AR) Complete unit (without fastening angles) for vertical installation, consisting of: Differential pressure monitor and clima-set straight type 6555. Output signal: **switchable root extracting / linear** Output: 0 – 10 V or 4 – 20 mA adjustable (3-Wire) with additional npn open collector switching output Dimensions: ø 85 x 58 mm (L x W), protection class: IP 54 Voltage supply 18 – 30 V AC, 16 – 32 V DC (3-Wire) **Data sheet no. 13252**	**DDS-AR984xx**			
without display	**DDS-AR984.5....3.K.0**	s. table	01	**171.50**
with display	**DDS-AR984.5....3.K.1**	on request	01	**204.00**
	... = Code for pressure range see sample table below			

Type (Pressure range)	Item no.	Measuring range 1	Measuring range 2	Overpress. safety	Temperature error
DDS-AR984.5.**E**.3.K.0	102 799	± 25 Pa	-	20 kPa	≤ ± 5% v. EW
DDS-AR984.5.**X**.3.K.0	103 241	± 50 Pa	-	20 kPa	≤ ± 5% v. EW
DDS-AR984.5.**W**.3.K.0	103 240	± 100 Pa	-	20 kPa	≤ ± 5% v. EW
DDS-AR984.5.**0**.3.K.0	103 238	0 – 25 Pa	0 – 50 Pa	20 kPa	≤ ± 5% v. EW
DDS-AR984.5.**1**.3.K.0	103 229	0 – 50 Pa	0 – 100 Pa	20 kPa	≤ ± 5% v. EW
DDS-AR984.5.**2**.3.K.0	103 246	0 – 100 Pa	0 – 250 Pa	20 kPa	≤ ± 2,5% v. EW
DDS-AR984.5.**3**.3.K.0	103 239	0 – 250 Pa	0 – 500 Pa	20 kPa	≤ ± 2,5% v. EW
DDS-AR984.5.**4**.3.K.0	103 143	0 – 500 Pa	0 – 1,000 Pa	20 kPa	≤ ± 1,5% v. EW
DDS-AR984.5.**5**.3.K.0	103 245	0 – 1 kPa	0 – 2,5 kPa	40 kPa	≤ ± 1% v. EW
DDS-AR984.5.**7**.3.K.0	103 244	0 – 5 kPa	0 – 10 kPa	60 kPa	≤ ± 1% v. EW
DDS-AR984.5.**9**.3.K.0	103 243	0 – 25 kPa	0 – 50 kPa	300 kPa	≤ ± 1% v. EW
DDS-AR984.5.**B**.3.K.0	103 242	0 – 100 kPa	0 – 250 kPa	1.2 MPa	≤ ± 1% v. EW
DDS-AR984.5.**....**3.K.**1**	with display, technical information as above.				

Please note the changed type descriptions.

Differential pressure transmitter air

Differential pressure transmitter
with automatic point zero adjustment
8 measuring ranges (Code QR) – adjustable

Complete unit (without fastening angles) for vertical installation, consisting of: Differential pressure monitor and clima-set straight type 6555.

Output signal: **switchable root extracting / linear**
Output: 0 – 10 V or 4 – 20 mA adjustable (3-Wire)
with additional npn open collector switching output
Dimensions: ø 85 x 58 mm (L x W), protection class: IP 54
Voltage supply 18 – 30 V AC, 16 – 32 V DC (3-Wire)

Data sheet no. 13252

	Type	Item no.	ADG	Euro/pc.
	DDS-QR984xx			
without display	**DDS-QR984.5.5.3.K.0**	103 597	01	**182.00**
with display	**DDS-QR984.5.5.3.K.1**	103 598	01	**214.50**

Type	Switch position	DDS-QR984.5.5.3.K.1	
		Pressure measuring range	Temperature error
DDS-QR984.5.**5**.3.K.1	1	±100 Pa	≤ ± 5 % v. EW
	2	0 – 100 Pa	≤ ± 5 % v. EW
Overpressure safety: 20 kPa	3	0 – 200 Pa	≤ ± 5 % v. EW
	4	0 – 500 Pa	≤ ± 3 % v. EW
Cracking pressure: 40 kPa	5	0 – 1,000 Pa	≤ ± 2 % v. EW
	6	0 – 1,500 Pa	≤ ± 2 % v. EW
	7	0 – 2,000 Pa	≤ ± 1.5 % v. EW
	8	0 – 2,500 Pa*	≤ ± 1.5 % v. EW
	LO	Test 0 V / 4 mA	-
	HI	Test 10 V / 20 mA	-
DDS-QR984.....K.0	without display, technical information as above		

* = Factory setting

Note:
replaces PEL 2500

without display	**DDS-QR984.5.4.3.K.0**	103 097	01	**182.00**
with display	**DDS-QR984.5.4.3.K.1**	103 098	01	**214.50**

Type	Switch position	DDS-QR984.5.4.3.K.1	
		Pressure measuring range	Temperature error
DDS-QR984.5.**4**.3.K.1	1	0 – 100 Pa	≤ ± 5 % v. EW
	2	0 – 250 Pa	≤ ± 2.5 % v. EW
Overpressure safety: 20 kPa	3	0 – 500 Pa	≤ ± 2.5 % v. EW
	4	0 – 1,000 Pa*	≤ ± 1.5 % v. EW
Cracking pressure: 40 kPa	5	± 50 Pa	≤ ± 5 % v. EW
	6	± 100 Pa	≤ ± 5 % v. EW
	7	± 250 Pa	≤ ± 5 % v. EW
	8	± 500 Pa	≤ ± 5 % v. EW
	LO	Test 0 V / 4 mA	-
	HI	Test 10 V / 20 mA	-
DDS-QR984.....K.0	without display, technical information as above		

* = Factory setting

Please note the changed type descriptions.

Accessories for DD . . and DDS 984 . .

		Type	Item no.	ADG	Euro/pc.
	**Clima-set straight** consisting of: 2 duct connection nipples plastic type 6551 with fastening screws, 2 m PVC hose ø 6 mm. **Data sheet no. 13101**	**6555**	102 631	01	**4.50**
	**Clima-set angled** consisting of: 2 duct connection nipples metal type 6552, 2 rubber feedthroughs type 6553, 2 m PVC hose ø 6 mm. **Data sheet no. 13101**	**6550**	102 627	01	**6.50**
	**Mounting bracket for DD/DDS, plastic, S-Form** snap fit for vertical installation position **Data sheet no. 13101**	**6482**	102 626	01	**3.50**
	**Mounting bracket for DD/DDS, plastic, L-Form** snap fit for horizontal installation position **Data sheet no. 13101**	**6481**	102 625	01	**3.50**
	**Mounting bracket for DD/DDS, metal, S-Form** for vertical installation position **Data sheet no. 13101**	**6402**	102 624	01	**3.50**
	**Mounting bracket for DD/DDS, metal, L-Form** for horizontal installation position **Data sheet no. 13101**	**6401**	102 623	01	**3.50**
	**Duct connection nipples, plastic – spare part** **Data sheet no. 13101**	**6551**	102 628	01	**1.00**
	**Duct connection nipples, metal without rubber feedthrough – spare part** **Data sheet no. 13101**	**6552**	102 629	01	**2.00**
	**Rubber feedthroughs for duct connection nipples, metal (Type 6552) – spare part** **Data sheet no. 13101**	**6553**	102 630	01	**1.00**
	**Weather protection** Stainless steel For devices and sensors of the series **OPP-SENS®**, DD..., and HT-TGÜ Dimensions: 120 x 140 x 75 mm (W x H x D) **Data sheet no. 20902**	**WTS**	102 405	01	**21.00**

Senso differential pressure indicator (battery-operated)

Differential pressure indicator Senso P
as round mounting-unit with big LCD display.
For the indication of differential pressure or filter pollution degree in %.
Battery operated for at least a 3-year service life.
Adjustable threshold with red LED indication in case of exceeding.

Measuring ranges:	4 measuring ranges, programmable by switch-keys, see information in the related data sheet
Error margin:	≤ 1.5 % of measuring range
Installation dimensions:	112 x 58 mm (ø x H)
2 connection nipples:	ø 6 mm flush with the backside
Protection class:	IP 54, with add. O-ring IP 64 (see accessories)

Delivery incl. 2 AA batteries.
Senso accessories on page 1.34, mounting set type Senso-Z
Note: please order together with the desired air-conditioning kit (straight or right-angle) for the connection (see page 1.34).

Type	Item no.	ADG	Euro/pc.
Snap fit cover, adapted to built-in type			
square design, working range 50 – 5,000 Pa	**P5000-00-SET**	101 434	01	**144.00**
round design, working range 50 – 5,000 Pa	**P5000-01-SET**	101 435	01	**149.00**

Data sheet no. 13153

Senso differential pressure indicator & transmitter

		Type		Item no.	ADG	Euro/pc.
Differential pressure indicator-transmitter-monitor Senso PP						
Round built-in type unit with large LCD display. Adjustable threshold with red LED indication in case of exceedance.						
Measuring range:	Measuring ranges freely programmable by switch keys in 10 Pa increments; see information in the relevant data sheet					
Error margin:	≤ 1.5 % of measuring range					
Installation dimensions:	112 x 58 mm (ø x H)					
2 connection fittings:	ø 6 mm flush with the rear side					
Supply voltage:	24 V AC / DC					
Output 1:	0(2) – 10 V					
Output 2:	0(4) – 20 mA					
Output 3:	relay with floating changeover contact					
Protection class:	IP 54, with add. O-ring IP 64 (see accessories)					
Senso accessories on page 1.34						
Note: Please order together with the desired air-conditioning kit (straight or right-angle) for the connection (see page 1.34).						
Snap-fit cover for built-in type unit, including Senso-ZP-type mounting set						
square design, working range	0 – 1,000 Pa	**PP1000-00-SET**		101 402	01	**178.50**
square design, working range	10 – 5,000 Pa	**PP5000-00-SET**		101 406	01	**198.00**
round design, working range	0 – 1,000 Pa	**PP1000-01-SET**		101 403	01	**184.00**
round design, working range	10 – 5,000 Pa	**PP5000-01-SET**		101 407	01	**203.00**
Surface-mounted housing configuration						
Surface-mounted configuration, working range 0 – 1,000 Pa		**PP1000-AP**	NEW	104 159	01	**184.00**
Surface-mounted configuration, working range 10 – 5,000 Pa		**PP5000-AP**	NEW	104 160	01	**203.00**
Technical specifications as above, but with protection class IP 65 and differing dimensions; connection fittings/electrical connection pointing down; without assembly kit.						
Data sheet no. 13154						

Senso differential pressure indicator & transmitter

	Type		Item no.	ADG	Euro/pc.
	**Low-pressure differential pressure indicator-transmitter-monitor Senso PP** High-precision round built-in type unit with large LCD display. Adjustable threshold with red LED indication in case of undershoot. Measuring ranges: 4 measuring ranges, programmable by switch keys; see information in the relevant data sheet Error margin: ≤ 1 % of measuring range Technical data: as for Senso PP **Senso accessories on page 1.34** **Note:** Please order together with the desired air-conditioning kit (straight or right-angle) for the connection (see page 1.34).				
	**Snap-fit cover for built-in type unit, including Senso-ZP-type mounting set**				
	square design, working range ±150 Pa	**PP150-00-SET**	101 404	01	**265.50**
	round design, working range ±150 Pa	**PP150-01-SET**	101 405	01	**270.50**
	**Surface-mounted housing configuration** Surface-mounted configuration, working range ± 150 Pa Technical specifications as above, but with protection class IP 65 and differing dimensions; connection fittings/electrical connection pointing down; without assembly kit. **Data sheet no. 13158**	**PP150-AP** NEW	104 161	01	**270.50**

Senso flow volume indicator & transmitter

	Type		Item no.	ADG	Euro/pc.
Flow volume indicator-transmitter-monitor Senso VP Round built-in type unit with large LCD display. k-factor and gas density ρ (Rho) programmable. Units of measure: m^3/h or l/sec or ft^3/min Adjustable threshold with red LED indication in case of undershoot. Measuring range: 0 – 5,000 Pa Error margin: ≤ 1.5 % of measuring range Working range: 10 – 5,000 Pa (for S 04 and higher) Installation dimensions: 112 x 58 mm (ø x H) 2 connection fittings: ø 6 mm flush with rear side Supply voltage: 24 V AC / DC Output 1: 0(2) – 10 V ≙ 0 – 99.999 m^3/h Output 2: 0(4) – 20 mA ≙ 0 – 99.999 m^3/h Output 3: relay with floating changeover contact Protection class: IP 54, with add. O-ring IP 64 (see accessories) **Senso accessories on page 1.34** **Note:** Please order together with the desired air-conditioning kit (straight or right-angle) for the connection (see page 1.34).					
Snap-fit cover for built-in type unit, including Senso-ZP-type mounting set					
square design	**VP5000-00-SET**		102 351	01	**304.00**
round design	**VP5000-01-SET**		102 352	01	**309.50**
Surface-mounted housing configuration Surface-mounted configuration Technical specifications as above, but with protection class IP 65 and differing dimensions; connection fittings/electrical connection pointing down; without assembly kit.	**VP5000-AP**	NEW	104 162	01	**309.50**
Data sheet no. 13156					

Senso flow volume indicator & transmitter

Low-pressure flow indicator-transmitter-monitor Senso VP
Highly accurate – especially for volume flow measurements withpitot tubes (e. g. Prandtl).
Round built-in type unit with large LCD display.
k value and ρ (Rho) programmable.
Units of measure: m^3/h or l/sec or ft^3/min
Adjustable threshold with red LED indication in case of undershoot.
Working range: 0 – 250 Pa
Error margin: ± 1 Pa (Tu 10 °C – 30 °C)
± 2 Pa (Tu < 10 °C or > 30°C)
analog output ≤ 1% of measuring range
Measuring range: 1 – 20 m/s
Installation dimensions: 112 x 58 mm (ø x H)
2 connection fittings: ø 6 mm flush with the rear side
Supply voltage: 24 V AC / DC
Output 1: 0(2) – 10 V ≙ 0 – 99.999 m^3/h
Output 2: 0(4) – 20 mA ≙ 0 – 99.999 m^3/h
Output 3: relay with floating changeover contact
Protection class: IP 54, with additional O-Ring IP 64 (see accessories)

Senso accessories on page 1.34

Note: Please order together with the desired air-conditioning kit (straight or right-angle) for the connection (see page 1.34).

	Type		Item no.	ADG	Euro / pc.
Snap-fit cover for built-in type unit, including Senso-ZP-type mounting set					
square design	**VP250-00-SET**		102 835	01	**332.50**
round design	**VP250-01-SET**		102 836	01	**339.00**

Surface-mounted housing configuration
Surface-mounted configuration
Technical specifications as above, but with protection class IP 65 and differing dimensions; connection fittings/electrical connection pointing down; without assembly kit.

	Type		Item no.	ADG	Euro / pc.
	VP250-AP	NEW	104 163	01	**339.00**

Data sheet no. 13159

Accessories: Senso

		Type	Item no.	ADG	Euro/pc.
	**Clima-set straight** consisting of: 2 duct connection nipples plastic type 6551 with fastening screws, 2 m PVC hose ø 6 mm. **Data sheet no. 13101**	**6555**	102 631	01	**4.50**
	**Clima-set angled** consisting of: 2 duct connection nipples metal type 6552, 2 rubber feedthroughs type 6553, 2 m PVC hose ø 6 mm. **Data sheet no. 13101**	**6550**	102 627	01	**6.50**
 	**Installation cover for built-in types** for inner edgeless covering, to avoid filter damage. The cover is made up of pulled aluminium with 3 grommets for cables and tubes on the side. Diameter ø 150 mm **Height 30 mm** **Height 50 mm** **Data sheet no. 13157**	 **Senso-D30** **Senso-D50**	 101 493 101 494	 01 01	 **13.50** **14.50**
	**Mounting set for built-in types** consisting of bracket, stud, wingnut. **Standard for Senso P, Senso V** **Data sheet no. 13157**	**Senso-Z**	101 556	01	**6.50**
	**Mounting set for built-in types** consisting of bracket, stud, wingnut. incl. 2 cable connections **Standard for Senso PP, Senso VP** **Data sheet no. 13157**	**Senso-ZP**	101 557	01	**8.50**
	**O-Ring IP 64 for built-in types** to put between cover and base **Data sheet no. 13157**	**Senso-D**	101 535	01	**8.50**

Accessories: Senso for built-in types

	Type	Item no.	ADG	Euro/pc.
On-wall-mounting-housing for on-wall-mounting of the Senso-series				
 **Double L-blade** Aluminium **Data sheet no. 13157**	**Senso KF**	101 545	01	**15.50**
 **L-form** Aluminium **Data sheet no. 13157**	**Senso KW**	101 546	01	**13.50**
Self-contained housing with shortened faces on the side, for the outlet of tubes and cables if necessary				
 Housing for 1 Senso, aluminium	**Senso G1-AL**	101 541	01	**22.50**
Housing for 1 Senso, white – powder-coated RAL 9001	**Senso G1-P**	101 540	01	**24.50**
 Housing for 2 Sensos, aluminium	**Senso G2-AL**	on request	01	**on req.**
Housing for 2 Sensos, white – powder-coated RAL 9001	**Senso G2-P**	101 542	01	**30.00**
Housing for 3 Sensos, aluminium	**Senso G3-AL**	on request	01	**on req.**
Housing for 3 Sensos, white – powder-coated RAL 9001	**Senso G3-P**	101 543	01	**35.00**
Housing for 4 Sensos, aluminium	**Senso G4-AL**	on request	01	**on req.**
Housing for 4 Sensos, white – powder-coated RAL 9001 **Data sheet no. 13157**	**Senso G4-P**	101 544	01	**37.00**
 **Sun protection device** white – powder-coated RAL 9001 **Data sheet no. 13157**	**Senso protection**	101 553	01	**38.00**

OPP-ROOM® Sensors for air quality

OPP-ROOM®
CO_2 and temperature transducer
CO_2, temperature and humidity transducer
Optionally also with presence and LUX brightness sensor.
Transmitter for indoor installation. For demand control of ventilation systems according to current occupancy.
Measuring principle: non-dispersive infrared technology with automatic self-calibration.

Also available with LCD display
Color change (alarm function):
Backlighting changes its color when a pre-programmed alarm threshold is reached (white - yellow - red), adjustable brightness.

The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings.

Supply voltage:	24 V AC/DC
Measurement range:	CO_2: 0 – 2.000 ppm
	Temperature: 0 – 50 °C
	rel. Humidity: 0 – 100 % RH (Type CO2TRH)
	Brightness: 0 – 3.000 LUX (option PIR-LUX)
Perm. Ambient conditions:	-30 – 70 °C, 0 – 95 % RH (non-condensing)
Housing:	Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted
Dimensions:	86 x 120 x 25 mm (L x W x D)
Terminals:	Screw terminals 0.05 – 1.5 mm²

	Type	Item no.	ADG	Euro/pc.
	CO_2-T-xxx-R-xx NEW	s. Table	s. Table	s. Table
	CO_2-TRH-xxx-R-xx NEW	s. Table	s. Table	s. Table
Voltage transmitter 3-wire, 0 – 10 V 3 analog outputs*	**s. Table**	s. Table	s. Table	s. Table
Current transmitter 3- wire, 4 – 20 mA 2 analog outputs*	**s. Table**	s. Table	s. Table	s. Table
Modbus transmitter (Modbus RTU)	**s. Table**	s. Table	s. Table	s. Table
BACnet transmitter (MS/TP)	**s. Table**	s. Table	s. Table	s. Table
Options: Occupancy + LUX brightness sensor **Data sheet no. 20521** **BACnet-Protocoll OPP-ROOM** **(Download only available online)**	**xxx-PIR-LUX**	s. Table	s. Table	s. Table

OPP-ROOM® USB configuration cable
For connecting active **OPP-ROOM®** transmitters with the PC.
Needed to configure the transmitter with OR-C software.

CAB-02	103 918	23	**92.00**

See page 2.27 for **OPP-ROOM®** type designation key.
*Units of measure and output assignment selectable via OR-C configuration software.

OPP-ROOM® Sensors for air quality

Type Item no. ADG Euro/pc.

CO_2 and temperature transducer	ADG	(Euro/pc.) -R Room sensor basic version	-R-D Room sensor basic version with display	-R-PIR-LUX Room sensor with occupancy and LUX brightness sensor	-R-D-PIR-LUX Room sensor with occupancy and LUX brightness sensor with display
CO2T-TV Voltage transmitter (3-wire, 0 – 10 V)	23	**180.00**	**209.50**	**256.50**	**286.00**
Item no.		104 185	104 186	104 187	104 188
CO2T-TC Current transmitter (3- wire, 4 – 20 mA)	23	**180.00**	**209.50**	**256.50**	**286.00**
Item no.		104 189	104 190	104 191	104 192
CO2T-MOD Modbus transmitter (Modbus RTU)	23	**205.00**	**234.50**	**281.50**	**311.00**
Item no.		104 193	104 194	104 195	104 196
CO2T-BAC BACnet transmitter (MS/TP)	23	**205.00**	**234.50**	**281.50**	**311.00**
Item no.		104 197	104 198	104 199	104 200

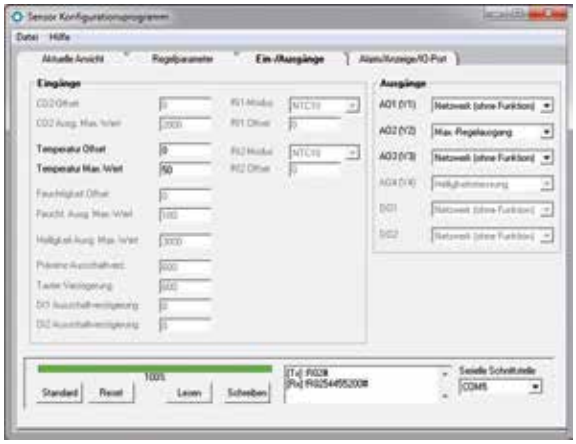
CO_2, temperature and humidity transducer	ADG	-R Room sensor basic version	-R-D Room sensor basic version with display	-R-PIR-LUX Room sensor with occupancy and LUX brightness sensor	-R-D-PIR-LUX Room sensor with occupancy and LUX brightness sensor with display
CO2TRH-TV Voltage transmitter (3-wire, 0 – 10 V)	23	**247.00**	**276.50**	**323.50**	**353.00**
Item no.		104 201	104 202	104 203	104 204
CO2TRH-TC Current transmitter (3-wire, 4 – 20 mA)	23	**247.00**	**276.50**	**323.50**	**353.00**
Item no.		104 205	104 206	104 207	104 208
CO2TRH-MOD Modbus transmitter (Modbus RTU)	23	**272.00**	**301.50**	**348.50**	**378.00**
Item no.		104 209	104 210	104 211	104 212
CO2TRH-BAC BACnet transmitter (MS/TP)	23	**272.00**	**301.50**	**348.50**	**378.00**
Item no.		104 213	104 214	104 215	104 216

Expected to be available from mid-Q1 2018.

Note: Pricing of **OPP-ROOM®** air quality sensors in PG1 (article discount group 23) follows a different discount structure.

OR-C configuration software

The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings.

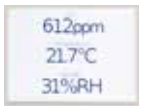


Download OR-C software with documentation (Download only available online)

Sensors for air quality

	Type	Item no.	ADG	Euro/pc.
				
CO_2 and temperature transducer Measuring range CO_2: **0 – 3,000 ppm; temperature 0 – +50 °C** (factory-made preset to 0 – 2,000 ppm) for regulation of the demands of ventilation systems dependent on number of people. The measuring principle is based on non-dispersive infrared technology with automatic self-calibration. 5 year service intervals. **Output for CO_2 and temperature: 0 – 10 V or 4 – 20 mA each,** programmable. If equipped with LCD display the concentration of CO_2 and the temperature are shown alternately; serial communication interface. **Voltage supply: 24 V AC / DC ± 20 %** Housing for vertical interior wall fastening. Housing: 61 x 97 x 19 mm (L x W x D); white; IP 30				
CO_2 and temperature transducer, with display	**CO_2-W-D-2.5**	100 092	01	**468.50**
CO_2 and temperature transducer, without display	**CO_2-W-2.5**	100 083	01	**421.50**
CO_2 and temperature transducer Modbus, with display	**CO_2-W-D-2.5-MOD**	103 278	01	**515.50**
CO_2 and temperature transducer Modbus, without display **Data sheet no. 14101**	**CO_2-W-2.5-MOD**	103 094	01	**468.50**
Note about the Modbus versions: Please indicate the Modbus address in your order. These are programmed by the factory. Notes about this can be found in the additional documentation. **Modbus-Protocol CO_2-W** **(Download only available online)**				
				
CO_2 transducer Low cost specification, since there is no temperature output. Indoor installation. Measuring range CO_2: **0 – 2,000 ppm** For regulation of the demands of ventilation system dependent on number of people. The measuring principle is based on non-dispersive infrared technology with automatic self-calibration. **2 outputs: 1x 0 – 10 V and 1x 2 – 10 V / 4 – 20 mA (FAI: only 1x 0 – 10 V)** **Power supply: 24 V AC / DC ± 20 %**				
CO_2 transducer with display	**CO_2-WD-LC**	100 089	01	**406.00**
CO_2 transducer without display	**CO_2-W-LC**	100 093	01	**359.00**
CO_2 transducer with display, LED traffic light + buzzer **Data sheet no. 14106**	**CO_2-WD-LC-FAI**	100 090	01	**406.00**

Sensors for air quality



	Type	Item no.	ADG	Euro/pc.
CO_2, temperature and humidity transducer 3-way transmitter for interior installation. With large illuminated color touch-display. Standard configuration with Modbus and BACnet interface. Configurable via display. Standard configuration additionally with 3 x 0 – 10V output per sensor metric plus 1 x relay output for CO_2. Measuring range: CO_2 **0 – 2,000 ppm** Temperature **0 – 50 °C** Relative humidity **0 – 100%** For controlling demand from ventilation systems as a function of CO_2, temperature, and humidity. Sensor principle: non-dispersion infrared technology with automatic self-calibration. Service interval: 5 years. The touch display can selectively display all 3 sensor metrics at the same time, or only 1 sensor metric or the time series for each sensor metric. The display can be programmed to switch between red and yellow when defined thresholds are exceeded. **Power supply: 24 V AC/DC ± 20 %** Perm. Ambient conditions: 0 – 50 °C, 0 – 95 % RH (non-condensing) Perm. Storage temperature: -30 – 70 °C. Housing for interior vertical wall mounting, Housing: approx. 83 x 122 x 23 mm (L x W x D); white; IP 20. Screw terminals max. 1.5 mm^2.				
CO_2-, temperature and humidity transducer, with color touch display **Data sheet no. 14110** **Modbus-Protocol CO_2-TRH** **(Download only available online)** **BACnet-Protocol CO_2-TRH** **(Download only available online)**	**CO_2-TRH-W-D**	103 682	01	**791.50**

Sensors for air quality

CO_2 transducer for duct installation
for installation in air ducts
Measuring range CO_2: **0 – 2,000 ppm**
Measuring range temperature: 0 – 50 °C
For regulation of the demands of ventilation system dependent on number of people. The measuring principle is based on non-dispersive infrared technology with automatic self-calibration.

2 outputs:	**0 – 10 V and 2 – 10 V / 4 – 20 mA**
Power supply:	**24 V AC / DC ± 20 %**
Protection class:	IP 65
Housing material:	ABS, flame-resistant according to UL 94 (IEC 707)
Dimensions:	84 x 142 x 46 mm (L x W x D), outlet tube 245 mm

	Type	Item no.	ADG	Euro / pc.
LC versions (without temperature)				
CO_2 transducer with Display	**CO_2-K-DLC**	100 067	01	**511.00**
CO_2 transducer without display	**CO_2-K-LC**	100 068	01	**462.50**
Data sheet no. 14106				
CO_2 and temperature transducer with display	**CO_2-K-D**	100 078	01	**564.50**
CO_2 and temperature transducer without display	**CO_2-K**	100 075	01	**515.50**
CO_2 and temperature transducer Modbus, with display	**CO_2-K-D-MOD**	103 280	01	**611.00**
CO_2 and temperature transducer Modbus, without display	**CO_2-K-MOD**	103 279	01	**562.00**

Data sheet no. 14101
Note about the Modbus versions: Please indicate the Modbus address in your order.
These are programmed by the factory. Notes about this can be found in the additional documentation.
Modbus-Protocol CO_2-K (Download only available online)

CO_2 detection system kit
Compact kit for straightforward local monitoring tasks. Wire pre-installed on connector for short signal paths between sensor and display unit and fast installation. Maximum distance between central unit and sensor approx. 10m. For instance for bottle warehouse, cabinet installations, kiosks. Not a substitute for gas detection system.

	Type	Item no.	ADG	Euro / pc.
Base kit consists of: 1 central unit with large display, 1 CO_2 sensor with display, 1 strobe with buzzer.	**CO_2-alarm set 1**	101 630	01	**723.50**
Expansion kit as addition/expansion for CO_2 detection kit 1, consisting of: 1 CO_2 sensor with display, 1 strobe with buzzer.	**CO_2-alarm set 2**	101 632	01	**440.00**

Power supply:
230 V AC with included plug-in power supply,
CO_2 sensor range: 0 – 30,000 ppm (corresponds to: 0 – 3 vol.%)
Optical and acoustic warning.
Data sheet no. 14151

Sensors for air quality

	Type	Item no.	ADG	Euro/pc.
CO_2 / humidity and hand-held temperature measuring device for simultaneous measuring of temperature, humidity, (RH version only) and CO_2 indoors. Large LCD display with backlight and actual value, MIN / MAX display; 15 min. or 8 h average value display; dew point display. CO_2 and humidity calibration. Alarm buzzer. Internal self-diagnostic system. Power supply: 4 x AA batteries (included) Measuring range: Temperature: 0 – +50 °C (accuracy ± 0.5 °C) Humidity: 0 – 95 % RH (RH version only) (accuracy ± 3 % at 25 °C and 10 – 90 % RH, otherwise ± 5 %) CO_2: 0 – 5,000 ppm (RH version) (accuracy ± 30 ppm and ± 5 % of reading) 0 – 2,000 ppm (standard version) (accuracy ± 75 ppm and ± 5 % of reading) Output: RS 232 data interface Housing: plastic ABS / PC Dimensions: 70 x 210 x 58 mm (L x W x D) Weight: about 180 g (without batteries) **Data sheet no. 14108**	**CO_2-TEMP-RH-HMG** **CO_2-TEMP-HMG**	100 081 100 082	01 01	**422.50** **318.50**

Vibration monitor

		Type	Item no.	ADG	Euro/pc.
Electronic vibration monitor		**VKVxx**			
For monitoring the overall level of vibration for machines and equipment on non-rotating component surfaces according to ISO 10816.					
If it exceeds a set limit the switch contact falls out (NC).					
Additional output as current signal 4 – 20 mA.					
Adjustable response delay.					
Supply voltage:	18 – 32 V DC				
Mechanical connection:	external connection thread M8				
Measuring range:	0 – 25 mm/s vibration rate	**VKV021**	102 333	01	**231.50**
	0 – 50 mm/s vibration rate	**VKV022**	102 334	01	**231.50**
Switching contact:	500 mA loadable				
Response delay:	1 – 60 s				
Protection class:	IP 67				
Electrical contact:	via M12 plug connector (Coupler)				
Data sheet no. 15507					

Suitable accessories for VKV					
M12 plug connector, coupler, angled					
2 m cable, 4-pole, PVC		**M12-KU-w-2m**	103 461	01	**15.50**
5 m cable, 4-pole, PVC		**M12-KU-w-5m**	100 435	01	**19.50**
10 m cable, 4-pole, PVC		**M12-KU-w-10m**	103 265	01	**24.50**

M12 plug connector, coupler, straight					
2 m cable, 4-pole, PVC		**M12-KU-g-2m**	103 462	01	**15.50**
5 m cable, 4-pole, PVC		**M12-KU-g-5m**	100 433	01	**19.50**
10 m cable, 4-pole, PVC		**M12-KU-g-10m**	100 434	01	**24.50**
Data sheet no. 15506					

Pipe burst detector
Leakage sensors

	Type	Item no.	ADG	Euro/pc.
 **Pipe burst detector** for the monitoring of water leakage of pipes, floorings and collecting trays. In case of appearance of water a relay with change-over contact connects. Matching sensors: VVA 1 VVA 2, VVN Supply voltage: 24 V AC / DC Alarm points: < 80 kΩ/< 10 kΩ, adjustable by DIP-switches Contact load: 230 V, 5 A Dimensions: 53 x 90 x 61 mm (L x W x D) **Data sheet no. 15102**	**VVK 2**	102 357	01	**102.00**
 **Leakage sensor** with 2 m cable to lay on the floor. Dimensions: 57 x 77 x 15 mm (L x W x D) **Data sheet no. 15102**	**VVA 2**	102 356	01	**46.00**
 **Leakage sensor** Installation in collecting trays. Protection class: IP 54 **Data sheet no. 15102**	**VVA 1**	102 355	01	**46.00**
 **Humidity sensor band** Fabric belt with inserted measuring wires and 2-wire connection cable. Maximum length 50 m **Data sheet no. 15102**	**VVN1 (length 1 m)** **VVN2 (length 2 m)** **VVN3 (length 3 m)** **...** **further length on request** Extra charge per meter	102 358 102 365 102 371	01 01 01	**37.00** **53.00** **69.00** **16.00**

Presence detectors

		Type	Item no.	ADG	Euro/pc.
	**Presence detector 24 V AC/DC** in white housing with socket, angle of coverage 110°, covering range at height of 2.4 m: 15 m, Adjustable delay (0 s – 10 min) and follow-up time (10 s – 30 min), floating change-over contact. Contact output loadable with 24 V / 3 A, Housing dimensions: 67 x 115 x 48 mm (L x W x D) Protection class: IP 20 Including swivelling panel MB 99 for wall and ceiling fastening **Data sheet no. 15603**	**OPP-PIR-1**	101 348	01	**105.50**
	**Presence detector 24 V AC/DC, ceiling mounting** in white housing with socket, angle of coverage 360°, Adjustable delay (0 s – 10 min) and follow-up time (10 s – 30 min), floating change-over contact. The presence detector is a passive infrared sensor with coverage thresholds for movement and presence and was especially developed for ventilation and air conditioning technology. The maximum installation height is 4.2 m. Dimensions: ø 110 mm x 40 mm height Protection class: IP 41 **Data sheet no. 15601**	**OPP-PIR-2**	101 349	01	**124.50**
	**Combination presence and brightness dectector, ceiling mounting** In a white housing with base, 360° detection zone, built-in PIR sensor for motion and CdS photocell for brightness. Multilevel adjustable delay (0 s – 10 min) and follow-up time (10 s – 30 min), floating change-over contact for climate control (max. 30 V DC, 0.2 A loadable) TTL output (standby 0 V / 5 V active) for lighting control Reaction speed 0.1 ~ 3.0 m/sec. Specifically designed for ventilation and air conditioning. Maximum installation height: 4.2 m (Coverage area: ø 10.5 m). Dimensions: ø 110 mm x 60 mm height Supply voltage: 24 V AC / DC (± 2V); 8 mA standby; 20 mA active **Data sheet no. 15604**	**OPP-PIR-LUX-1**	102 688	01	**138.00**
	You can find additional occupancy and brightness sensors in the **OPP-ROOM®** range starting on page 2.32				

Sensors PG2

Temperature and humidity sensors

Note: Another discount structure applies to the OPP-SENS® (article discount group 22) and OPP-ROOM® (article discount group 23) product ranges and to section 2!

Standard temperature sensor

T
page 2.3

I/O-Module
page 2.10

Temperature sensor

TESK
page 2.11

T-xxx-C6x45-xx
page 2.13

Temperature measuring transmitter

M-...
page 2.8

Immersion sleeve

page 2.6

Air duct flange

F
page 2.6

Surface mounted temperature sensors

T-...-CO
page 2.15

T-...-CO-2M
page 2.14

Air duct temperature sensor

TA
page 2.24

TA-T
page 2.25

T-...-C6x...-2M
page 2.12

External temperature sensor

T-...-OUT
page 2.18

Dew point monitor and sensor

O-EGH 1.5
page 2.26

Room temperature sensor (passive/active)

T-xxx-R-xx
from page 2.28

T-xxx-PIR-LUX
page 2.32

T-xxx-R-D
page 2.32

Room temperature controller

C1-xx-R-xx
page 2.34

I/O modules

IO-xx-R-xx
page 2.37

Humidity-temperature sensor

H/HT-xxx-R-xx
page 2.35 / 2.36

HT-xxx-PIR-LUX
page 2.36

H/HT-...-OUT
page 2.38 / 2.39

H/HT
page 2.41 / 2.42

OPP-HBC..
page 2.49

OPP-HSC..
page 2.49

Antifreeze monitor

OPP-FRO..
page 2.50

2-phase antifreeze controller air-side

OPP-FRO-S..
page 2.51

water-side

JVA
page 2.51

Safety temperature limiter

STB
page 2.52

Temperature monitor

TW
page 2.53

Typenschlüssel **OPP-SENS®** Sensorikprogramm
Type designation **OPP-SENS®** sensor program

XX - XXXX - XX - XXX - X

Produktgruppe | Product group

FT	Flow / Temperature | Luftstrom / Temperatur
H	Humidity | Feuchte
HT	Humidity / Temperature | Feuchte / Temperatur
HTa	Absolute Humidity / Temperature | absolute Feuchte / Temperatur
HTx	Enthalpy, Humidity / Temperature | Enthalpie, Feuchte / Temperatur
IO	I/O-Module | I/O-Modul
M	Measuringtransmitter | Messumformer
P	Pressure | Druck
PV	Pressure / Volumetric flow rate | Druck / Volumenstrom
T	Temperature | Temperatur
TA	Temperature Average | Temperatur Mittelwert
VT	Volumetric flow rate / Temperature | Volumenstrom / Temperatur

Typ / Übertragung | Type / Transmission

T	Transmitter | 4 – 20 mA oder 0 – 10 V switchable
TC	Transmitter Current | 4 – 20 mA
TV	Transmitter Voltage | 0 – 10 V
T5P	Transmitter 5-Point-Calibration | 4 – 20 mA oder 0 – 10 V switchable
TC5P	Transmitter Current 5-Point-Calibration | 4 – 20 mA
MOD	Modbus-Transmitter
BAC	BACnet-Transmitter
KP10	Passive sensors | passive Sensoren
NI1000	Characteristics and Terms
NI1000LG	see page 2.56
NTC1,8	
NTC10	
NTC10AN	
NTC10C	
NTC10KB	
NTC20	
PT100	
PT100_1/3D	
PT100CLA	
PT1000	
PT10001/3D	
PT1000CLA	

Anwendungsbereich | Application

I	Immersion | Eintauchfühler
CO	Contact | Anlegefühler
OUT	Outside | Außenfühler
S	Surface | Oberflächenmontage
C6x45	Cable | Kabelfühler Hülse 6 x 45 mm
C6x80	Cable | Kabelfühler Hülse 6 x 80 mm
C6x130	Cable | Kabelfühler Hülse 6 x 130 mm
C6x180	Cable | Kabelfühler Hülse 6 x 180 mm
C6x230	Cable | Kabelfühler Hülse 6 x 230 mm
W16	Water < 16 bar | Wasser < 16 bar
AD1	Air Differential < 1 kPa | Differenzdruck Luft < 1 kPa
AD4	Air Differential < 4 kPa | Differenzdruck Luft < 4 kPa

Parameter

Length | Länge	in mm oder m
AI	Analog Input | Analogeingang
DI	Digital Input | Digitaleingang
...SI	Silicone | Silikon
...TE	Teflon

Optionen | Options

D	Display | Anzeige
G	Galvanic Isolation | Galvanische Trennung
3W	3-Wire | 3-Leiter
4W	4-Wire | 4-Leiter
...s	Special | Sonderfühler

OPP-SENS® Immersion temperature sensors

OPP-SENS® Standard temperature sensor (passive)
Immersion sensor for measuring the temperatures of liquids in pipelines and containers with appropriate immersion sleeves or for measuring temperatures in air ducts with mounting flanges.
Captive lid with **8-way positioning.**

Nominal diameter:	Stainless steel sleeve ø 6 mm
Housing:	IP 65 including seal Plastic grey/yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm²
Perm. Ambient temperature:	-25 – 85 °C
Perm. Medium temperature:	**-50 – 120 °C**

Data sheet no. 20900

Type	Item no.	ADG	Euro/pc.
T-xxx-I-xx	see table below	see table below	see table below

Sensor device Type	ADG	Sensor depth mm (Euro/pc.) 50	100	150	200	250	300	350	450
Topseller									
T-NI1000-I-… Item no.	90	**23.50** 102 842	**23.50** 102 848	**25.50** 102 849	**25.50** 102 850	**26.50** 102 852	**26.50** 102 853	**27.50** 102 923	**28.50** 102 924
T-PT1000-I-… Item no.	90	**20.50** 102 984	**20.50** 102 985	**22.50** 102 986	**22.50** 102 987	**24.00** 102 988	**24.00** 102 989	**25.00** 102 990	**26.00** 102 991
Standard sensor									
T-KP10-I-… Item no.	22	**24.00** 102 967	**24.00** 102 968	**26.00** 102 969	**26.00** 102 970	**26.50** 102 971	**26.50** 102 972	**27.50** 102 973	**28.50** 102 974
T-NI1000LG-I-… Item no.	22	**23.50** 102 992	**23.50** 102 993	**25.50** 102 994	**25.50** 102 995	**26.50** 102 996	**26.50** 102 997	**27.50** 102 998	**28.50** 102 999
T-NTC1,8-I-… Item no.	22	**20.50** 102 959	**20.50** 102 960	**22.50** 102 961	**22.50** 102 962	**24.00** 102 963	**24.00** 102 964	**25.00** 102 965	**26.00** 102 966
T-NTC10AN-I-… Item no.	22	**22.50** 102 935	**22.50** 102 936	**24.00** 102 937	**24.00** 102 938	**25.50** 102 939	**25.50** 102 940	**26.50** 102 941	**27.50** 102 942
T-NTC10-I-… Item no.	22	**20.50** 102 927	**20.50** 102 928	**22.50** 102 929	**22.50** 102 930	**24.00** 102 931	**24.00** 102 932	**25.00** 102 933	**26.00** 102 934
T-NTC10KB-I-… Item no.	22	**24.50** 102 951	**24.50** 102 952	**26.50** 102 953	**26.50** 102 954	**27.00** 102 955	**27.00** 102 956	**28.00** 102 957	**29.00** 102 958
T-NTC20-I-… Item no.	22	**20.50** 102 943	**20.50** 102 944	**22.50** 102 945	**22.50** 102 946	**24.00** 102 947	**24.00** 102 948	**25.00** 102 949	**26.00** 102 950
T-PT100-I-… Item no.	22	**20.50** 102 976	**20.50** 102 977	**22.50** 102 978	**22.50** 102 979	**24.00** 102 980	**24.00** 102 981	**25.00** 102 982	**26.00** 102 983
Special sensor									
T-NTC10C-I-…-s Item no.	80	**35.10** 103 440	**35.10** 103 441	**37.00** 103 442	**37.00** 103 443	**38.20** 103 444	**38.20** 103 445	**39.10** 103 446	**40.30** 103 447
T-PT100CLA-I-…-s Item no.	80	**37.90** 103 191	**37.90** 103 192	**39.80** 103 157	**39.80** 103 194	**41.00** 103 195	**41.00** 103 196	**41.90** 103 158	**43.10** 103 198
T-PT100_1/3D-I-…-s Item no.	80	**39.10** 103 163	**39.10** 103 164	**41.00** 103 155	**41.00** 103 165	**42.20** 103 161	**42.20** 103 166	**43.10** 103 156	**44.30** 103 167
T-PT1000CLA-I-…-s Item no.	80	**37.90** 103 176	**37.90** 103 177	**39.80** 103 178	**39.80** 103 179	**41.00** 103 180	**41.00** 103 181	**41.90** 103 182	**43.10** 103 183
T-PT10001/3D-I-…-s Item no.	80	**39.10** 103 168	**39.10** 103 169	**41.00** 103 170	**41.00** 103 171	**42.20** 103 172	**42.20** 103 173	**43.10** 103 174	**44.30** 103 175

PT 100 and PT 1000 are also available in accuracy categories EN60751 F0.1 (1/3DIN: 1/3D) and F0.15 (class A: CLA) (see table).

Order code: T-**sensor element**-I **depth**; example: T-**NI1000**-I-**250**: Sensor device Ni1000, sensor depth 250 mm
Article number and delivery time on request.
Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.

3-wire model type T-…-I-…-3Ws (special sensor), surcharge always € 2 per item.
4-wire model type T-…-I-…-4Ws (special sensor), surcharge always € 2 per item.

Measuring ranges und characteristics see page 2.56 Accessories see page 2.6

ADG = Article discount group

OPP-SENS®
Immersion temperature transmitter

	Type	Item no.	ADG	Euro/pc.
	**T-T...**	see following page	see following page	see following page

OPP-SENS® Base temperature transmitter (active) for measuring the temperatures of liquids in pipelines, vessels through immersion sleeves or appropriate for measuring temperatures in air ducts on mounting flange.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast, display (temperature, flow or alternating) and temperature unit can be set via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:
Note: scale only – please observe rated media temperature (see below)

-50 °C – 200 °C	-20 °C – 150 °C
-50 °C – 50 °C	-20 °C – 80 °C
-30 °C – 60 °C	0 °C – 40 °C
0 °C – 50 °C	**0 °C – 100 °C***
0 °C – 150 °C	0 °C – 200 °C

***Factory settings**

Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC/DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-50 – 120 °C**
Sensor element:	PT1000
Housing:	IP 65 including seal, Plastic grey/yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm²

OPP-SENS®
Immersion temperature transmitter

	Type	Item no.	ADG	Euro/pc.
Basic analog transmitter 2-wire / 3-wire switchable (0 – 10 V / 4 – 20 mA switchable) without 5P calibration				
without display	**T-T-I-xx**	see table	see table	see table
with display**	**T-T-I-xx-D**			
5P Transmitter with 5-point calibration				
Current transmitter (2-wire, 4 – 20 mA)				
without display	**T-TC5P-I-xx**	see table	see table	see table
with display**	**T-TC5P-I-xx-D**			
Current-/Voltage transmitter (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**T-T5P-I-xx**	see table	see table	see table
with display	**T-T5P-I-xx-D**			
Modbus transmitter (Modbus RTU)				
without display*	**T-MOD-I-xx**	see table	see table	see table
with display	**T-MOD-I-xx-D**			
BACnet transmitter (MS/TP)				
without display*	**T-BAC-I-xx**	see table	see table	see table
with display	**T-BAC-I-xx-D**			

Data sheet no. 20901

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

Transmitter Type without display*	ADG	Sensor length mm (Euro/pc.) 50	100	150	200	250	300	350	450
T-T-I Basic Analog Transmitter Item no.	22	**55.50** 102 860	**55.50** 102 874	**57.50** 102 875	**57.50** 102 876	**58.50** 102 877	**58.50** 102 878	**60.00** 102 879	**61.00** 102 880
T-TC5P-I 5P Current Transmitter Item no.	22	**60.50** 102 861	**60.50** 102 881	**62.50** 102 882	**62.50** 102 883	**63.50** 102 884	**63.50** 102 885	**65.00** 102 886	**66.00** 102 887
T-T5P-I 5P Current / voltage-transmitter Item no.	22	**60.50** 102 862	**60.50** 102 888	**62.50** 102 889	**62.50** 102 890	**63.50** 102 891	**63.50** 102 892	**65.00** 102 893	**66.00** 102 894
T-MOD-I 5P Modbus Transmitter (Modbus RTU) Item no.	22	**81.00** 102 863	**81.00** 102 895	**83.00** 102 896	**83.00** 102 897	**84.00** 102 898	**84.00** 102 899	**85.50** 102 900	**86.50** 102 901
T-BAC-I 5P BACnet Transmitter (MS/TP) Item no.	22	**81.00** 102 902	**81.00** 102 903	**83.00** 102 904	**83.00** 102 905	**84.00** 102 906	**84.00** 102 907	**85.50** 102 908	**86.50** 102 909

Transmitter Type with display	ADG	50	100	150	200	250	300	350	450
T-T-I-xx-D Basic Analog Transmitter Item no.	22	**104.00** 103 669	**104.00** 103 670	**106.50** 103 671	**106.50** 103 672	**107.50** 103 673	**107.50** 103 674	**109.00** 103 675	**110.00** 103 676
T-TC5P-I-xx-D 5P Current Transmitter Item no.	22	**109.50** 103 684	**109.50** 103 685	**111.50** 103 686	**111.50** 103 687	**112.50** 103 688	**112.50** 103 689	**114.00** 103 690	**115.00** 103 691
T-T5P-I-xx-D 5P Current / voltage-Transmitter Item no.	22	**109.50** 103 692	**109.50** 103 693	**111.50** 103 694	**111.50** 103 695	**112.50** 103 696	**112.50** 103 697	**114.00** 103 698	**115.00** 103 699
T-MOD-I-xx-D 5P Modbus Transmitter (Modbus RTU) Item no.	22	**129.50** 103 706	**129.50** 103 707	**132.00** 103 708	**132.00** 103 709	**133.00** 103 710	**133.00** 103 711	**134.50** 103 712	**135.50** 103 713
T-BAC-I-xx-D 5P BACnet Transmitter (MS/TP) Item no.	22	**129.50** 103 716	**129.50** 103 717	**132.00** 103 718	**132.00** 103 719	**133.00** 103 720	**133.00** 103 721	**134.50** 103 722	**135.50** 103 723

Order code: T-**sensor element**-I-**length**

Example: T-**TC5P**-I-**200**: Current transmitter with 5-point calibration, probe length 200 mm

Accessories see page 2.6. Option display see page 2.7

Accessories: OPP-SENS®
Immersion temperature sensors

	Type	Item no.	ADG	Euro/pc.
 **Immersion sleeves** for use with standard temperature sensors and transmitters such as cable temperature sensors with ø 6 mm. Connection: G½ A Type: Type ATM, PN 16 bar, Nickel-plated brass Type AT, PN 16 bar, Stainless steel 1.4571 Immersion depth: See table **Data sheet no. 20902** **Sizing calculator (Download only available online)**	see table	see table	see table	see table

Immersion sleeve type	ARG	Immersion depth mm/(Euro/St.)							
		50	100	150	200	250	300	350	450
Type ATM, nickel-plated brass*	02	**7.00**	**7.50**	**8.00**	**9.00**	**9.00**	**9.50**	**10.00**	**11.50**
Item no.		100 038	100 040	100 041	100 042	100 043	100 044	100 045	100 046
Type AT, stainless steel 1.4571*	02	**12.00**	**12.50**	**13.00**	**14.00**	**14.50**	**15.00**	**15.50**	**16.00**
Item no.		100 024	100 027	100 029	100 031	100 033	100 035	100 036	100 037

* plus the relevant current material price surcharge

The capacity of the immersion sleeves (protective tubes) depends on the process medium, pressure, temperature, flow rate as well as the design of the protective tube and the installation situation. In critical operating conditions a separate calculation is recommended.
The professional planner/implementing company is responsible for the selection of the immersion sleeve appropriate for the application.
Current local rules and regulations are to be observed, in particular:

- VDE/VDI 3511 Technical temperature measurements
- DIN 43772 Control technology – metal protective tubes and extension tubes for liquid-in-glass thermometers, dial thermometers, thermocouples and resistance thermometers – dimensions, materials, testing
- VDI Guideline 2035, page 2 – water related corrosion; preventing damage in hot water heating systems Stainless steel tubes are to be selected for cooling devices, well water and contact with food.

Ordering example: Immersion sleeve with depth 100 mm,
Stainless steel PN 40: AT 100
Nickel-plated brass: ATM 100

	Type	Item no.	ADG	Euro/pc.
 **Air duct flange** for use with **OPP-SENS®**-sensors. For straight and round ducts with lip seal for airtight seal, 2 holes for bolting to air duct. The flanges are made of dark grey plastic, including cross-head screw for fixing the sensor.				
Bore diameter: **ø 13 mm** for attaching the base temperature sensor on the housing, **standard**	**F-13**	103 041	22	**2.70**
ø 6 mm moveable along the length of the probe	**F-6**	103 043	22	**2.70**
ø 10 mm for airflow and humidity sensors moveable along the length of the probe	**F-10**	103 042	22	**2.70**
Data sheet no. 20902				

Accessories: OPP-SENS®
Immersion temperature transmitter

	Type	Item no.	ADG	Euro/pc.
	**D**	103 040	22	**49.00**
OPP-SENS® Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** Fits all round **OPP-SENS®**-sensors with connection heads with active outputs. The unit is fitted with ribbon cable and a reverse polarity connector on the electronics board and is ready for operation without adjustment (autoadapt). The corresponding menu for the transmitter is automatically displayed. The unit is illuminated (only with 3-wire connection) and has capacitive buttons. The duration of lighting, contrast and temperature settings can be adjusted via the menu. With the bus transmitters, all parameters such as bus addresses, baud rate, etc. can be set directly. Also, the 5-point calibration is performed via this unit. IP 65 protection due to the integrated seal. **For configuration and calibration:** Multiple sensors can be configured one after another using one unit and then operated with the normal cover closed. **Operation as actual value display:** The display permanently replaces the cover. **Data sheet no. 20902**				
	**WTS**	102 405	01	**21.00**
Weather protection Stainless steel For devices and sensors of the series **OPP-SENS®**, DD..., and HT-TGÜ Dimensions: 120 x 140 x 75 mm (W x H x D) **Data sheet no. 20902**				

OPP-SENS®
Temperature measuring transmitter

OPP-SENS® measuring transmitter for PT1000 cable sensor
Converts passive sensor signal PT1000 in 0 – 10 V or 4 – 20 mA analogue signals or communicates the temperature value via Modbus or BACnet. See catalogue page 2.10 for the accompanying PT1000 cable sensor **Illuminated display, indicator & control unit** with **autoadapt** and **capacitive buttons (Option).** The duration of lighting, contrast, display (temperature, flow or alternating) and temperature unit can be set via the menu.

5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:
Note: scale only – please observe rated media temperature for separate PT1000 cable sensor

-50 °C – 200 °C	-20 °C – 150 °C	-50 °C – 50 °C
-20 °C – 80 °C	-30 °C – 60 °C	0 °C – 40 °C
0 °C – 50 °C	**0 °C – 100 °C***	0 °C – 150 °C
0 °C – 200 °C	***Factory settings**	

Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC / DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	depends on installed
PT1000 cable sensor	
Sensorelement:	Sensor element: PT1000 sensor cable separately available. Connection via spring terminals.
Housing:	IP 65 including seal, Plastic grey / yellow
Cable gland:	2 x M16 for analog versions 2 x M16 + 1 x M12 for bus versions
Terminals:	Spring terminals 0.2 – 1.5 mm²

Type	Item no.	ADG	Euro / pc.
M-...	see following page	see following page	see following page

OPP-SENS®
Temperature measuring transmitter

		Type	Item no.	ADG	Euro/pc.
Basic analog transmitter 2-wire / 3-wire switchable					
(0 – 10 V / 4 – 20 mA switchable) without 5P calibration					
without display		**M-T**	103 471	22	**52.00**
with display**		**M-T-D**	103 730	22	**101.00**
5P Transmitter with 5-point calibration					
Stromtransmitter (2-Leiter / 4 – 20 mA)					
without display*		**M-TC5P**	103 372	22	**57.50**
with display**		**M-TC5P-D**	103 729	22	**106.50**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**M-T5P**	103 256	22	**57.50**
with display		**M-T5P-D**	103 726	22	**106.50**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**M-MOD**	103 371	22	**77.50**
with display	Modbus	**M-MOD-D**	103 728	22	**126.50**
BACnet transmitter (MS/TP)					
without display*	BACnet	**M-BAC**	103 370	22	**77.50**
with display	BACnet	**M-BAC-D**	103 727	22	**126.50**

Data sheet no. 20910

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

Option display see page 2.7

OPP-SENS® I/O-Module

OPP-SENS® I/O module
for connecting external portable devices with relay and current/voltage output with spring clamps. This permits integrating analog transmitters into bus networks.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting and contrast can be set via the menu. **Captive lid** with **8-way positioning.**

Supply voltage:	24 V AC/DC
Digital input:	configurable as closer or opener, switchable with DIP
Option:	galvanically isolated digital input
Analog input:	3-wire 0 – 10 V or 4 – 20 mA, switchable with DIP.
External transmitter supply voltage:	up to 100 mA
Input impedance at 0 – 10V:	10 kΩ
Load at 4 – 20mA:	100 Ω
Perm. Medium temperature:	**-20 – 70 °C**
Housing:	IP 65 including seal, Plastic grey / yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm²

		Type	Item no.	ADG	Euro / pc.
		IO-...			
Modbus transmitter,					
2 digital inputs	without display*	**IO-MOD-S-DI2**	103 646	22	**100.00**
	with display	**IO-MOD-S-DI2-D**	103 654	22	**149.00**
1 analog- / 1 digital input	without display*	**IO-MOD-S-AI1DI1**	103 648	22	**100.00**
	with display	**IO-MOD-S-AI1DI1-D**	103 656	22	**149.00**
Modbus transmitter with galvanic isolation					
2 digital inputs	without display*	**IO-MOD-S-DI2-G**	103 647	22	**121.50**
	with display	**IO-MOD-S-DI2-DG**	103 655	22	**170.50**
1 analog- / 1 digital input	without display*	**IO-MOD-S-AI1DI1-G**	103 649	22	**121.50**
	with display	**IO-MOD-S-AI1DI1-DG**	103 657	22	**170.50**
BACnet transmitter,					
2 digital inputs	without display*	**IO-BAC-S-DI2**	103 650	22	**100.00**
	with display	**IO-BAC-S-DI2-D**	103 658	22	**149.00**
1 analog- / 1 digital input	without display*	**IO-BAC-S-AI1DI1**	103 652	22	**100.00**
	with display	**IO-BAC-S-AI1DI1-D**	103 660	22	**149.00**
BACnet transmitter with galvanic isolation					
2 digital inputs	without display*	**IO-BAC-S-DI2-G**	103 651	22	**121.50**
	with display	**IO-BAC-S-DI2-DG**	103 659	22	**170.50**
1 analog- / 1 digital input	without display*	**IO-BAC-S-AI1DI1-G**	103 653	22	**121.50**
	with display	**IO-BAC-S-AI1DI1-DG**	103 661	22	**170.50**

Data sheet no. 20915
BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

Immersion temperature sensors

Immersion temperature sensors
for the measurement of temperature of liquid media in pipelines. Immersion depth adjustable by Ermeto-screw connection.

Measuring range:	0 – 400 °C
Nominal width:	G½ A, ø 10 x 100 ... 200 mm, stainless steel 1.4404
Nominal pressure:	PN 16
Sensors:	see table
Leakage resistance:	≥ 100 MΩ, 20 °C, 500 V DC
Protection class:	IP 54
Cable connection:	M16
Housing material:	aluminium

	Type	Item no.	ADG	Euro/pc.
100 Ω /0 °C,tolerance ±0.3 °C/0 °C, (EN 60751/B)	**TESK PT 100**	102 131	02	**189.00**
1,000 Ω /0 °C,tolerance ±0.3 °C/ 0 °C, (Honeywell, Danfoss)	**TESK PT 1000**	102 132	02	**189.00**
2-wire supply voltage 15 – 35 V DC, output 4 – 20 mA	**TESK LL 0/400**	102 129	02	**235.00**
3-wire supply voltage 24 V AC/DC, output 0 – 10 V < 2 mA	**TESK LU 0/400**	102 130	02	**235.00**

Data sheet no. 20106

OPP-SENS® Air duct temperature sensors

OPP-SENS® Air duct temperature sensor (passive)
For the measurement of temperatures in ventilation ducts.
The sensor is used for the measurement of temperatures in combination with automated ventilation systems.
The mounting flange is separately available.

Perm. medium temperature:	-50 – +105 °C
Cable:	LIYY 2 x 0.34 mm²
	with end sleeves: length 2 m
Sensor size:	ø 6 mm, stainless steel
Duct connection:	Plastic flange F-6 (optional)
Sensors:	see table

Type T-...-C6x...-2M | Item no. see table below | ADG see table below | Euro/pc. see table below

Sensor device Type	Sleeve length mm (Euro/pc.)			
	80 (Special sensor „s“)	**130**	**180** (Special sensor „s“)	**230** (Special sensor „s“)
T-KP10-C6x…-2M Item no. / ADG	**36.00** 103 416 / 80	**22.50** 103 426 / 22	**38.00** 103 391 / 80	**39.00** 103 406 / 80
T-NI1000-C6x…-2M Item no. / ADG	**31.50** 103 414 / 80	**18.00** 103 424 / 22	**33.50** 103 389 / 80	**34.50** 103 404 / 80
T-NI1000LG-C6x…-2M Item no. / ADG	**31.50** 103 415 / 80	**18.00** 103 425 / 22	**33.50** 103 390 / 80	**34.50** 103 405 / 80
T-NTC1,8-C6x…-2M Item no. / ADG	**31.50** 103 417 / 80	**18.00** 103 427 / 22	**33.50** 103 392 / 80	**34.50** 103 407 / 80
T-NTC10AN-C6x…-2M Item no. / ADG	**33.00** 103 419 / 80	**19.50** 103 429 / 22	**35.00** 103 394 / 80	**36.00** 103 409 / 80
T-NTC10-C6x…-2M Item no. / ADG	**31.50** 103 418 / 80	**18.00** 103 428 / 22	**33.50** 103 393 / 80	**34.50** 103 408 / 80
T-NTC10C-C6x…-2M-s Item no. / ADG	**31.50** 103 456 / 80	**32.50** 103 457 / 80	**33.50** 103 458 / 80	**34.50** 103 459 / 80
T-NTC10KB-C6x…-2M Item no. / ADG	**36.00** 103 421 / 80	**22.50** 103 431 / 22	**38.00** 103 396 / 80	**39.00** 103 411 / 80
T-NTC20-C6x…-2M Item no. / ADG	**31.50** 103 420 / 80	**18.00** 103 430 / 22	**33.50** 103 395 / 80	**34.50** 103 410 / 80
T-PT1000-C6x…-2M Item no. / ADG	**31.50** 103 412 / 80	**18.00** 103 422 / 22	**33.50** 103 387 / 80	**34.50** 103 402 / 80
T-PT100-C6x…-2M Item no. / ADG	**31.50** 103 413 / 80	**18.00** 103 423 / 22	**33.50** 103 388 / 80	**34.50** 103 403 / 80

Example: T-PT1000-C6x180-2Ms: measuring device PT1000, Sleeve length 180mm, cable length 2m, special sensor

Note: Sensors which are not retained in stock have an “s“ (Special sensor) at the end.
Article number and delivery time on request.

PT100 and PT1000 are also available in accuracy categories EN60751 F0.1 (1/3DIN: 1/3D) and F0.15 (Class A: CLA).
Surcharge F0.1 (1/3DIN: 1/3D): € 4 per item (Special sensor).
Surcharge F0.15 (Class A: CLA): € 2.80 per item (Special sensor).

Measuring ranges and characteristics see page 2.56
Data sheet no. 20903

Air duct flange
For use with the **OPP-SENS®** sensors.
For straight and round air ducts with lip for airproof termination, 2 holes to screw on the air duct. The flange consists of dark-grey plastic, includes cross-head screw to affix the sensors.
Drill hole diameter: **ø 6 mm**
Relocatable over the entire sensor length
Data sheet no. 20902

F-6 | 103 043 | 22 | **2.70**

OPP-SENS® Cable temperature sensors

	Type	Item no.	ADG	Euro/pc.
OPP-SENS® Cable temperature sensor (passive) To measure temperatures in vessels. Perm. medium temperature: -50 – 105 °C Cable connection: PVC cable, 2-wire LIYY 2 x 0.34 mm2 with end sleeves Sleeve: ø 6 mm x 45 mm stainless steel Protection: IP 65	**T-xxx-C6x45-xx**	see table below	see table below	see table below

Sensor device Type	ADG	Sensor length in m (Euro/pc.)				
		2 m	4 m	6 m	8 m	10 m
T-KP10-C6x45-… Item no.	22	**18.50** 103 000	**20.50** 103 109	**22.50** 103 110	**24.50** 103 111	**26.50** 103 112
T-NI1000-C6x45-… Item no.	90	**16.00** 103 001	**18.00** 103 101	**20.00** 103 102	**22.00** 103 103	**24.00** 103 104
T-NI1000LG-C6x45-… Item no.	22	**16.00** 103 002	**18.00** 103 113	**20.00** 103 114	**22.00** 103 115	**24.00** 103 116
T-NTC1,8-C6x45-… Item no.	22	**16.00** 102 864	**18.00** 103 105	**20.00** 103 106	**22.00** 103 107	**24.00** 103 108
T-NTC10AN-C6x45-… Item no.	22	**17.50** 103 004	**19.50** 103 121	**21.50** 103 122	**23.50** 103 123	**25.50** 103 124
T-NTC10-C6x45-… Item no.	22	**16.00** 103 003	**18.00** 103 117	**20.00** 103 118	**22.00** 103 119	**24.00** 103 120
T-NTC10C-C6x45-…-s Item no.	80	**30.50** 103 451	**32.50** 103 452	**34.50** 103 453	**36.50** 103 454	**38.50** 103 455
T-NTC10KB-C6x45-… Item no.	22	**20.50** 103 006	**22.50** 103 129	**24.50** 103 130	**26.50** 103 131	**29.00** 103 132
T-NTC20-C6x45-… Item no.	22	**16.00** 103 005	**18.00** 103 125	**20.00** 103 126	**22.00** 103 127	**24.00** 103 128
T-PT1000-C6x45-… Item no.	90	**16.00** 103 008	**18.00** 103 137	**20.00** 103 138	**22.00** 103 139	**24.00** 103 140
T-PT100-C6x45-… Item no.	22	**16.00** 103 007	**18.00** 103 133	**20.00** 103 134	**22.00** 103 135	**24.00** 103 136

Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.
Article number and delivery time on request.

PT100 and PT1000 are also available in accuracy categories EN60751 F0.1 (1/3DIN: 1/3D) and F0.15 (Class A: CLA).
Surcharge F0.1 (1/3DIN: 1/3D): € 4 per item (Special sensor).
Surcharge F0.15 (Class A: CLA): € 2.80 per item (Special sensor).

3-wire design type T-…-I-…-3Ws (Special sensor), surcharge each € 2 per meter.
4-wire design type T-…-I-…-4Ws (Special sensor), surcharge each € 2 per meter.

Silicon design (-50 – 180 °C) Type T-…-I-…SI-s (Special sensor), Surcharge each € 2.50 per meter.

Data sheet no. 20903

Measuring ranges and characteristics see page 2.56
Accompanying immersion sleeves see page 2.6

OPP-SENS® Contact temperature sensors

OPP-SENS® contact temperature sensor with cable (passive) for the measurement of temperature on plane areas and pipes.
For low add-on height
Perm. Medium temperature: -50 – 105 °C
Sensor fastening: with cable ties for pipes, incl. cable ties and thermal pad
Sensors: see table
Cable connection: 2 m PVC cable, 2-wire

	Type	Item no.	ADG	Euro/pc.
KP10 2732 mV/0 °C, (Kieback&Peter)	**T-KP10-CO-2m**	103 381	22	**25.50**
NI 1000 (DIN)	**T-NI1000-CO-2m**	103 377	90	**18.50**
NI 1000 LG (Siemens)	**T-NI1000LG-CO-2m**	103 379	22	**18.50**
NTC 1,8 (Schneider Electric)	**T-NTC1,8-CO-2m**	103 386	22	**18.50**
NTC 10 AN (Andover)	**T-NTC10AN-CO-2m**	103 384	22	**24.50**
NTC 10 (Trend)	**T-NTC10-CO-2m**	103 382	22	**18.50**
NTC 10 C (Carel)	**T-NTC10C-CO-2m-s**	103 450	80	**33.00**
NTC 10KB (Satchwell)	**T-NTC10KB-CO-2m**	103 383	22	**24.50**
NTC 20 (Honeywell)	**T-NTC20-CO-2m**	103 385	22	**18.50**
PT 1000 (Honeywell, Danfoss)	**T-PT1000-CO-2m**	103 378	90	**17.50**
PT 100 (EN 60751/B)	**T-PT100-CO-2m**	103 380	22	**17.50**

Data sheet no. 20913

Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.
Article number and delivery time on request.

Measuring ranges and characteristics see page 2.56

OPP-SENS® Contact temperature sensors

OPP-SENS® Contact temperature sensor (passive)
to measure temperatures on pipe surfaces including cable ties for ø 10 – 75 mm and thermal pad.
Please include clamping strap with your order.
Captive lid with **8 way positioning.**

Nominal diameter:	with 2 cable ties for tube diameter ø 10 – 75 mm
Housing:	IP 65 including seal Plastic grey / yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm²
Perm. Ambient temperature:	-25 – 85 °C

Perm. Medium temperature: -50 – 120 °C

	Type	Item no.	ADG	Euro / pc.
	T-xxx-CO			
KP10 2732 mV/0 °C, (Kieback&Peter)	**T-KP10-CO**	102 869	22	**32.50**
NI 1000 (DIN)	**T-NI1000-CO**	103 009	90	**27.00**
NI 1000 LG (Siemens)	**T-NI1000LG-CO**	103 010	22	**27.00**
NTC 1,8 (Schneider Electric)	**T-NTC1,8-CO**	103 011	22	**27.00**
NTC 10 AN (Andover)	**T-NTC10AN-CO**	103 013	22	**31.50**
NTC 10 (Trend)	**T-NTC10-CO**	103 012	22	**27.00**
NTC 10 C (Carel)	**T-NTC10C-CO-s**	103 449	80	**41.50**
NTC 10KB (Satchwell)	**T-NTC10KB-CO**	103 014	22	**31.50**
NTC 20 (Honeywell)	**T-NTC20-CO**	103 015	22	**27.00**
PT 1000 (Honeywell, Danfoss)	**T-PT1000-CO**	103 017	90	**27.00**
PT 100 (EN 60751/B)	**T-PT100-CO**	103 016	22	**27.00**

Data sheet no. 20904

Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.

Article number and delivery time on request.

PT100 and PT1000 are also available in accuracy categories EN60751 F0.1 (1/3DIN: 1/3D) and F0.15 (Class A: CLA).
Surcharge F0.1 (1/3DIN: 1/3D): € 4 per item (Special sensor).
Surcharge F0.15 (Class A: CLA): € 2.80 per item (Special sensor).

3-wire design type T-…-I-…-3Ws (Special sensor), surcharge each € 2 per meter.

4-wire design type T-…-I-…-4Ws (Special sensor), surcharge each € 2 per meter.

Folding hinge

Accessories

Clamping straps

chrome steel, with folding hinge for ø 60 – 110 mm	**SB-K01**	103 619	22	**2.60**
stainless steel, without folding hinge for ø 16 – 25 mm	**SB-01**	103 618	22	**0.50**
For other diameters on request				

Data sheet no. 20904

OPP-SENS® Contact temperature sensors

	Type	Item no.	ADG	Euro/pc.
	**T-T-...-CO**	see following page	see following page	see following page

OPP-SENS® Contact temperature sensor (active)
to measure temperatures on pipe surfaces including cable ties for Ø 10 – 75 mm and thermal pad.
Please include clamping strap with your order.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting and temperature unit can be set via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch.

Note: scale only – please observe rated media temperature (see below)

-50 °C – 200 °C	-20 °C – 150 °C	-50 °C – 50 °C
-20 °C – 80 °C	-30 °C – 60 °C	0 °C – 40 °C
0 °C – 50 °C	**0 °C – 100 °C***	0 °C – 150 °C
0 °C – 200 °C	***Factory settings**	

Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC/DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-50 – 120 °C**
Nominal diameter:	with two cable ties for tube diameter ø 10 – 75 mm or depending on the selected clamping strap
Sensor element:	PT1000
Housing:	IP 65 including seal, Plastic grey/yellow
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm^2

OPP-SENS® Contact temperature sensors

	Type	Item no.	ADG	Euro/pc.
Basic analog transmitter 2-wire / 3-wire switchable (0 – 10 V / 4 – 20 mA switchable) without 5P calibration				
without display	**T-T-CO**	102 865	22	**64.00**
with display**	**T-T-CO-D**	103 700	22	**113.00**
5P Transmitter with 5-point calibration				
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**T-TC5P-CO**	103 036	22	**69.00**
with display	**T-TC5P-CO-D**	103 704	22	**118.00**
Current-/Voltage transmitter (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**T-T5P-CO**	103 037	22	**69.00**
with display	**T-T5P-CO-D**	103 705	22	**118.00**
Modbus transmitter (Modbus RTU)				
without display*	**T-MOD-CO**	103 038	22	**89.50**
with display	**T-MOD-CO-D**	103 715	22	**138.50**
BACnet transmitter (MS/TP)				
without display*	**T-BAC-CO**	103 039	22	**89.50**
with display	**T-BAC-CO-D**	103 725	22	**138.50**

Data sheet no. 20905

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

Option display see page 2.21

Folding hinge

	Type	Item no.	ADG	Euro/pc.
Accessories				
Clamping straps				
chrome steel, with folding hinge for ø 60 – 110 mm	**SB-K01**	103 619	22	**2.60**
stainless steel, without folding hinge for ø 16 – 25 mm	**SB-01**	103 618	22	**0.50**
For other diameters on request				

Data sheet no. 20905

OPP-SENS® External temperature sensors

	Type	Item no.	ADG	Euro/pc.
OPP-SENS® External temperature sensor (active) for measuring the outside temperature, the temperature in humid conditions, such as cooling / greenhouses. **Illuminated display, indicator & control unit** with **autoadapt** and **capacitive buttons (Option).** The duration of lighting, contrast, display (temperature, flow or alternating) and temperature unit can be set via the menu. **5-point calibration:** linear interpolation of the output curve over 5 user-defined points. **10 offset points:** linear shift of characteristic curve the output signal via 10-level rotary switch. **Captive lid** with **8-way positioning.**	**T-T...-OUT**	see following page	see following page	see following page

10 measurement ranges can be set using the rotary switch.

-50 °C – 200 °C	-20 °C – 150 °C	-50 °C – 50 °C
-20 °C – 80 °C	-30 °C – 60 °C	0 °C – 40 °C
0 °C – 50 °C	**0 °C – 100 °C***	0 °C – 150 °C
0 °C – 200 °C	***Factory settings**	

Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC / DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Perm. Ambient temperature:	**-20 – 70 °C**
Sensor element:	PT1000
Housing:	IP 65 including seal, Plastic housing dark grey, ring available in yellow or grey, Specify the color in the order.
Cable gland:	M16
Terminals:	Spring terminals 0.2 – 1.5 mm²

OPP-SENS® External temperature sensor

	Type	Item no.	ADG	Euro/pc.
Basic analog transmitter 2-wire / 3-wire switchable (0 – 10 V / 4 – 20 mA switchable) without 5P calibration				
without display	**T-T-OUT**	102 871	22	**80.50**
with display**	**T-T-OUT-D**	103 701	22	**129.00**
5P Transmitter with 5-point calibration				
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**T-TC5P- OUT**	103 032	22	**85.50**
with display	**T-TC5P-OUT-D**	103 702	22	**134.50**
Current-/Voltage transmitter (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**T-T5P- OUT**	103 033	22	**85.50**
with display	**T-T5P-OUT-D**	103 703	22	**134.50**
Modbus transmitter (Modbus RTU)				
without display*	**T-MOD- OUT**	103 034	22	**106.00**
with display	**T-MOD- OUT-D**	103 714	22	**154.50**
BACnet transmitter (MS/TP)				
without display*	**T-BAC- OUT**	103 035	22	**106.00**
with display	**T-BAC- OUT-D**	103 724	22	**154.50**

Data sheet no. 20908

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

Option display see page 2.21

OPP-SENS® External temperature sensor

OPP-SENS® External temperature sensor (passive)
for measuring the outside temperature, the temperature in humid conditions, such as cooling / greenhouses.
Captive lid with **8-way positioning.**
Dimensions: ø 90 x 45 mm
Housing: IP 65 including seal, Plastic grey/yellow
Cable gland: M16
Terminals: Spring terminals 0.2 – 1.5 mm²
Perm. Ambient temperature: -25 – 85 °C
Perm. Medium temperature: -25 – 85 °C

	Type	Item no.	ADG	Euro / pc.
	T-xxx-OUT			
KP10 2732 mV/0 °C, (Kieback&Peter)	**T-KP10-OUT**	102 870	22	**17.00**
NI 1000 (DIN)	**T-NI1000-OUT**	103 018	90	**15.00**
NI 1000 LG (Siemens)	**T-NI1000LG-OUT**	103 019	22	**15.00**
NTC 1,8 (Schneider Electric)	**T-NTC1,8-OUT**	103 020	22	**13.00**
NTC 10 AN (Andover)	**T-NTC10AN-OUT**	103 022	22	**15.00**
NTC 10 (Trend)	**T-NTC10-OUT**	103 021	22	**13.00**
NTC 10 C (Carel)	**T-NTC10C-OUT-s**	103 448	80	**27.50**
NTC 10KB (Satchwell)	**T-NTC10KB-OUT**	103 023	22	**34.50**
NTC 20 (Honeywell)	**T-NTC20-OUT**	103 024	22	**13.00**
PT 1000 (Honeywell, Danfoss)	**T-PT1000-OUT**	103 026	90	**13.00**
PT 100 (EN 60751/B)	**T-PT100-OUT**	103 025	22	**13.00**

Data sheet no. 20907

Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.
Article number and delivery time on request.

PT100 and PT1000 are also available in accuracy categories EN60751 F0.1 (1/3DIN: 1/3D) and F0.15 (Class A: CLA).
Surcharge F0.1 (1/3DIN: 1/3D): € 4 per item (Special sensor).
Surcharge F0.15 (Class A: CLA): € 2.80 per item (Special sensor).

3-wire design type T-…-I-…-3Ws (Special sensor), surcharge each € 2 per meter.
4-wire design type T-…-I-…-4Ws (Special sensor), surcharge each € 2 per meter.

Measuring ranges and characteristics see page 2.56

Accessories: OPP-SENS®

	Type	Item no.	ADG	Euro/pc.
	**D**	103 040	22	**49.00**

OPP-SENS® Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.**
Fits all round **OPP-SENS®**-sensors with connection heads with active outputs. The unit is fitted with ribbon cable and a reverse polarity connector on the electronics board and is ready for operation without adjustment (autoadapt).
The corresponding menu for the transmitter is automatically displayed.
The unit is illuminated (only with 3-wire connection) and has capacitive buttons.
The duration of lighting, contrast and temperature settings can be adjusted via the menu.
With the bus transmitters, all parameters such as bus addresses, baud rate, etc. can be set directly.
Also, the 5-point calibration is performed via this unit.
IP 65 protection due to the integrated seal.

For configuration and calibration:
Multiple sensors can be configured one after another using one unit and then operated with the normal cover closed.

Operation as actual value display:
The display permanently replaces the cover.

Data sheet no. 20902

	**PROG-MOD-01**	103 641	22	**97.00**

OPP-SENS® parameter programming tool
For fast programming of Modbus parameters.
Matches all **OPP-SENS®** Modbus transmitters.
The parameter programming tool is plugged into the electronic circuit board with a ribbon cable and a reverse-polarity-proof connector, and is operational without adjustment (auto-adapt). For programming purposes, the transmitter must have its own power supply.
Transmitters can be quickly configured for Modbus use with the parameter programming tool. Once a basic setting has been selected, only the Modbus address must be entered and transferred. The baud rate and parity, etc. are automatically programmed based on the selection.
This process saves time compared to programming parameters via display. The parameter programming tool can be used to sequentially program several sensors, which are then sealed with the standard lid and placed back into service.

Data sheet no. 20914

	**WTS**	102 405	01	**21.00**

Weather protection
Stainless steel
For devices and sensors of the series
OPP-SENS®, DD..., and HT-TGÜ
Dimensions: 120 x 140 x 75 mm (W x H x D)
Data sheet no. 20902

Accessories: OPP-SENS®
M12-BUS-SET

OPP-SENS® M12-BUS-SET.
The Oppermann M12-BUS-SET is an optional accessory available for all **OPP-SENS® Modbus- or BACnet transmitters.**

Please specify this add-on option in your purchase order if desired.

For this option, the factory pre-harnesses the bus transmitters for the connector and replaces the cable grommets with premium M12 connectors. In addition to the power supply, these also supply the plug-in ready bus cable and screen.
Bus transmitters are quickly and reliably connected to each other with the cable and connector accessory product line. This dramatically reduces the on-site assembly effort and minimizes the risk of wiring errors and the on-site effort to isolate defects.
Plug-and-play as your advantage.

Supplied scope:
– 1 x metal input connector M12-BUS
– 1 x metal output coupling M12-BUS
– Assembly input connector and output coupling
– Connection of 5 x leads with core ferrule (24V+, GND, BUS A, BUS B, screen) for output coupling
– Connection of 5 x leads with core ferrule (24V+, GND, BUS A, BUS B, screen) for input connector
– Function check

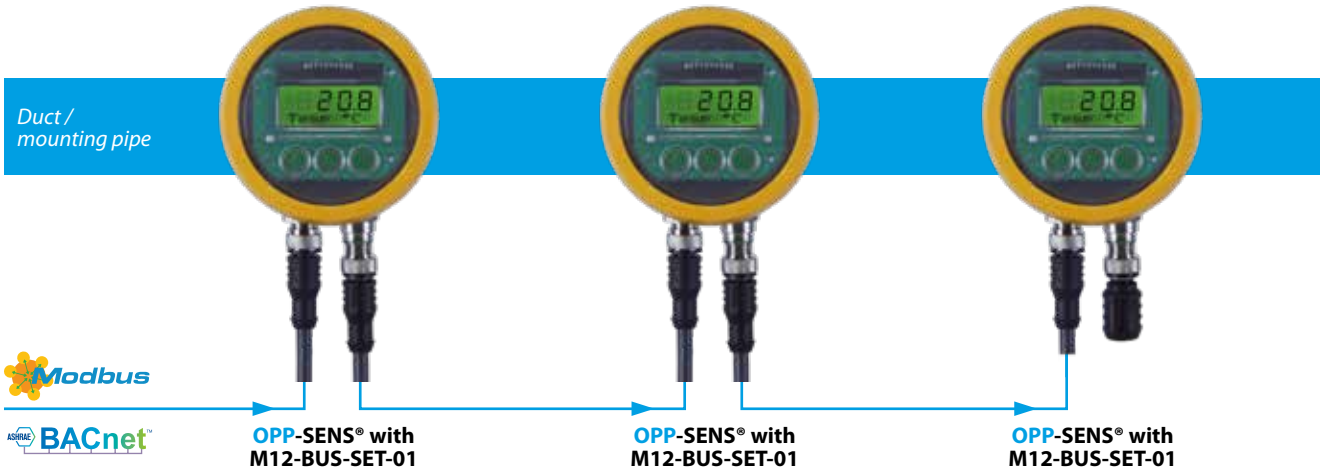
Data sheet no. 20920

Type	Item no.	ADG	Euro/pc.
M12-BUS-SET-01 NEW	104 139	22	**29.50**

Modbus

BACnet

M12-BUS-SET for OPP-SENS® Modbus or BACnet transmitter



Accessories: OPP-SENS®
M12-BUS-SET

		Type	Item no.	ADG	Euro/pc.
	Oppermann M12 accessories				
	**Starter cable M12-BUS** Connects the DDC to the first transmitter 5 x lead with core ferrule, 2 m cable 5 leads, screened, 1 x M12 coupling	NEW **M12-BUS-START-2M**	104 135	22	**20.00**
	**Interface cable M12-BUS** For interconnecting transmitters or as extension cable. Cable 5 leads, screened, 1 x M12 coupling, 1 x M12 connector				
	Cable, length 0,5 m	NEW **M12-BUS-CON-0,5M**	104 130	22	**23.50**
	Cable, length 1 m	NEW **M12-BUS-CON-1M**	104 131	22	**24.50**
	Cable, length 2 m	NEW **M12-BUS-CON-2M**	104 132	22	**27.50**
	Cable, length 5 m	NEW **M12-BUS-CON-5M**	104 133	22	**36.00**
	Cable, length 10 m	NEW **M12-BUS-CON-10M**	104 134	22	**50.00**
	**Wall cable M12-BUS** Connects transmitter through wall, etc. onto customer-installed box 5 x lead with core ferrule, 2 m cable 5 leads, screened, 1 x M12 connector	NEW **M12-BUS-EXT-2M**	104 136	22	**20.00**
	**Protective cap M12-BUS** Termination cap (dust protection) for last transmitter. Fits on M12 coupling.	NEW **M12-BUS-CAP**	104 138	22	**1.50**
	**Termination connector M12-BUS-120 ohm** Termination cap (dust protection) for last transmitter – includes 120 ohm terminating resistor. Only required if the internal add-in resistor in the OPP-SENS® is not used. Fits on M12 coupling.	NEW **M12-BUS-120Ω**	104 137	22	**14.00**
	Data sheet no. 20920				

Oppermann Safecabling® NEW

What is Oppermann Safecabling®?

Oppermann Safecabling® represents Oppermann's latest generation of OPP-SENS® transmitters (analog and bus version) with complete internal reverse polarity protection.

We have all seen this happen at the construction site: for instance the power supply and measurement output are inadvertently reversed. Or the power supply is wired to the bus. Until now this has meant „certain death" for the transmitter. We have now put an end to this!

All Oppermann OPP-SENS® transmitters displaying the Oppermann Safecabling® logo are reverse polarity proof and can deal with all sorts of wiring errors without being damaged. Only 230 V or a lightning strike can continue to negatively impact the transmitter.

A true innovation that will win you over! Finally an end to defects and complaints due to installations defects and wiring errors. And all of this at no surcharge!

OPP-SENS® transmitters with Oppermann Safecabling are identifiable by the SC logo:

OPP-SENS® Air duct temperature sensors

OPP-SENS® Air duct temperature sensor (passive), average value for the measurement of average temperatures in ventilation ducts.
Fully active flexible sensor probe.
Measurement of the average value over the entire length.
Captive lid with **8-way positioning.**

Mounting clamps separately available (see below).

Perm. Ambient temperature:	-25 – 60 °C
Perm. Medium temperature:	**-30 – 105 °C**
Nominal diameter:	ø 6 mm
Sensor length:	See table
Sensors:	See table
Installation:	air duct mounting flange F-6 (included in scope of delivery)
Housing:	IP 65 including seal, Plastic grey / yellow
Cable gland:	M16
Terminals:	Spring terminals

	Type	Item no.	ADG	Euro / pc.
NI1000				
Sensor length 400 mm	**TA-NI1000-I-400**	103 057	22	**91.00**
Sensor length 3,000 mm	**TA-NI1000-I-3000**	103 049	22	**119.00**
Sensor length 6,000 mm	**TA-NI1000-I-6000**	103 065	22	**139.00**
NI1000LG (Siemens)				
Sensor length 400 mm	**TA-NI1000LG-I-400**	103 058	22	**91.00**
Sensor length 3,000 mm	**TA-NI1000LG-I-3000**	103 050	22	**119.00**
Sensor length 6,000 mm	**TA-NI1000LG-I-6000**	103 055	22	**139.00**
PT1000 (Honeywell, Danfoss)				
Sensor length 400 mm	**TA-PT1000-I-400**	103 060	22	**91.00**
Sensor length 3,000 mm	**TA-PT1000-I-3000**	103 052	22	**119.00**
Sensor length 6,000 mm	**TA-PT1000-I-6000**	103 053	22	**139.00**
PT100 (EN 60751/B)				
Sensor length 400 mm	**TA-PT100-I-400**	103 059	22	**91.00**
Sensor length 3,000 mm	**TA-PT100-I-3000**	103 067	22	**119.00**
Sensor length 6,000 mm	**TA-PT100-I-6000**	103 066	22	**139.00**
Data sheet no. 20906				

Order code: TA-**Sensor device**-I-**Length**
Example: TA-**NI1000**-I-**3000**: Sensor device Ni1000, Sensor length 3,000 mm

Note: Further characteristics and lengths on request.
Measuring ranges and characteristics see page 2.56

Mounting clamp (1 Item) — **MK** — 101 196 — 22 — **0.90**
for average sensor

Note: Per sensor with a sensor length of 3,000 mm we recommend 4 MK installation clamps.
Per sensor with a sensor length of 6,000 mm we recommend 6 MK installation clamps.
The number of installation clamps may vary depending on the number of turns.
Data sheet no. 20906

OPP-SENS® Air duct temperature sensors

OPP-SENS® Air duct temperature sensor (active), average value for the measurement of average temperatures in ventilation ducts.
Fully active flexible sensor probe.
Measurement of the average value over the entire length.
Captive lid with **8-way positioning.**

Mounting clamps separately available (see below).

Perm. Ambient temperature:	-25 – 60 °C
Perm. Medium temperature:	**-30 – 105 °C**
Nominal diameter:	ø 6 mm
Installation:	air duct mounting flange F-6 (included in scope of delivery)
Housing:	IP 65 including seal, Plastic grey / yellow
Cable gland:	M16
Terminals:	Spring terminals
4 measuring ranges (adjustable):	-50 – 50 °C
*Factory setting	0 – 50 °C
	0 – 100 °C*
	0 – 150 °C
Current transmitter (2-wire)	
Supply:	24 V DC
Output:	4 – 20 mA
Voltage transmitter (3-wire)	
Supply:	24 V AC / DC
Output:	0 – 10 V

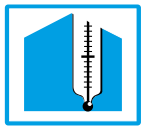
	Type	Item no.	ADG	Euro / pc.
Current transmitter (2-wire, 4 – 20 mA)				
Sensor length 400 mm	**TA-TC-I-400**	103 069	22	**149.00**
Sensor length 3,000 mm	**TA-TC-I-3000**	103 061	22	**169.00**
Sensor length 6,000 mm	**TA-TC-I-6000**	103 063	22	**199.00**
Current transmitter (3-wire, 0 – 10 V)				
Sensor length 400 mm	**TA-TV-I-400**	103 068	22	**149.00**
Sensor length 3,000 mm	**TA-TV-I-3000**	103 062	22	**169.00**
Sensor length 6,000 mm	**TA-TV-I-6000**	103 064	22	**199.00**
Data sheet no. 20906				
Order code: TA-**Analogue Output**-I-**Length**				
Example: TA-**TC**-I-**6000**: Current transmitter (2-wire), Output 4 – 20 mA, Sensor length 6,000 mm				
Note: Further lengths available on request.				
There are no displays, 5P calibration, no Safecabling and no Bus transmitter available for this sensor.				

Mounting clamp (1 Item) for average sensor	**MK**	101 196	22	**0.90**
Note: Per sensor with a sensor length of 3,000 mm we recommend 4 MK installation clamps. Per sensor with a sensor length of 6,000 mm we recommend 6 MK installation clamps. The number of installation clamps may vary depending on the number of turns.				
Data sheet no. 20906				

Dew point monitor and sensors

		Type	Item no.	ADG	Euro/pc.
	**Dew point monitor and sensor 24 V AC/DC** for the protection of cooling chamber ceilings against condesation, contact and analogue output, silicone-free design, springy supported dew point sensor that connects a relay with change-over contact at approx 85 % RH (max. 1 A 24 V AC / DC) An additional analogue signal 0 – 10 V is available for the range of 70 – 85 % RH Delivery includes tensioning belt for pipes up to ø 10 – 100 mm and heat-conductive paste. Dimensions: 60 x 60 x 33 mm (L x W x D) Protection class: IP 40 **Data sheet no. 15503**	**O-EGH 1.5**	101 317	02	**120.50**
	**Dew point monitor and sensor 24 V AC/DC** low cost version for chill protection against condensation, contact, and analogue output silicon free Execution, relay output (SPDT) with adjustable Set point (24 V AC / DC, 1 A). Additional analogue output 0 – 10 V. Delivery includes 2 cable straps for pipes from ø 10 – 100 mm. Dimensions: 85 x 95 x 50 mm (L x W x D) Protection class: IP 54 **Data sheet no. 15515**	**KA 10**	102 834	02	**93.00**

Typenschlüssel **OPP-ROOM®**
Raumfühlerprogramm
Type designation **OPP-ROOM®**



XX - XXXX - R - X - X

Produktgruppe I Product group

H	Humidity I Feuchte
HT	Humidity / Temperature I Feuchte / Temperatur
T	Temperature I Temperatur
CO_2T	CO_2 Carbon dioxide/ Temp. I CO_2 Kohlendioxid/Temp. ****
CO_2TRH	CO_2 Carbon dioxide/Temp./Humidity I CO_2 Kohlendioxid/Temp./Feuchte ****
IO	I/O-Module I I/O-Modul
C1	Controller, standard I Regler, Standard

Typ / Übertragung I Type / Transmission

TC	Transmitter Current I 4 – 20 mA
TV	Transmitter Voltage I 0 – 10 V
MOD	Modbus-Transmitter
BAC	BACnet-Transmitter
KP10	
NI1000	
NI1000LG	
NTC1,8	
NTC10	
NTC10AN	
NTC10C	
NTC10KB	
NTC20	
PT100	
PT1000	

Passive sensors I passive Sensoren
Characteristics and Terms
see page 2.56

Anwendungsbereich I Application

R	Room sensors I Raumfühler

Parameter I Parameter

D	Display (LCD) I Anzeige (LCD)
IO4	In- and outputs, number I In- und Outputs, Anzahl
IO9	In- and outputs, number I In- und Outputs, Anzahl

Optionen I Options

S5	Switch five step I Schalter, fünfstufig*
P1	Potentiometer, active I Potentiometer aktiv**
P2	Potentiometer, passive I Potentiometer passiv*
B	Button, momentary switch I Taster
L	LED I LED
PIR-LUX	Person-In-Room-Sensor + LUX-Sensor I Präsenz- + LUX-Helligkeitssensor***
...s	Special I Sonderfühler

* Only one option selectable, S5 or P2. No combination possible.
** Only for Modbus or BACnet transmitters.
*** Option PIR-LUX cannot be combined with options S5, P1, P2, B or L.
**** CO_2 air quality sensors are not combinable with all of the above-named options.
The available combinations are listed in the Sensors PG1 section starting on page 1.36.

OPP-ROOM® Room temperature sensors

	Type	Item no.	ADG	Euro/pc.
OPP-ROOM® Room temperature sensor (passive) For measuring interior air temperatures. Measurement range: 0 – 50 °C Perm. Ambient conditions: -30 – 70 °C, 0 – 95 % RH (non-condensing) Housing: Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted Dimensions: 86 x 120 x 25 mm (L x W x D) Terminals: Screw terminals 0.05 – 1.5 mm²	**T-xxx-R-xx**	see table below	see table below	see table below
Options:				
LED (green), for 24 V AC/DC external	**T-xxx-R-L**	see table	see table	see table
Button (changeover contact), for 24 V AC/DC, 0.1 A external	**T-xxx-R-B**	see table	see table	see table
Button and LED (green)	**T-xxx-R-BL**	see table	see table	see table

Data sheet no. 20520

Room sensor type	ADG	Standard version (Euro/pc.)			
		-R Room sensor	-R-L with LED	-R-B with button	-R-BL with button and LED
T-KP10 Item no.	23	**17.50** 103 851	**27.50** 103 852	**28.50** 103 853	**38.50** 103 854
T-NI1000 Item no.	23	**16.50** 103 839	**26.50** 103 840	**27.00** 103 841	**37.50** 103 842
T-NI1000LG Item no.	23	**16.50** 103 827	**26.50** 103 828	**27.00** 103 829	**37.50** 103 830
T-NTC1,8 Item no.	23	**14.50** 103 815	**24.50** 103 816	**25.00** 103 817	**35.50** 103 818
T-NTC10 Item no.	23	**15.50** 103 803	**25.50** 103 804	**26.00** 103 805	**36.50** 103 806
T-NTC10AN Item no.	23	**15.50** 103 791	**25.50** 103 792	**26.00** 103 793	**36.50** 103 794
T-NTC10C…-s Item no.	80	**39.00** 103 779	**48.90** 103 780	**49.60** 103 781	**59.50** 103 782
T-NTC10KB Item no.	23	**32.50** 103 767	**43.00** 103 768	**43.50** 103 769	**53.50** 103 770
T-NTC20 Item no.	23	**15.50** 103 755	**25.50** 103 756	**26.00** 103 757	**36.50** 103 758
T-PT100 Item no.	23	**15.50** 103 743	**25.50** 103 744	**26.00** 103 745	**36.50** 103 746
T-PT1000 Item no.	23	**15.50** 103 742	**25.50** 103 741	**26.00** 103 740	**36.50** 103 733

Sensor characteristics see page 2.56

Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.
Article number and delivery time on request.

OPP-ROOM® Room temperature sensors

		Type	Item no.	ADG	Euro/pc.
OPP-ROOM® Room temperature sensor (passive),		**T-xxx-R-P2xx**	see table below	see table below	see table below
For measuring interior air temperatures.					
Measurement range:	0 – 50 °C				
Perm. Ambient conditions: (non-condensing)	-30 – 70 °C, 0 – 95 % RH				
Housing:	Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted				
Dimensions:	86 x 120 x 25 mm (L x W x D)				
Terminals:	Screw terminals 0.05 – 1.5 mm²				
Options:					
LED (green), for 24 V AC/DC external		**T-xxx-R-P2L**	see table	see table	see table
Button (changeover contact), for 24 V AC/DC, 0.1 A external		**T-xxx-R-P2B**	see table	see table	see table
Button and LED (green)		**T-xxx-R-P2BL**	see table	see table	see table

Data sheet no. 20520

Room sensor type	ADG	with setpoint potentiometer (Euro/pc.)			
		-R-P2 Room sensor with setpoint potentiometer (basic)	**-R-P2L** Room sensor with setpoint potentiometer and LED	**-R-P2B** Room sensor with setpoint potentiometer and button	**-R-P2BL** Room sensor with setpoint potentiometer, button and LED
T-KP10 Item no.	23	**28.00** 103 855	**38.00** 103 856	**38.50** 103 857	**49.00** 103 858
T-NI1000 Item no.	23	**26.50** 103 843	**37.00** 103 844	**37.50** 103 845	**47.50** 103 846
T-NI1000LG Item no.	23	**26.50** 103 831	**37.00** 103 832	**37.50** 103 833	**47.50** 103 834
T-NTC1,8 Item no.	23	**24.50** 103 819	**35.00** 103 820	**35.50** 103 821	**45.50** 103 822
T-NTC10 Item no.	23	**25.50** 103 807	**36.00** 103 808	**36.50** 103 809	**46.50** 103 810
T-NTC10AN Item no.	23	**25.50** 103 795	**36.00** 103 796	**36.50** 103 797	**46.50** 103 798
T-NTC10C…-s Item no.	80	**49.10** 103 783	**59.00** 103 784	**59.70** 103 785	**69.60** 103 786
T-NTC10KB Item no.	23	**43.00** 103 771	**53.00** 103 772	**54.00** 103 773	**64.00** 103 774
T-NTC20 Item no.	23	**25.50** 103 759	**36.00** 103 760	**36.50** 103 761	**46.50** 103 762
T-PT100 Item no.	23	**25.50** 103 747	**36.00** 103 748	**36.50** 103 749	**46.50** 103 750
T-PT1000 Item no.	23	**25.50** 103 739	**36.00** 103 738	**36.50** 103 737	**46.50** 103 731

Sensor characteristics see page 2.56

Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.
Article number and delivery time on request.
Option P2 by default with 10 kΩ potentiometer. Other values available, incl. versions with in-series resistors.
For this purpose please use our "Custom sensor" order form.
Custom sensor order form (Download only available online)

OPP-ROOM® Room temperature sensors

OPP-ROOM® Room temperature sensor (passive)
With 5-way switch (24 V AC/DC, 0.1 A) external.
Switching positions are configured without resistors (see sketch below).
For measuring interior air temperatures.
Measurement range: 0 – 50 °C
Perm.
Ambient conditions: -30 – 70 °C, 0 – 95 % RH (non-condensing)
Housing: Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted
Dimensions: 86 x 120 x 25 mm (L x W x D)
Terminals: Screw terminals 0.05 – 1.5 mm²

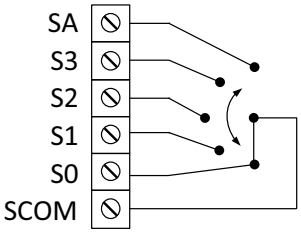
Options:

	Type	Item no.	ADG	Euro/pc.
	T-xxx-R-S5xx	see table below	see table below	see table below
LED (green), for 24 V AC/DC external	**T-xxx-R-S5L**	see table	see table	see table
Button (changeover contact), for 24 V AC/DC, 0.1 A external	**T-xxx-R-S5B**	see table	see table	see table
Button and LED (green)	**T-xxx-R-S5BL**	see table	see table	see table

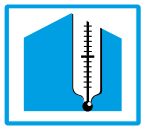
Data sheet no. 20520

Room sensor type	ADG	with 5-way-switch (Euro/pc.)			
		-R-S5 Room sensor with 5-way switch	**-R-S5L** Room sensor with 5-way switch and LED	**-R-S5B** Room sensor with 5-way switch and button	**-R-S5BL** Room sensor with 5-way switch, button and LED
T-KP10 Item no.	23	**31.00** 103 859	**41.50** 103 860	**42.00** 103 861	**52.00** 103 862
T-NI1000 Item no.	90	**30.00** 103 847	**40.00** 103 848	**41.00** 103 849	**51.00** 103 850
T-NI1000LG Item no.	23	**30.00** 103 835	**40.00** 103 836	**41.00** 103 837	**51.00** 103 838
T-NTC1,8 Item no.	23	**28.00** 103 823	**38.00** 103 824	**39.00** 103 825	**49.00** 103 826
T-NTC10 Item no.	23	**29.00** 103 811	**39.00** 103 812	**40.00** 103 813	**50.00** 103 814
T-NTC10AN Item no.	23	**29.00** 103 799	**39.00** 103 800	**40.00** 103 801	**50.00** 103 802
T-NTC10C…-s Item no.	80	**52.40** 103 787	**62.30** 103 788	**63.00** 103 789	**72.90** 103 790
T-NTC10KB Item no.	23	**46.50** 103 775	**56.50** 103 776	**57.00** 103 777	**67.50** 103 778
T-NTC20 Item no.	23	**29.00** 103 763	**39.00** 103 764	**40.00** 103 765	**50.00** 103 766
T-PT100 Item no.	23	**29.00** 103 751	**39.00** 103 752	**40.00** 103 753	**50.00** 103 754
T-PT1000 Item no.	90	**29.00** 103 736	**39.00** 103 735	**40.00** 103 734	**50.00** 103 732

Sensor characteristics see page 2.56
Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.
Article number and delivery time on request.
Option S5 also available with resistor network.
For this purpose please use our Custom sensor order form
Custom sensor order form (Download only available online)



OPP-ROOM® Room temperature sensors optionally with occupancy + LUX brightness sensor



OPP-ROOM® Room temperature sensor (active)
For measuring interior air temperatures.
Optionally with occupancy + LUX brightness sensor.
Also available with LCD display
Color change (alarm function):
Backlighting changes its color when a pre-programmed alarm threshold is reached (white - yellow - red), adjustable brightness.

The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings.

Supply voltage: 24 V AC/DC
Measurement range: 0 – 50 °C,
0 – 3,000 LUX (option PIR-LUX)
Perm.
Ambient conditions: -30 – 70 °C, 0 – 95 % RH (non-condensing)
Housing: Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted
Dimensions: 86 x 120 x 25 mm (L x W x D)
Terminals: Screw terminals 0.05 – 1.5 mm²

	Type	Item no.	ADG	Euro/pc.
Voltage transmitter 3-wire, Output 0 – 10 V				
without display	**T-TV-R**	103 868	23	**48.00**
with display	**T-TV-R-D**	103 872	23	**77.50**
Current transmitter 3-wire, Output 4 – 20 mA				
without display	**T-TC-R**	103 876	23	**55.50**
with display	**T-TC-R-D**	103 880	23	**85.00**
Modbus transmitter (Modbus RTU)				
without display	**T-MOD-R**	103 894	23	**73.50**
with display	**T-MOD-R-D**	103 898	23	**103.00**
BACnet transmitter (MS/TP)				
without display	**T-BAC-R**	103 902	23	**73.50**
with display	**T-BAC-R-D**	103 906	23	**103.00**
Options:				
Button (illuminated)	**xxx-BL**	see table	see table	see table
Setpoint potentiometer active (only Modbus and BACnet)	**xxx-P1**	see table	see table	see table
Setpoint potentiometer passive (10 kΩ, on current/voltage output)	**xxx-P2**	see table	see table	see table
Occupancy + LUX brightness sensor	**xxx-PIR-LUX**	see table	see table	see table

Data sheet no. 20521
BACnet-Protocol OPP-ROOM
(Download only available online)

OPP-ROOM® USB configuration cable
For connecting active **OPP-ROOM®** transmitters with the PC. Needed to configure the transmitter with OR-C software.

	CAB-02	103 918	23	**92.00**

OPP-ROOM® Room temperature sensors optionally with occupancy + LUX brightness sensor

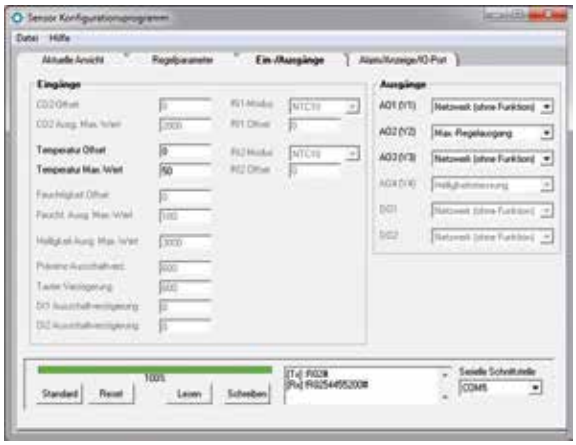
Transmitter-Typ without display	ADG	(Euro/pc.) -R Room sensor basic version	-R-P1** -R-P2** Room sensor with setpoint potentiometer	-R-BL Room sensor with button	-R-P1BL** -R-P2BL** Room sensor with setpoint potentiometer and button	-R-PIR-LUX*** Room sensor with occupancy and LUX brightness sensor
T-TV Voltage transmitter	23	48.00	58.50	76.50	87.00	124.50
Item no.		103 868	103 867	103 866	103 865	103 997
T-TC Current transmitter	23	55.50	65.50	84.00	94.00	132.00
Item no.		103 876	103 875	103 874	103 873	103 999
T-MOD Modbus transmitter	23	73.50	93.00	102.00	121.50	150.00
Item no.		103 894	103 893	103 892	103 891	104 001
T-BAC BACnet-Transmitter	23	73.50	93.00	102.00	121.50	150.00
Item no.		103 902	103 901	103 900	103 899	104 003

Transmitter-Typ with display	ADG	-R-D Room sensor basic version	-R-D-P1** -R-D-P2** Room sensor with setpoint potentiometer	-R-D-BL Room sensor with button	-R-D-P1BL** -R-D-P2BL** Room sensor with setpoint potentiometer and button	-R-D-PIR-LUX*** Room sensor with occupancy and LUX brightness sensor
T-TV Voltage transmitter	23	77.50	88.00	106.50	116.50	154.00
Item no.		103 872	103 871	103 870	103 869	103 998
T-TC Current transmitter	23	85.00	95.00	113.50	123.50	161.50
Item no.		103 880	103 879	103 878	103 877	104 000
T-MOD Modbus transmitter	23	103.00	122.50	132.00	151.00	179.50
Item no.		103 898	103 897	103 896	103 895	104 002
T-BAC BACnet transmitter	23	103.00	122.50	132.00	151.00	179.50
Item no.		103 906	103 905	103 904	103 903	104 004

** P1 setpoint potentiometer active (only for bus transmitters)
P2 setpoint potentiometer passive (10 kΩ) only for voltage and current transmitters.
*** Option PIR-LUX cannot be combined with options S5, P1, P2, B, L or BL (see OPP-ROOM type codes page 2.27).

OR-C configuration software

The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings.



Download OR-C software with documentation (Download only available online)

OPP-ROOM® Room temperature controller

	Type	Item no.	ADG	Euro/pc.

OPP-ROOM® Room temperature controller
To control room temperature (heating and cooling).
Including setpoint potentiometer (active) to adjust the desired room temperature.
Also available with LCD display
The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings.

Supply voltage:	24 V AC/DC
Measurement range:	0 – 50 °C
Perm. Ambient conditions: (non-condensing)	-30 – 70 °C, 0 – 95 % RH
Housing:	Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted
Dimensions:	86 x 120 x 25 mm (L x W x D)
Terminals:	Screw terminals 0.05 – 1.5 mm²
Dead zone:	0 – 3 °C
P band:	1 – 25 °C
Setpoint potentiometer:	Adjustable range 18 – 24 °C Configurable center point
Inputs:	1 switching input (closer, potential-free) 1 NTC10 external (auto detect)
Outputs:	3 x 0 – 10 V DC (1x heating, 2 x cooling) 2 x DO (digital output – only with 24 AC power supply) Configurable on 3 way or PWM.

Analog version with output 0 – 10 V DC				
without display, with two LEDs (heating / cooling)	**C1-TV-R-P1L**	103 919	23	**61.50**
with display, without separate LEDs	**C1-TV-R-D-P1**	103 920	23	**91.00**
Modbus version (Modbus RTU)				
without display, with two LEDs (heating / cooling)	**C1-MOD-R-P1L**	103 921	23	**87.00**
with display, without separate LEDs	**C1-MOD-R-D-P1**	103 922	23	**116.50**
BACnet version (MS/TP)				
without display, with two LEDs (heating / cooling)	**C1-BAC-R-P1L**	103 923	23	**87.00**
with display, without separate LEDs	**C1-BAC-R-D-P1**	103 924	23	**116.50**

Data sheet no. 20530
BACnet-Protocol OPP-ROOM
(Download only available online)

OPP-ROOM® USB configuration cable
For connecting active **OPP-ROOM®** transmitters with the PC. Needed to configure the transmitter with OR-C software.

CAB-02	103 918	23	**92.00**

OPP-ROOM® Room humidity sensors

	Type	Item no.	ADG	Euro/pc.
  **OPP-ROOM® Room humidity sensor** For measuring interior relative humidity. **Also available with LCD display** Color change (alarm function): Backlighting changes its color when a pre-programmed alarm threshold is reached (white - yellow - red), adjustable brightness. The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings. Supply voltage: 24 V AC/DC Measurement range: 0 – 100 % RH Perm. Ambient conditions: -30 – 70 °C, 0 – 95 % RH (non-condensing) Housing: Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted Dimensions: 86 x 120 x 25 mm ((L x W x D) Terminals: Screw terminals 0.05 – 1.5 mm².				
Voltage transmitter 3-wire, Output 0 – 10 V				
without display	**H-TV-R**	104 095	23	**106.50**
with display	**H-TV-R-D**	104 096	23	**136.00**
Data sheet no. 20541				
 **OPP-ROOM® USB configuration cable** For connecting active **OPP-ROOM®** transmitters with the PC. Needed to configure the transmitter with OR-C software.	**CAB-02**	103 918	23	**92.00**

OPP-ROOM® Room humidity-temperature sensors optionally with occupancy + LUX brightness sensor

OPP-ROOM® Room humidity-temperature sensor
For measuring interior relative humidity and air temperatures.
Optionally with occupancy + LUX brightness sensor.
Also available with LCD display
Color change (alarm function):
Backlighting changes its color when a pre-programmed alarm threshold is reached (white - yellow - red), adjustable brightness.

The OR-C configuration software must be used to assign sensor metrics to outputs, to program simple control parameters, the display, for wall calibration, and any expanded bus settings.

Supply voltage:	24 V AC/DC
Measurement range:	0 – 100 % RH, 0 – 50 °C, 0 – 3,000 LUX (option PIR-LUX)
Perm.	
Ambient conditions:	-30 – 70 °C, 0 – 95 % RH (non-condensing)
Housing:	Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted
Dimensions:	86 x 120 x 25 mm (L x W x D)
Terminals:	Screw terminals 0.05 – 1.5 mm²

	Type	Item no.	ADG	Euro/pc.
Voltage transmitter 3-wire, Output 0 – 10 V				
without display	**HT-TV-R**	103 908	23	**116.50**
without display, with occupancy + LUX brightness sensor	**HT-TV-R-PIR-LUX**	104 005	23	**193.00**
with display	**HT-TV-R-D**	103 907	23	**146.00**
with display, with occupancy + LUX brightness sensor	**HT-TV-R-D-PIR-LUX**	104 006	23	**222.50**
Modbus transmitter (Modbus RTU)				
without display	**HT-MOD-R**	103 910	23	**142.00**
without display, with occupancy + LUX brightness sensor	**HT-MOD-R-PIR-LUX**	104 007	23	**218.50**
with display	**HT-MOD-R-D**	103 909	23	**171.50**
with display, with occupancy + LUX brightness sensor	**HT-MOD-R-D-PIR-LUX**	104 008	23	**248.00**
BACnet transmitter (MS/TP)				
without display	**HT-BAC-R**	103 912	23	**142.00**
without display, with occupancy + LUX brightness sensor	**HT-BAC-R-PIR-LUX**	104 009	23	**218.50**
with display	**HT-BAC-R-D**	103 911	23	**171.50**
with display, with occupancy + LUX brightness sensor	**HT-BAC-R-D-PIR-LUX**	104 010	23	**248.00**

Data sheet no. 20540
BACnet-Protocol OPP-ROOM
(Download only available online)

OPP-ROOM® USB configuration cable
For connecting active **OPP-ROOM®** transmitters with the PC. Needed to configure the transmitter with OR-C software.

	CAB-02	103 918	23	**92.00**

OPP-ROOM® I/O module

	Type	Item no.	ADG	Euro/pc.
	**OPP-ROOM® I/O module** For connecting external analog portable devices and room sensors, conversion to Modbus or BACnet. Display not possible. Supply voltage: 24 V AC/DC Perm. Ambient conditions: -30 – 70 °C, 0 – 95 % RH (non-condensing) Housing: Plastic (ABS); IP20, White similar to RAL 9010, wall-mounted Dimensions: 86 x 120 x 25 mm (L x W x D) Terminals: Screw terminals 0.05 – 1.5 mm² **Version IO4:** Inputs: 2 x switching input (closer, potential-free) Outputs: 2 x DO digital outputs – only with 24 V AC supply voltage			
	Modbus transmitter (Modbus RTU)	**IO-MOD-R-IO4**	103 916	23	**127.50**
	BACnet transmitter (MS/TP)	**IO-BAC-R-IO4**	103 914	23	**127.50**
	Version IO9: Inputs: 2 x switching input (closer, potential-free) 2 x analog input (0 – 50 kΩ, e.g. for NTC) Outputs: 3 x 0 – 10 V DC 2 x DO digital outputs – only with 24 V AC supply voltage			
	Modbus transmitter (Modbus RTU)	**IO-MOD-R-IO9**	103 915	23	**153.00**
	BACnet transmitter (MS/TP)	**IO-BAC-R-IO9**	103 913	23	**153.00**
	Data sheet no. 20550 **BACnet-Protocol OPP-ROOM** **(Download only available online)**			
	**OPP-ROOM® USB configuration cable** For connecting active **OPP-ROOM®** transmitters with the PC. Needed to configure the transmitter with OR-C software.	**CAB-02**	103 918	23	**92.00**

OPP-SENS® External humidity sensors (relative humidity)

OPP-SENS® External humidity sensor (relative humidity)
For the measurement of relative humidity outside.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting and contrast can be configured via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

Output humidity:	0 – 100 % RH linear
Supply voltage:	24 V AC/DC
Output:	0 – 10 V or 4 – 20 mA switchable
Margin of error:	
Humidity	± 3 % RH at 25 °C for 20 – 80 % RH
Perm. Ambient temperature:	-20 – 70 °C
Housing:	IP 65 including seal, Plastic grey / yellow
Terminals:	Spring terminals 0.2 – 1.5 mm²
Cable gland:	M16

	Type	Item no.	ADG	Euro / pc.
Current-/Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**H-T-OUT**	104 103	22	**173.50**
with display	**H-T-OUT-D**	104 104	22	**222.50**

Data sheet no. 20916

	Type
OPP-SENS® External humidity sensor (relative humidity)	**H-...-OUT**

* To program/assign addresses and 5P calibration, a display must be used at least once.

OPP-SENS® External humidity temperature sensors (relative humidity)

	Type	Item no.	ADG	Euro/pc.
OPP-SENS® external humidity temperature sensor (relative humidity)	**HT-...-OUT**			
For the measurement of relative humidity and temperature outside.				
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast and temperature can be configured via the menu.				
5-point calibration: linear interpolation of the output curve over 5 user-defined points.				
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.				
Captive lid with **8-way positioning.**				
Output 1 humidity: 0 – 100 % RH linear				
Output 2 temperature: -50 – 50 °C linear				
Supply voltage:				
2-wire 24 V DC				
3-wire/Modbus/BACnet 24 V AC / DC				
Output:				
2-wire 4 – 20 mA				
3-wire 0 – 10 V or 4 – 20 mA switchable or Bus				
Margin of error:				
Humidity ±3 % RH at 25 °C for 20 – 80 % RH				
Temperature ±0.5 °C for 0 – 65 °C				
Perm. Ambient temperature: -20 – 70 °C				
Housing: IP 65 including seal, Plastic grey / yellow				
Terminals: Spring terminals 0.2 – 1.5 mm²				
Cable gland: M16				
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**HT-TC-OUT**	103 464	22	**184.00**
with display**	**HT-TC-OUT-D**	103 468	22	**233.00**
Current-/Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**HT-T-OUT**	103 463	22	**184.00**
with display	**HT-T-OUT-D**	103 467	22	**233.00**
Modbus transmitter (Modbus RTU)				
without display*	**HT-MOD-OUT**	103 465	22	**209.50**
with display	**HT-MOD-OUT-D**	103 469	22	**258.50**
BACnet transmitter (MS/TP)				
without display*	**HT-BAC-OUT**	103 466	22	**209.50**
with display	**HT-BAC-OUT-D**	103 470	22	**258.50**

Data sheet no. 20909

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

OPP-SENS® External humidity temperature sensors (absolute humidity)

OPP-SENS® external humidity temperature sensor (absolute humidity)
For the measurement of absolute humidity and temperature outside.
Illuminated display, indicator & control unit with **auto-adapt** and **capacitive buttons.** The duration of lighting, contrast and temperature can be configured via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:
0 – 15g/m³ 0 – 20g/m³ 0 – 35g/m³ **0 – 50g/m³***
0 – 100g/m³ 0 – 130g/m³ 0 – 150g/m³ 0 – 200g/m³
0 – 300g/m³ 0 – 500g/m³ ***Factory settings**

Measuring range temperature:	Factory settings -50 to 50 °C, with adjustable optional display between -50 and 100 °C
Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC / DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Margin of error:	
Humidity	± 3 % RH at 25 °C for 20 – 80 % RH
Temperature	± 0.5 °C for 0 – 65 °C
Perm. Ambient temperature:	-20 – 70 °C
Housing:	IP 65 including seal, Plastic grey / yellow
Terminals:	Spring terminals 0.2 – 1.5 mm²
Cable gland:	M16

	Type	Item no.	ADG	Euro / pc.
	HTa-...-OUT			
Current transmitter (2-wire, 4 – 20 mA)				
without display*	**HTa-TC-OUT**	103 504	22	**184.00**
with display**	**HTa-TC-OUT-D**	103 505	22	**233.00**
Current-/Voltage transmitter (3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**HTa-T-OUT**	103 506	22	**184.00**
with display	**HTa-T-OUT-D**	103 507	22	**233.00**
Modbus transmitter (Modbus RTU)				
without display*	**HTa-MOD-OUT**	103 508	22	**209.50**
with display	**HTa-MOD-OUT-D**	103 509	22	**258.50**
BACnet transmitter (MS/TP)				
without display*	**HTa-BAC-OUT**	103 510	22	**209.50**
with display	**HTa-BAC-OUT-D**	103 511	22	**258.50**

Data sheet no. 20911
BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).
** Display on the 2-wire models are not illuminated.

OPP-SENS® Duct humidity sensors (relative humidity)

OPP-SENS® duct humidity sensor (relative humidity)
for measurement of relative humidity in ventilation ducts.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast and temperature can be configured via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

Output 1 humidity:	0 – 100 % RH linear
Supply voltage:	24 V AC/DC
Output:	0 – 10 V or 4 – 20 mA switchable
Margin of error:	
Humidity	± 3 % RH at 25 °C for 20 – 80 % RH
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-40 – 100 °C**
Nominal diameter:	Stainless steel sleeve ø 10 mm
Mounting:	air duct mounting flange F-10 (included)
Housing:	IP 65 including seal, Plastic grey / yellow
Terminals:	Spring terminals 0.2 – 1.5 mm²
Cable gland:	M16

	Type	Item no.	ADG	Euro/pc.
	H-xxx-I-...			
Immersion length 50 – 150 mm:				
Current-/Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**H-T-I-150**	104 099	22	**145.00**
with display	**H-T-I-150-D**	104 100	22	**194.00**
Immersion length 200 – 400 mm:				
Current-/Voltage transmitter				
(3-wire, 0 – 10 V / 4 – 20 mA switchable)				
without display*	**H-T-I-400**	104 101	22	**163.50**
with display	**H-T-I-400-D**	104 102	22	**212.50**

Data sheet no. 20916

* To program/assign addresses and 5P calibration, a display must be used for once.

OPP-SENS® Duct humidity temperature sensors (relative humidity)

OPP-SENS® duct humidity temperature sensor (relative humidity)
for measurement of relative humidity and temperature in ventilation ducts.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast and temperature can be configured via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

Output 1 humidity:	0 – 100 % RH linear
Output 2 temperature:	-50 – 50 °C linear
Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC / DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Margin of error:	
Humidity	± 3 % RH at 25 °C for 20 – 80 % RH
Temperature	± 0.5 °C for 0 – 65 °C
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-40 – 100 °C**
Nominal diameter:	Stainless steel sleeve ø 10 mm
Mounting:	air duct mounting flange F-10 (included)
Housing:	IP 65 including seal, Plastic grey / yellow
Terminals:	Spring terminals 0.2 – 1.5 mm²
Cable gland:	M16

Type	Item no.	ADG	Euro / pc.
HT-xxx-I-...	see following page	see following page	see following page

OPP-SENS® Duct humidity temperature sensors (relative humidity)

		Type	Item no.	ADG	Euro/pc.
Immersion length 50 – 150 mm:					
Current transmitter (2-wire, 4 – 20 mA)					
without display*		**HT-TC-I-150**	102 856	22	**155.00**
with display**		**HT-TC-I-150-D**	102 857	22	**204.00**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**HT-T-I-150**	102 854	22	**155.00**
with display		**HT-T-I-150-D**	102 855	22	**204.00**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**HT-MOD-I-150**	102 858	22	**180.50**
with display	Modbus	**HT-MOD-I-150-D**	102 859	22	**229.50**
BACnet transmitter (MS/TP)					
without display*	BACnet	**HT-BAC-I-150**	102 919	22	**180.50**
with display	BACnet	**HT-BAC-I-150-D**	102 920	22	**229.50**
Immersion length 200 – 400 mm:					
Current transmitter (2-wire, 4 – 20 mA)					
without display*		**HT-TC-I-400**	103 313	22	**173.50**
with display**		**HT-TC-I-400-D**	103 314	22	**222.50**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**HT-T-I-400**	103 219	22	**173.50**
with display		**HT-T-I-400-D**	103 220	22	**222.50**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**HT-MOD-I-400**	103 276	22	**199.00**
with display	Modbus	**HT-MOD-I-400-D**	103 277	22	**248.00**
BACnet transmitter (MS/TP)					
without display*	BACnet	**HT-BAC-I-400**	103 474	22	**199.00**
with display	BACnet	**HT-BAC-I-400-D**	103 475	22	**248.00**

Data sheet no. 20909

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).
** Display on the 2-wire models are not illuminated.

OPP-SENS® Duct humidity temperature sensors (absolute humidity)

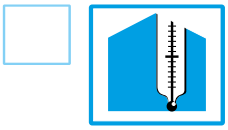
	Type	Item no.	ADG	Euro/pc.
	**HTa-xxx-l-...**	see following page	see following page	see following page

OPP-SENS® duct humidity temperature sensor (absolute humidity)
for measurement of relative humidity and temperature in ventilation ducts.
Illuminated display, indicator & control unit with **autoadapt** and **capacitive buttons.** The duration of lighting, contrast and temperature can be configured via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:
0 – 15 g/m³ 0 – 20 g/m³ 0 – 35 g/m³ **0 – 50 g/m³***
0 – 100 g/m³ 0 – 130 g/m³ 0 – 150 g/m³ 0 – 200 g/m³
0 – 300 g/m³ 0 – 500 g/m³ ***Factory settings**

Measuring range temperature:	Factory settings -50 to 50 °C, with adjustable optional display between -50 and 100 °C
Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC / DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Margin of error:	
Humidity	± 3 % RH at 25 °C for 20 – 80 % RH
Temperature	± 0.5 °C for 0 – 65 °C
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-40 – 100 °C**
Nominal diameter:	Stainless steel sleeve ø 10 mm
Mounting:	air duct mounting flange F-10 (included)
Housing:	IP 65 including seal, Plastic grey / yellow
Terminals:	Spring terminals 0.2 – 1.5 mm²
Cable gland:	M16

OPP-SENS® Duct humidity temperature sensors (absolute humidity)



		Type	Item no.	ADG	Euro/pc.
Immersion length 50 – 150 mm:					
Current transmitter (2-wire, 4 – 20 mA)					
without display*		**HTa-TC-I-150**	103 476	22	**155.00**
with display**		**HTa-TC-I-150-D**	103 477	22	**204.00**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**HTa-T-I-150**	103 478	22	**155.00**
with display		**HTa-T-I-150-D**	103 479	22	**204.00**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**HTa-MOD-I-150**	103 480	22	**180.50**
with display		**HTa-MOD-I-150-D**	103 481	22	**229.50**
BACnet transmitter (MS/TP)					
without display*	BACnet	**HTa-BAC-I-150**	103 482	22	**180.50**
with display		**HTa-BAC-I-150-D**	103 483	22	**229.50**
Immersion length 200 – 400 mm:					
Current transmitter (2-wire, 4 – 20 mA)					
without display*		**HTa-TC-I-400**	103 484	22	**173.50**
with display**		**HTa-TC-I-400-D**	103 485	22	**222.50**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**HTa-T-I-400**	103 486	22	**173.50**
with display		**HTa-T-I-400-D**	103 487	22	**222.50**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**HTa-MOD-I-400**	103 488	22	**199.00**
with display		**HTa-MOD-I-400-D**	103 489	22	**248.00**
BACnet transmitter (MS/TP)					
without display*	BACnet	**HTa-BAC-I-400**	103 490	22	**199.00**
with display		**HTa-BAC-I-400-D**	103 491	22	**248.00**

Data sheet no. 20911

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).
** Display on the 2-wire models are not illuminated.

OPP-SENS® Duct humidity temperature sensors (enthalpy)

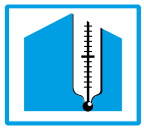
OPP-SENS®Duct humidity temperature Sensor (enthalpy)
For the measurement of enthalpy temperature in air ducts. The transmitter can be configured over the optional display, so that the absolute or relative humidity can be shown, instead of the enthalpy. The absolute pressure can also be adjusted via the display.
Illuminated display, indicator & control unit with **auto-adapt** and **capacitive buttons.** The duration of lighting, contrast and temperature can be configured via the menu.
5-point calibration: linear interpolation of the output curve over 5 user-defined points.
10 offset points: linear shift of characteristic curve the output signal via 10-level rotary switch.
Captive lid with **8-way positioning.**

10 measurement ranges can be set using the rotary switch:
0 – 50 kJ/kg 0 – 80 kJ/kg **0 – 100 kJ/kg*** 0 – 200 kJ/kg
0 – 400 kJ/kg 0 – 1,000 kJ/kg -50 – 50 kJ/kg -50 – 200 kJ/kg
-50 – 400 kJ/kg -50 – 1,000 kJ/kg ***Factory settings**

Measuring range temperature:	Factory settings -50 to 50 °C, with adjustable optional display between -50 and 100 °C
Supply voltage:	
2-wire	24 V DC
3-wire/Modbus/BACnet	24 V AC / DC
Output:	
2-wire	4 – 20 mA
3-wire	0 – 10 V or 4 – 20 mA switchable or Bus
Margin of error:	
Humidity	± 3 % RH at 25 °C for 20 – 80 % RH
Temperature	± 0.5 °C for 0 – 65 °C
Perm. Ambient temperature:	-20 – 70 °C
Perm. Medium temperature:	**-40 – 100 °C**
Nominal diameter:	Stainless steel sleeve ø 10 mm
Mounting:	air duct mounting flange F-10 (included)
Housing:	IP 65 including seal, Plastic grey / yellow
Terminals:	Spring terminals 0.2 – 1.5 mm²
Cable gland:	M16

Type	Item no.	ADG	Euro / pc.
HTx-xxx-I-...	see following page	see following page	see following page

OPP-SENS® Duct humidity temperature sensors (enthalpy)



		Type	Item no.	ADG	Euro/pc.
Immersion length 50 – 150 mm:					
Current transmitter (2-wire, 4 – 20 mA)					
without display*		**HTx-TC-I-150**	103 512	22	**277.50**
with display**		**HTx-TC-I-150-D**	103 513	22	**326.50**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**HTx-T-I-150**	103 514	22	**277.50**
with display		**HTx-T-I-150-D**	103 515	22	**326.50**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**HTx-MOD-I-150**	103 516	22	**303.00**
with display	Modbus	**HTx-MOD-I-150-D**	103 517	22	**352.00**
BACnet transmitter (MS/TP)					
without display*	BACnet	**HTx-BAC-I-150**	103 518	22	**303.00**
with display	BACnet	**HTx-BAC-I-150-D**	103 519	22	**352.00**
Immersion length 200 – 400 mm:					
Current transmitter (2-wire, 4 – 20 mA)					
without display*		**HTx-TC-I-400**	103 520	22	**296.00**
with display**		**HTx-TC-I-400-D**	103 521	22	**345.00**
Current-/Voltage transmitter					
(3-wire, 0 – 10 V / 4 – 20 mA switchable)					
without display*		**HTx-T-I-400**	103 522	22	**296.00**
with display		**HTx-T-I-400-D**	103 523	22	**345.00**
Modbus transmitter (Modbus RTU)					
without display*	Modbus	**HTx-MOD-I-400**	103 524	22	**321.50**
with display	Modbus	**HTx-MOD-I-400-D**	103 525	22	**370.50**
BACnet transmitter (MS/TP)					
without display*	BACnet	**HTx-BAC-I-400**	103 526	22	**321.50**
with display	BACnet	**HTx-BAC-I-400-D**	103 527	22	**370.50**

Data sheet no. 20912

BACnet-Protocol OPP-SENS (Download only available online)

* To program/assign addresses and 5P calibration, a display must be used at least once. Display on the 2-wire models are not illuminated. The PROG-MOD-01 parameter programming tool can be used alternatively to program Modbus parameters in Modbus transmitters (see catalog pages 1.11 and 2.21).

** Display on the 2-wire models are not illuminated.

Accessories: OPP-SENS®
Duct humidity temperature sensors

		Type	Item no.	ADG	Euro/pc.
	**Accessories: Sinter filters for humidity sensors** Protects sensors from pollution. External connections fit on all **OPP-SENS®** duct humidity sensors. Sinter filter plastic **Data sheet no. 20909**	**HT-SF2**	103 045	22	**14.50**
	**Weather protection** Stainless steel For devices and sensors of the series **OPP-SENS®**, DD..., and HT-TGÜ Dimensions: 120 x 140 x 75 mm (W x H x D) **Data sheet no. 20902**	**WTS**	102 405	01	**21.00**

Humidistats

Duct humidistat
for the monitoring and control of the relative humidity in air ducts or rooms. Readoutpotentiometer outside/inside with optional housing cover.

Measuring range:	15 – 95 % RH
Max. air speed:	10 m/s
Contact load:	max. 5 A, 230 V min. 10 mA at 24 V
Dimensions:	140 x 73 x 64 mm (L x W x D)
Adjustable from:	130 – 156 mm
Scope of delivery:	duct humidistat with mounting flange and cable gland M16

	Type	Item no.	ADG	Euro/pc.
2-point-EPU	**OPP-HBC 1.1**	101 303	02	**240.00**
3-point-EPU	**OPP-HBC 1.2**	101 304	02	**284.00**

Data sheet no. 20631

Housing cover for duct humidistat
with clear cover for higher protection class IP 55

	Type	Item no.	ADG	Euro/pc.
	GD 1.1	100 512	02	**42.50**

Data sheet no. 20631

Room humidistat
for the monitoring and control of the relative humidity in rooms.
Readoutpotentiometer outside or optionally inside.

Measuring range:	30 – 90 % RH
Dimensions:	76 x 76 x 34 mm (L x W x D incl. socket)
Colour:	RAL 9010

	Type	Item no.	ADG	Euro/pc.
Adjustment outside	**OPP-HSC 1.01**	101 305	02	**67.50**
Adjustment inside	**OPP-HSC 1.10**	101 306	02	**69.50**

Data sheet no. 20632

Antifreeze monitors

	Type	Item no.	ADG	Euro/pc.
 **Antifreeze monitor** to prevent freezing of air heaters. Capillaries filled with steam with accurate switching mechanism. Setting range: -18 – 13 °C Protection class with cover plate: IP 44 Electric change-over contact: 16 A, 250 V Cable connection: M16 strain-relieved Delivery includes mounting plate and capillary feedthrough Capillary pipe length 3 m without reset with 4 mounting clamps	**OPP-FRO 3**	101 287	02	**54.50**
Capillary pipe length 6 m without reset with 6 mounting clamps **Data sheet no. 20671**	**OPP-FRO 6**	101 291	02	**57.50**
 **Cover plate, sealing possible** **Data sheet no. 20671**	**AP**	101 295	02	**5.00**
 **Mounting plate** **Data sheet no. 20671**	**MP**	101 307	02	**1.50**
 **Mounting angle** **Data sheet no. 20671**	**OPP-MW**	101 308	02	**3.50**
 **Screws, sealing possible** for antifreeze monitors 6 pieces per bag **Data sheet no. 20671**	**SR**	101 309	02	**3.00**
 **Mounting clamp (spare part, 1 pc.)** for antifreeze and average value sensors **Data sheet no. 20671**	**MK**	101 196	02	**0.90**
 **Duct connection nipple, plastic** **(**for capillary feedthrough**)** **Data sheet no. 13101**	**6551**	102 628	01	**1.00**

Antifreeze controller

2-phase antifreeze control, downstream - with display
for monitoring temperature of air heaters against freezing. Copper capillary tube with precision switching mechanism and analog output 0 –10 V for proportional opening of control valves. The freeze protection monitor always responds to the coldest location of the capillary tube (min. immersion depth: 250 mm). Setpoint potentiometer, operating mode switch for „Auto“, „Test“, „Manual“, reset button, large display for operating mode and red LED for freeze warning.

Supply voltage:	24 V AC +10/-20 %; 50/60 Hz
Power consumption:	6.6 VA
Sensor/adjustable range:	0 – 15 °C/1 – 10 °C
Default setting:	5 °C
Switching differential:	approx. 2 k
Relay output	(changeover contact) max. 6 A, 230 V AC; 6 A, 24 V DC min. 5 mA, 5 V AC/DC
Input / output signal:	0 – 10 V max 1 mA each
Rated device head temp.:	-15 – 55 °C
Protection type/class:	IP 42; I
Time constant:	calm air 90 sec moving air < 40 sec
Capillary tube:	Rated temperature max. 110 °C
Electrical connections:	Spring clips max. 2 x 1.5 mm^2 or 1 x 2.5 mm^2
Delivered scope:	M16 cable gland, rubber grommet for feeding the capillary tubes through the duct and screw fasteners.

	Type	Item no.	ADG	Euro/pc.
Capillary tube length 2 m, with 4 mounting clamps	**OPP-FRO-S2**	101 297	02	**214.00**
Capillary tube length 6 m, with 6 mounting clamps	**OPP-FRO-S6**	101 298	02	**249.00**

Data sheet no. 20672

Mounting clamps (replacement part 1 pc.) for antifreeze and average value sensors	**MK**	101 196	02	**0.90**

Data sheet no. 20672

2-phase antifreeze control, water-side
for the proportional opening of control valves via the 0 – 10 V output signal and the shutdown of fans and pumps. For installation in control cabinets. Temperature sensors PT 1000 or NI 1000 LG, can be connected. With reset button, LED for antifreeze and LED for prewarning that flashes if the output signal for the valve drive is being raised. 2 relay outputs for the input to the automation station and for the shutdown of pumps and fans.

Dimensions:	90 x 53 x 60 mm (L x W x D) for DIN installation rail
Supply voltage:	24 V AC/DC, 2 VA
Measuring range:	0 – 16 °C
Proportional range:	2 °C fixed

	Type	Item no.	ADG	Euro/pc.
2-phase antifreeze control	**JVA 24**	100 966	02	**126.50**
2-phase antifreeze control with the possibility to keep a constant temperature in case of switched-off fans, e.g. on roof devices or start-up circuits / set point 0 – 50 °C	**JVS 24**	100 967	02	**131.00**

Data sheet no. 20670

Safety temperature limiter

Electromechanical safety temperature limiter
For use in heat generators and other HVAC applications. Intrinsically safe design. Rupture of the capillary tube causes the contact to open. After a temperature-triggered shutdown the sensor tube must be allowed to cool down by ca. 25 ± 5 K before manual reset becomes possible. There are various installation options: direct mounting on the immersion sleeve, raised mounting, mounting on the pipe or in the air duct.
If it is to be installed directly on the immersion sleeve, the safety temperature limiter (STB) / temperature monitor (TW) must be fastened on the immersion sleeve fitting. Immersion sleeves and mounting hardware are not included in the scope of delivery. Accessories are listed on pages 2.54 and 2.55. Immersion sleeves TH should be selected from those listed under Accessories STB / TW to ensure conformity to the requirements of EN 14597.

Protection type:	IP 66
Setting range:	90 – 110 °C
Length of capillary tube:	approx. 1 m
Electrical changeover contact:	
Break contact	0.5 ... 10 (2.5)A / 250 VAC
Closing contact	0.5 A / 250 VAC
Connection:	screw terminals
Cable grommet:	M20
Dimensions (W x H x D):	approx. 70 x 110 x 70 mm

Data sheet no. 20680

Type		Item no.	ADG	Euro/pc.
STB-01	NEW	104 217	02	**38.00**

Temperature monitor

Electromechanical temperature monitor
For use in heat generators and other HVAC applications. There are various installation options: direct mounting on the immersion sleeve, raised mounting, mounting on the pipe or in the air duct.
If it is to be installed directly on the immersion sleeve, the safety temperature limiter (STB) / temperature monitor (TW) must be fastened on the immersion sleeve fitting. Immersion sleeves and mounting hardware are not included in the scope of delivery. Accessories are listed on pages 2.54 and 2.55. Immersion sleeves (TH) should be selected from those listed under Accessories STB / TW to ensure conformity to the requirements of EN 14597.

Protection type:	IP 66
Setting type:	10 – 95 °C
Length of capillary tube:	approx. 1 m
Electrical changeover contact:	
Break contact	0.5 ... 10 (2.5)A / 250 VAC
Closing contact	0.5 ... 6 (2.5)A / 250 VAC
Connection:	Schraubklemmen
Cable grommet:	M20
Dimensions (W x H x D):	approx. 70 x 110 x 70 mm

Data sheet no. 20680

Type		Item no.	ADG	Euro/pc.
TW-01	NEW	104 218	02	**37.50**

Accessories: STB/TW

	Type		Item no.	ADG	Euro/pc.
	**Immersion sleeves** For use in safety temperature limiter STB-01 or temperature monitor TW-01. TH-MS-10-xxx: brass, PN10, thread size R½" tube and lid fitting: CuZn39Pb3 TH-V4A-40-xxx: stainless steel, PN40, thread size G½" tube and lid: 1.4571 fitting: 1.4435 **Data sheet no. 20680**	**TH-xxx-xx-xxx**	NEW	see table	see table	see table

Note: Combinations of STB / TW with immersion sleeves in stainless steel design are currently scheduled for testing in accordance with EN 14597.

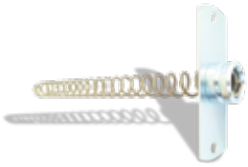
Immersion sleeve type	ADG	Immersion depth mm/(Euro/pc.)					
		100	150	200	280	450	600
Type TH-MS-10-xxx*	02	**7.50**	**9.00**	**10.50**	**12.90**	**15.00**	**19.50**
Item no.		104 219	104 220	104 221	104 222	104 223	104 224
Type TH-V4A-40-xxx*	02	**31.50**	**34.50**	**37.50**	**42.30**	**46.50**	**55.50**
Item no.		104 225	104 226	104 227	104 228	104 229	104 230

* plus the relevant current material price surcharge

The capacity of the immersion sleeves (protective tubes) depends on the process medium, pressure, temperature, flow rate as well as the design of the protective tube and the installation situation. In critical operating conditions a separate calculation is recommended.
The professional planner/implementing company is responsible for the selection of the immersion sleeve appropriate for the application.
Current local rules and regulations are to be observed, in particular:

- VDE/VDI 3511 Technical temperature measurements
- DIN 43772 Control technology – metal protective tubes and extension tubes for liquid-in-glass thermometers, dial thermometers, thermocouples and resistance thermometers – dimensions, materials, testing
- VDI Guideline 2035, page 2 – water related corrosion; preventing damage in hot water heating systems Stainless steel tubes are to be selected for cooling devices, well water and contact with food.

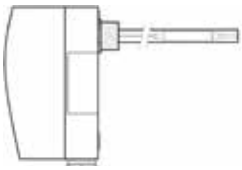
Ordering example: Immersion sleeve with depth 100 mm,
Stainless steel PN 40: TH-V4A-40-100
Brass PN 10: TH-MS-10-100

	**Holding bracket** The holding bracket is used for raised mounting. It prevents the capillary sensor from slipping out of the immersion sleeve. **Data sheet no. 20680**	**HK**	NEW	104 231	02	**0.50**
	**Tension band** for on-pipe mounting The tension band is used for mounting the safety temperature limiter STB or temperature monitor TW on a pipe. In this case the capillary sensor functions as a contact sensor. The tension band has a length of 330 mm and is suitable for pipes from 0.5" to 3" dia. **Data sheet no. 20680**	**SB-02**	NEW	104 232	02	**3.50**
	**Helical holder** for mounting in the air duct The helical holder is used for mounting the temperature limiter STB or temperature monitor TW in the air duct. Length of helical holder max. 200 mm **Data sheet no. 20680**	**SWH**	NEW	104 233	02	**16.50**

Accessories: STB/TW

	Type		Item no.	ADG	Euro/pc.
	**Wall mounting bracket** for raised mounting The wall mounting bracket is used for mounting the temperature limiter STB or temperature monitor TW at a distance from the measuring point. The bracket is required in cases where the capillary tube cannot be laid through the recess in the housing bottom and clearance is required between the STB or TW and the mounting surface. **Data sheet no. 20680**	**WBB**	NEW	104 234	02	**8.50**
	**Spacer 50 mm** The spacer can be used for mounting across insulation material. **Data sheet no. 20680**	**DS-50**	NEW	104 235	02	**19.00**
	**Spacer 100 mm** The spacer can be used for mounting across insulation material. **Data sheet no. 20680**	**DS-100**	NEW	104 236	02	**34.00**

Installation examples

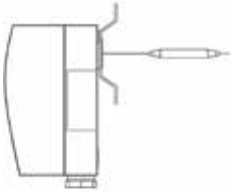


Mounting on the immersion sleeve
The STB /TW can be mounted on the immersion sleeve TH.
The housing bottom has a recess matching the size of the immersion sleeve TH.

Recommended accessories*: immersion sleeve TH

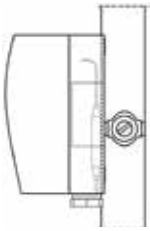
On-wall mounting
The STB /TW can be mounted directly on a wall.
In this case the capillary tube must be laid through the recess in the housing bottom.

Recommended accessories*: immersion sleeve TH, holding bracket HK



On-wall mounting with bracket
The wall mounting bracket can be used to mount the STB / TW so that it is raised from the mounting surface.
The capillary does then not need to be laid through the recess in the housing bottom.

Recommended accessories*: wall mounting bracket WBB, holding bracket HK



On-pipe mounting
The tension band SB-02 is used for mounting the SBT / TW on a pipe.
The capillary tube then functions as a contact sensor.
Suitable for pipe diameters from 0.5“ to 3“.

Recommended accessories*: tension band SB-02

In-air-duct mounting
Using the helical holder the capillary sensor can also be mounted in the air duct.

Recommended accessories*: helical holder SWH, holding bracket HK

* This list is not necessarily complete.
What accessories are required also depends on the requirements of the application and the conditions on site.

Sensor characteristics

Temp. °C	KP10 mV	NI 1000 DIN Ω	NI 1000LG Ω	NTC 1,8 kΩ	NTC 10-AN kΩ	NTC 10 kΩ	NTC 10 C kΩ	NTC-KB Ω	NTC 20 kΩ	PT 1000 Ω	PT 100 Ω
-50	2232	743	790.88	63.229	441.30	672.600	329.500	9854	1659.082	803.10	80.31
-40	2332	791	830.83	35.480	239.80	337.270	188.500	9712	810.861	842.70	84.27
-30	2432	842	871.69	20.660	135.20	176.680	111.300	9466	414.698	882.20	88.22
-20	2532	893	913.48	12.440	78.91	96.970	67.770	9067	221.088	921.60	92.16
-10	2632	946	956.24	7.730	47.54	55.300	42.470	8472	122.431	960.90	96.04
±0	2732	1000	1000.00	4.940	29.49	32.660	27.280	7661	70.203	1000.00	100.00
+10	2832	1056	1044.79	3.240	18.79	19.900	17.960	6667	41.567	1039.00	103.90
+20	2932	1112	1090.65	2.170	12.26	12.490	12.090	5573	25.350	1077.90	107.79
+25	2982	1141	1113.99	1.800	10.00	10.000	10.000	5025	20.000	1097.40	109.74
+30	3032	1171	1137.61	1.490	8.19	8.055	8.313	4492	15.887	1116.70	111.67
+40	3132	1230	1185.71	1.050	5.59	5.320	5.827	3518	10.211	1155.40	115.54
+50	3232	1291	1234.97	0.750	3.89	3.600	4.160	2702	6.718	1194.00	119.40
+60	3332	1353	1285.44	0.550	2.76	2.490	3.020	2056	4.517	1232.40	123.24
+70	3432	1417	1337.14	0.402	1.99	1.750	2.228	1563	3.099	1270.70	127.07
+80	3532	1483	1390.12	0.300	1.46	1.260	1.668	1193	2.166	1308.90	130.89
+90	3632	1549	1444.39	0.230	1.08	0.920	1.266	923	1.541	1347.00	134.70
+100	3732	1618	1500.00	0.180	0.82	0.680	0.973	723	1.114	1385.00	138.50
+110	3832	1688	1556.98	0.140	0.62	0.510	0.758	576	0.820	1422.90	142.29
+120	3932	1760	1615.36	0.110	0.48	0.390	0.597	467	0.609	1460.60	146.06
+130	4032	1833	1675.18	0.090	0.38	0.300	0.747	385	0.460	1498.20	149.82
+140	4132	1909	1736.47	0.071	0.30	0.230	0.381	324	0.350	1535.80	153.58
+150	4232	1987	1799.26	–	0.24	0.180	-	–	0.270	1573.30	157.33

Note: The self-warming by the measuring current affects the measuring precision and may not exceed a maximum of 10 mA.
Target values: PT 100, PT 1000 (thin film): <2 mA, NI 1000 DIN: <2 mA, NTCs <1 mA, KP10: 0.45 – 5 mA.
The PT100/PT1000 guidelines also apply for the tolerance classes - A and 1/3DIN. To avoid inductive interspersion, the sensor wire must be run shielded (J-Y (St) 2 x 2 x 0.8). Sensor wires must not be run parallel to conductors.
Please observe the EMV guidelines!

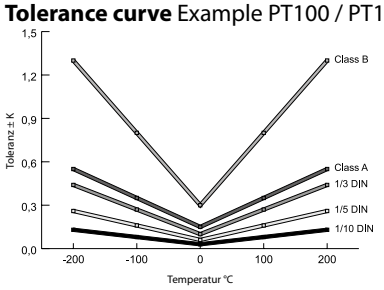
Note: Sensors which are not retained in stock have an "s" (Special sensor) at the end.

Tolerance table (base tolerances)

Sensor element	Tolerance	Standard Product Series (Example)
KP 10	±0.2 K/25 °C	Kieback&Peter
NI 1000	±0.4 K/0 °C	DIN
NI 1000 LG	±0.4 K/0 °C	Siemens
NTC 1.8	±0.3 K/25 °C	Schneider
NTC 10 AN	±0.2 K/25 °C	Andover

Sensor element	Tolerance	Standard Product Series (Example)
NTC 10	±0.2 K/25 °C	Trend
NTC 10 C	±0.3 K/25 °C	Carel
NTC 10 KB	±0.5 K/25 °C	Satchwell
NTC 20	±0.2 K/25 °C	Honeywell
PT 1000	±0.3 K/0 °C	Honeywell, Danfoss
PT 100	±0.3 K/0 °C	EN 60751/B

Tolerance curve Example PT100 / PT1000



Tolerance table [±K] Example PT100 / PT1000

Temperature °C	-200	-100	0	100	200
Class A: CLA	0.55	0.35	0.15	0.35	0.55
Class B	1.3	0.8	0.3	0.8	1.3
1/3 DIN: 1/3D	0.44	0.27	0.1	0.27	0.44
1/5 DIN	0.26	0.16	0.06	0.16	0.26
1/10 DIN	0.13	0.08	0.03	0.08	0.13

Gas and CO warning devices PG3
OPP-SOR®

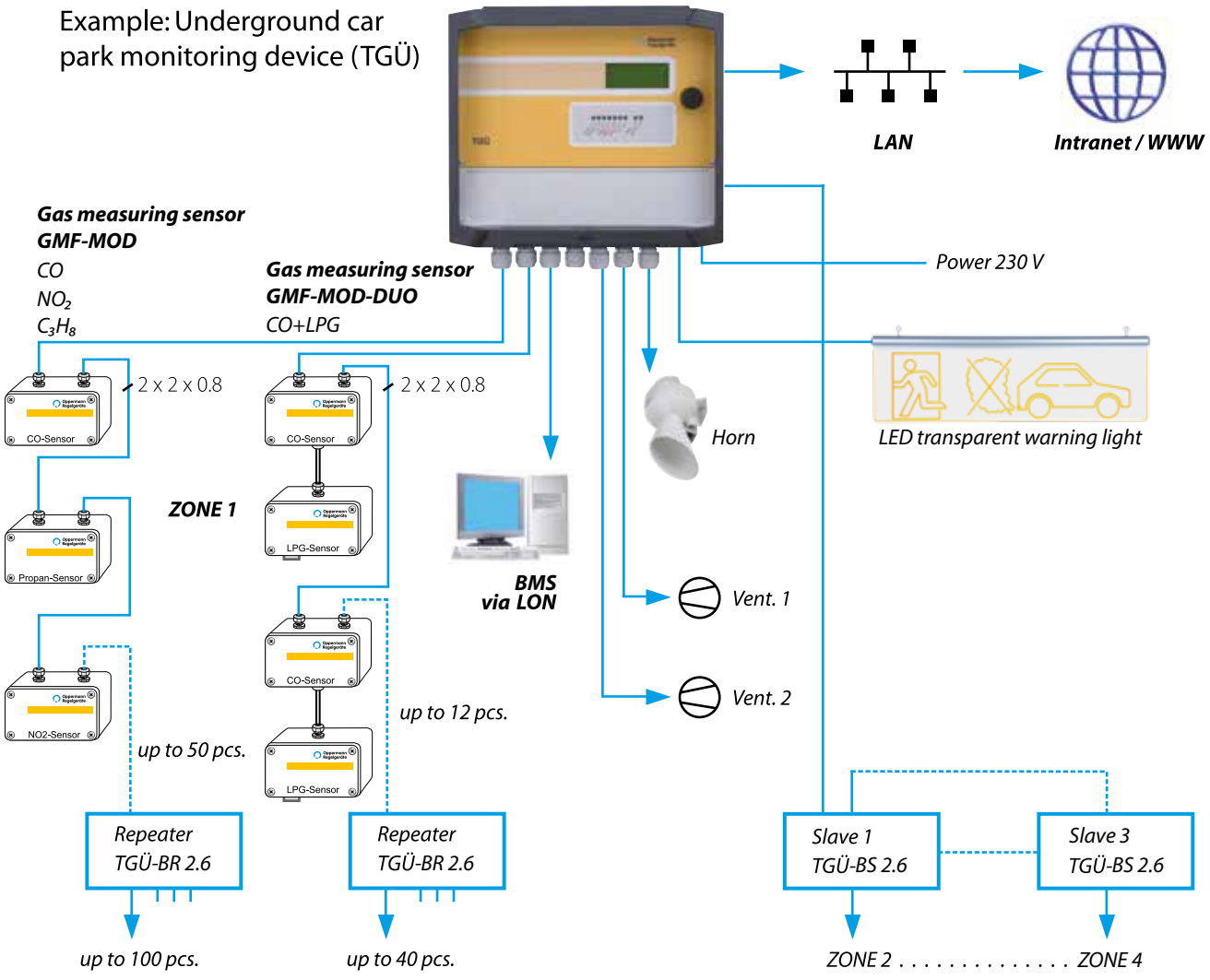
Our wide offer of bus-compliant OPP-SOR® gas and CO warning systems and relevant bus-capable OPP-SOR® gas measuring sensors offer a broad selection for various applications. The program is supplemented by conventional gas warning systems/measuring sensor in analogue technology.

Gas warning devices are for monitoring rooms for toxic and flammable gases. For example, the max. permissible working place concentrations, the so-called **MAK-value**, or the lower explosive limit **(UEG)** of gases and vapour is monitored. When the adjusted threshold value is exceeded, optical and acoustic alarm devices are turned on. This way people are warned in time and can leave the endangered area. Via additional floating contacts e.g. solenoid valves, the corresponding media lines can be closed.

Therefore gas warning devices provide optimum protection for persons and technical systems from the negative effects of gases and vapour.

In particular CO warning devices (Types TGÜ) are used together with ventilation systems are used to avoid excessive and harmful concentrations of carbon monoxide in underground car parks, parking garages and tunnels.
For this purpose **CO sensors** that measure and analyse the CO contents of the inhaled air are installed in the car park. NO_2 sensors are used for the survey of diesel emissions.
The CO monitoring system is TÜV-certified and is suitable for use in all German federal states in accordance with the current regulations for car parks; also in Switzerland, Austria and the Netherlands.
For the reduction of Installation costs and avoidance of complicated radial wiring, the bus-capable **OPP-SOR®** gas measuring sensor is linked via a proprietary bus with the central.

Please observe all local regulations and rules. Make sure that products are completely suitable for your application.



OPP-SOR® CO warning devices for car parks and tunnels (bus technology)

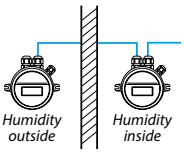
System description for TGÜ-BM2.6

The TGÜ-BM 2.6 is a bus-compliant measuring and control system for monitoring CO-NO_2-LPG concentration of inhaled air in underground car parks or similar closed buildings, where there are cars and vehicles with running combustion engines. Different types of gas sensors can be connected simultaneously. 50 CO/NO_2 or 12 DUO sensors can be connected directly.
A repeater can be interconnected to the Modbusline, if more sensors are needed. This increases the number of possible sensors to 100 CO/NO_2 or 40 DUO.
The control center has one integrated alarm zone. If more alarm zones are needed (up to 4), an additional zone device (TGÜ BS2.6) is required for every zone. Every zone device is connected via bus with the control center. The zone device has no control elements. The setting-up and the control of the whole unit occurs through the control center. The interfaces to ventilators, transparent warning lights and horns as well as to the sensors are designed the same as in the control center. With every zone device an extension of the number of sensors is possible via the repeater (TGÜ-BR 2.6). The connection between control center and sensor occurs via 4-wire-system: 2 for supply and 2 for data communication.
The communication between the control center and the gas sensors is carried out digitally by bus. The control center cyclically requests the current values from the gas sensors and stores the results for further processing. In the same way bus and sensors are also monitored. Malfunctions will be signalised.

The gas sensors signals in the sensor electronics are digitalized. Measured data will be temperature compensated, scaled and analysed according to the adjusted average time. In case the preset threshold control commands are exceeded, this is passed on via relay or optocoupler for ventilators, transparent warning lights, horns, device fault reporting to the building management system (BMS).
Five variable thresholds regarding average time, delay time and hysteresis can be set independently from each other. For test purposes it is possible to simulate the alarm thresholds with an integrated virtual sensor. Parametrisation of the TGÜ is carried out via operating menu with display and turn-pushbutton. The text indicator in the LCD is selectable in German, English and Dutch. Access to the main menu is password protected to prevent improper use. Synchronous to the LCD displays the unit status is signalised via 9 LEDs.
Another special feature for menu control is the operation of the TGÜ via interactive webpages. For this the device is connected to a TCP/IP-network via integrated Ethernet interface. A connection to GLT (BMS = Building Management System) can also be realised via LonWorks. Status information will be indicated by LonMark compliant objects. The calibration of the connected gas sensors is carried out at the sensors with a manual control unit. Supply voltage is 230 VDC, the connection of an additional uninterruptible power supply (24 V DC) is provided.

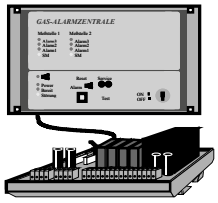
	Type	Item no.	ADG	Euro/pc.
OPP-SOR® Monitoring device for underground car parks according to the system description for up to 100 **OPP-SOR®** CO measuring points. Supply voltage **230 V/50 – 60 Hz or 24 V DC**. 4 alarm switching points depending on average value or actual value. 1 alarm switching point for peak threshold value, depending on actual value. 1 collective failure output with floating change-over contacts. 5 switching relay outputs for ventilator 1 + 2, as well as signal horn, warning transparency and device malfunction. 1 optocoupler output for GLT (BMS), 4 digital control inputs. Multiline LCD for notification of operation, alarm and failure as well as for indication of measuring point information like type of gas, concentration value, notification of alarm and failure of single measuring points, selectable out of different languages. Menu navigation via turn-pushbutton. Average calculation, system clock for data recording functionality, self monitoring, bus-monitoring, data interface RS485, Modbus. Ethernet interface for connection to TCP/IP-based networks. LON-interface for the connection to GLT. Housing: plastic wall casing with folding perspex cover. Protection class: IP 54 Dimensions: 264 x 234 x 141 mm (L x W x D), incl. 9 cable connections M16 and 1 dividable cable connection M25. **Data sheet no. 34115**	**TGÜ-BM 2.6**	102 186	03	**1,035.50**

OPP-SOR® CO warning devices for car parks and tunnels (bus technology)

		Type	Item no.	ADG	Euro/pc.
	**OPP-SOR® Monitoring device for cabinet installation, master** according to the system description for up to 100 **OPP-SOR®** CO measuring points. Technical specifications according to the base unit **TGÜ-BM 2.6**, page 3.2. Construction is separated into control unit for installation on control cabinet back plane and operating panel for control cabinet door installation. The two devices are connected with a 1.5 m, pluggable signal line **Data sheet no. 34115**	**TGÜ-BMS 2.6**	102 188	03	**1,129.50**
	**OPP-SOR® Zone monitoring device, Slave** Interfaces to ventilators, transparent warning lights and horns as well as to sensors are designed like TGÜ-BM 2.6. Without operational control. Connection to TGÜ-BMS via bus interface. **Data sheet no. 34116**	**TGÜ-BS 2.6**	102 194	03	**733.50**
	**OPP-SOR® Repeater for TGÜ-B 2.6** for multiplication of the number of sensors in 1 zone. Connection to TGÜ-BM 2.6 or TGÜ-BS 2.6 via Modbus-interface. 4 galvanic isolated RS485 interfaces for 160 additional CO/NO_2 or 28 additional DUO sensors. **Data sheet no. 34117**	**TGÜ-BR 2.6**	102 192	03	**723.50**
	**OPP-SOR® Monitoring device for car parks, compact device – bus technology** for connecting up to 24 CO or NO_2 **OPP-SOR®** GMF-MOD gas sensors. Supports up to 6 selectable languages. Operation and monitoring with on-board display with sensor keypad, menu-controlled and 5 LEDs, different colors. RS485 output for connecting to automation stations. 6 relay outputs, potential-free, partially programmable for cycles. Input for horn disengage. Integrated **timed switch** for cyclical ventilation & **optional humidity monitor**. This allows underground garages to be monitoredeven more energy-efficiently and also to be ventilated based on requirements The optional humidity monitor ensures that no additional humidity is drawn into the garage from the outside. Ideal protection against mold and moisture damage. Power supply 230 V or 24 V DC from UPS unit. With M16 cable gland, protection type IP 65. Tested iaw. DIN EN 50545-1 VDE 0400-80 (TÜV Rheinland) for monitoring underground garages and tunnels. **Data sheet no. 34118** **TÜV certificate (Download only available online)**	**TGÜ-KM 3.6**   Option 	102 213	03	**780.50**
	**OPP-SOR® humidity-temperature sensor, bus technology,** required for the humidity control function on the TGÜ-KM 3.6. 2 HT-TGÜ sensors are required: one in the underground garage, the other in the outdoor area. Humidity sensors are connected like GMF-MOD gas sensors. The two sensors reduce the maximum number of gas sensors of the TGÜ-KM 3.6 from 24 to 22. **Data sheet no. 36300**	**HT-TGÜ**	104 021	03	**325.50**

Note: UPS, see page 3.17

Gas warning systems (analog technology)

	Type	Item no.	ADG	Euro/pc.
				
Gas warning device – for 1 gas sensor	**GWA 01.6**	100 870	03	**636.50**
Gas warning device – for 2 gas sensors	**GWA 02.6**	100 872	03	**800.00**
in **compact design**. For a continuous monitoring of the air for flammable gases and toxic gas concentrations.				
All **sensors with signal output 4 – 20 mA** can be connected.				
Self and line monitoring, cold-start false alarm suppression, 2 programmable alarm switching points per measuring point, alarm output: (contact load 250 V/2.5 A) 1 floating change-over contact each for alarm 1 and alarm 2, 1 floating change-over contact, in switch mode/static for warning lamp, alarm 1, 1 floating normally open contact for horn, resettable, 1 floating change-over contact for device error, built-in piezo buzzer with reset button, external reset can be connected LED display for operation, alarm and error messages. Key switch for alarm suppression in case of maintenance.				
Housing dimensions: 200 x 140 x 60 mm (L x W x D)				
Protection class: IP 65				
Data sheet no. 30101				
Optional also available with display	**GWA xxx D**			
				
Gas warning device for 1 gas sensor 230 V AC, 24 V DC installation in control cabinet	**GWAS 01.6**	100 888	03	**923.50**
Gas warning device for 2 gas sensors 230 V AC, 24 V DC installation in control cabinet	**GWAS 02.6**	100 890	03	**1,090.50**
in **compact design**. For a continuous monitoring of the air for flammable gases and toxic gas concentrations.				
All **sensors with signal output 4 – 20 mA** can be connected.				
Self and line monitoring, cold-start false alarm suppression, 2 programmable alarm switching points per measuring point, alarm output: (contact load 250 V/2.5 A) 1 floating change-over contact each for alarm 1 and alarm 2, 1 floating change-over contact, in switch mode/static for warning lamp, alarm 1, 1 floating normally open contact for horn, resettable, 1 floating change-over contact for device error, built-in piezo buzzer with reset button, external reset can be connected.				
LED display for operation, alarm and error messages.				
Key switch for alarm suppression in case of maintenance.				
Relay module with click-in base for top hat rail installation.				
Display for installation in front doors.				
Housing dimensions: relay module 170 x 105 x 70 mm (L x W x D)				
Housing dimensions: display 213 x 125 x 45 mm (L x W x D) cut-out 205 x 117 mm (L x W)				
Data sheet no. 30108				
Optional also available with display	**GWAS xxx D**	on request	03	**on request**
Note: Construction with display or with additional gas sensors on request (4 or 8 sensors). **For greater transparency and reading of the measuring values, we recommend the design with display, for an additional surcharge**				

OPP-SOR® Gas warning systems (bus technology)

OPP-SOR® Gas warning device – bus technology
for the connection of 1 – 10* Oppermann **OPP-SOR®** GMF-MOD gas sensors in bus technology for continuous monitoring of the air for flammable gases and toxic concentrations.

New: new version of **local individual alarms**
Only possible in conjunction with **OPP-SOR®** GMF-MOD-IR infrared gas sensors with output relay.
Instead of having the gas detection system trigger a collective alarm it is possible to have local visual or acoustic alarms which trigger only in locations where the gas concentration is exceeded, Individual alarms can be connected to the output relays which are serially integrated into the **OPP-SOR®** GMF-MOD-IR infrared sensors.
* 10 sensors are the standard, up to 20 are possible (nos. 1 to 10 can be of any type, from no. 11 on IR sensors only). Please note any constraints on the number or type of sensors as well as any requirements for additional power supply units given in the data sheet.

Up to 6 languages selectable.
Supply voltage: 230 V AC or 24 V DC or
230 V AC with emergency current supply 24 V DC
2 programmable alarm switching points per measuring point for pre-alarm and main alarm.
Configuration and data selection by PC-Software-GWA.

Inputs:	bus-capable GMF-MOD gas sensor,
	Key for horn-unlocking device
Outputs:	Relay EPU pre-alarm
	Relay EPU main alarm
	Relay EPU transparent warning, clocking or continuously programmable
	Relay EPU horn
	Relay EPU error
Operation:	LCD display for the visualisation
	LED red pre-alarm
	LED red main alarm
	LED yellow disturbance
	LED green operation
	Device and unlocking device key
	Programmer's and user's keys
	Integrated piezo buzzer

RS485 interface for the transmission to BMS

Housing:	Plastic ABS
Protection class:	IP 65
Dimensions:	200 x 145 x 87 mm (L x W x D)
	Included cable screw connections

Data sheet no. 30109

Type		Item no.	ADG	Euro/pc.
GWA M 3.6	NEW	100 868	03	**567.50**

Note: For UPS units any additional power supply units for a larger number of gas sensors see page 3.17

OPP-SOR® Gas measuring sensors

OPP-SOR® Gas measuring sensor for carbonic oxide gas CO bus-capable **GMF 4.E.CO.08.MOD**
in an aluminium housing
Measuring principle: electrochemical, temperature and humidity compensated,
thereby high precision, low cross sensitivity for CO_2, NO, NO_2 and H_2O, colour: grey,
Dimensions: 125 x 80 x 60 mm (L x W x D), protection class: IP 44
Proofed to DIN EN 50545-1 VDE 0400-80 (TÜV-Rheinland)
for the monitoring of car parks and tunnels.

Data sheet no. 38100
TÜV certificate (Download only available online)

OPP-SOR® Gas measuring sensor for nitrogen dioxide (diesel smoke) NO_2 bus-capable **GMF 4.E.NO2.03.MOD**
in an aluminium housing
Measuring principle: electrochemical, temperature and humidity compensated,
thereby high precision, low cross sensitivity for other gases like CO_2 and NO, colour: grey,
Dimensions: 125 x 80 x 60 mm (L x W x D), Protection class: IP 44
Proofed to DIN EN 50545-1 VDE 0400-80 (TÜV-Rheinland)
for the monitoring of car parks and tunnels.

Data sheet no. 38101
TÜV certificate (Download only available online)

OPP-SOR® Gas measuring sensor for propane (LPG) bus-capable **GMF 4.P.C3H8.30.MOD**
in an aluminium housing
Measuring principle: platinum electrical resistor, temperature and humidity
compensated, thereby high precision, low cross sensitivity for solvent vapour.
Gas inlet via sinter filter, colour: grey,
Dimensions: 125 x 80 x 60 mm (L x W x D), protection class: IP 44

Data sheet no. 38102

OPP-SOR® Gas measuring sensor for natural gas/methane (CH_4) bus-capable **GMF 4.P.CH4.30.MOD**
in an aluminium housing
Measuring principle: platinum electrical resistor, temperature and humidity
compensated, thereby high precision, low cross sensitivity for solvent vapour.
Gas entrance by sinter filter, colour: grey,
Dimensions: 125 x 80 x 60 mm (L x W x D), protection class: IP 44

Data sheet no. 38103

OPP-SOR® Gas measuring sensor for frigene bus-capable **GMF 4.H.R. … .12.MOD**
in an aluminium housing
Measuring principle: semi-conductor, temperature and humidity compensated,
thereby high precision, low cross sensitivity for CO_2, NO, NO_2 and H_2O, colour: grey,
Dimensions: 125 x 80 x 60 mm (L x W x D), protection class: IP 44

Data sheet no. 38105

OPP-SOR® Gas measuring sensor for frigene bus-capable **GMF 5.H.XXX.MOD**
in a plastic housing
Measuring principle: semi-conductor, temperature and humidity compensated,
thereby high precision, low cross sensitivity for other gases
Dimensions: 125 x 90 x 60 mm (L x W x D), protection class: IP 44

Data sheet no. 38106

OPP-SOR® Gas measuring sensor for Oxygen O_2 bus-capable **GMF 4.Z.O2.54.MOD** NEW
in an aluminium housing
Measuring principle: Zirconium oxide sensor, temperature-compensated for high accuracy,
low cross-sensitivity to other gases, suitable for monitoring for oxygen displacement
colour: grey, Dimensions: 125 x 80 x 60 mm (L x W x D), protection class: IP 44

Data sheet no. 38112

OPP-SOR® Gas measuring sensors

OPP-SOR® Gas measuring sensor for flammable or toxic gases bus-capable **GMF 5.E.XXX.MOD**
in a plastic housing **GMF 5.P.XXX.MOD**
Measuring principle: electrochemical or pellistor, with temperature and humidity compensation, thereby high precision, low cross sensitivity in regard to other gases. Available for CO, NO_2, LPG, CH_4, colour: grey,
Dimensions: 130 x 95 x 60 mm (L x W x D), protection class: IP 44
Proofed to DIN EN 50545-1 VDE 0400-80 (TÜV-Rheinland)
for the monitoring of car parks and tunnels.
Data sheet no. 38107
TÜV certificate (Download only available online)

OPP-SOR® Combined **GMF 5.E.CO+NO2.08+03.MOD**
carbon monoxide (CO) / nitrogen dioxide (NO_2)
in a plastic housing
Measuring principle: electrochemical, temperature and humidity compensated, thereby high precision, low cross sensitivity to other gases, colour: grey,
Dimensions: 130 x 95 x 60 mm (L x W x D), protection class: IP 44 (housing IP 65)
Proofed to DIN EN 50545-1 VDE 0400-80 (TÜV-Rheinland)
for the monitoring of car parks and tunnels.
Data sheet no. 38108
TÜV certificate (Download only available online)

Double gas measuring sensor DUO-MOD bus capable **GMF-DUO.E/P.CO/LPG-MOD**
for the detection of CO and LPG, in particular in underground car parks, admitting gas-powered vehicles, for example in **Holland**.
Two separate housings for perfect positioning.
Measuring principle CO: electrochemical, temperature and humidity compensated, for a high precision and low cross sensitivity.
Measuring principle LPG: platinum electrical resistor, logarithmical signal curve, gas inlet via sinter filter, colour: grey
Also available for CO + NO_2.
Proofed to DIN EN 50545-1 VDE 0400-80 (TÜV-Rheinland)
for the monitoring of car parks and tunnels.
Data sheet no. 38104
TÜV certificate (Download only available online)

OPP-SOR® infrared gas measuring sensor for various gasses bus-capable **GMF 4.IR.xx.xx.MOD**
in aluminum housing. **Board inclusive 2 output relays for horn & warning transparency.**
or 1 output relay for warning sign for the HP-MOD type (HP = integrated horn)
Measuring principle: Infrared technology in high-quality dual-beam 2-beam process.
Pollution, air pressure, temperature and humidity compensated, Extremely high precision. Very low cross sensitivity. This results in no onsite recalibration, just a release test with measuring gas is needed. It is especially suited for demanding supervision tasks e.g. in cold storage houses.
color grey, Dimensions: 125 x 80 x 60 mm (L x W x D), protection class: IP 54
Data sheet no. 38109 / 38111 with integrated horn GMF4.IR.xx.xx.HP-MOD
Deliverable for various gas types on request.

OPP-SOR® infrared gas measuring sensor for various gasses bus-capable **GMF 5.IR.xx.xx.MOD**
in plastic housing. **Board inclusive 2 output relays for horn & warning transparency**
Measuring principle: Infrared technology in high-quality dual-beam 2-beam process.
Pollution, air pressure, temperature and humidity compensated, Extremely high precision. Very low cross sensitivity. This results in no onsite recalibration, just a release test with measuring gas is needed. It is especially suited for demanding supervision tasks e.g. in cold storage houses.
color grey, Dimensions: 130 x 95 x 60 mm (L x W x D), protection class: IP 54
Data sheet no. 38110
Deliverable for various gas types on request.

Conventional gas measuring sensors

Conventional gas measuring sensor for carbon monoxide **GMF 4.E.CO.08**
in an aluminium housing
Measuring principle: electro-chemical, output: **4 – 20 mA**, with temperature and humidity compensation, thereby high precision, low cross sensitivity for CO_2 , NO, NO_2 and H_2O, gas inlet via sinter filter, colour: grey
Dimensions: 125 x 80 x 57 mm (L x W x D), protection class: IP 44
Data sheet no. 37110

Conventional gas measuring sensor for nitrogen dioxide (diesel smoke) **GMF 4.E.NO2.03**
in an aluminium housing
Measuring principle: electro-chemical, output: **4 – 20 mA**, with temperature and humidity compensation, thereby high precision, low cross sensitivity for other gases like CO_2 and NO, gas inlet via sinter filter, colour: grey
Dimensions: 125 x 80 x 57 mm (L x W x D), protection class: IP 44
Data sheet no. 37111

Conventional gas measuring sensor for flammable or toxic gases **GMF 2.H.XXX**
in an aluminium housing
Measuring principle: semiconductor, output: **4 – 20 mA**, logarithmic signal curve for alarm point monitoring, gas inlet via sinter filter, colour: yellow
Dimensions: 90 x 80 x 80 mm (L x W x D), protection class: IP 44
Data sheet no. 37301

Conventional gas measuring sensor for flammable or toxic gases **GMF 2.P.XXX**
in an aluminium housing.
Measuring principle: pellistor, output: **4 – 20 mA**, linear, with temperature and humidity compensation, thereby high precision, low cross sensitivity for solvent vapour, gas inlet via sinter filter, colour: yellow
Dimensions: 90 x 80 x 80 mm (L x W x D), protection class: IP 44
Data sheet no. 37201

Conventional gas measuring sensor for toxic gases **GMF 2.IR.XXX**
in an aluminium housing
Measuring principle: non-dispersive infrared technology,
Output: **4 – 20 mA**, linear between 0 – 5,000 ppm.
Low cross sensitivity. Gas inlet via sinter filter.
Data sheet no. 37760

Conventional gas measuring sensor for toxic gases, hydrogen and oxygen **GMF 2.E.XX.30**
in an aluminium housing
Measuring principle: electro-chemical, output: **4 – 20 mA**, linear, with temperature compensation, thereby high precision, low cross sensitivity for other gases, gas inlet via sinter filter,
Dimensions: 90 x 80 x 80 mm (L x W x D), protection class: IP 44
Data sheet no. 37401

Note: Conventional gas measuring sensor on request.
Type-specific also deliverable in Design 0 – 10 V.

Type designation code gas measuring sensors

Example: **GMF X - X - XXX - XX - XXX**

Gas measuring sensor

Housing type:

1 – Plastic housing
2 – Square aluminium housing
3 – Special housing
4 – Rectangular aluminium housing
5 – Rectangular plastic housing
6 – Free
7 – Ex housing
UG – Air channel housing venturi tube
DUO – 2 housings one upon the other
I – Infrared service interface

Measuring principle:

E = Electrochemical
H = Semi-conductor chemical formula
P = Platinum electrical resistor
Z = Zirconium oxide
IR = Infrared technique

Type of gas:

Chemical formula / abbreviation

Measuring range:

0	–	1 ppm	00	0	–	2,000 ppm	12
0	–	5 ppm	01	0	–	4,000 ppm	13
0	–	10 ppm	02	0	–	30,000 ppm	14
0	–	20 ppm	03	0	–	5,000 ppm	18
0	–	30 ppm	04	0	–	100 % UEG	30
0	–	50 ppm	05	0	–	1 Vol %	50
0	–	60 ppm	06	0	–	4 Vol %	52
0	–	100 ppm	07	0	–	5 Vol %	53
0	–	300 ppm	08	0	–	25 Vol %	54
0	–	3,000 ppm*	09	0	–	100 Vol %	55
0	–	1,000 ppm	10	0	–	20 Vol %	56
0	–	1,500 ppm	11				

Options:

MOD = Modbus RS485
HP-MOD = Modbus RS485 with integrated horn
LON = LONbus
… = other options

Examples:

CO gas measuring sensor	Electrochemical, 0 – 300 ppm, conventional 4 – 20mA	GMF 4.E.CO.08
CO gas measuring sensor	Electrochemical, 0 – 300 ppm, bus-capable	GMF 4.E.CO.08.MOD
Natural gas sensor	Half-wire, 0 – 300 ppm, bus-capable	GMF 4.H.CH4.08.MOD
Natural gas sensor	Pellistor, 0 – 100 % UEG, conventional 4 – 20 mA	GMF 2.P.CH4.30.
Nitrogen dioxide sensor	Electrochemical, 0 – 100 % Vol %, conventional 4 – 20 mA	GMF 4.E.NO2.55
CO+NO_2-combined sensor	Electrochemical, 0 – 300 ppm / 0 – 20 ppm NO_2, bus-capable	GMF 5.E.CO+NO2.08+03.MOD
Freon R134a	IR technology, 0 – 2,000 ppm, bus-capable	GMF 5.IR.R134a.12.MOD

* Conversion Example 3,000 ppm is equal to 0.3 vol%

Gas measuring sensor choice table

Type of gas	Formula	MAK-value*	Measuring range	rel. gas density/ install. height	Type	Item no.	ADG	Euro/pc.
Acetylene	C_2H_2		0 – 100 % UEG	0.9/ ceiling	**GMF 2.H.C2H2.30**	100 605	03	**312.50**
Acetylene	C_2H_2		0 – 100 % UEG	0.9/ ceiling	**GMF 2.P.C2H2.30**	100 636	03	**459.00**
Ammonia	NH_3	20 ppm	0 – 1,500 ppm	0.59/ ceiling	**GMF 2.H.NH3.11**	100 622	03	**556.00**
Ammonia	NH_3	20 ppm	0 – 30,000 ppm	0.59/ ceiling	**GMF 2.P.NH3.14**	100 647	03	**642.00**
Ammonia	NH_3	20 ppm	0 – 100 ppm	0.59/ ceiling	**GMF 2.E.NH3.07**	100 594	03	**1,008.00**
Ammonia	NH_3	20 ppm	0 – 300 ppm	0.59/ ceiling	**GMF 2.E.NH3.08**	100 595	03	**1,008.00**
Ammonia	NH_3	20 ppm	0 – 1,000 ppm	0.59/ ceiling	**GMF 2.E.NH3.10**	100 596	03	**1,008.00**
Benzine	HC		0 – 100 % UEG	3.2/ floor	**GMF 2.H.HC.30**	100 620	03	**362.50**
Benzine	HC		0 – 100 % UEG	3.2/ floor	**GMF 2.P.HC.30**	100 645	03	**642.00**
Butane	C_4H_{10}	1,000 ppm	0 – 100 % UEG	2.05/ floor	**GMF 2.H.C4H10.30**	100 614	03	**303.00**
Butane	C_4H_{10}	1,000 ppm	0 – 100 % UEG	2.05/ floor	**GMF 2.P.C4H10.30**	100 641	03	**459.00**
Chlorine	CL_2	0.5 ppm	0 – 5 ppm	2.45/ floor	**GMF 2.E.CL2.01**	100 584	03	**740.50**
Hydrogen chloride	HCL	5 ppm	0 – 20 ppm	1.26/ floor	**GMF 2.E.HCL.03**	100 590	03	**1,008.00**
Hydrocyanic acid	HCN	10 ppm	0 – 30 ppm	0.93/1.5 – 1.8 m	**GMF 2.E.HCN.04**	100 591	03	**1,008.00**
Ethane	C_2H_6		0 – 100 % UEG	1.04/1.5 – 1.8 m	**GMF 2.H.C2H6.30**	100 610	03	**312.50**
Ethane	C_2H_6		0 – 100 % UEG	1.04/1.5 – 1.8 m	**GMF 2.P.C2H6.30**	102 689	03	**459.00**
Ethyl alcohol	C_2H_5OH	1,000 ppm	0 – 100 % UEG	1.59/ floor	**GMF 2.H.C2H5OH.30**	100 609	03	**642.00**
Ethyl alcohol	C_2H_5OH	1,000 ppm	0 – 100 % UEG	1.59/ floor	**GMF 2.P.C2H5OH.30**	102 659	03	**642.00**
Ethylene	C_2H_4		0 – 100 % UEG	0.97/ ceiling	**GMF 2.H.C2H4.30**	100 611	03	**642.00**
Ethylene	C_2H_4		0 – 100 % UEG	0.97/ ceiling	**GMF 2.P.C2H4.30**	100 611	03	**642.00**
Freon R 22		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 2.H.R22.12**	100 624	03	**642.00**
Freon R 23		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 2.H.R23.12**	100 625	03	**642.00**
Freon R 134a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 2.H.R134a.12**	100 623	03	**642.00**
Freon R 404a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 2.H.R404a.12**	100 626	03	**642.00**
Freon R 407c		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 2.H.R407c.12**	100 627	03	**642.00**
Freon R 134 a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.H.R134a.12.MOD**	100 779	03	**392.00**
Freon R 404a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.H.R404a.12.MOD**	100 780	03	**392.00**
Freon R 407c		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.H.R407c.12.MOD**	100 781	03	**392.00**
Freon R 410a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF.5.H.R410a.12.MOD**	100 782	03	**392.00**

*** The MAK values have in the meantime been superseded by the AGW values.**
The values given are non-binding guide values. Please observe the applicable local regulations.

Gas measuring sensor choice table

Type of gas	Formula	MAK-value	Measuring range	rel. gas density/ install. height	Type		Item no.	ADG	Euro/pc.
Freon[1] R22		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R22.12.MOD**		103 530	03	**1,519.00**
Freon[1] R22		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R22.12.HP-MOD**	NEW	104 144	03	**1,534.00**
Freon[1] R 123		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R123.12.MOD**		103 531	03	**1,519.00**
Freon[1] R 123		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R123.12.HP-MOD**	NEW	104 145	03	**1,534.00**
Freon[1] R 125		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R125.12.MOD**		103 532	03	**1,519.00**
Freon[1] R 125		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R125.12.HP-MOD**	NEW	104 146	03	**1,534.00**
Freon[1] R 134a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R134a.12.MOD**		103 533	03	**1,519.00**
Freon[1] R 134a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R134a.12.HP-MOD**	NEW	104 147	03	**1,534.00**
Freon[1] R 404a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R404a.12.MOD**		103 534	03	**1,519.00**
Freon[1] R 404a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R404a.12.HP-MOD**	NEW	104 148	03	**1,534.00**
Freon[1] R 407a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R407a.12.MOD**		103 535	03	**1,519.00**
Freon[1] R 407a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R407a.12.HP-MOD**	NEW	104 149	03	**1,534.00**
Freon[1] R 407c		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R407c.12.MOD**		103 536	03	**1,519.00**
Freon[1] R 407c		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R407c.12.HP-MOD**	NEW	104 150	03	**1,534.00**
Freon[1] R 410a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R410a.12.MOD**		103 537	03	**1,519.00**
Freon[1] R 410a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R410a.12.HP-MOD**	NEW	104 151	03	**1,534.00**
Freon[1] R 507		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R507.12.MOD**		103 538	03	**1,519.00**
Freon[1] R 507		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R507.12.HP-MOD**	NEW	104 152	03	**1,534.00**
Freon[1] R 1234yF		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R1234yF.12.MOD**		103 539	03	**1,519.00**
Freon[1] R 1234yF		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 4.IR.R1234yF.12.HP-MOD**	NEW	104 153	03	**1,534.00**
Freon[1] R22		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R22.12.MOD**		103 540	03	**1,509.00**
Freon[1] R 123		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R123.12.MOD**		103 541	03	**1,509.00**
Freon[1] R 125		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R125.12.MOD**		103 542	03	**1,509.00**
Freon[1] R 134a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R134a.12.MOD**		103 543	03	**1,509.00**
Freon[1] R 404a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R404a.12.MOD**		103 544	03	**1,509.00**
Freon[1] R 407a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R407a.12.MOD**		103 545	03	**1,509.00**
Freon[1] R 407c		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R407c.12.MOD**		103 546	03	**1,509.00**
Freon[1] R 410a		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R410a.12.MOD**		103 547	03	**1,509.00**
Freon[1] R 507		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R507.12.MOD**		103 548	03	**1,509.00**
Freon[1] R 1234yF		500 ppm	0 – 2,000 ppm	> 2.0/ floor	**GMF 5.IR.R1234yF.12.MOD**		103 549	03	**1,509.00**
Heptane	C_7H_{16}	50 ppm	0 – 100 % UEG	3.46/ floor	**GMF 2.H.C7H16.30**		100 562	03	**362.50**
Heptane	C_7H_{16}	50 ppm	0 – 100 % UEG	3.46/ floor	**GMF 2.P.C7H16.30**		100 662	03	**459.00**
Hexane	C_6H_{14}	50 ppm	0 – 100 % UEG	2.79/ floor	**GMF 2.H.C6H14.30**		100 616	03	**362.50**
Hexane	C_6H_{14}	50 ppm	0 – 100 % UEG	2.79/ floor	**GMF 2.P.C6H14.30**		100 643	03	**459.00**
Carbon dioxide	CO_2	5,000 ppm	0 – 2,000 ppm	1.52/ floor	CO_2 see page 1.36 – 1.41				–
Carbon dioxide	CO_2	5,000 ppm	0 – 0.3 Vol %	1.52/ floor	**GMF 2.IR.CO2.09**		100 632	03	**1,409.00**
Carbon dioxide	CO_2	5,000 ppm	0 – 3 Vol %	1.52/ floor	**GMF 2.IR.CO2.14**		103 217	03	**1,225.00**
Carbon dioxide	CO_2	5,000 ppm	0 – 5 Vol %	1.52/ floor	**GMF 2.IR.CO2.53**		100 633	03	**1,225.00**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 5,000 ppm	1.52/ floor	**GMF 4.IR.CO2.18.MOD**		103 550	03	**1,030.50**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 5,000 ppm	1.52/ floor	**GMF 4.IR.CO2.18.HP-MOD**	NEW	104 154	03	**1,045.50**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 5 Vol %	1.52/ floor	**GMF 4.IR.CO2.53.MOD**		103 551	03	**1,030.50**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 5 Vol %	1.52/ floor	**GMF 4.IR.CO2.53.HP-MOD**	NEW	104 155	03	**1,045.50**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 20 Vol %	1.52/ floor	**GMF 4.IR.CO2.56.MOD**		103 552	03	**1,030.50**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 20 Vol %	1.52/ floor	**GMF 4.IR.CO2.56.HP-MOD**	NEW	104 156	03	**1,045.50**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 5,000 ppm	1.52/ floor	**GMF 5.IR.CO2.18.MOD**		103 553	03	**1,020.00**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 5 Vol %	1.52/ floor	**GMF 5.IR.CO2.53.MOD**		103 554	03	**1,020.00**
Carbon dioxide[2]	CO_2	5,000 ppm	0 – 20 Vol %	1.52/ floor	**GMF 5.IR.CO2.56.MOD**		103 555	03	**1,020.00**

[1] = high-precision, low-maintenance dual-beam IR sensors with low cross sensitivity (also available as 0 – 1,000 ppm) Suitable for GWA M 3.6. Further refrigerants such as R290, R600, R744 available on request. **Board inclusive 2 output relays for horn & warning transparency. or 1 output relay for warning sign for the HP-MOD type (HP = integrated horn)**

[2] = high-precision, low-maintenance dual-beam IR sensors with low cross sensitivity. Also suitable for CO2 refrigerant agent supervision Suitable for GWA M 3.6. Available for other gasses such as acetylene, butane, methane, propane, ethylene, CO, sulfur hexafluoride on request. **Board inclusive 2 output relays for horn & warning transparency or 1 output relay for warning sign for the HP-MOD type (HP = integrated horn)**

Gas measuring sensor choice table

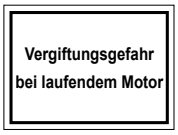
Type of gas	Formula	MAK-value	Measuring range	rel. gas density/ install. height	Type	Item no.	ADG	Euro/pc.
Carbon monoxide	CO	30 ppm	0 – 300 ppm	0.97/1.5 – 1.8m	**GMF 2.E.CO.08**	100 585	03	**495.00**
Carbon monoxide	CO	30 ppm	0 – 1,000 ppm	0.97/1.5 – 1.8m	**GMF 2.E.CO.10**	100 587	03	**642.00**
Carbon monoxide	CO	30 ppm	0 – 4,000 ppm	0.97/1.5 – 1.8m	**GMF 2.E.CO.13**	100 588	03	**825.50**
Carbon monoxide	CO	30 ppm	0 – 300 ppm	0.97/1.5 – 1.8m	**GMF 4.E.CO.08**	100 766	03	**223.50**
Carbon monoxide	CO	30 ppm	0 – 300 ppm	duct installation	**GMF UG.E.CO.08**	100 545	03	**356.00**
Carbon monoxide	CO	30 ppm	0 – 300 ppm	duct installation	**GMF UG.E.CO.08.MOD**	100 546	03	**363.50**
Carbon monoxide	CO	30 ppm	0 – 300 ppm	0.97/1.5 – 1.8m	**GMF 5.E.CO.08.MOD**	100 777	03	**187.00**
Carbon monoxide	CO	30 ppm	0 – 300 ppm	0.97/1.5 – 1.8m	**GMF 4.E.CO.08.MOD**	100 768	03	**202.00**
Methane/natural gas	CH_4		0 – 100 % UEG	0.55/ ceiling	**GMF 2.H.CH4.30**	100 608	03	**337.00**
Methane/natural gas	CH_4		0 – 100 % UEG	0.55/ ceiling	**GMF 2.P.CH4.30**	100 638	03	**459.00**
Methane/natural gas	CH_4		0 – 100 % UEG	0.55/ ceiling	**GMF 4.P.CH4.30.MOD**	100 773	03	**318.50**
Methane/natural gas	CH_4		0 – 100 % UEG	0.55/ ceiling	**GMF 5.P.CH4.30.MOD**	100 783	03	**303.00**
Methane/natural gas	CH_4		0 – 100 % UEG	duct installation	**GMF UG.P.CH4.30.MOD**	100 547	03	**448.00**
Methanol	CH_3OH	200 ppm	0 – 100 % UEG	1.11/ floor	**GMF 2.H.CH3OH.30**	100 606	03	**642.00**
Methanol	CH_3OH	200 ppm	0 – 100 % UEG	1.11/ floor	**GMF 2.P.CH3OH.30**	100 637	03	**642.00**
Methyl-ethyl-ketone	C_4H_8O	200 ppm	0 – 100 % UEG	2.48/ floor	**GMF 2.H.C4H8O.30**	100 615	03	**642.00**
Methyl-ethyl-ketone	C_4H_8O	200 ppm	0 – 100 % UEG	2.48/ floor	**GMF 2.P.C4H8O.30**	100 642	03	**642.00**
Nonane	C_9H_{20}		0 – 100 % UEG	4.43/ floor	**GMF 2.H.C9H20.30**	100 619	03	**642.00**
Nonane	C_9H_{20}		0 – 100 % UEG	4.43/ floor	**GMF 2.P.C9H20.30**	100 644	03	**642.00**
Ozone	O_3	0.1 ppm	0 – 1 ppm	1.66/ floor	**GMF 2.E.O3.00**	100 602	03	**1,008.00**
Propane	C_3H_8	1,000 ppm	0 – 100 % UEG	1.56/ floor	**GMF 2.H.C3H8.30**	100 613	03	**312.50**
Propane	C_3H_8	1,000 ppm	0 – 100 % UEG	1.56/ floor	**GMF 2.P.C3H8.30**	100 640	03	**459.00**
Propane	C_3H_8	1,000 ppm	0 – 100 % UEG	1.56/ floor	**GMF 4.P.C3H8.30.MOD**	100 774	03	**318.50**
Propane	C_3H_8	1,000 ppm	0 – 100 % UEG	1.56/ floor	**GMF 5.P.C3H8.30.MOD**	100 785	03	**303.00**
Oxygen	O_2		0 – 25 Vol %	1.0/1.5 – 1.8 m	**GMF 2.Z.O2.54**	100 648	03	**1,835.00**
Oxygen	O_2		0 – 25 Vol %	1.0/1.5 – 1.8 m	**GMF 2.E.O2.54**	100 599	03	**561.00**
Oxygen	O_2		0 – 25 Vol %	1.0/1.5 – 1.8 m	**GMF 4.Z.O2.54.MOD** NEW	104 181	03	**1,348.00**
Sulfur dioxide	SO_2	2.0 ppm	0 – 20 ppm	2.21/ floor	**GMF 2.E.SO2.03**	100 604	03	**1,008.00**
Hydrogen sulfide	H_2S	10 ppm	0 – 100 ppm	1.19/ floor	**GMF 2.E.H2S.07**	100 592	03	**713.00**
Nitrogen dioxide	NO_2	5 ppm	0 – 20 ppm	1.59/ floor	**GMF 4.E.NO2.03**	100 769	03	**418.50**
Nitrogen dioxide	NO_2	5 ppm	0 – 20 ppm	1.59/ floor	**GMF 4.E.NO2.03.MOD**	100 771	03	**382.50**
Nitrogen dioxide	NO_2	5 ppm	0 – 20 ppm	1.59/ floor	**GMF 5.E.NO2.03.MOD**	100 778	03	**367.50**
Nitrogen monoxid	NO	25 ppm	0 – 100 ppm	1.04/ floor	**GMF 2.E.NO.07**	100 598	03	**1,088.50**
Styrene	C_8H_8	20 ppm	0 – 100 % UEG	3.59/ floor	**GMF 2.H.C8H8.30**	100 618	03	**642.00**
Toluene	C_7H_8	50 ppm	0 – 100 % UEG	3.18/ floor	**GMF 2.H.C7H8.30**	100 617	03	**642.00**
Tetrahydrofuran	CH_4H_8O		0 – 100 % UEG	2.49/ floor	**GMF 2.H.CH4H8O.30**	100 607	03	**642.00**
Tetrahydrofuran	CH_4H_8O		0 – 100 % UEG	2.49/ floor	**GMF 2.P.CH4H8O.30**	102 691	03	**642.00**

Gas measuring sensor choice table

Type of gas	Formula	MAK-value	Measuring range	rel. gas density/ install. height	Type	Item no.	ADG	Euro/pc.
Hydrogen	H_2		0 – 100 % UEG	0.5/ ceiling	**GMF 2.H.H2.30**	100 621	03	**312.50**
Hydrogen	H_2		0 – 4 Vol %	0.5/ ceiling	**GMF 2.E.H2.12**	100 593	03	**988.50**
Hydrogen	H_2		0 – 100 % UEG	0.5/ ceiling	**GMF 2.P.H2.30**	100 646	03	**459.00**
Double gas measuring sensor DUO-MOD								
consisting of								
Carbon monoxide			0 – 300 ppm	height 1.5 m	**GMF.DUO.E.CO.08.MOD**	100 839	03	**521.50**
LPG/Pellistor			0 – 100 % UEG	height 10 cm	**GMF.DUO.P.C3H8.30.MOD**			
Housing type 4								
Combined gas measuring sensor CO/NO_2-MOD								
for simultaneous measuring of CO and NO_2 in a combined housing.								
Mounting height for CO target gas. Regard local rules and regulations!								
Carbon monoxide			0 – 300 ppm	height 1.5 m	**GMF 5.E.CO+NO2.08+03.MOD**	100 775	03	**529.50**
Nitrogen dioxide			0 – 20 ppm					
Housing type 5 (plastic)								

Other types of gas or sensing head/housing specifications available on request.

Accessories: Transparent warning lights

		Type	Item no.	ADG	Euro/pc.
	**LED transparent warning light 230 V AC with text "gas alarm"**	**WT-G 1.1-LED**	102 495	03	**224.50**
	LED transparent warning light 24 V DC with text "gas alarm"	**WT-G 1.3-LED**	102 504	03	**136.00**
	Material: Plastic glass Dimensions: 305 x 147 x 22 mm (L x W x D) Suitable for wall, ceiling and pendant mounting LED bulbs for minimum of 50,000 operating hours Viewing distance according to DIN 4844 up to 20 m. Character luminance > 200 cd/m² Protection class: IP 54 Junction box 230 V version: 105 x 105 x 55 mm Junction box 24 V DC version: 65 x 65 x 45 mm With 1 m flexible connecting cable for pendant mounting Connected load about 5 W Includes break-resistant packaging **Data sheet no. 36103**				
	**Warning sign "Gas alarm"** yellow, black font, black border according to DIN 4818/4819, with the following text: **"Gas alarm – explosion hazard! Do not operate electric equipment! Do not light open fire! Open windows and doors! Warn other persons! Leave the building!"** Material: Plastic Dimensions: 300 x 200 mm **Data sheet no. 36203**	**WS-Gas**	102 459	03	**117.50**
	**Warning sign** according to the regulations of the German federal states, yellow, black font, black border according to DIN 4818/4819, with the following text: **"Toxic hazard if motor is running!"** Material: Plastic Dimensions: 300 x 200 mm **Other text available on request.** **Data sheet no. 36203**	**WS-GHV**	102 460	03	**81.00**
	Other versions available on request.				

Accessories: Transparent warning lights

	Type	Item no.	ADG	Euro/pc.
LED transparent warning light 230 V AC	**WT-LT-230**	102 541	03	**193.00**
LED transparent warning light 24 V DC	**WT-LT-24**	102 545	03	**136.00**
LED transparent warning light 230 V AC with battery	**WT-LT-Akku**	102 531	03	**346.00**

with pictogram / language neutral symbol (see picture)
TÜV-certified lighted on two sides, suitable for wall, ceiling and pendant mounting
Material: Plastic glass
Dimensions: 605 x 187 x 22 mm (L x W x D)
LED bulbs for minimum of 50,000 operating hours
Viewing distance according to DIN 4844 up to 40 m.
Character luminance > 200 cd/m^2
Protection class: IP 54; battery version IP 40
Junction box 230 V version: 105 x 105 x 55 mm
Junction box 24 V DC version: 65 x 65 x 45 mm
Junction box 230 V battery version: 160 x 120 x 75 mm
Battery version includes 0.8 Ah battery (1 hour emergency power supply) and 1 m flexible connecting cable for pendant mounting
Connected load about 5 W; includes break-resistant packaging
Data sheet no. 36102

Other versions available on request.

Accessories: Lights and alarm horns

	Type	Item no.	ADG	Euro/pc.
				
Warning flashing light 230 V AC	**WZ 1.1 N**	on request	03	**103.00**
Warning flashing light 24 V DC	**WZ 1.3 N**	on request	03	**96.00**
Flash energy 5 Joules,				
Power input: 35 mA (230 V) / 250 mA (24 V)				
Dimensions: 86 x 86 x 83 mm (L x W x D),				
protection class: IP 66, Xenon tube with high efficiency level				
Available lens colours: red, green, blue, lucid, yellow, amber.				
Please specify color with order.				
Data sheet no. 36217				
				
Alarm horn interior mounting 230 V AC, 92 dB, IP 43	**HP 1.1**	100 927	03	**81.00**
Alarm horn interior mounting 24 V AC, 92 dB, IP 43	**HP 1.2**	100 928	03	**81.00**
Alarm horn interior mounting 24 V DC, 92 dB, IP 43	**HP 1.3**	100 929	03	**81.00**
Housing ABS grey,				
Dimensions: approx 80 x 152 x 80 (L x W x D)				
Data sheet no. 36218				
				94.00
Alarm horn 230 V AC exterior mounting, 100 dB, IP 65	**HP AM 1.1 N**	100 922	03	**94.00**
Alarm horn 24 V AC / DC exterior mounting, 100 dB, IP 65	**HP AM 1.3 N**	100 923	03	
Housing ABS grey				
Dimensions: approx 84 x 177 x 94 mm (L x W x D)				
3 different alert sounds possible				
Data sheet no. 36221				
				
Combined signal transmitter 230 V AC	**KBWLHP 1.1 N**	on request	03	**171.50**
Combined signal transmitter 24 V DC	**KBWLHP 1.3 N**	on request	03	**125.50**
Combined flashing light + horn, sound level 100 dB(A),				
Flash energy 5 Joules,				
Dimensions: 86 x 172 x 83 mm (L x W x D)				
Protection class: IP 66, power input: 6.6 W, VdS certified				
Available lens colours: red, green, blue, lucid, yellow, amber.				
Please specify color with order.				
Data sheet no. 36219				
				
Multitone signal transmitter red 230 V AC	**MSG 1.1 N**	101 205	03	**86.00**
Multitone signal transmitter red 24 V DC	**MSG 1.3 N**	101 208	03	**54.00**
Volume level: 100 dB(A) with 10 acoustic signals to be set,				
Included DIN acoustic signal for fire protection and safety engineering.				
Protection class: IP 66				
Dimensions: 86 x 86 x 64.5 mm (L x W x D)				
Power input: 0.6 W				
Data sheet no. 36220				

Accessories: UPS (USV) power supply

		Type	Item no.	ADG	Euro/pc.
	**UPS (USV) compact device** 24 V DC battery 12 Ah, 10 A **to supply the control units TGÜ / GWA and electronic warning lights simultaneously.** Previous dimensioning required. With built-in power supply, charger, deep discharge, overcharge protection. Ready to use built-in battery easy to change and with power failure message. Dimensions: approx 340 x 256 x 244 mm (L x W x D) for installation in control consoles **Data sheet no. 31502**	**USV 2410-12 Ah**	102 281	03	**700.00**
	Housing for UPS (USV) 24 10-12 Ah from sheet steel Dimensions: 500 x 500 x 300 mm (L x W x D)	**WSS-USV**	102 447	03	**370.00**
	**UPS (USV) compact device** 24V DC, Battery 2.3 Ah, 1.6A **to supply the control units TGÜ / GWA and electronic warning lights simultaneously.** Previous dimensioning required. With built-in power supply, charger, deep discharge, overcharge protection. Ready to use built-in battery easy to change and with power failure message. **Including housing** for wall mounting Dimensions: approx 200 x 200 x 80 mm (L x W x D) **Data sheet no. 31505**	**USV 2401-2.3 Ah**	102 832	03	**411.50**
	Sizing calculator UPS **(Download only available online)**				

Accessories: Power supply units

Power supply unit NTG03-24VDC-36W
Basic power supply unit IP 66
The power supply unit serves for the power supply of gas sensors of the **OPP-SOR®** GMF-MOD-IR series whenever more than 7 of these devices are to be operated within a system.

Power supply:	230 V AC 50 – 60 Hz
Output supply:	max. 36 W
Housing:	PS, light gray, IP 66
Cable grommet:	3 x M16
Dimensions (W x H x D):	approx. 180 x 130 x 90 mm
Weight:	approx. 0.8 kg

Data sheet no. 36401

Type	Item no.	ADG	Euro/pc.
NTG03-24VDC-36W NEW	104 182	03	**199.00**

Expected to be available from mid-Q1 2018

Accessories: Communication

Modbus hub GMF-MOD-HUB-01
The Modbus hub serves for the conversion of analog underground garage monitoring systems with star-type configuration to systems based on modern **OPP-SOR®** GMF-MOD bus technology. Existing sensor cables in star layout can largely continue to be used.
Up to 8 sensors per hub can be used in a star-type network. The device is cascadable, i.e. several hubs can be joined together (see drawing below). Note: 4-core cables to the gas sensors and possibly a separate power supply are required. Housing with click-in base for installation on mounting rail in control cabinet.

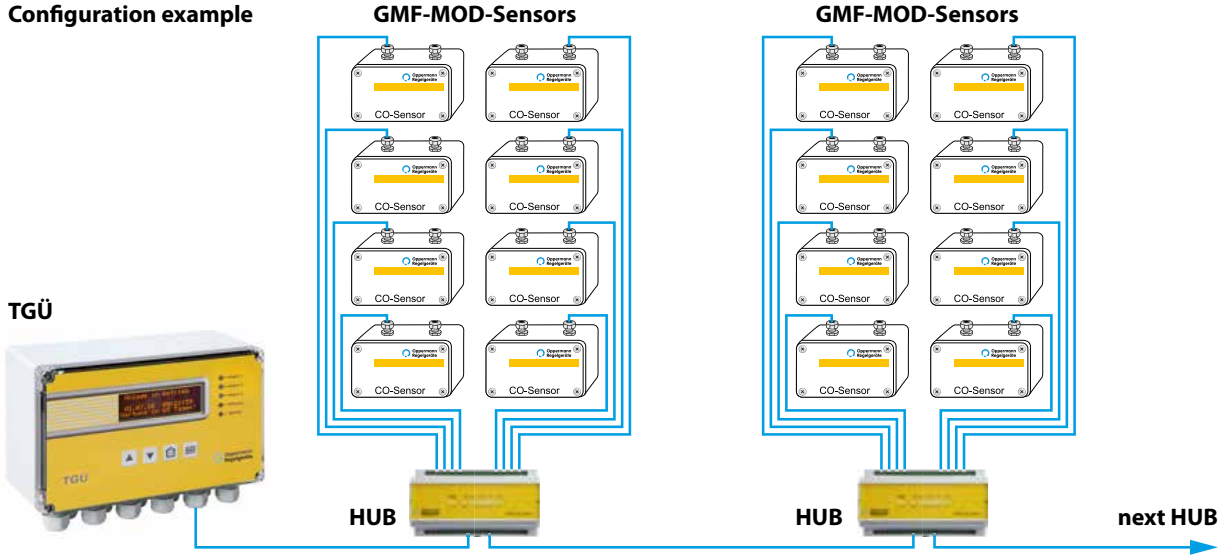
Supply voltage:	24 V DC
Housing	
top part:	PC, light gray
base:	PPO, black
Perm. ambient temperature:	0 – 40 °C
Dimensions: (W x H x D):	approx. 160 x 90 x 60 mm
Weight:	0.3 kg

Data sheet no. 36410

Type	Item no.	ADG	Euro/pc.
GMF-MOD-HUB-01 NEW	104 183	03	**329.00**

Expected to be available from mid-Q1 2018

Configuration example



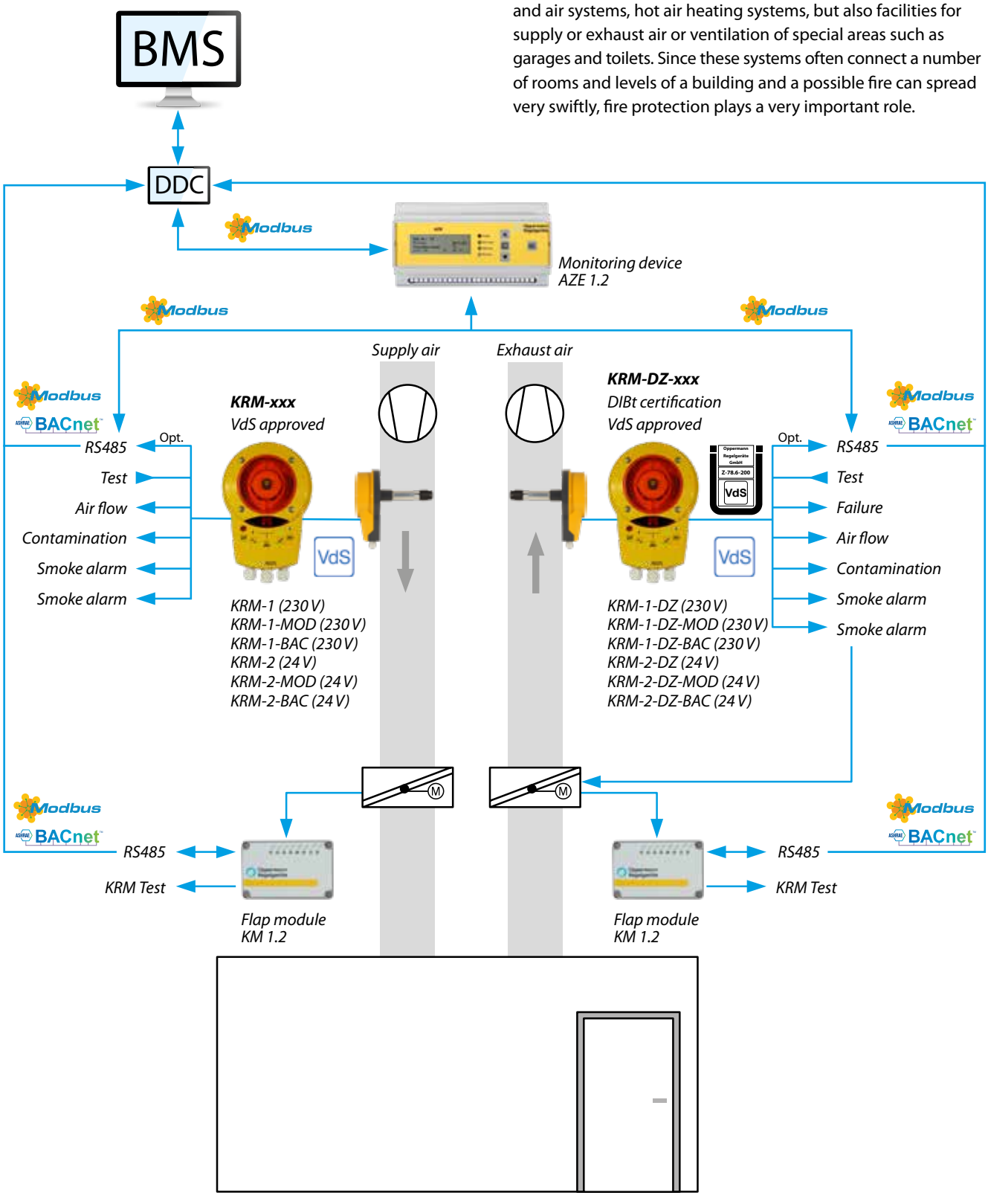
Services for gas and CO warning devices

	Type	Item no.	ADG	Euro/pc.
Planning support and consulting Based on your input we will support your planning/configuration and support requirements up to the subsequent start-up of the CO and gas detection system. On request this also includes the technical review of functions and consulting for system layout; e.g. for arranging and selecting the gas sensors or support in the layout of zones for underground garage monitoring systems (TGÜ). If an order is placed, this also includes (on request) the integration of sensors, signs, and horns into layout plans, and preparation of a list of cables to be pulled. Please note that we do not offer CAD-based planning.				-----
Startup of CO and gas detection systems We will commission your CO and gas detection system in compliance with trade standards. This includes testing functions, making any required adjustments, and calibrating the sensors. Briefing operators in the system functions. Support for TÜV acceptance reviews. We would be delighted to prepare a customized proposal, incl. roundtrip travel, inspection transcripts, and test gas.	**IBN TGÜ / GWA**			**on request**
Maintenance of CO and gas detection systems Recurring function checks, maintenance and calibration are necessary to preserve the value of your systems, and in many cases are mandated by standards or the law. Our work includes (among others): maintenance of the detection systems and calibrating the sensors as required. We would be delighted to prepare a customized proposal, incl. roundtrip travel, inspection transcripts, and test gas. Replacement of wear parts and trouble-shooting malfunctions and/or on-call services are not included. We would be delighted to perform such work according to your orders based on customized remuneration.	**WR TGÜ / GWA**			**on request**
We would be delighted to prepare a corresponding proposal for startup and maintenance. Our factory customer service team and our service partners are available to address your needs throughout Germany. Do not hesitate to contact us. You can find your assigned contacts for CO/gas detection applications in the very front of the catalog or on our website. 				

With the VdS-tested and monitored KRM smoke duct detector series, Oppermann offers the best smoke detectors for all applications.

Fire and smoke are some of the greatest dangers for people inside buildings. Experiences with fires have shown that the vast majority of fatalities and a bigger part of property damages result from toxic and aggressive smoke. The task of fire protection is the timely detection of fires to prevent the spreading of fire and smoke.

Ventilation systems are for example air conditioning, ventilation and air systems, hot air heating systems, but also facilities for supply or exhaust air or ventilation of special areas such as garages and toilets. Since these systems often connect a number of rooms and levels of a building and a possible fire can spread very swiftly, fire protection plays a very important role.



Fire protection – Requirements for duct smoke detectors

The (LüAR) national German fire safety requirements of ventilation systems are the valid guideline in the building inspection guidelines for various states. Additional information can be found in the sample policy on fire protection requirements of ventilation systems (M-LüAR), supervision of the commission. The necessary proofs (testing, approval, monitoring) of smoke detectors for smoke and fire flaps in ventilation systems, are stipulated in the building regulations.

Among other things, in this publication the following will be underlined:

- No smoke may pass via the air **supply air systems** into the buildings. The transfer of smoke via the outside air through fire protection flaps with smoke release equipment or smoke flaps is to be prevented ...

- For **ventilation systems with circulating air** the supply air has to be protected against the transfer of smoke by shut-off devices with smoke release equipment or smoke protection flaps. The smoke release equipment can be placed in re-circulation or in exhaust air ducts. They can, however, be combined in the supply air duct after the outside and re-circulated air have been combined, if the intake of external air is to be protected against smoke entry at the same time ... When the smoke release equipment responds, the ventilators must be turned off unless their continued function serves to prevent smoke spreading further.

- **Air handling units** must have fire protection flaps (except exhaust or outdoor air ducts, which lead directly to the outside) at the inlet and outlet; the fire flaps must be equipped with smoke release equipment devices ...

- **In ventilation systems for special structures** such as buildings or areas with a large number of people or rooms for sick or disabled people, or rooms with high fire or explosion hazards, it is necessary to determine whether additional or other fire protection measures are necessary, e.g. additional smoke release equipment for fire flaps to keep smoke from traveling.

- With **heat recovery systems**, the spreading of fire between exhaust and supply air must be prevented by means of technical measures (i.e. protection of supply air through fire flaps and smoke release equipment devices or smoke flaps) ...

- **Outdoor air and exhaust air openings** (outlets) of ventilation ducts must be arranged or constructed so fire or smoke cannot enter other floors, fire zones, units of use, stairways, spaces between stairways and exits going outdoors or corridors. This stipulation is considered met when the openings of ventilation pipes are protected by fire flaps ...

Based on these principles, for the selection of our KRM duct smoke detector the following notes resulted.

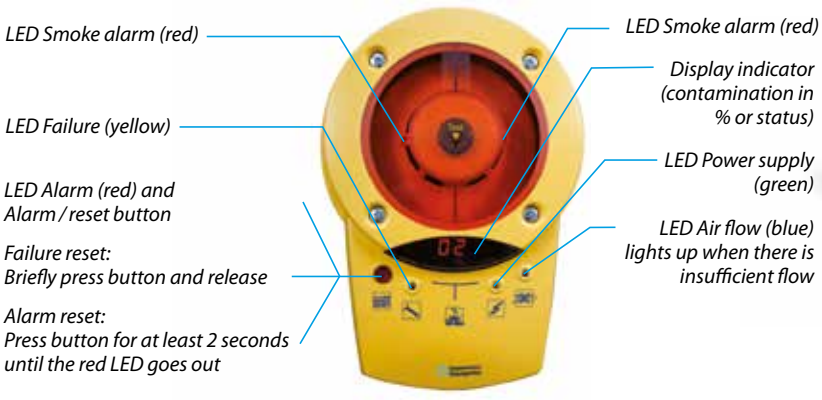
For the control of fire or smoke flaps, **general building authorities' approved smoke detectors** by the DIBt (German Institute for Building Technology) are required (see lists of building regulations). These are our versions of the DZ-KRM with approval: Z-78.6-200.

For the fan control, monitoring of ventilation pipes and fire alarms, VdS approved KRM types without DIBt can be used (KRM-1, KRM-1-MOD, KRM-1-BAC, KRM-2, KRM-2-MOD, KRM-2-BAC).

Note:
Subject to change. Local rules and regulations are valid.

Feature table duct smoke detector KRM®

Features / Functions	KRM-1	KRM-1-MOD KRM-1-BAC	KRM-2	KRM-2-MOD KRM-2-BAC	KRM-1-DZ	KRM-1-DZ-MOD KRM-1-DZ-BAC	KRM-2-DZ	KRM-2-DZ-MOD KRM-2-DZ-BAC
Power supply 230 V AC	X	X			X	X		
Power supply 24 V AC / DC			X	X			X	X
DIBt approval for the control of fire / smoke flaps					X	X	X	X
VDS approval for automatic fire alarm systems (monitoring ventilation, fans, etc.)	X	X	X	X	X	X	X	X
Large digital indicator (value in %)	X	X	X	X	X	X	X	X
Contamination signal (> 70 %) through floating NC contact	X	X	X	X	X	X	X	X
Contamination through digital message display (blinking > 70 %)	X	X	X	X	X	X	X	X
Alarm threshold tracking for increased lifetime	X	X	X	X	X	X	X	X
Smoke alarm message via floating changeover contact	X	X	X	X	X	X	X	X
Additional smoke alarm message through another floating NC contact	X	X	X	X	X	X	X	X
Smoke alarm indication through LED	X	X	X	X	X	X	X	X
Release of smoke alarm via reset button	X	X	X	X	X	X	X	X
Release of smoke alarm via remote reset (optional connection of external NC contact)	X	X	X	X	X	X	X	X
Reset smoke alarm via voltage disconnection	X	X	X	X				
Reset button for test alarm triggering	X	X	X	X	X	X	X	X
Function test with testing gas without disassembling (testing opening in cover)	X	X	X	X	X	X	X	X
Annual maintenance cycle	X	X	X	X	X	X	X	X
Flow indication by LED	X	X	X	X	X	X	X	X
Flow monitoring by floating break contact (no current = open)					X	X	X	X
Flow-optimized TurboTube sampling tube for optimal smoke detection (suitable for all channel cross-sections Ø/□ > 100 mm; permitted flow 1 – 20 m/s)	X	X	X	X	X	X	X	X
Fault indication by LED	X	X	X	X	X	X	X	X
Failure reporting through floating break contact					X	X	X	X
Particularly easy to assemble and install wiring (plug and play)	X	X	X	X	X	X	X	X
Operating and status display (LED display)	X	X	X	X	X	X	X	X
RS485 interface (Modbus RTU or BACnet) for connection to automation stations (visualization of contamination, status, temperature, flow)		X		X		X		X
Connection possibility for AZE external display unit 1.2 via RS 485 (Modbus RTU) to indicate contamination status, temperature, flow		Modbus version only X		Modbus version only X		Modbus version only X		Modbus version only X



AZE 1.2 for KRM-2-MOD/KRM-2-DZ-MOD KRM-1-MOD/KRM-1-DZ-MOD

Type designation duct smoke detectors KRM®

Data sheet no.:	New	Replaces	Note		
41300	KRM-2 KRM-1	UG-2-A2-0 / UG-2-A4-0-SR UG-2-A3-0	24 V AC / DC 230 V AC	VdS certification	including air sampling tube LKR 0.16 m
41300	KRM-2-MOD KRM-2-BAC KRM-1-MOD KRM-1-BAC	new	24 V AC / DC 230 V AC	Modbus, BACnet, VdS certification	including air sampling tube LKR 0.16 m
41302	KRM-2-DZ KRM-1-DZ	UG-2-A4-0-OPP24 UG-2-A4-0-OPP230	24 V AC / DC 230 V AC	DIBt-Certification, VdS-Approval	including air sampling tube LKR 0.16 m
41302	KRM-2-DZ-MOD KRM-2-DZ-BAC KRM-1-DZ-MOD KRM-1-DZ-BAC	new	24 V AC/DC 230 V AC	Modbus, BACnet, DIBt approval VdS certification	including air sampling tube LKR 0.16 m
43105	AZE 1.2	Indicator unit (Modbus) for up to 99 duct smoke detector type KRM-2-MOD / KRM-2-DZ-MOD / KRM-1-MOD / KRM-1-DZ-MOD			
41303	SM	Type-approved 24 V power supply unit for the KRM duct smoke detector with DIBt approval (KRM-2-DZ / KRM-2-DZ-MOD / KRM-2-DZ-BAC)			
41306	KM 1.2	Flap module to feedback to the BSK/RSK end position – bus capable (Modbus RTU or BACnet MSTP)			
41305	NT01/NT02	Design-approved basic power supplies 24 V for the duct smoke detector KRM with DIBt approved (KRM-2-DZ / KRM-2-DZ-MOD / KRM-2-DZ-BAC)			
40102	DRM 3.3 RM 3.3 RMS 3.3 PG 3.3	Ceiling smoke detector with base, bus-capable for STG 1.2 (consisting of RM 3.3 + RMS 3.3) Smoke detector without base, bus compatible – suitable for duct smoke detector type KRM or base RMS 3.3 Base for smoke detector RM 3.3 Programmer for DKM / DRM 3.3 including programming cable			
49103	DKM 3.3	Manual call point bus-capable for STG 1.2			
43104	STG 1.2	Control unit (system bus smoke detector) for up to 99 ceiling smoke detector DRM 3.3 / manual call point DKM 3.3			
	Accessories:				
	KS ASR WDG LKR 0.16/0.6/1.5/3.0	Console Aerosol spray Waterproof housing TurboTube air duct sampling tube 0.16 m, 0.6 m, 1.5 m or 3.0 m			

Legend:

KRM = duct smoke detector
MOD = RS485 bus-capable – Modbus RTU
BAC = RS485 bus-capable – BACnet
-1 = 230 V
-2 = 24 V AC/DC
DZ = DIBt version for control of fire/smoke protection flaps
LKR = TurboTube – air duct sampling tube

Duct smoke detectors KRM®

Standard version – for fan control and ventilation monitoring

	Type	Item no.	ADG	Euro/pc.
Duct smoke detector 230 V AC	**KRM-1 0.16**	103 883	04	**451.00**
Duct smoke detector 230 V AC	**KRM-1 0.6**	101 066	04	**456.00**
Duct smoke detector 230 V AC MOD	**KRM-1-MOD 0.16**	104 017	04	**481.50**
Duct smoke detector 230 V AC MOD	**KRM-1-MOD 0.6**	104 024	04	**486.50**
Duct smoke detector 230 V AC BAC	**KRM-1-BAC 0.16**	104 019	04	**481.50**
Duct smoke detector 230 V AC BAC	**KRM-1-BAC 0.6**	104 026	04	**486.50**
Duct smoke detector 24 V AC/DC	**KRM-2 0.16**	103 885	04	**441.00**
Duct smoke detector 24 V AC/DC	**KRM-2 0.6**	101 074	04	**446.00**
Duct smoke detector 24 V AC/DC MOD	**KRM-2-MOD 0.16**	103 888	04	**471.50**
Duct smoke detector 24 V AC/DC MOD	**KRM-2-MOD 0.6**	101 087	04	**476.50**
Duct smoke detector 24 V AC/DC BAC	**KRM-2-BAC 0.16**	103 889	04	**471.50**
Duct smoke detector 24 V AC/DC BAC	**KRM-2-BAC 0.6**	102 843	04	**476.50**

For use in air ducts for early detection of smoldering fires and fires with smoke development. The detector operates on the principle of scattered light. With alarm threshold tracking it has a longer service life. Continuous indication of contamination level from a two-digit LED display in plain text, relay is released when percentage is greater than 70 %. Display of smoke alarm, lack of air flow and system malfunction and operating state by LEDs. Release and function testing is done by push button.
Smoke alarm relay with floating changeover/break contact. Checking with test spray without opening the cover is possible.
The BACnet and Modbus Models have an RS485 interface for connection to an automation station or our AZE 1.2 (Modbus only).
Supplied complete with air duct sampling tube (patented).
Dimensions without tube: approx 166 x 257 x 77 mm (L x W x D)
Perm. Ambient temperature: -20 – +50 °C
Perm. Floating rate: 1 – 20 m / s
Protection class IP 54, with WDG IP 65
Screw connection 3 x M16

Versions 0.16 incl. probe tube LKR 0.16 m – new universal length. Matches all duct cross-sections**
Versions 0.16 incl. probe tube LKR 0.6 m (optionally also available with 1.5 m or 3. m)

Data sheet no. 41300
VdS approval G210059
Modbus-Protocol KRM-…-MOD
BACnet-Protocol KRM-…-BAC
(Download only available online)

*** The 0.16 m long LKR TurboTube sampling tube is also suitable for larger channels and approved. There are no restrictions on the maximum channel width / height / diameter. In conjunction with console KS, channels to <100mm diameter can be monitored. The longer LKRs can be shorted when required.*

Note: For monitoring the control of the fans, the ventilation duct and fire alarms VdS approved KRM types can be used without DIBt certification.
For more information refer to page. **4.**1 / **4.**2

ADG = Article discount group

Duct smoke detector KRM®

DIBt-version – for control of fire and smoke protection flaps		DZ-Types	Item no.	ADG	Euro/pc.
Duct smoke detector 230 V AC		**KRM-1-DZ 0.16**	103 884	04	**746.00**
Duct smoke detector 230 V AC		**KRM-1-DZ 0.6**	101 070	04	**751.00**
Duct smoke detector 230 V AC MOD	Modbus	**KRM-1-DZ-MOD 0.16**	104 018	04	**776.50**
Duct smoke detector 230 V AC MOD	Modbus	**KRM-1-DZ-MOD 0.6**	104 025	04	**781.50**
Duct smoke detector 230 V AC BAC	BACnet	**KRM-1-DZ-BAC 0.16**	104 020	04	**776.50**
Duct smoke detector 230 V AC BAC	BACnet	**KRM-1-DZ-BAC 0.6**	104 027	04	**781.50**
Duct smoke detector 24 V AC/DC		**KRM-2-DZ 0.16**	103 886	04	**733.50**
Duct smoke detector 24 V AC/DC		**KRM-2-DZ 0.6**	101 078	04	**738.50**
Duct smoke detector 24 V AC/DC MOD	Modbus	**KRM-2-DZ-MOD 0.16**	103 887	04	**764.00**
Duct smoke detector 24 V AC/DC MOD	Modbus	**KRM-2-DZ-MOD 0.6**	101 082	04	**769.50**
Duct smoke detector 24 V AC/DC BAC	BACnet	**KRM-2-DZ-BAC 0.16**	103 890	04	**764.00**
Duct smoke detector 24 V AC/DC BAC	BACnet	**KRM-2-DZ-BAC 0.6**	102 844	04	**769.50**

Device approved in connection with fire-smoke protection flaps; DIBt approval for annual service check for use in air ducts and early detections of smoldering fires and smoke. The detector functions according to the scattered light principle, and with alarm threshold tracking has a longer service life. Continuous indication of contamination level from a two-digit LED display in plain text, relay is released when percentage is greater than 70 %. Display of smoke alarm, lack of air flow and system malfunction and operating state by LEDs. Release and function testing is done by push button. Smoke alarm relay with floating changeover/break contact. Checking with test spray without opening the cover is possible. The BACnet and Modbus Models have an RS485 interface for connection to an automation station or our AZE 1.2 (Modbus only). Supplied complete with air duct sampling tube (patented).
Dimensions without tube: approx 166 x 257 x 77 mm (L x W x D)
Perm. Ambient temperature: -20 – +50 °C
Perm. Floating rate: 1 – 20 m / s
Protection class IP 54, with WDG IP 65
Screw connection 3 x M16
Data sheet no. 41302
VdS approval G210148
DIBt approval no. Z-78.6-200
Modbus-Protocol KRM-…-DZ-MOD
BACnet-Protocol KRM-…-DZ-BAC
(Download only available online)

Versions 0.16 incl. probe tube LKR 0.16 m – new universal length. Matches all duct cross-sections**
Versions 0.16 incl. probe tube LKR 0.6 m (optionally also available with 1.5 m or 3. m)

VdS

Oppermann Regelgeräte GmbH
Z-78.6-200
VdS

DIBt certification as smoke tripping device iaw. M-LüAR (Reference Ventilation System Directive)

*** The 0.16 m long LKR TurboTube sampling tube is also suitable for larger channels and approved. There are no restrictions on the maximum channel width / height / diameter. In conjunction with console KS, channels to <100mm diameter can be monitored. The longer LKRs can be shorted when required.*

Note: For the control of fire and smoke protection flaps building authority approved **smoke detectors with general technical approval** by the DIBt (German Institute for Building Technology) are required (see Building Regulations Lists). These are our DZ versions of the KRM with Z-78.6-200 approval.
For more information page. **4.**1 / **4.**2

Flap module for duct smoke detectors KRM®

Housing Aluminium

Housing Plastic (PE)

Flap module
Supply 24 V AC / DC.
Only usable in connection with bus-capable KRM (KRM-MOD or KRM-BAC). The module can achieve both end positions BSK/RSK (2 changeover inputs) and send these via BUS protocol to the DDC.
The module can be connected to terminal 9+10 of the KRM and (in service mode after release via jumper) a test input be generated, which can be sent from the DDC via BUS to the module. Design is possible in plastic (PE) or aluminum housing.
2 changeover inputs for feedback from BSK/RSK.
1 relay output for test of KRM with LED red.
LED KRM (red) lit, when the test output is active.
Relay output closed when current-less (load current principle), so that the KRM does not stop during a power outage.
4 green LED displays for flap setting
(Position of changeover inputs) – NO1, NC1, NO2, NC2
LED Bus (green) – display of communication
LED Failure (yellow) – error message
LED Power (green) – voltage supply
2 rotary switches to set the BUS address 1 – 99
1 jumpers to set the baud rate.
1 jumper to release the test function.
4 Cable gland: M16
Connected with spring terminals 0.2 – 1.5 mm²
Dimensions: Alu approx 130 x 95 x 50 mm (L x W x D)
PE approx 125 x 90 x 60 mm (L x W x D)
Protection housing: IP 65
Perm.
Ambient temperature: -20 – 50 °C

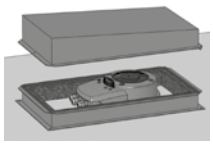
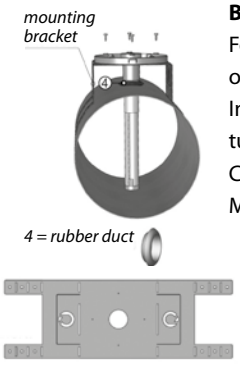
Data sheet no. 41306
BACnet-Protocol KM 1.2
(Download only available online)

Type	Item no.	ADG	Euro / pc.
KM 1.2-ALU-MOD	103 528	04	**239.00**
KM 1.2-PE-MOD Modbus	103 529	04	**203.00**
KM 1.2-ALU-BAC	103 662	04	**239.00**
KM 1.2-PE-BAC BACnet	103 663	04	**203.00**

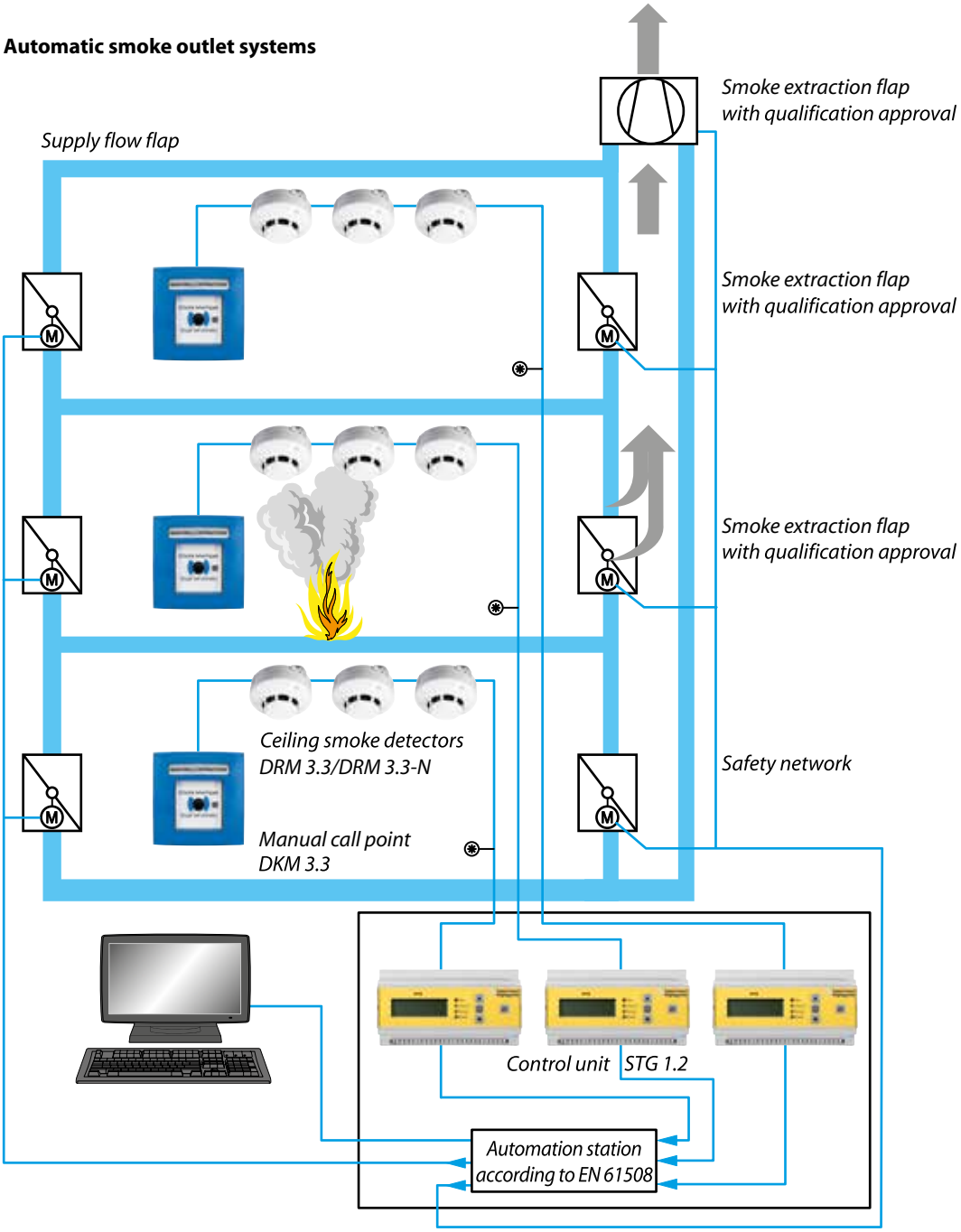
Accessories: Duct smoke detector KRM®

	Type	Item no.	ADG	Euro/pc.
 **Power supply Type SM** Comfort power supply with output 24 V AC and 24 V DC. Inclusive additional relay outputs for Contact reinforcement. Housing in IP 65 design. DIBt type approved in conjunction with KRM-2-DZ / KRM-2-DZ-MOD, KRM-2-DZ-BAC. (DIBt designs). Integrated in general building regulation approvalKRM Nr. Z-78.6-200. Necessary as secure voltage supply for 24 V AC / DC (only if KRM also supplies the BSK/RSK). Supply voltage: 230 V AC +10 % / -15 %; 50 – 60 Hz Power output: < 30 VA Output supply: max. 8 VA (24 V DC); max.12 VA (24 V AC) additional relay outputs: smoke alarm (K1) 5 A, 230 V failure (K2) 2 A, 230 V LED display: Operating (green); Closed (red); Failure (yellow) Housing: ABS, grey, IP 65 Perm. ambient temperature: -10 – +50 °C Dimensions: approx 166 x 160 x 130 mm (L x W x D) Weight: approx 1.54 kg **Data sheet no. 41303**	**SM**	101 610	04	**398.00**
  **Power supply Type NT** Basic power supply IP 20. DIBt type approved in conjunction with KRM-2-DZ / KRM-2-DZ-MOD, KRM-2-DZ-BAC (DIBt designs). Integrated in general building regulation approval KRM Nr. Z-78.6-200**. Necessary as secure voltage supply for 24 V AC or 24 V DC (only if KRM also supplies the BSK/RSK). Specify the required type/voltage with the order. Supply voltage: 230 V AC +10 % / -15 %; 50 – 60 Hz Power output: NT01: < 30 V AC; NT02: < 25 W Output supply: NT01: max. 24 VA (24 V AC); NT02: max. 20 W (24 V DC) LED display: operating (green) Housing: PC, grey with clear cover, IP 20 Perm. ambient temperature: -20 – +50 °C Dimensions: approx 120 x 120 x 60 mm (L x W x D) Weight: NT01: approx 0.8 kg; NT02: approx 0.4 kg **Data sheet no. 41305**	**NT01 - 24V-AC** **NT02 - 24V-DC**	103 472 103 473	04 04	**211.50** **211.50**
 **Monitoring device for Modbus KRM 24 V AC/DC** For connecting and displaying the operating status of up to 99 smoke duct detectors type: KRM-2-MOD / KRM-2-DZ-MOD/ KRM-1-MOD / KRM-1-DZ-MOD. The monitoring device takes over the indication and analysis of smoke, contamination, failure as well as cable monitoring for cable break and short-circuit which is displayed in the LCD display in plain text and with LEDs. The signalling is both via floating contacts and via an RS485 interface for distribution to building automation systems. With a keyboard the current status of each detector can be called up. Housing with click-in base for installation on mounting rail in the cabinet. Dimensions: approx 160 x 90 x 50 mm (L x W x D) Protection class IP 20, Perm. Ambient temperature: 0 – 50 °C **Data sheet no. 43105**	**AZE 1.2**	100 050	04	**380.50**

Accessories: Duct smoke detector KRM®

		Type		Item no.	ADG	Euro/pc.
	**Smoke detector, without socket – bus-capable** suitable for type KRM duct smoke detectors or as replacementfor DRM 3.3. ceiling smoke detector. **Data sheet no. 40103**	**RM 3.3**		101 457	04	**129.00**
	**TurboTube air duct sampling tube** Including flange, length 0.16 m/0.6 m/1.5 m/3.0 m; flange -ø 160 mm; Suitable for all KRM models. Spare parts prices. For KRM-set prices, please see above or available on request.	**LKR 0,16** **LKR 0,6** **LKR 1,5** **LKR 3,0**		103 881 101 105 101 106 101 107	04 04 04 04	**27.00** **32.00** **78.00** **118.50**
	**Aerosol spray ASR** For the functional test and to trigger smoke detectors, adapted to the optical system. Free from oil mist, free from residues, non-flammable. 150 ml aerosol spray. Note: ASR-A3 no longer available on account of EU directive on greenhouse gases	**ASR-A10**	NEW	104 237	04	**30.00**
	**Water resistant housing for KRM** for mounting outdoors or in cold areas, protects evaluation electronics from condensation. Galvanized, internally insulated sheet metal housing with removable cover. Dimensions: approx 235 x 400 x 135 mm (L x W x D)	**WDG**		102 394	04	**158.50**
	**Bracket for KRM** For mounting the KRM smoke detector on round or insulated ducts. Includes rubber grommets to seal off sampling tube of air duct. Console is delivered flat. Mounting area for KRM: approx 166 x 162 mm	**KS**		101 090	04	**30.00**
	**Large console for KRM with WDG** Larger console for mounting the KRM duct smoke detector, together with WDG type splash-proof housing on round or insulated ducts. Includes rubber grommet for sealing the sampling tube leading to the air duct Console is delivered flat. Mounting area for KRM/WDG: approx 240 x 370 mm	**KS-WDG**		101 091	04	**43.00**

Automatic smoke outlet systems



Operating mode:
This sketch shows you the interaction of detectors and actuators in order to efficiently avoid the spreading of fire and smoke by means of a RLT system which is installed in the building.
In case a smoke detector which has been installed in the fire section sets off an alarm, the designated smoke extracting flap of the automation station triggered by the STG 1.2 control unit will open and the smoke extracting ventilator will be turned on. Other smoke extraction flaps are closed in order to concentrate the extract air volume on one smoke zone.

Requirements:
- DIN 18232 – structural fire protection, smoke/heat removal
- Number and arrangement of the smoke detectors is specified in VDE 0833
- Requires its own circuit with its own separately signed fuse protection
- Smoke detectors according to EN 54-7
- Preservation of the functionality of the wires for a min. of 30 min. according to DIN 4102-12
- Signalling of contamination
- Signalling of system failure
- Manual overmodulation is possible
- Smoke protection areas may not exceed fire areas

Note: Subject to change.
The local rules and regulations apply.

Control, smoke alarm, manual alarms (bus technology)

		Type	Item no.	ADG	Euro/pc.
	**Control unit – system bus DRM/DKM 24V AC / DC** to connect up to 99 bus-capable DRM 3.3/DRM 3.3-N ceiling smoke detectors/DKM 3.3 manual call point. The control unit takes over the indication and analysis of smoke, contamination, system failure, cable break and short-circuit, shown in the LCD display in plain text and by LED. The reporting is done both through floating contacts and via an RS485 interface for forwarding to building automation PLCs. The current status of each detector can be called up using a keyboard. Housing with click-in base for installation on mounting rail in the cabinet. Dimensions: 160 x 90 x 50 mm (L x W x D) Protection class: IP 20, Perm. Ambient temperature: 0 – 50 °C **Data sheet no. 43104**	**STG 1.2**	101 645	04	**437.00**
	**Ceiling smoke detector, with socket – bus-capable** for use **in rooms** for early detection of smoldering fires and smoke development. The detector operates on the principle of scattered light. The light scattered by suspended particles (Tyndall effect) reaches the receiver and is turned into an electrical signal. **Two red LEDs indicate alarm.** The detector to the **control unit STG 2.1** **(Data sheet no. 43104)** is operated via a safety ring bus. Dimensions: diameter 100 mm, height 50 mm Perm. Ambient temperature: -10 – 50 °C **VdS G 208038 approval** **EN54-7** **Data sheet no. 40103**	**DRM 3.3-N** **Note:** replaces DRM 3.3	104 011	04	**149.00**
	**Smoke detector, without socket – bus-capable** suitable for type KRM duct smoke detectors or as replacement for DRM 3.3/DRM 3.3-N ceiling smoke detector. **Data sheet no. 40103**	**RM 3.3**	101 457	04	**129.00**
	**Smoke detector socket – bus-capable** Replacement part suitable for RM 3.3 / DRM 3.3-N **Data sheet no. 40103**	**RMS 3.3-N** **Note:** replaces RMS 3.3	104 012	04	**30.00**
	**Manual call point – bus-capable** **Color blue**, similar RAL 5005 **Color red**, similar RAL 3001 **Color yellow**, similar RAL 1003 The alarm is operated by the STG 1.2 control unit via a safety ring bus. Plastic housing. Dimensions: 135 x 135 x 35 mm (L x W x D) **VdS-Approval G202028** **EN54-11 (only in color red)** **Data sheet no. 49103**	 **DKM-3.3 bl** **DKM-3.3 ro** **DKM-3.3 ge**	 100 342 100 349 100 344	 04 04 04	 **107.50** **107.50** **107.50**
	**Programmer** For programming the bus addresses of DRM 3.3/DRM 3.3-N ceiling smoke detectors and DKM 3.3 manual call point, includes programming cable. **see Data sheet no. 40103/49103**	**PG 3.3**	101 347	04	**212.50**

Control, smoke alarm, manual alarms (analog technology)

	Type	Item no.	ADG	Euro/pc.
 **Optical smoke detector for indoor** use for early detection of smoldering fire and fire with smoke development. The detector operates according to the scattered light principle. **Delivery including mounting base**. Light transmitters and receivers are arranged in the measuring chamber in a way that the luminous beam of the transmitter cannot hit the receiver directly. Only the light which is scattered at floating particles (Tyndall effect) reaches the receiver and is converted into an electrical signal. **A green LED shows contamination (service), a red LED indicates an alarm.** The detector is operated by the **control device ABAV-S** (Data sheet no. 43102) which also supplies the measuring voltage, alarm current: 55 mA Perm. Ambient temperature: -10 – 50 °C **VDS test certificate: G202091** Data sheet no. 40101	**ST-P-DA-STB**	101 650	04	**191.00**
 **Optical smoke detector 16 – 30 V DC with alarm relay with potential-free changeover contact. Mounting base included in shipment. For indoor** use for early detection of smoldering fire and firewith smoke development. The detector operates according to the scattered light principle. Light transmitters and receivers are arranged in the measuring chamber in a way that the luminous beam of the transmitter cannot hit the receiver directly. Only the light which is scattered at floating particles (Tyndall effect) reaches the receiver and is converted into an electrical signal. **A green LED shows contamination (service), a red LED indicates an alarm**. Relay contact, loadable with 24 V / 1 A Perm. Ambient temperature: -10 – 50 °C Power consumption 2.64 watt **VDS test certificate: G202091** Data sheet no. 40201	**ST-P-DA-24VR**	101 654	04	**212.50**
 **Thermodifferential alarm 24 V DC** as fire detector for installation at ceilings. **Responds to a fast temperature rise or to the exceeding of a fixed temperature limit value. LED display and contact output via controller ABAV-S. Delivery including mounting base**. The fire detector is used in areas where smoke detectors would cause false alarms due to environmental conditions like smoke, steam or dust. The speed of the temperature rise is defined according to EN 54 class A1R. (static maximal construction temperature 50 °C in normal operation). The upper temperature limit value is set fixed to 57 °C ± 3 K. An output for parallel display (-1.4 V/100 mA) is built-in. **The thermodifferential alarm runs with the controller ABAV-S which also supplies the voltage of 24 V DC.** Alarm current consumption: 52 mA at 24 V DC Perm. Ambient temperature: -20 – 90 °C no icing Dimensions with socket: 100 x 50 mm (ø x H) Data sheet no. 43501	**TD 122.3**	101 659	04	**82.00**

Control, smoke alarm, manual alarms (analog technology)

	Type		Item no.	ADG	Euro/pc.
	**Controller 230 V AC**	**ABAV-S 3.1**	100 000	04	**227.50**
	Controller 24 V AC/DC	**ABAV-S 3.2**	100 001	04	**187.00**
	For evaluation of signals and for the power supply of up to 30 analog smoke sensors/manual alarms. The controller also takes over wire monitoring for short-circuit, cable break and system failure. Smoke alarms, contamination, cable break, short-circuit, normal operation on floating contacts for smoke alarm, contamination signal and system failure are all indicated via LED. Self interlock in case of smoke alarm. Release via internal switch. Frame with click-in base for the installation on mounting rail. Protection class: IP 20, Perm. Ambient temperature: 0 – 50 °C (Inspection report E810113 Delta Hörsolm) Power consumption 1.8 VA **Data sheet no. 43102**				
	**Manual call point 24 V (line monitored)***				
	colour blue, similar RAL 5015	**DKM-2.3 bl**	100 332	04	**133.00**
	colour grey, similar RAL 7035	**DKM-2.3 gr**	100 336	04	**133.00**
	colour yellow, similar RAL 1021	**DKM-2.3 ge**	100 333	04	**133.00**
	colour orange, similar RAL 2011	**DKM-2.3 or**	100 339	04	**133.00**
	With resistances for cable monitoring for short-circuit and cable breakage made of aluminium casting to actuate an ERK and to switch on the smoke extraction system. Easily replaceable standard thin pane of glass in standard lockable door protects unit from uninteaded triggering. A special locking device keeps the button in the pressed position until the door is opened and the unblocking lever is activated. LED green (ready for operation), red (triggered), ERK "OPEN", LED yellow, system error. Dimensions: 125 x 125 x 34 mm (L x W x D) Protection class: IP 42 Perm. Ambient temperature: 0 – 50 °C **Data sheet no. 49102**				
	**Note:** *With power monitoring use control device ABAV-S. **(Data sheet no. 43102)**				
	**Aerosol spray ASR**	**ASR-A10** NEW	104 237	04	**30.00**
	For the functional test and to trigger smoke detectors, adapted to the optical system. Free from oil mist, free from residues, non-flammable. 150 ml aerosol spray. Note: ASR-A3 no longer available on account of EU directive on greenhouse gases				

Calibration protocols

Single-point factory calibration protocols
Default versions
The single-point factory calibration protocol is always performed on the same standard locations for each measured physical variable. This is the most cost-effective version for you. You can find the relevant calibration value in the form available in the online version. If this standard single-point factory calibration protocol meets your needs, you only need to indicate the type number in your order. Please note that the single-point factory calibration protocols are always performed in accordance with the version published online. Please verify first that this is the value you need for your application. If not, please note the instructions for customized factory calibration protocols.

		Type	Item no.	Euro/pc.
Factory calibration protocol / Differential pressure	Single-point	WK-DP-1P	WK-0001	30.00
Factory calibration protocol / Absolute pressure	Single-point	WK-AP-1P	WK-0002	30.00
Factory calibration protocol / Temperature	Single-point	WK-T-1P	WK-0003	30.00
Factory calibration protocol / Flow	Single-point	WK-F-1P	WK-0004	30.00
Factory calibration protocol / Humidity	Single-point	WK-RH-1P	WK-0005	30.00

Custom calibration point
The custom single-point factory calibration protocols differ from the above versions in that you can freely select the desired calibration point within the specified limits. Please print the form. Select the desired value within the specified limits and send the form to us together with your binding order. We are unfortunately unable to calibrate values outside of the range shown in the form. We ask for your understanding.

		Type	Item no.	Euro/pc.
Factory calibration protocol / Differential pressure	custom single-point	WK-DP-1P-I	WK-0020	50.00
Factory calibration protocol / Absolute pressure	custom single-point	WK-AP-1P-I	WK-0021	50.00
Factory calibration protocol / Temperature	custom single-point	WK-T-1P-I	WK-0022	50.00
Factory calibration protocol / Flow	custom single-point	WK-F-1P-I	WK-0023	50.00
Factory calibration protocol / Humidity	custom single-point	WK-RH-1P-I	WK-0024	50.00

3-point factory calibration protocols
Default versions
The same comments for single-point factory calibration protocols also apply here. The difference is that 3 default values are calibrated.

		Type	Item no.	Euro/pc.
Factory calibration protocol / Differential pressure	3-point	WK-DP-3P	WK-0040	70.00
Factory calibration protocol / Absolute pressure	3-point	WK-AP-3P	WK-0041	70.00
Factory calibration protocol / Temperature	3-point	WK-T-3P	WK-0042	70.00
Factory calibration protocol / Flow	3-point	WK-F-3P	WK-0043	70.00

Custom calibration points
he custom 3-point factory calibration protocols differ from the above versions in that you can freely select the desired calibration points within the specified limits. Please print the form. Select the desired values within the specified limits and send the form to us together with your binding order. We are unfortunately unable to calibrate values outside of the range shown in the form.
Thank you for your appreciation.

		Type	Item no.	Euro/pc.
Factory calibration protocol / Differential pressure	custom 3-point	WK-DP-3P-I	WK-0060	90.00
Factory calibration protocol / Absolute pressure	custom 3-point	WK-AP-3P-I	WK-0061	90.00
Factory calibration protocol / Temperature	custom 3-point	WK-T-3P-I	WK-0062	90.00
Factory calibration protocol / Flow	custom 3-point	WK-F-3P-I	WK-0063	90.00

All calibration protocols are available as downloads in the online version of the catalog. Please complete these protocols and send these to us together with your order. You can also find the calibration protocols on our website:
www.oprg.de

Note: The calibration protocol prices quoted here are **non-discountable net prices** and do not include the respectively applicable local VAT rate. **Graduated offers for large quantities on request.**

Note: Our product range does not support 3-point calibration protocols for relative humidity. Only the temperature values can be customized on relative humidity sensors. The calibration for this is particularly elaborate. If you need a 3-point calibration for this sensor type, you will need to order 3 x one custom single-point calibration protocol for 3 different temperatures at EUR 50.00 each (total cost: EUR 150.00).

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Type index

General conditions of sale

Only valid terms and conditions apply.
Further informations can be found at:

www. oprg.de

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