Dräger Polytron SE Ex
Fixed Gas Detector

The Dräger Polytron SE Ex ... DD sensing heads are gas detectors for the continuous monitoring of flammable gases and vapors in the ambient air. The measurement is based on the heat of reaction principle, where a chemical reaction takes place in a catalytic bead (so-called pellistor) inside the sensor.

By this, concentrations of flammable gases can be detected long before they tend to be ignitable, in other words: before they reach the lower explosive limit (LEL). The sensing heads are intended to be used in the harsh industrial environment and connected to a suitable central controller by means of a 3-core cable. Based on different sensor types Dräger offers three versions for different applications: On the one hand for the detection of up to 100 %LEL (where a special HT-version can be used at ambient temperatures up to 150 °C), on the other hand for the detection of very low concentrations in the range 0 ... 10 %LEL (leak detection).

EIGHT HOUSING VARIANTS

The sensing heads Dräger Polytron SE Ex PR ... DD and SE Ex LC ... DD are available as four variants each, which differ by their junction boxes, specified by the following code:

M1 - small standard housing
M2 - midsize standard housing
M3 - big GRP plastic housing

Besides these junction boxes made of glass fiber reinforced Polyester (GRP) with type of protection “e” (increased safety) housing a sensor with metric (“M”) thread, a further variant with type of protection “d” (flameproof enclosure) is available, coded as:
NPT1 - flame-proof metal housing
This variant houses a sensor with NPT-thread and is intended to be used in conduit installations. The variant M2 should preferably be used in outdoor applications since the lateral cable gland may be exchanged by the stopping plug so that the cable can be inserted from the bottom.

COMPREHENSIVE EXPLOSION PROTECTION

The sensing heads Polytron SE Ex ... DD are labeled acc. to the Directive 94/9/EC (Atex 95) as II 2G/ II 2D and thus are

Sensing head
Dräger Polytron SE Ex PR M1 DD

SCREWLESS TERMINALS

The variants M1 and M2 are provided with so-called spring-type terminals which not only support easy installation but also ensure a long-term constant contact pressure - never to perform regular re-adjustments of screw terminals anymore!

suitable for operation in areas with potentially explosive atmospheres of zone 1 and 2 as well as zone 21 and 22. In the same way, for world-wide applications, an IECEx-approval allows to operate these sensing heads in hazardous areas.

MEASURING SIGNAL

The flame-proof encapsulated gas sensor produces a mV-signal which is proportional to the gas concentration and can be evaluated by a suitable central controller (e.g. Dräger REGARD or Polytron SE Ex). Connected to the sensing head via a shielded 3-core cable of several hundreds of meters length, the central controller is intended to activate alarms if dangerous gas concentrations occur.

PELLISTOR SENSORS TYPE DD

Since they are operated as precisely measuring temperature dependent resistors, the measuring beads housed in the sensor are called pellistors (from engl. pellet and resistor). A pellistor is a small bead made of very porous ceramic material which is impregnated by a special catalyst and embedding a small platinum filament. By means of an electrical current of approx. 255 mA on the one hand the platinum filament heats up the ceramic bead to roughly 450 °C, on the other hand this platinum wire acts as a measuring resistor dependent on the bead's temperature.

When molecules of a flammable gas penetrate into the catalytic bead they react with the activated airborne oxygen which is adsorbed in the porous ceramic and release heat of reaction causing the pellistor's temperature rising. The resulting resistance increase of some milli-Ohms is proportional to the gas concentration.

ENVIRONMENTAL CONDITIONS

By means of a second, entirely uniform pellistor, which is especially encapsulated, any parameter affecting precise measurement is optimal compensated. This is particularly true in respect to humidity and ambient temperature.

During manufacturing these pellistors are matched in respect to optimum compensation characteristics. Since both these pellistors are catalytic the sensor is called type DD, standing for double detector with a resulting long-term stable sensor signal being nearly unaffected by ambient temperature changes.

POISON RESISTANCE

The pellistors which are manufactured since decades are of type PR, which means poison resistant. Based on their special construction these sensors have a longer lifetime compared to conventional sensors when being exposed to industrial atmospheres containing catalyst poisons such as sulfur-, phosphor-, lead- or silicon-compounds.

VERY SHORT RESPONSE TIMES

To achieve short response times the gas entrance of the DD-sensor is not a conventional sinter disc but a thin wire mesh disc so that the gas to be detected can very quickly enter the pellistors by way of diffusion.

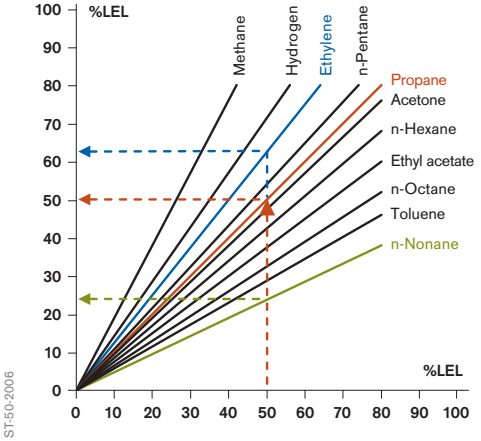
MEASURING FUNCTION FOR EXPLOSION PROTECTION

In conjunction with some Dräger central controller units the Dräger sensing heads Polytron SE Ex PR ... DD and HT M DD are type-approved to be used in preventive explosion protection applications acc. to EN 1127-1. This is a customer's benefit since in case of a dangerous gas concentration a performance approved gas detection system will automatically activate countermeasures so that explosive concentrations cannot form and the extension of hazardous areas thus decrease. By this, electrical installations can be designed more simply and in some cases even no further explosion protection measures are necessary.

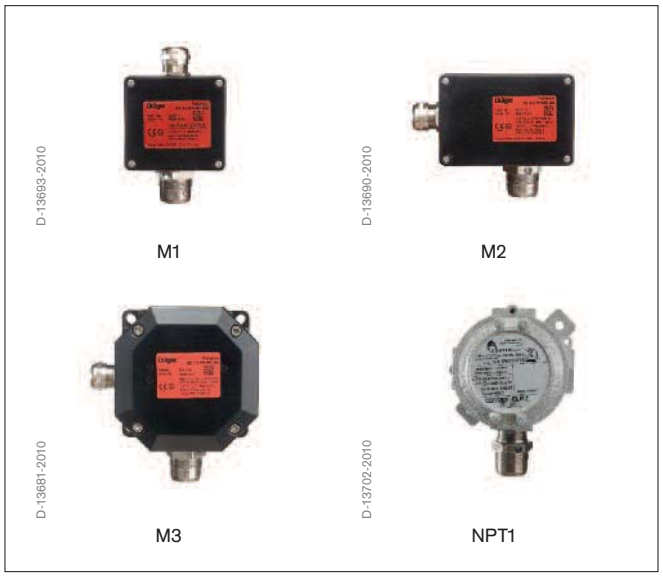
This is because potentially explosive atmospheres occur seldom or even not at all when having a gas detection system like this.

CALIBRATION

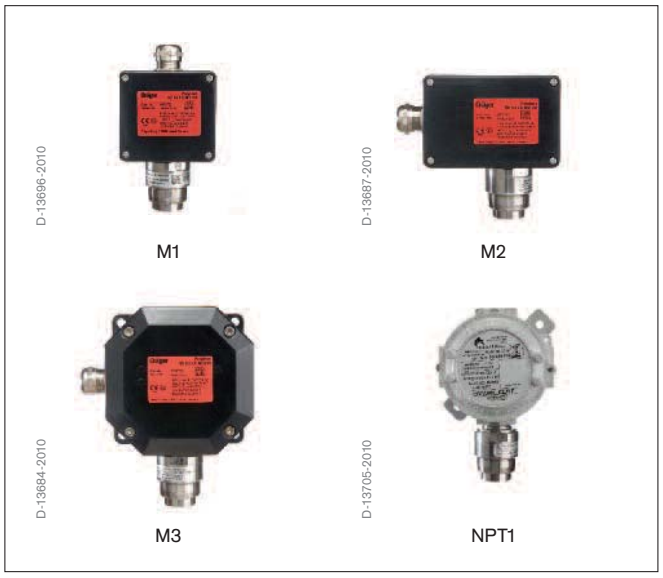
A suitable central controller supplies the sensor with a constant current and, by means of its Wheatstone-semibridge input, converts the sensors's resistance change into a mV-signal. Before this, however, the sensor signal needs to be balanced to 0 mV when being exposed to normal clean air (zero calibration). When applying defined gas concentrations the resulting mV-signal needs to be adjusted at the central controller such that the current gas concentration is correctly displayed in %LEL. This is the procedure of span calibration. Since a pellistor-sensor reacts with different sensitivity when being exposed to different gases (s. graphics), in the presence of several gases and vapors it must be calibrated to the gas which the sensor is least sensitive to. The oxygen content of the monitored atmosphere must not be lower than 12 % by volume.



Different sensitivities of a propane-calibrated pellistor sensor: 50% LEL n-nonane cause a measuring value of only 23 %LEL propane while 50 %LEL ethylene cause a measuring value of 62% LEL (schematic).



Dräger Polytron SE Ex PR ... DD



Dräger Polytron SE Ex LC ... DD

DRÄGER POLYTRON SE EX PR ... DD

Wherever there is a risk of flammable gas or vapor release, the sensing head Polytron SE Ex PR ... DD can be used to prevent the formation of explosive atmospheres. By means of the central controller unit not only the operator is alarmed, but simultaneously counter measures (e.g. at 20 %LEL) are activated. If however the counter measure fails and the gas concentration rises, the main-alarm threshold (e.g. at 40 %LEL) is exceeded so that a shut-down is automatically activated. For this application the sensing heads Polytron SE Ex PR ... DD and HT M DD with central controller units REGARD or REGARD-1 have been type tested in compliance with the EN 60079-29-1.

DRÄGER POLYTRON SE EX LC ... DD

The sensing heads Polytron SE Ex LC ... DD (LC = Low Concentration) is suitable to detect very low gas concentrations reliably. This sensing head is rather used for early leak detection of flammable gases and vapors with concentrations lower than 10 %LEL than for preventive explosion protection measures. Typical alarm thresholds are 3 %LEL and 5 %LEL, corresponding to e.g. 300 and 500 ppm n-hexane. The flame-proof encapsulated sensor contains complex amplification electronics which is especially factory-adjusted in respect to several measuring parameters.

DRÄGER POLYTRON SE EX HT M DD

The sensing head Polytron SE Ex HT M DD (HT = High Temperature) is intended to be used at ambient temperatures up to 150 °C. This sensing head is preferably used in applications where extremely high temperatures can occur, especially for leak detection in the direct vicinity of gas turbines. The temperature resistant terminals are housed in a robust galvanized cast iron enclosure.

Dräger Polytron SE Ex HT M DD

TECHNICAL DATA

SENSING HEADS

All sensing heads Polytron SE Ex ... DD

Type	Sensing head with catalytic bead sensor	
Gases and Vapors	Flammable gases and vapors in the ambient air such as methane, propane, acetone, acetylene, ammonia, petrol 065/095, benzene, 1.3-butadiene, n-butane, n-butyl acetate, diethyl ether, dimethyl ether, ethanol, ethylene (ethene), ethyl acetate, ethylene oxide, n-hexane, hydrogen, methanol, methyl ethyl ketone (MEK), methyl methacrylate, n-nonane, n-octane, n-pentane, i-propanol, propylene (propene), propylene oxide, toluene and o-xylene.	
Maximum cable length	between sensing head and controller Polytron SE Ex:	3 x 1.5 mm^2: 1450 m
		3 x 1.0 mm^2: 950 m
		3 x 0.75 mm^2: 700 m
	between sensing head and controller REGARD:	3 x 1.5 mm^2: 700 m
		3 x 1.0 mm^2: 450 m
		3 x 0.75 mm^2: 350 m
Ambient conditions	atmospheric pressure: 800 ... 1100 mbar	
	relative humidity: 5 ... 95 %, non-condensing	
Expected sensor lifetime	> 3 years	

Polytron SE Ex PR ... DD

Full scale deflection	Combined with a suitable controller - 100 % of the Lower Explosion Limit (LEL)		
Sensor current	240 ... 270 mA (preferably 255 mA) constant current produced by a suitable controller, approx. 1 W		
Response time (25 °C)	t_{50} ≤ 4 s, t_{90} ≤ 8 s (methane)		
	t_{50} ≤ 4 s, t_{90} ≤ 9 s (propane)		
Measuring function (94/9/EC)	Measuring function for explosion protection acc. to EN 60079-29-1 for the a.m. gases and vapors		
Measuring cable	screened 3-core cable, core cross sections 0.5 ... 1.5 mm^2		
	outer diameter 7 ... 12 mm - exception: Sensing head Polytron SE Ex PR NPT1 DD (Conduit thread)		
Cable gland	M 20 x 1.5 - exception: Sensing head Polytron SE Ex PR NPT1 DD (comes without cable gland)		
Ambient temperature	SE Ex PR M1/2 DD:	minimum temperature: -50 °C	maximum temperature: T4: 85 °C, T5: 55 °C, T6: 40 °C
	SE Ex PR M3 DD:	minimum temperature: -50 °C	maximum temperature: T4: 65 °C, T5: 55 °C, T6: 40 °C
	SE Ex PR NPT1 DD:	minimum temperature: -40 °C	maximum temperature: T4: 60 °C, T5: 55 °C, T6: 40 °C
Housings	SE Ex PR M1/2/3 DD:	IP 66, glass fiber reinforced Polyester (GRP)	
	SE Ex PR NPT1 DD:	IP 66, aluminum	
Dimensions (w x h x d) and weight	SE Ex PR M1 DD:	small standard housing 80 x 130 x 56 mm incl. sensor and cable gland, 0.5 kg	
	SE Ex PR M2 DD:	midsize standard housing 136 x 107 x 56 mm incl. sensor and cable gland, 0.6 kg	
	SE Ex PR M3 DD:	big GRP plastic housing 147 x 154 x 75 mm incl. sensor and cable gland, 1.2 kg	
	SE Ex PR NPT1 DD:	flameproof metal housing 101 x 142 x 75 mm incl. Sensor, 0.7 kg	
Explosion protection acc. to EU-directive 94/9/EC (Atex 95)	SE Ex PR M1/2/3 DD:	II 2G Ex de IIC T6/T5/T4 Gb	II 2D Ex tD A21 IP 6x T130 °C
	SE Ex PR NPT1 DD:	II 2G Ex d IIC T6/T5/T4 Gb	II 2D Ex tD A21 IP 6x T130 °C
	EC-Type examination certificate BVS 10 ATEX E 060 X		
Explosion protection acc. to IECEx	SE Ex PR M1/2/3 DD:	Ex de IIC T6/T5/T4 Gb	Ex tD A21 IP 6x T130 °C
	IECEx Certificate of Conformity BVS 10.0045X		

Polytron SE Ex HT M DD

Full scale deflection	Combined with a suitable controller - 100 % of the Lower Explosion Limit (LEL)			
Sensor current	240 ... 270 mA (preferably 255 mA) constant current produced by a suitable controller, approx. 1 W			
Response time (25 °C)	t_{50} ≤ 4 s, t90 ≤ 8 s (methane)			
	t_{50} ≤ 4 s, t90 ≤ 9 s (propane)			
Measuring function (94/9/EC)	Measuring function for explosion protection acc. to EN 60079-29-1 for the a.m. gases and vapors			
Measuring cable	screened 3-core cable, core cross sections 0.5 ... 1.5 mm^2			
	outer diameter 7 ... 12 mm, sufficiently temperature resistant			
Cable gland	M 20 x 1.5			
Ambient temperature	minimum temperature: -50 °C, maximum temperature: T3: 150 °C T4: 85 °C, T5: 55 °C, T6: 40 °C			
Housing	IP 66, galvanized cast iron housing			
Dimensions (w x h x d) and weight	150 x 152 x 85 mm incl. sensor and cable gland, 2.6 kg			
Explosion protection acc. to EU-directive 94/9/EC (Atex 95)	DrägerSensor HT M DD:	DEMKO 09 ATEX 0924202X	II 2G Ex d IIC T3	II 2D Ex tD A21 IP 6x T195 °C
	Housing:	SIRA 06 ATEX 3153	II 2G Ex e II T3	II 2D Ex tD A21 IP 66
	Cable gland:	SIRA 01 ATEX 1272X	II 2G Ex e II	II 2D Ex tD A21 IP 66

continue page 05

TECHNICAL DATA

SENSING HEADS

Polytron SE Ex **LC ...** DD			
Full scale deflection	Combined with a suitable controller - 10 % of the Lower Explosion Limit (LEL)		
Sensor current	276 mA constant current produced by a suitable controller, approx. 1 W		
Response time (25 °C)	t_{50} < 6 s, t_{90} < 20 s (methane)		
Measuring cable	screened 3-core cable, core cross sections 0.5 ... 1.5 mm²		
	outer diameter 7 ... 12 mm - exception: Sensing head Polytron SE Ex LC NPT1 DD (Conduit thread)		
Cable gland	M 20 x 1.5 - exception: Sensing head Polytron SE Ex LC NPT1 DD (comes without cable gland)		
Ambient condition	maximum temperature:	SE Ex LC M1/2 DD:	T4: 85 °C, T5: 50 °C, T6: 40 °C
		SE Ex LC M3 DD:	T4: 65 °C, T5: 50 °C, T6: 40 °C
		SE Ex LC NPT1 DD:	T4: 60 °C, T5: 50 °C, T6: 40 °C
	minimum temperature:	-40 °C	
	atmospheric pressure:	800 ... 1100 mbar	
	relative humidity:	5 ... 95 %, non-condensing	
Housings	SE Ex LC M1/2/3 DD:	IP 66, glass fiber reinforced Polyester (GRP)	
	SE Ex LC NPT1 DD:	IP 66, aluminum	
Dimensions (w x h x d) and weight	SE Ex LC M1 DD:	small standard housing 80 x 130 x 56 mm incl. sensor and cable gland, 0.6 kg	
	SE Ex LC M2 DD:	midsize standard housing 136 x 107 x 56 mm incl. sensor and cable gland, 0.7 kg	
	SE Ex LC M3 DD:	big GRP plastic housing 147 x 154 x 75 mm incl. sensor and cable gland, 1.3 kg	
	SE Ex LC NPT1 DD:	flameproof metal housing 101 x 142 x 75 mm incl. Sensor, 0.8 kg	
Explosion protection acc. to	SE Ex LC M1/2/3 DD:	II 2G Ex de IIC T6/T5/T4 Gb	II 2D Ex tD A21 IP 6x T130 °C
EU-directive 94/9/EC (Atex 95)	SE Ex LC NPT1 DD:	II 2G Ex d IIC T6/T5/T4 Gb	II 2D Ex tD A21 IP 6x T130 °C
	EC-Type examination certificate BVS 10 ATEX E 060 X		
Explosion protection acc. to	SE Ex LC M1/2/3 DD:	Ex de IIC T4/T5/T6 Gb	IP 6x T85/T100/T135 °C
IECEx	IECEx Certificate of Conformity BVS 10.0045X		

SENSORS

Type	Catalytic bead sensor for range 0 ... 100 %LEL		
Explosion protection acc. to	DrägerSensor PR M DD:	II 2G Ex d IIC T4/T5/T6	II 2D Ex tD A21 IP6X T130 °C
EU-directive 94/9/EC (Atex 95)	DrägerSensor PR NPT DD:	II 2G Ex d IIC T4/T5/T6	II 2D Ex tD A21 IP6X T130 °C
	DrägerSensor HT M DD:	II 2G Ex d IIC T3/T4/T5/T6	II 2D Ex tD A21 IP6X T130/T195 °C
	EC-Type examination certificate DEMKO 09 ATEX 0924202X		
Explosion protection acc. to	DrägerSensor PR M DD:	Ex d IIC T6/T5/T4	Ex tD A21 IP6x T130 °C
IECEx	DrägerSensor PR NPT DD:	Ex d IIC T6/T5/T4	Ex tD A21 IP6x T130 °C
	DrägerSensor HT M DD:	Ex d IIC T6/T5/T4/T3	Ex tD A21 IP6x T130/T195 °C
	IECEx Certificate of Conformity UL 09.0006X		

Type	Catalytic bead sensor for range 0 ... 10 %LEL		
Explosion protection acc. to	Ex-Sensor LC M:	II 2G Ex de IIC T6/T5/T4 Gb	II 2D Ex t IIIC T80/T95/T130 °C Db
EU-directive 94/9/EC (Atex 95)	Ex-Sensor LC NPT:	II 2G Ex d IIC T6/T5/T4 Gb	II 2D Ex t IIIC T80/T95/T130 °C Db
	EC-Type examination certificate DMT 02 ATEX E 188 X, 2nd Supplement		
Explosion protection acc. to	Ex-Sensor LC M:	Ex de IIC T6/T5/T4 Gb	Ex t IIIC T80/T95/T130 °C Db IP 6X
IECEx	Ex-Sensor LC NPT:	Ex d IIC T6/T5/T4 Gb	Ex t IIIC T80/T95/T130 °C Db IP 6X
	IECEx Certificate of Conformity BVS 10.0012X		

ORDER INFORMATION

Dräger Polytron SE Ex PR M1 DD, small standard housing, 0 ... 100 %LEL	68 12 711
Dräger Polytron SE Ex PR M2 DD, midsize standard housing, 0 ... 100 %LEL	68 12 710
Dräger Polytron SE Ex PR M3 DD, big GRP plastic housing, 0 ... 100 %LEL	68 12 718
Dräger Polytron SE Ex PR NPT1 DD, flame-proof metal housing, 0 ... 100 %LEL	68 12 800
Dräger Polytron SE Ex LC M1 DD, small standard housing, 0 ... 10 %LEL	68 12 722
Dräger Polytron SE Ex LC M2 DD, midsize standard housing, 0 ... 10 %LEL	68 12 721
Dräger Polytron SE Ex LC M3 DD, big GRP plastic housing, 0 ... 10 %LEL	68 12 719
Dräger Polytron SE Ex LC NPT1 DD, flame-proof metal housing, 0 ... 10 %LEL	68 12 801
Dräger Polytron SE Ex HT M DD, high temperature version, 0 ... 100 %LEL	68 12 720
DrägerSensor PR M DD	68 12 220
DrägerSensor PR NPT DD	68 12 380
DrägerSensor HT M DD	68 12 390
Ex-Sensor LC M	68 10 350
Ex-Sensor LC NPT	68 10 675
Dust filter for DrägerSensor PR M DD and PR NPT DD (PE-discs, 10 pcs.)	68 10 537
Calibration adapter (PE, max. operation temperature 70 °C)	68 06 978
Process adapter (stainless steel, with locking nut M30 x 1,5) for DrägerSensor PR M DD, PR NPT DD and HT M DD	68 12 470
Process adapter (stainless steel, with locking nut M36 x 1,5) for Ex-Sensor LC M and LC NPT	68 12 465

90 46 142 | 12.10-1 | Marketing Communications | LE | PR | LE | Printed in Germany | Chlorine-free – environmentally compatible | Subject to modifications | © 2010 Drägerwerk AG & Co. KGaA

HEADQUARTERS
Dräger Safety AG & Co. KGaA
Revalstrasse 1
23560 Lübeck, Germany

www.draeger.com

SYSTEM CENTERS

P. R. CHINA
Beijing Fortune Draeger Safety Equipment Co., Ltd.
A22 Yu An Rd, B Area,
Tianzhu Airport Industrial Zone,
Shunyi District, Beijing 101300
Tel +86 10 80 49 80 00
Fax +86 10 80 49 80 05

GERMANY
Dräger Safety AG & Co. KGaA
Revalstrasse 1,
23560 Lübeck
Tel +49 451 882-2794
Fax +49 451 882-4991

FRANCE
Dräger Safety France SAS
3c route de la Fédération, BP 80141
67025 Strasbourg Cedex 1
Tel +33 3 88 40 59 29
Fax +33 3 88 40 76 67

SINGAPORE
Draeger Safety Asia Pte Ltd
67 Ayer Rajah Crescent #06-03
Singapore 139950
Tel +65 68 72 92 88
Fax +65 65 12 19 08

UNITED KINGDOM
Draeger Safety UK Ltd.
Blyth Riverside Business Park
Blyth, Northumberland NE24 4RG
Tel +44 1670 352 891
Fax +44 1670 544 475

USA
Draeger Safety, Inc.
505 Julie Rivers, Suite 150
Sugar Land, TX 77478
Tel +1 281 498 1082
Fax +1 281 498 5190