



Warsaw

## USER MANUAL

edition 10PU2

# DEX<sup>®</sup>/P

CONCENTRATION-MEASURING GAS DETECTOR  
WITH EXPLOSION-PROOF CONSTRUCTION, WITH 4-20 mA  
output,

with an interchangeable  
catalytic, electrochemical or  
Infra-Red optical **SENSOR**

models: **DEX-P<sub>n</sub>K/N**, **DEX-P<sub>n</sub>KL/N**,  
**DEX-P<sub>n</sub>E/N**, **DEX-P<sub>n</sub>R/N**

[U2] series from 2021

Read the USER MANUAL in its entirety  
BEFORE installation.

To ensure safety during installation and  
operation of the detector, it is essential



to comply with the  
recommendations  
and warnings in this Manual  
bearing this symbol.



Proceed only if you have fully understood this  
Manual.

Keep this Manual for reference by the User of the gas  
detection system.

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**Work and Live SAFER with Us!**

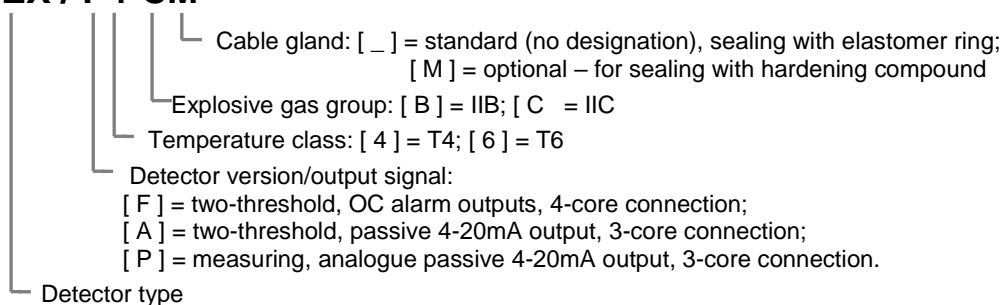
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## DEFINITIONS AND DESIGNATIONS USED:

- gas detector** – hereinafter ‘detector’ – a device that converts the changing concentration of gas, mist, or vapour of a specific substance in the air into an electrical signal;
- sensor module** – a replaceable component of the gas detector containing a gas sensor (an electronic component that is sensitive to changes in the concentration of gas in the air);
- smart sensor** or **smart sensor module** – a sensor module equipped, among others, with a microprocessor-based control and regulation system, event memory, calibration period exceedance notification, and an automatic test procedure – detectors with such a sensor are marked with the letter ‘N’ in the model symbol;
- calibration gas** – a type of gas or substance vapour used to set alarm thresholds (usually: the medium the detector/sensor module is designed to detect);
- calibration** – verification of the detector or sensor module’s response to the calibration gas and adjustment of the measurement range to match the prescribed values;
- short calibration certificate** – a document confirming the correct response of the detector to the medium specified in the document, at specified concentrations, under specified conditions;
- DEX/P** – DEX type explosion-proof concentration-measuring gas detector with a flameproof shield, in the following versions: P4-B, P4-BM, P4-HT-B, P4-HT-BM, P4-C, P4-CM, P4-S-C, P4-S-CM, P4-HT-C, P4-HT-CM, P6-B, P6-BM, P6-C, P6-CM; hereinafter ‘DEX’ or ‘detector’;
- DEX-PnK(L)/N** – concentration-measuring detector with a catalytic sensor – models DEX-PnK/N or DEX-PnKL/N, where ‘n’ is the digit representing the calibration gas code according to GAZEX nomenclature;
- MDP** – measuring alarm modules manufactured by GAZEX, type MDP-(1, 4, 8, 16)...;
- LEL** – the lower explosive limit of a given flammable substance – the highest volumetric concentration of a mixture of a flammable gas or vapour with air, below which no explosion of the mixture can occur (values for individual substances in accordance with PN-EN 60079-20-1:2010);
- MAC** – the maximum allowable concentration of a harmful substance in the working environment (pursuant to the Ordinance of the Minister of Family, Labour and Social Policy of 12 June 2018, Dz.U. [*Polish Journal of Laws*] 2018, item 1286, as amended);
- IMAC** – the instantaneous maximum allowable concentration of a harmful substance in the working environment (as above);
- ppm** – parts per million;
- v/v** – volume per volume;
- RH** – relative air humidity;
- <t<sub>1</sub>/t<sub>2</sub>** – time limit for the occurrence of a given factor described as ‘periodic’ or ‘instantaneous’ – means: over a period of time no longer than t<sub>1</sub> within a period of time no shorter than t<sub>2</sub>; electrical **cable** vs. **wire** – a connection cable is a collection of several insulated single-core conductors (with copper cores, single-wire or multi-wire, known as rope) within a common insulating sheath.

## Nomenclature used on the nameplate:

### DEX / P4-CM




## 1. INTENDED USE

**DEX/P** detectors are designed to measure the concentration of explosive, toxic gases or vapours, or oxygen in the air in enclosed spaces. They feature an analogue current output in the 4-20 mA standard (passive – current sinking).

These detectors are intended for use with **MDP...** type alarm modules manufactured by GAZEX. They can also be used with other control panels that accept the 4-20 mA input line standard (current emitting) when used with the optional MDPL1 power limiter.

DEX detectors comply with the essential requirements of Directive 2014/34/EU (ATEX) of the European Parliament and of the Council of 26 February 2014, on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres, implemented by Ordinance of the Minister of Development of 6 June 2016 on the requirements for equipment and protective systems intended for use in potentially explosive atmospheres Dz.U. [*Polish Journal of Laws*] 2016, item 817).

The detectors are explosion-proof devices with a flameproof shield and can be used in Zones 1 or 2 at risk of explosion from gases or flammable vapours classified in explosion groups IIA or IIB (for versions marked P...-B....) or in groups IIA, IIB, or IIC (for versions marked P...-C...), temperature classes T1, T2, T3, or T4 (for versions marked P4-...) or temperature classes T1, T2, T3, T4, T5, or T6 (for versions marked P6-...).

Application area according to ATEX Directive:  II 2G.

The DEX detector meets the standards: PN-EN IEC 60079-0:2018-09 [*EN IEC 60079-0:2018*], PN-EN 60079-1:2014-12 [*EN 60079-1:2014*]; and has an EU Type Examination Certificate (Module B): KDB 04ATEX133X, issued by the Central Mining Institute – notified body No 1453.

DEX/P detectors have the following features:

DEX version	Feature*	DEX version	Feature
P6-B, P6-BM	Ex db IIB T6 Gb	<b>P4-B</b> , P4-BM, P4-HT-B, P4-HT-BM	Ex db IIB T4 Gb
P6-C, P6-CM	Ex db IIC T6 Gb	<b>P4-C</b> , P4-CM, P4-S-C, P4-S-CM, P4-HT-C, P4-HT-CM	Ex db IIC T4 Gb

*Standard versions marked in **bold** (others available on request)*

\* – features required for carbon disulphide, phosphine, ethyl nitrite risks (substances belonging to class T5, T6)

Since DEX incorporates a thermal compensation circuit, it can be used under variable ambient temperatures. DEX can be used outdoors with the use of a sun/rain shield and/or a splashproof enclosure type AP-1 or AP-1F (the certificate allows the use of AP-1... with detectors versions P6-B, P6-C, P4-B or P4-C, if special requirements described in the AP-1 User Manual are met).

Detectors intended for detection of gases and vapours heavier than air, installed in areas exposed to mechanical damage (warehouses, depots, stockrooms), can be equipped with a shield made of profiled tubes type AR-1d.

DEX®/P detectors are available:

with a catalytic sensor module – DEX-PnK/N and DEX-PnKL/N models;

with an electrochemical sensor module – DEX-PnE/N models;

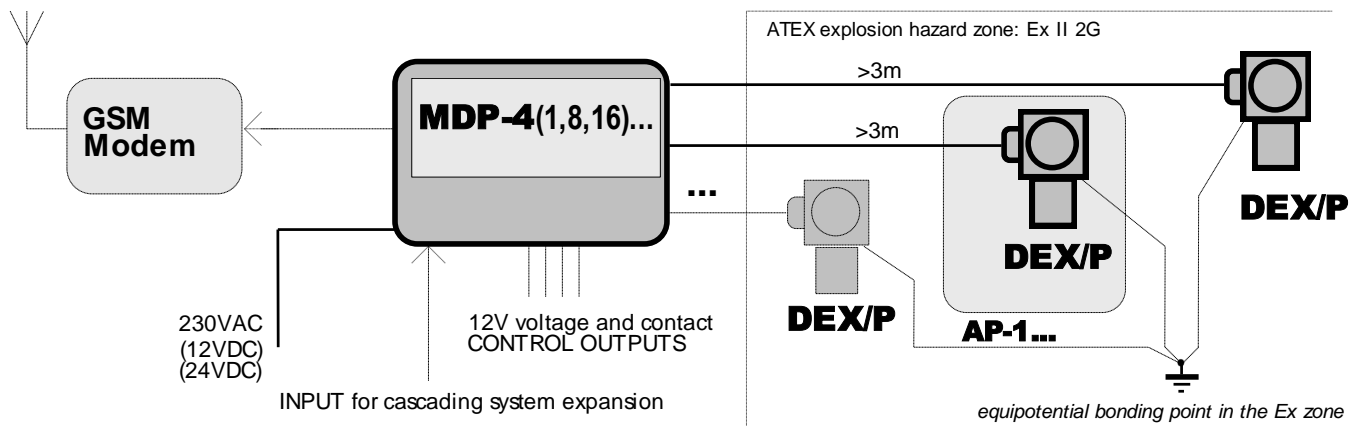
an optical (Infra-Red) sensor module – DEX-PnR/N models,

*where 'n' is for digits comprising the code of the sensor module (i.e. calibration gas).*

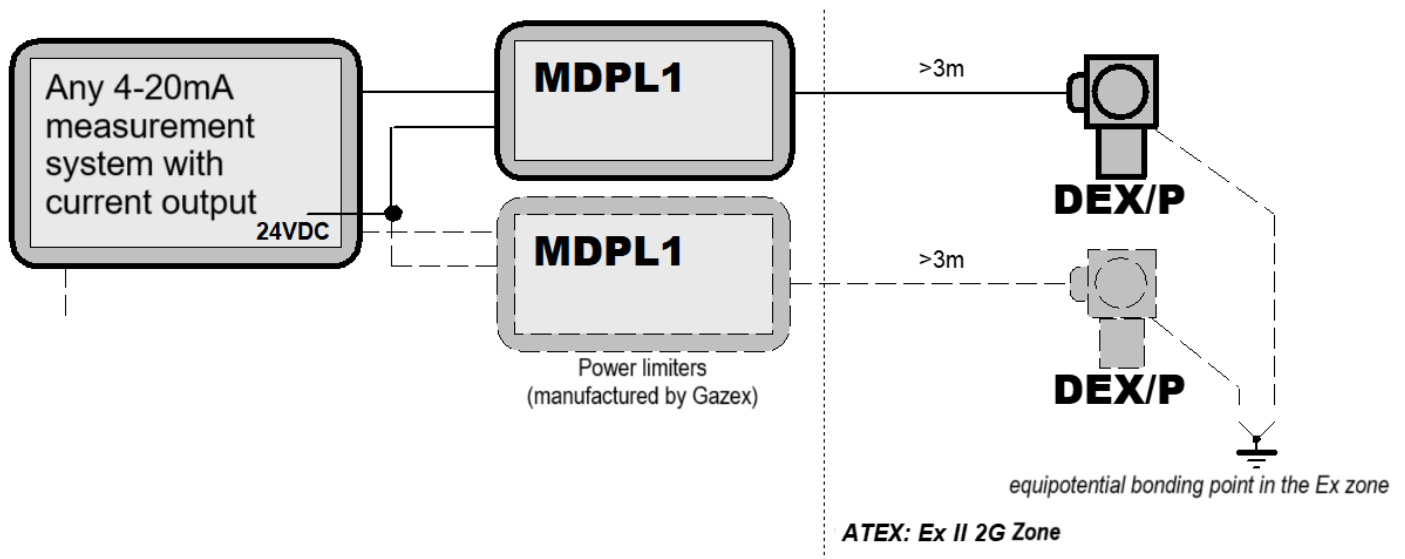
In bodies marked as 'type/variant - DEX/P...', sensor modules of types MS-PnK/N, MS-PnKL/N, MS-PnE/N, MS-PnR/N can be used interchangeably.

**Note:** The aforementioned types of sensor modules cannot be used in bodies manufactured by GAZEX before December 2020 and marked as '**DEX/P...(Pn)**' as these are only compatible with older generation sensor modules **MS-Pn**, **MS-Pn/N** and **MS-Pn/L/N**!

## Block diagram of connections in the gas detection system



## Block diagram of DEX/P connections with an external gas detection system



## DEX-PnK(L)/N MODEL RANGE

The range of standard DEX-PnK(L)/N detectors with a catalytic sensor includes the following models:

**TABLE 1.1.PnK**

SYMBOL			Concentration RANGE							Calibration PERIOD		
Model	Standard version	Sensor module MS- ...	Gas / medium	Concentration range + selectivity	Measurement range	Short-term stability	Allowed temporarily (<1min/30min)	STANDARD CALIBRATION	Unit	Recommended max value [months]	Optimal [months]	Service life* in clean air approx. [years]
1	2	3	4	5	6	7	8	8A	9	10	11**	12
<b>DEX-P1KL/N</b> <sup>AL H</sup>	P4-C	P1KL/N-X	combustible gases,	W	0÷100	± 2	110	50	%LEL	12***	6	5
<b>DEX-P1K/N</b> <sup>AL H</sup>	P4-C	P1K/N-X	methane (increased resistance to poisoning)	W	0÷100	± 2	110	50	%LEL	12***	6	5
<b>DEX-P1KL5/N</b> <sup>AL H</sup>	P4-C	P1KL5/N-X	propane-butane, (hydrocarbons)	W	0÷100	± 2	110	50	%LEL	12***	6	5
<b>DEX-P3K/N</b> <sup>H</sup>	P4-B	P3K/N	petroleum derivatives, alcohols	W+SL	0÷100	± 2	110	50	%LEL	6	3	5
<b>DEX-P4K/N</b> <sup>H</sup>	P4-C	P4K/N	ammonia, (hydrocarbons)	W+SL	0÷20	± 1	50	20	%LEL	6	3	5
<b>DEX-P7KL/N</b> <sup>AL H</sup>	P4-C	P7KL/N-X	hydrogen	W	0÷100	± 2	110	50	%LEL	12***	6	5

Designations: W – concentrations considered high in metrological practice;

SL – increased selectivity (including low sensitivity to methane, reduced resistance to poisoning);

<sup>AL</sup> – in the standard version, the enclosure is aluminum, oxidised (marked 'AL' on the nameplate); when operating in environments with aggressive gases, vapours with acidity pH<4 or alkalinity pH>9, or in high humidity environments (especially seawater), an optional model with a brass (nickel-plated) or stainless steel enclosure is available (316L);

\* – the sensors' durability in DEX-PnK(L)/N detectors is highly dependent on the presence of silicones, sulphur compounds and other substances that may react with the catalyst on the sensor's active surface;

\*\* – calibration is also recommended before each important measurement/event relevant for the user;

\*\*\* – provided that the operation is checked using a test gas at least every 3 months; otherwise, the recommended calibration interval is 6 months.

<sup>H</sup> – a model available in the P4-HT high-temperature variant (up to +80°C), marked as e.g., DEX-P1KL/N-HT;

### ATTENTION – IMPORTANT INFORMATION:



- The catalytic sensors used in the detector are not selective within the specified set of explosive (calibration) gases – they may react to flammable gases and vapours listed in Table 1.2.PnK below.
- The sensor used in the detector is resistant to **temporary** increases in the concentration of gases/substance vapours listed in Table 1.1.PnK, column 6. Operation of the detector in gas concentrations exceeding those indicated in column 8 may cause malfunction of the detector (e.g., loss of alarm signals despite the presence of an explosive substance) or permanent changes in measurement parameters.
- The use of gases with uncontrolled concentrations to test the detector's operation is NOT permitted!

**TABLE 1.2.PnK** Theoretical relative sensitivity of catalytic sensors: for DEX-P1K(P1KL, P1KL5,P7KL)/N relative to methane =1; for DEX-P3K/N, -P4K/N relative to n-pentane {=1}

Medium	Sensitivity coefficient	Medium	Sensitivity coefficient	Medium	Sensitivity coefficient
methane	<b>1.00</b> {0.05}	n-octane	0.32	ethylene	0.63 {1.08}
ethane	0.68	methanol	0.78	hydrogen sulfide	0.46
propane	0.51 {0.94}	ethanol	0.63	carbon monoxide	0.79
n-butane	0.52 {0.82}	isopropyl alcohol	0.44	ethylene oxide	0.49
isobutane	0.45	benzene	0.45	ammonia	1.43 {2.53}
n-pentane	0.51 { <b>1.00</b> }	toluene	0.42	hydrogen	0.81 {1.89}
hexane	0.40 {0.54}	o-Xylene	0.38	acetylene	0.63
heptane	0.42	acetone	0.60	JP-4 (jet fuel)	{1.39}

The data for Table 1.2.PnK were sourced from materials provided by the catalytic sensor manufacturer. GAZEX assumes no responsibility for the reliability of the above data (updated on 19 July 2007). Coefficients for other media (if provided by the manufacturer) are available at GAZEX. The above coefficients should be regarded as approximate; they may differ from the actual values for a given sensor and may change over the course of operation.

## DEX-PnE/N MODEL RANGE

The range of standard DEX-PnE/N detectors with a replaceable electrochemical sensors includes the following models:

**TABLE 1.1.PnE**

SYMBOL			Concentration RANGE							Calibration PERIOD		Expected service life in clean air approx. [years]
MODEL	Standard version	Sensor module MS-...	Gas	Concentration + selectivity	Measurement range*	Resolution	Allowed temporarily (<1min / 8h)	STANDARD CALIBRATION*	Unit	Recommended max value [months]	Optimal [months]	
1	2	3	4	5	6	7	8	8A	9	10	11**	12***
<b>DEX-P2E/N<sup>AL</sup></b>	P4-C	P2E/N	carbon monoxide	N + SLK	0 to 500	5	1,500	200	ppm	12	6	2
<b>DEX-P4E/N</b>	P4-C	P4E/N-X	ammonia	W + SLK	500 to 1,000	50	2,000	500	ppm	6	3	2
<b>DEX-P7E/N<sup>AL</sup></b>	P4-C	P7E/N	hydrogen	N + SLK	0 to 10,000	100	10,000	500	ppm	6	3	2
<b>DEX-P9E5/N<sup>AL</sup></b>	P4-C	P9E5/N****	oxygen	W + SLK	0 to 25	0.2	30	20.9	% v/v	24	24	2

SLK (col. 5) – selectivity as per Table 1.2.PnE; N – concentrations considered low in metrological practice, W – concentrations considered high in metrological practice;

<sup>AL</sup> – in the standard version, the enclosure is aluminum, oxidised (marked '(AL)' on the nameplate); when operating in environments with aggressive gases, vapours with acidity pH<4 or alkalinity pH>9, or in high humidity environments (especially seawater), an optional model with a brass (nickel-plated) or stainless steel enclosure is available (316L);

\* – upon request: option to select a different range or calibration point

\*\* – calibration is also recommended before each important measurement/event relevant for the user;

\*\*\* – col. 12: exceeding the concentrations in col. 6 and exceeding the recommended operating temperatures shortens the sensor's lifespan and may necessitate calibration;

\*\*\*\* – the stabilisation period of parameters after power is switched on or after a brief power outage is approx. 15 minutes; overestimation of oxygen concentration may occur for up to 2 hours (depending on the duration of the power outage) → the detector is intended for continuous operation; emergency power backup for the system with DEX-9E5/N is recommended!

**NOTE:** Detecting media in other ranges or different media is possible = special version, requires consultation with GAZEX; in particular cases, it is possible to tailor detector parameters to a specific application = **ANALYSIS OF OPERATING CONDITIONS IS REQUIRED.**

**TABLE 1.2.PnE. Selectivity of electrochemical sensors – estimated response to test gases in [ppm]**

Test gas - concentration -	CO 300 ppm	H <sub>2</sub> S 15 ppm	H <sub>2</sub> >1,000 ppm	SO <sub>2</sub> 5 ppm	NO 35 ppm	NO <sub>2</sub> 5 ppm	Cl <sub>2</sub> 1 ppm	ethylene C <sub>2</sub> H <sub>4</sub> 100 ppm	ethanol C <sub>2</sub> H <sub>5</sub> OH 200 ppm	other	other
<b>MS-P2E/N</b> response (1,000 ppm CO range)	300	0	< 400	0	< 3	0	0		0	NH <sub>3</sub> : 0	CO <sub>2</sub> : 0
<b>MS-P4E/N</b> response (1,000 pm NH <sub>3</sub> )	0	0	0	-2	0	0			0		CO <sub>2</sub> : 0
<b>MS-P7E/N</b> response (10,000 ppm H <sub>2</sub> range)	< 180	~0	1000	0		~20	0	0	~	NH <sub>3</sub> (20ppm): 0	CH <sub>4</sub> (1%): 0
<b>MS-P9E5/N</b> response (25% v/v oxygen range)										Oxygen (20.9%): 20.9%	

**TAB.1.2.PnE :** The influence of other gases is possible, but the extent of their impact is not provided by the electrochemical sensor manufacturer. The degree of influence of the gases listed may vary for concentrations different from those in the header. Empty spaces indicate the lack of data from the sensor manufacturer (should be interpreted as a potential, though unspecified, influence). The data for Tables 1.1.PnE and 1.2.PnE were sourced from materials provided by the electrochemical sensor manufacturer (updated November 2023). GAZEX assumes no responsibility for the reliability of the above data.

**NOTE:** When selecting a detector for a specific Customer application, GAZEX may use sensors with **different parameters than those listed above.**

## DEX-PnR/N MODEL RANGE

The range of standard DEX-PnR/N detectors with a replaceable infra-red (optical) sensor includes the following models:

TABLE 1.1.PnR

SYMBOL			Concentration RANGE							Calibration PERIOD		
Model	Standard version	Sensor module MS-...	Gas / medium	Concentration range + selectivity	Measurement range ***	Resolution	Allowed temporarily	STANDARD CALIBRATION	Unit	Recommended max value [months]	Optimal [months]	Expected service life in clean air approx.[years]
1	2	3	4	5	6	7	8	8A	9	10	11**	12
DEX-P1R2/N <sup>AL</sup>	P4-C	P1R2/N	methane	W+SL	0 to 100	1	++	50	%LEL	36	12	>5
DEX-P1R5/N <sup>AL</sup>	P4-C	P1R5/N	propane, butane	W+SL	0 to 100	1	++	50	%LEL	36	12	>5
DEX-P3R/N	P4-B	P3R/N-X	petroleum derivatives	W+SL	0 to 100	1	++	40	%LEL	12	12	>5
DEX-P8R/N <sup>AL</sup>	P4-C	P8R/N	carbon dioxide (CO <sub>2</sub> )	W+SL	0 to 5	0.05	100	2	%v/v	36	12	>5

++ – no limitations;

<sup>AL</sup> – in the standard version, the enclosure is aluminum, oxidised (marked '(AL)' on the nameplate); when operating in environments with aggressive gases, vapours with acidity pH<4 or alkalinity pH>9, or in high humidity environments (especially seawater), an optional model with a brass (nickel-plated) or stainless steel enclosure is available (316L);

\*\* – calibration is also recommended before each important measurement/event relevant for the user;

\*\*\* – parameters may depend on the selection of the sensor for a specific application.

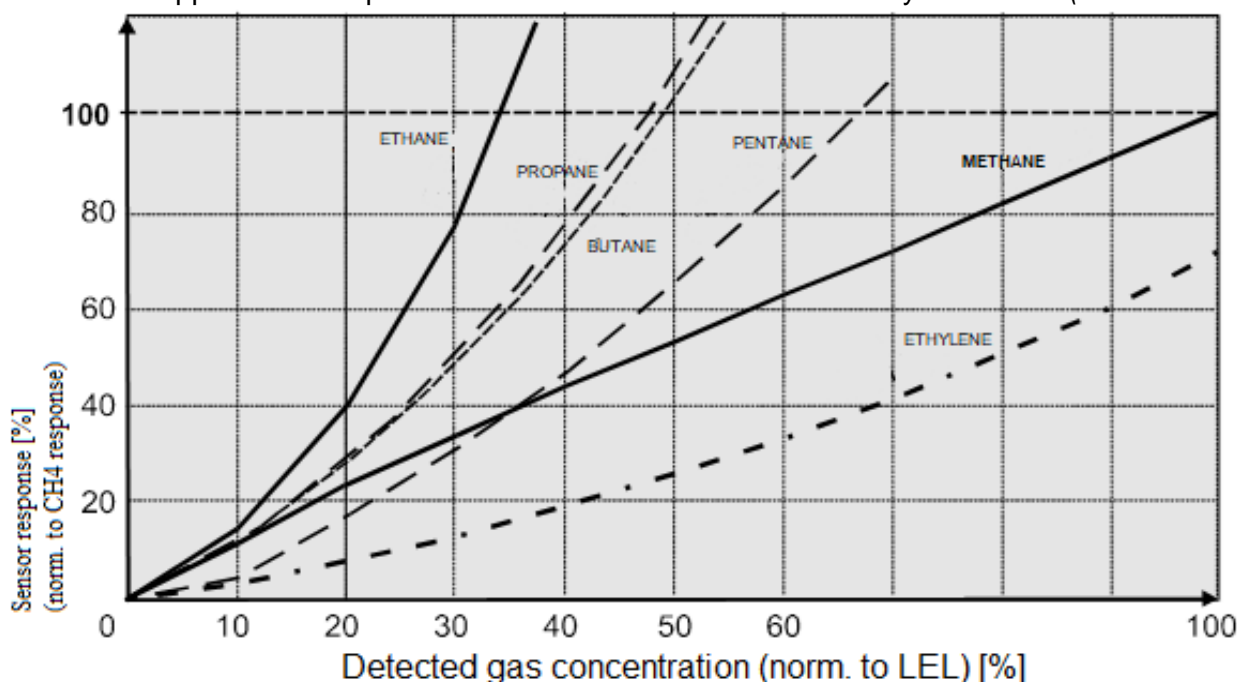
Concentration range MARKING:

W – concentrations considered high in metrological practice; SL – selectivity as per Figure 1.2.PnR



*Detecting other media or in other ranges is possible = special version, requires consultation with GAZEX; in particular cases, it is possible to tailor detector parameters to a specific application = **ANALYSIS OF OPERATING CONDITIONS IS REQUIRED.***

FIGURE 1.2.PnR Approximate response of the Infra-Red sensor to selected hydrocarbons (relative to methane)



The influence of other gases is possible, but the extent of their impact is not provided by the sensor manufacturer. The data for Figure 1.2.PnR were sourced from materials provided by the sensor manufacturer (updated July 2015). According to these data, the sensor used in the DEX-P8R/N model is selective (no cross-gases were specified). GAZEX assumes no responsibility for the reliability of the above data.



## 2. TECHNICAL PARAMETERS

TABLE 2.1. Parameters common to all models

Supply voltage	9 V <sub>DC</sub> nominal, unregulated; permissible range 6.0 to 9.0 V; permissible instantaneous (<30s/1h) limits: 6.0 V ÷ 15 V
Supply current	DEX-PnK/N models: approx. 150 mA, DEX-PnKL/N models: approx. 40 mA; DEX-PnE/N models – typically: 30 mA DEX-PnR/N models – typically: 90 mA
Gas sensor	interchangeable with a sensor module; DEX-PnK(L)/N: catalytic (intelligent, with event history), DEX-PnE/N: electrochemical (intelligent, with event history), DEX-PnR/N: optical (Infra-Red, intelligent, with event history)
Response time	t <sub>90</sub> – as specified in the tables below
Ambient temperature	recommended and occasionally permissible: as specified in the tables below; permissible limits (constructional according to Ex certificate, without considering metrological parameter changes): from -30°C to +50°C for all DEX/P variants (except P4-HT...); from -30°C to +80°C for the P4-HT version ( <b>available only for DEX-PnK(L)/N models</b> ); from -30°C to +45°C for DEX/P variants P6-B, P6-C, P4-B, P4-C placed in an additional splashproof cover AP-1...
Detectable gases	according to Tables 1.1... column 4 and Tables 1.2....
Measurement signal output	standard 4–20 mA, passive (current sinking, U <sub>0</sub> ≤10 V)
Dimensions and weight	103 x 105 x 54 mm (H x W x D) – in mounting position, without the mounting bracket; approx. 0.5 kg (aluminum enclosure) or approx. 1.3 kg (brass or steel enclosure)
Enclosure	IP65/IP6X, flameproof shield, material: nickel-plated brass (MO58 grade) ( <i>unless otherwise specified</i> ); or aluminum alloy (grade PA6), oxidised – only standard models marked 'AL' in Tables 1.1... or stainless steel (316L grade) – for P4-S-C version
Ex detector feature	Ex db IIB T6 Gb for P6-B, P6-BM versions; Ex db IIB T4 Gb for P4-B, P4-BM, P4-HT-B, P4-HT-BM versions; Ex db IIC T6 Gb for P6-C, P6-CM versions; Ex db IIC T4 Gb for P4-C, P4-CM, P4-S-C, P4-S-CM, P4-HT-C, P4-HT-CM versions
Ex detector certificate	KDB 04ATEX133X with Supplementary Certificates
Warranty	Standard Gazex 3-Year Plus Warranty (SGG3Y+) covering the period until the end of the year in which the device was manufactured and the following 3 years ( <i>year of manufacture indicated on the nameplate =&gt; no warranty cards required</i> ); extension option: up to 5 years (RGG5Y+); sensor modules in DEX: covered by Gazex Limited Plus warranty (OGG+).



**TABLE 2.1.PnK Selected DEX-PnK(L)/N model range parameters**

Supply voltage	9 VDC nominal, unregulated; permissible range 6.5 to 9.0 V; permissible instantaneous (<30s/1h) limits: 6.5 V ÷ 15 V
Operating temperature – metrological limitations	recommended: -20°C to +40°C; occasionally permissible (<1h/24h): -30°C to +50°C; with RH at 10% to 90% (without condensation on the shield)
Factors interfering with sensor operation	significant oxygen deficiency (<10% vol.); hydrogen sulfide, halogen compounds (hydrocarbons containing fluorine, chlorine, bromine, iodine derivatives) – commonly found in solvents, cleaning agents, overheated PVC; <i>PnK/N models</i> : rapid changes in airflow around the sensor
Factors limiting sensor durability	silicone compounds (lubricants, moulding and polishing pastes, adhesives, medicinal and cosmetic ointments, rubbers, etc.); sulphur, lead, phosphorus compounds
Response time	$t_{90}$ = 30 to 120 s (depending on the model and calibration level; excluding diffusion time to the detector); metrological readiness = after approximately 20 minutes
Measurement accuracy (relative error)	±5% of the measured value (but not less than ±2% of the measurement range) under calibration conditions, i.e.: 20(-2/+5)°C, RH 65(±10)%, atmospheric pressure 1,013(±30) hPa, >72 h of continuous power supply
Stability (relative error related to calibration conditions)	thermal: ±10% of the measured value, but not less than ±5% of the measurement range, within the temperature range from 0°C to +40°C long-term: drift ≤ ±5% per month; tendency for sensitivity decrease
Calibration period	recommended: < 6 months or < 12 months ( <i>exceedance indicated by cyclic activation of the fault signal, i.e., <math>I_o</math> = 1 mA, but only when the measurement signal is close to zero</i> ); optimal: 3 or 6 months; as per TABLE 1.1.PnK
Storage conditions	in a place free from moisture, dust, vibrations, exhaust fumes, and any chemically active substances (especially those containing silicones and derivatives), in a tightly sealed polyethylene bag; storage temperature from -20°C to +50°C

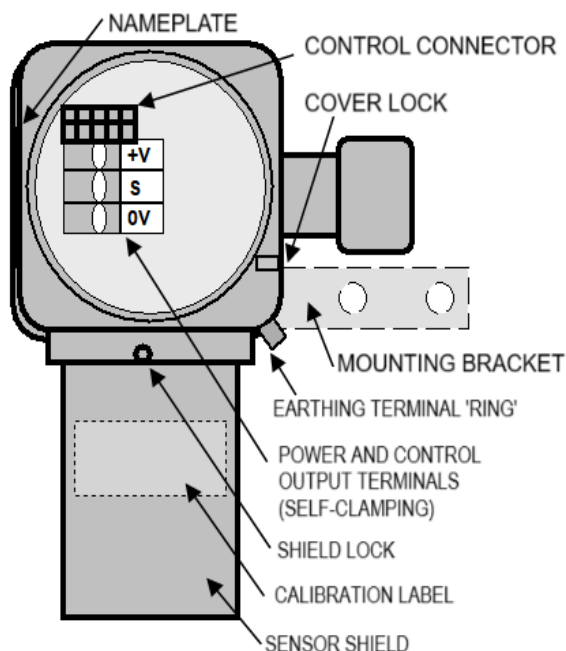
**TABLE 2.1.PnE. Selected DEX-PnE/N model range parameters**

Operating temperature – metrological limitations	recommended: -20°C to +40°C; occasionally permissible (<1h/24h): -25°C to +50°C; for DEX-P4E/N – recommended: -30°C to +50°C; at RH 35 ÷ 90% (without condensation on the gas sensor)
Gases interfering with sensor operation	as per Table 1.2.PnE, significant oxygen deficiency (<0.5% vol.); large, rapid changes in humidity
Gas sensor lifespan	in accordance with Table 1.1.PnE., column 10
Factors limiting sensor durability	operation above concentrations specified in Table 1.1.PnE, column 6, high concentrations of other gases. Even a brief increase in concentration above the value in col. 8 is not permitted = requires sensor calibration or may cause its permanent damage
Response time	$t_{90}$ = approx. 30 s for DEX-P9E5/N; $t_{90}$ = 30 ÷ 90 s for DEX-P2E/N, DEX-P7E/N; $t_{90}$ = 90 ÷ 120 s for DEX-P4E/N; (depending on the calibration; excluding diffusion time to the detector); metrological readiness from power on – approx. 5 min
Relative measurement error	≤ ±10% of the measured value (but not less than ±2% of the measurement range) under calibration conditions, i.e.: 20(-2/+5)°C, relative humidity 65(±10)%, atmospheric pressure 1,013(±30) hPa, >72 h of continuous power supply
Stability (relative error related to calibration conditions)	thermal: < ±5% for DEX-P9E5/N; < ±10% for others long-term: gradual decrease in sensitivity - < ±3% per month; for ...P9E5/N: < ±5%/2 years, for ...P2E/N: < ±5%/year; depends on the duration and intensity of sensor exposure to gases
Calibration period	recommended: < 6 months ( <i>exceedance indicated by cyclic activation of the fault signal, i.e., <math>I_o</math> = 1 mA, but only when the measurement signal is close to zero</i> ); optimal: 3 months, or as per Table 1.1.PnE
Storage conditions	n a tightly sealed polyethylene bag, in a place free from moisture, dust, exhaust fumes, vibrations, and any chemically active substances; storage temperature from -20°C to +25°C. After a period of 6 months from the production date, calibration is required ( <i>does not apply to DEX-P9E5/N</i> ).

**TABLE 2.1.PnR Selected DEX-PnR/N model range parameters**

Operating temperature – metrological limitations	recommended: -20°C to +40°C; permissible: -30°C to +50°C (outside the temperature compensation range); with RH at 0% to 90% (without condensation on the shield)
Detectable gases	hydrocarbons; for DEX-P8R/N model – carbon dioxide (CO <sub>2</sub> )
Selected typical chemical compounds with minimal impact on the sensor	cyclohexanol, acetic acid, chloromethane, methyl formate, chloroethanol, nitroethane, ethylene oxide, furan, for others = contact GAZEX; (does not apply to DEX-P8R/N model).
Typical chemical compounds with no impact on the sensor	hydrogen, acetylene, ammonia, carbon monoxide, carbon disulphide, hydrogen cyanide, phenol, dichloroethylene, dichlorobenzenes, aniline, acrylonitrile, tetrafluoroethylene;
Factors limiting sensor durability	heavy dust, strong mechanical shocks, corrosive gases
Response time	$t_{90} = 40 \div 120$ s (depending on the medium; excluding diffusion time to the detector); metrological readiness from power on – 15 min
Relative measurement error	$\leq \pm 10\%$ (but not less than $\pm 2\%$ of the measurement range) under calibration conditions, i.e.: 20(-2/+5)°C, RH 65( $\pm 10$ )%, atmospheric pressure 1,013( $\pm 30$ )hPa, >72 h of continuous power supply
Thermal stability	$\pm 15\%$ , within the temperature range from 0°C to +40°C
	drift < $\pm 2\%$ LEL per month; (DEX-P8R/N model: <0.05% v/v per month); long-term drift over 1 year $\leq \pm 5\%$ LEL; (DEX-P8R/N model: <0.10% v/v)
Calibration period	recommended: < 36 months ( <i>for DEX-P3R/N &lt; 12 months</i> ) ( <i>exceedance indicated by cyclic activation of the fault signal, i.e., <math>I_o = 1</math> mA, but only when the measurement signal is close to zero</i> ) optimal: 12 months
Storage conditions	in a tightly sealed polyethylene bag, in a soft package; in a place free from moisture, dust, and any chemically active substances; in a location free from strong shocks or prolonged vibrations; at a temperature from -20°C to +50°C

### 3. DETECTOR DESCRIPTION / ORDER PICKING



Package contents for standard DEX/P detector:

- DEX detector (sensor shield mounted and locked; cover screwed on, but not locked) – 1 pc.
- mounting bracket (stainless steel, loose) – 1 pc.
- M5 metal screws (crosshead) for attaching the mounting bracket to the detector body – 2 pcs.
- 5 mm copper ring terminal for crimping the core (4 or 6 mm<sup>2</sup>) connecting to the equipotential bonding point in the Ex zone – 1 pc.
- hex key 1.5 mm (for unscrewing the screws that lock the sensor shield and cover) – 1 pc.
- 'U' wrench/handle (for unscrewing the cover) – 1 pc.
- EU declaration of conformity for the detector – 1 pc.
- short calibration certificate for the sensor module – 1 pc.
- detector operating manual (may be included with the manual for the MDP-type control module) and available at [www.gazex.pl](http://www.gazex.pl)

FIG. 3.1. VIEW WITHOUT COVER

#### Example of DEX Designation

(photos A, B, C):

**DEX-12/N** model, F4-C version, aluminum housing, two-threshold, equipped with a semiconductor smart methane sensor, calibrated with methane (thresholds: A1=10% LEL, A2= 30% LEL)

A

#### DEX/F nameplate

type  
designation  
(DEX)



version  
designation

(version F4-C; [AL.] aluminum enclosure)

B

#### DEX/F calibration plate (on sensor shield)

MS model

(model determinant: DEX-12/N)



C

#### MS sensor module (after removing the sensor shield and filling)

model  
(selection indicated by a dot or typed number)

'smart' designation  
(2<sup>nd</sup> generation)



FIG. 3.2. **DEX/P** COMPONENTS:

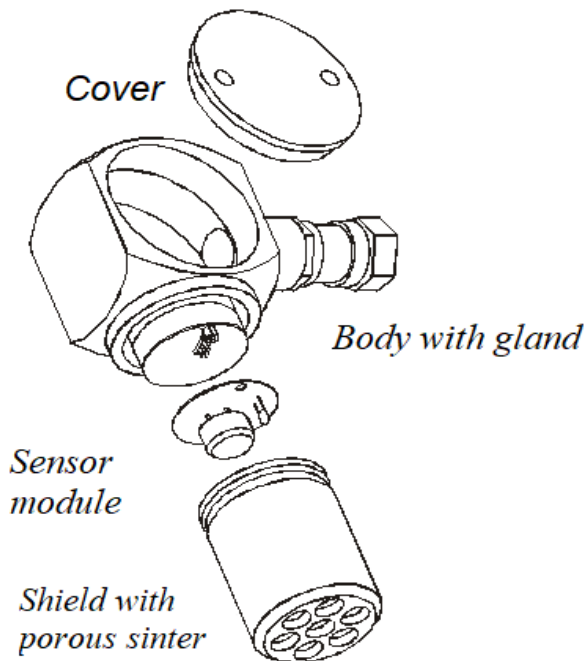


Fig. 3.3. BEFORE unscrewing the cover ==> unscrew the COVER LOCKING screw:



## 4. INSTALLATION CONDITIONS



The user of the detector and the **INSTALLATION TECHNICIAN** must be aware of the special design and unusual use of the **DEX<sup>®</sup>** detector. This necessitates carrying out all installation and maintenance work with the **UTMOST CARE** by competent personnel!!

The **PLACE OF INSTALLATION** of the detector on premises at risk of gas or vapours emissions has a **FUNDAMENTAL** effect on the correct operation of the detector. For this reason, the installation site should be determined by a competent specialist.



### PLEASE NOTE:

Installation work in a zone classified as **Zone 1 or 2 hazardous areas for explosion** of gases, liquid vapours or mists can only be performed by individuals qualified in the operation of equipment in explosive hazard zones, in accordance with the relevant regulations.

In many cases, it can be assumed that the best place to install the detector is as follows (general rules):

- as close as possible to the potential source of gas emissions (but no more than approx. **8 m** away; this distance may depend on factors such as the type and concentration of the medium, the nature of the emission sources, the ventilation of the room, and thermal conditions);
- in an area unexposed to sunlight, away from sources of strong electromagnetic fields (including mobile phones);
- away from supply vents, windows, doors;
- in a place not exposed to the direct influence of: outside air, water vapour, water or other liquids, cooking fumes, exhaust gases from furnaces, dust, mechanical impact, vibration;
- in a place where the detector can be **ACCESSED** and there is free space of at least 15 cm below the sensor shield (for future servicing).

And in addition (special conditions):

1) For DEX-P1KL/N, DEX-P1K/N, DEX-P1R2/N, DEX-P4K/N, DEX-P7KL/N, DEX-P4E/N models calibrated for methane (natural gas, coke oven gas, biogas), acetylene, ethylene, ammonia (lighter than air – accumulate in the upper areas of rooms):

- on the wall or bracket, at a height **NO LOWER than 30 cm** from the ceiling, or on the ceiling;
- ALWAYS above the top edge of doors or windows!
- in a location NOT separated from the potential gas emission source by a barrier taller than 30 cm (such as a beam or ceiling tiles).

2) For DEX-P1KL5/N, DEX-P1R5/N, DEX-P3K/N, DEX-P3R/N, DEX-P8R/N calibrated for propane, butane, pentane, hexane (or gasoline, diesel, fuel oil vapours), benzene, toluene (or other organic solvents), alcohols (significantly heavier than air, accumulate in the lower areas of rooms):

- on the wall or bracket, at a height **NO HIGHER than 15 to 30 cm** above the floor level;
- NOT above any depressions in the floor;
- in a location NOT separated from the potential gas emission source by steps/thresholds, channels.

3) For DEX-P7KL/N, DEX-P7E/N calibrated for hydrogen (very light, tends to 'chimney' when emissions are high):

- above the potential emission source, at a height just below the ceiling;
- in rooms where lead-acid batteries are charged = **15 to 20 cm** below the ceiling.

4) For DEX-PnE/N calibrated for toxic gases or oxygen – used to secure the workplace:

- on the wall, support, or bracket **at a height of the working person's face**;
- as close as possible to the workplace but always within the incoming air stream from the potential toxic gas emission source.

5) For DEX-P8R/N designed to detect carbon dioxide (CO<sub>2</sub>) (heavier than air, at high concentrations – accumulates in the lower areas of rooms):

- - on the wall or bracket, at a height of **approx. 50cm** above the floor level (for models designed to detect low concentrations of CO<sub>2</sub>, i.e., not larger than 5,000 ppm – the maximum height can be **180cm**);
- - NOT in the path of external airflow or within the ventilation supply stream;
- - out of the range of air exhaled by people (to avoid false alarms);
- - in a location NOT separated from the potential gas emission source by steps, thresholds, or channels.

**The above-mentioned distances** from the emission sources refer to an unimpeded diffusion zone, i.e., a temperature-homogeneous space, without heat sources, mechanical barriers restricting the flow of gases of vapours, forced air circulation, or gravitational ventilation. All of the factors mentioned can influence the proper placement of detectors.

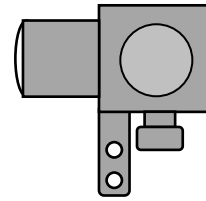
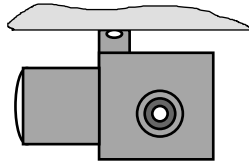
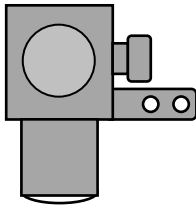


**ATTENTION – IMPORTANT INFORMATION:** If there are any changes that significantly affect the correct operation of the detector, such as a change in the type of hazardous/detected medium, reconfiguration of potential gas emission sources, reconstruction or change of purpose of the monitored room/area, or a change in its use, modifications to the electrical installation or ventilation/heating systems, or changes in the configuration of electromagnetic interference, it is imperative to **verify the selection of detectors, their placement, and cable connections!**

**BEFORE** installation, ensure that the detector is equipped with a **short calibration certificate SSW** (the listed calibration medium and measurement range must match the details on the yellow label on the cover).

The document must be retained and it is essential to pass it on to the detector/system user, as it forms the basis for dealing with any claims or calibration procedure.

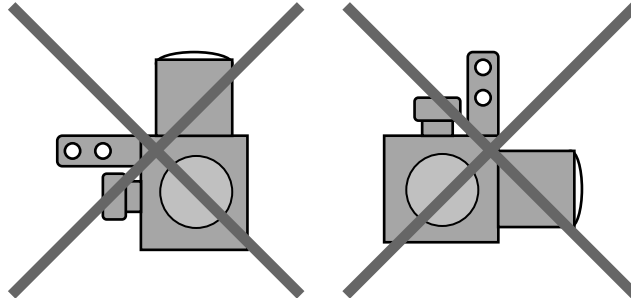
## INSTALLATION POSITIONS:



RECOMMENDED: **vertical**

allowed conditionally for DEX-PnK/N (increased measurement error);  
recommended for DEX-PnKL/N, -PnE/N, -PnR/N: **horizontal**

NOT PERMITTED:



## 5. DEX® INSTALLATION

5. When installing the DEX detector in an Ex zone with an explosion hazard, it is essential to follow the requirements of the PN-EN 60079-14:2014-06 standard. The following description pertains to the installation requirements when mounting the detector in such a zone, unless exceptions are clearly indicated for other cases. When installing DEX in an area where **no explosion hazard zone has been designated**, it is permissible to follow the requirements explicitly marked with a darker background in this User Manual. Compliance with these exceptions should be noted in the post-installation documentation of the gas detection system, specifying that they apply to DEX operation outside the Ex zone.



**NOTE:** When installing DEX in an **EXPLOSION HAZARD ZONE** marked 'EX,' the body of the DEX detector must be connected to the equipotential bonding system of accessible conductive parts (e.g., metal enclosures of devices) – earthing! This requirement arises from the potential for dangerous electrostatic charges to accumulate on the detector's enclosure, which could trigger an explosion in the surrounding explosive atmosphere. The connection of the DEX detector's enclosure to the equipotential bonding system – earthing – can be achieved in one of the following ways:

I. Attaching the DEX detector body to a conductive structural element connected to the equipotential bonding system – earthing. The attachment method must be permanent and ensure reliable electrical contact.

II. Creating a connection with an additional wire. One end of the core of this wire should be crimped into the ring terminal supplied with the detector using the appropriate tool and the other end connected to the equipotential bonding system – earthing. A wire with a stranded copper core and a cross section of 4 to 6 mm<sup>2</sup> should be used (to ensure adequate mechanical strength). The ring terminal should be mounted under the head of the M5 screw that secures the bracket to the DEX detector's enclosure. If the detector is mounted without using the bracket, the ring terminal can be effectively used to connect the equipotential bonding wire to the detector body using the M5 screw that secures the detector.

When installing DEX in an area where **no explosion hazard zone has been designated**, earthing the detector's enclosure is not required.



**5.1.** Release the COVER LOCK of the terminal chamber by unscrewing the locking screw approximately 1.5 mm using the included hex key (Figure 3.3). Remove the terminal chamber cover by unscrewing it. Use the included 'U' shaped handle by inserting its ends into the recesses on the cover and turning counterclockwise. If there is significant resistance, use a wrench or screwdriver as a lever. Be careful not to damage the cover threads. Insert the three-core round cable through the gland and place the stripped wire ends into the terminals. **CAUTION:** Mechanical damage to the terminal board may result in **IRREPARABLE** damage to the electronic circuits, necessitating the **REPLACEMENT** of the mounting board, which is **NOT** covered by the **WARRANTY!!!**



**5.1.1. The CABLE connected to a control module must be** a uniform section of **at least 3 m** from the point of entry into the DEX detector. This requirement does not apply to , located on the nameplate, with cable entries sealed with a hardening compound (these have the letter 'M' in their version name on the nameplate).

**ONLY ONE, ROUND, FILLED** cable is permitted. It is recommended that the cable is continuous throughout the entire length of the connection to the control module.

**5.1.1.1.** Required specifications for the connection cable:

- a) round with an outer diameter of **7.5 to 11.7 mm**;
- b) insulated copper cores, single or multiple, with a cross-section of 0.5 to 1.0mm<sup>2</sup>;
- c) three-core cable with cores of different colours or markings;
- d) filled, with compact mechanical structure;
- e) flame retardant insulation according to PN-EN 60332-1-2;
- f) without shield or braid;
- g) when selecting a cable with single cores, it is recommended to use cables with at least **300/500 V insulation class**;
- h) when selecting a flexible cable with multi-wire cores, it is necessary to take into account the requirement for sufficient mechanical strength specified in section 9.3.3 of the PN-EN 60079-14:2014-06 standard. As this requirement is not precise in the standard, GAZEX recommends the use of flexible control cables with polyvinyl chloride (PVC) or similar plastic insulation, designed by the manufacturer for industrial applications, for permanent installation, including outdoors and directly in the ground, with a rated voltage of 0.6/1 kV.

Examples of recommended flexible cables: - BiT 1000 FR 3x0.75 or 3x1, manufactured by BITNER;  
- OLFLEX Classic 110 Black 0.6/1 kV 3x0.75 or 3x1, manufactured by LAPP.

The list of recommended cables for connecting DEX in Ex zones can be updated based on current cable supplier offers and is available from GAZEX upon request.

When installing DEX in an area where NO explosion hazard zone has been designated, the above recommendations are applicable in points **b)** and **c)**. In point **a)**, the recommended external cable diameter range is extended to **6.0 to 11.7 mm**. It is advised to use cables with an insulation class of **at least 300/500 V**.



The selected cable should have an appropriate fire reaction class. This requirement is related to the legislation on cables and wires as construction products – Regulation (EU) No 305/2011 (CPR) of the European Parliament and of the Council. The specific fire reaction class required for the cable, depending on the application, is detailed in standards such as N SEP-E-007:2017-09 or *applicable legal acts as they are published*.



The requirement for a specific outer cable diameter is critical for the proper sealing in the gland.

For DEX P4-HT high temperature version..., the maximum operating temperature of the connection cable should not be less than 110°C.

When installing DEX/P4-HT... in an area where NO explosion hazard zone has been designated, the above recommendations are applicable for a connection cable with a maximum operating temperature of **not less than 95°C**.

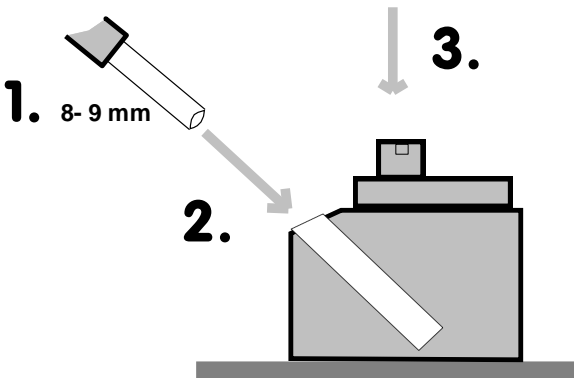
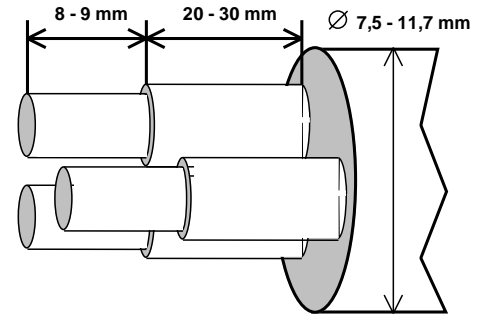


Due to the very low currents in the connection cable core, their cross-sectional areas are not critical. Only practical considerations such as the mechanical strength and outer diameter of the cables, result in a recommended core cross-section of **0.75 or 1.0 mm<sup>2</sup>**. The permissible length of the connection cable is given in the installation recommendations in the MDP User Manual.

### 5.1.2. CORE ENDS:

The core tip, which is inserted into the terminal chamber of the detector, should be prepared in such a way that:

- the cores secured in the terminals do not need to be bent inside the detector;
- the external insulation of the core be removed to such an extent that the intact outer sheath of the cable (after the cable has been inserted and secured in the terminal strip) reaches the inner surface of the detector body.



#### 5.1.2.1 Inserting a core into a **self-clamping** (angled) type terminal:

1. A. Single-wire core – remove the core insulation over a section of precisely 8 to 9 mm.
- B. Multi-wire core – it is recommended to crimp a ferrule with an insulating collar onto the end of the stripped core.

2. Use pliers to push (insert) the stripped core end into the round opening of the terminal up to the stop.

A properly inserted core cannot be dislodged from the terminal. To release and remove the core, press the grey pin above the core (as indicated by arrow 3).



**5.1.3.** The cable should be routed straight from the DEX cable gland, exactly along the axis of the gland. Non-axial routing of the cable can result in a loss of flameproof integrity at the point where the cable seals to the elastomer ring, which could invalidate the flameproof enclosure and Ex certificate for the detector. The first bend in the cable should start at least 2.5 cm from the end of the DEX cable gland. The cable should also be additionally secured to a fixed surface close to the DEX cable gland, i.e., not more than 30 cm from the end of the gland. The purpose is to fix the cable in the correct position and provide additional protection against damage or pulling out of the gland. The cable exiting the detector should be formed into a 'U' or loop with the 'belly' pointing downwards as close to the detector as possible (this will prevent any water running along the connection cable into the detector gland and provide extra cable length for future adjustments to the connection end). The bend radius of each cable should be as recommended by the cable manufacturer. In the absence of a manufacturer's recommendation, the bend radius must be at least 10 times the outer diameter of the cable!

**5.1.4.** Route the connection cable to the location where the MDP module is to be installed. Secure the cable along its entire length to the substrate or lay it in installation trays. Protect it from mechanical damage and chemical or thermal influences – especially in explosion hazard zones. Avoid running it together with high power control via or other wires that may cause electromagnetic interference. The insulation class of the detector connection cable must not be lower than the insulation class of the cables used together. Use gas-tight cable transitions through shields and structural elements adjacent to the explosive hazard zone.

It is generally recommended (and required where cables are routed through areas accessible to unauthorised persons) that the connection cable is routed in a metal or plastic conduit. This will protect the system from accidental or intentional damage.



In an explosion hazard zone, only use cable conduits made of earthed metal pipes or plastics that do not accumulate electrostatic charges, or long elements made of any plastic, provided the projection does not exceed 25 mm.

If it is necessary to extend the cable ('splicing,' i.e., joining cables), and the connection is in an explosive hazard zone, use an explosion-proof 'Ex' junction box with at least three terminals (available from GAZEX). The cable connecting the junction box to the control module should then meet the requirements listed in section 5.1.1.1: a) with an outer diameter selected for the cable gland used in the junction box, b) with core cross-sections appropriate for the terminals in the junction box, d), e), g), h).

If the cable joint falls in an area NOT covered by the Ex zone for gas, dust, or vapour hazard, the connection can be made in a sealed installation box with a protection rating of at least IP54.

#### 5.1.5. **IMPORTANT:**

The cable should be clamped firmly enough in the DEX detector gland so that the cable does not slip out of the detector when attempting to pull it out by hand (and does not transmit mechanical forces to the detector connection terminals). In this way, the detector gland will be properly sealed.

#### 5.1.6. **Tightening the terminal chamber cover**

When installing the cover, ensure that the threads are clean and that the rubber gasket is correctly positioned to provide a complete seal for the cover. The cover should be tightened using the included 'U' shaped handle by inserting its ends into the recess on the cover, turning clockwise until tight. In the case of difficulty in tightening, use a flat spanner or screwdriver as a lever. Lock the cover by screwing the COVER LOCK screw with a hex key until resistance is felt.

**5.2.** Mount the detector on the bracket with the measurement chamber facing downwards so that the inlet to the chamber with the sensor is positioned at the recommended height (depending on the gas being detected) as per section 4.1. It is essential to use two screws to secure the bracket. The installation should ensure access to the detector for maintenance and service activities.

**5.3.** It is important to ensure that the detector is not exposed to mechanical damage (optionally, a protective cover made of AR-1d profiled tubes can be used) or to flooding by water or other agents (optionally, a splashproof shield AP-1... can be used; however, this extends the detector's response time!).



DAMAGE of the measuring chamber of the DEX detector by water or other liquids causes irreversible **DESTRUCTION** of the gas sensor! In such a case, sensor replacement is **NOT** covered by the warranty!!!

**5.4.** Connect the connecting cable to the MDP, ensuring the correct order of all cores!

Incorrect wiring order of the cores connected to the DEX detector outputs will cause an MDP emergency.

**5.4.1.** Connect the power supply to the MDP module or the system control panel, and check the proper power supply indication for the system.

**IMPORTANT:** DEX® must not be powered unless the terminal compartment cover is properly secured, the cable gland is sealed, and the sensor shield is screwed on and locked. The DEX® power supply must **ONLY** be switched on with the terminal chamber open (for calibration or operational checks) if the gaseous atmosphere around the detector is safe and continuously monitored by a suitable explosimeter.



**5.4.2.** After powering on, an initial warm-up cycle of the sensor in DEX® begins, lasting from approximately a few to several dozen seconds or even minutes (depending on environmental conditions, the sensor used, and the duration of the power interruption). The signal from the detector during this period should be ignored.

**5.4.2.A** For detectors equipped with a smart sensor module MS (*with the letter 'N' at the end of the symbol on the yellow, rectangular calibration label*), upon powering on the detector, an automatic, one-time start-up sequence occurs: processor star-up and warm-up status for a few seconds → generation of the normal status at the 'S' output (4 mA) for approx. 2 seconds → alarm signal A1 (8 mA) for approx. 2 seconds → alarm signal A2 (12 mA) for approx. 2 seconds → alarm signal A3 (20 mA) for approx. 2 seconds → return to warm-up status → transition to measurement mode. The signal can be monitored with a milliammeter connected to the 'S' and '+V' terminals of the detector.

Under normal conditions, the above start-up sequence is 'unnoticed' by the MDP – the detector's readings are masked during the warm-up period for the first minute (the default setting in GAZEX control modules). When connecting DEX/P to third-party systems, the operation of the above start-up sequence should be taken into account.

Table 5. Typical test sequence at the 'S' output after powering up the detector

Time [s]	>0<	< 10	2	2	2	2	2	2	2	<30	...
'S' output signal [mA]	0	< 2	4	< 2	8	< 2	12	< 2	20	< 2	4 - 20
Meaning of the statuses	Power on	Start-up and warm-up	Normal status	warm-up	Alarm status A1	warm-up	Alarm status A2	warm-up	Alarm status A3	warm-up	Measurement mode



The start-up sequence is presented for illustrative purposes. The start-up sequence described above may vary depending on the type/model of the MS sensor module installed in the detector. The sequence may have a different timing or may be interrupted if errors in the sensor or detector malfunctions are detected.

**5.4.3. PLEASE NOTE:** The warm-up cycle may also occur after a power interruption in DEX®. The length of the cycle depends on the duration of the interruption; therefore, ensuring an uninterrupted power supply to the system is essential!

**5.4.4. WARNING:** The MDP control module must be installed outside the EXPLOSION HAZARD ZONE!!!

**5.5.** The final stage of installation is a final check of the **DEX/P + MDP** operation.

**5.5.1.** Ensure that the detector is properly powered and that the warm-up cycle has been completed (appropriate module status), and that the detector's power supply continuity has been maintained for not less than the metrological readiness time (see Table 2.1...).

**5.5.2.** Generate the detector alarm statuses:

Using a TC-DEX type test cap (the detector is placed in IIA or IIB gas-hazardous zone), apply test gas at a flow rate of approximately 0.5 l/min. The type of test gas should match the description on the calibration certificate of the detector, and the concentration should be selected to fall within the range of 20 to 80% of the measurement range.

After a few seconds, the MDP should display an increase in the measurement signal to a value close to the concentration of the test gas.

A detector with a catalytic sensor may be tested using a test gas other than the calibration gas, provided that the sensitivity coefficient values of the calibration and test gases (from Table 1.2.A) do not differ by more than 50% and the calculated relative concentration does not exceed the measurement range of the detector tested.

The detector test with an electrochemical sensor can only be conducted using the calibration test gas. The use of a test gas is permitted if the sensitivity coefficient relative to the calibration gas (from Table 1.2.B) is greater than +5%, and the calculated relative concentration does not exceed the measurement range of the tested detector.

**5.5.3.** Testing a detector with gases of unspecified/incorrect concentrations may lead to temporary or permanent sensor damage or necessitate recalibration (**which is NOT covered by the WARRANTY!**).

Following a positive test result,  
the **DEX detector** can be considered operational and started up.

For selected models with an electrochemical sensor, the time required to reach full measurement efficiency may exceed 24 hours (Table 2.1.B).

Note: DEX-P9E5/N is sensitive even to brief power interruptions and may overestimate oxygen concentration readings after such an event — returning to normal operation may take up to 2 hours.

A detector with a catalytic sensor reaches full measurement efficiency after at least 20 minutes of uninterrupted power (and may require up to several hours)!!!

For DEX-nKL/N models, metrological readiness is achieved after a minimum of 1 minute.

A detector with an optical (Infra Red) sensor reaches full measurement efficiency after at least 15 minutes of uninterrupted power.

The date and name of the person performing the installation, along with the serial numbers of all detectors installed in the system, must be recorded in the Periodic Inspection Record attached to the MDP (or available at [www.gazex.pl](http://www.gazex.pl)). The individual short calibration certificate should be stored with the Record.

If there are any uncertainties or doubts regarding the installation and operation of the DETECTOR, please contact an Authorised Service Centre or the MANUFACTURER.

## 6. MAINTENANCE / OPERATION

6.1. The use of DEX/P in a gas detection system means that proper and regular maintenance is essential to achieve the intended measurement objectives.

IT IS NECESSARY TO:

- A) Remove dust from the sensor cover with a porous sinter by vacuuming;
- B) Check the tightness of the cable gland and the round detector cover;
- C) Check the system's operation as outlined in section 5.5. of this Manual.

*The recommended frequency for periodic inspections is  
at least every 3 month.*



NOTE: Please refer to the comment in **section 6.6** of this Manual.

The check based on the procedure in 5.5. is also mandatory after any system power restoration following an interruption longer than 3 days (excluding DEX-PnKL/N and DEX-PnR/N models) and always after the occurrence or suspicion of gas concentrations exceeding the values specified in Table 1.1.A,B column 6. An inspection should also precede any measurement relevant to the user!

D) In cases of high humidity in the monitored room or exposure of the connecting cable or the detector itself to water splashes, the above procedure should be supplemented by checking the tightness of the detector's gland:

- Turn off the detector (system) power, wait 10 min, and check that there is no explosive gas atmosphere around the detector.
- Remove the detector's round cover (after loosening the locking screw with a hex key);
- Check if the terminal chamber or connection terminals are damp, covered with deposits, or show signs of corrosion. In such a case, the terminal chamber must be thoroughly dried, the gland sealed (tightened), and water droplets should be removed from the area around the gland (using flanges, cable sleeves, a 'U' loop in the cable before the gland, etc.);
- Reinstall the cover (if the threaded surfaces show signs of corrosion but without pitting, coat them with a thin layer of technical petroleum jelly), and tighten the locking screw;
- Perform a check according to the procedure in Section 5.5.

When maintaining the DEX detectors placed in an Ex zone with an explosion hazard, it is essential to follow the recommendations of the PN-EN 60079-17:2014-05 [ EN 60079-17:2014] standard.

The user of the DEX detector should be aware that the correct (no false alarms) and long-term (cost-effective) operation of the detector largely depends on the correct installation of the detector and properly functioning **ventilation** in the monitored room !



**6.1.1.A** For DEX-PnK/N - As the catalytic gas sensor inherently tends to lose sensitivity over time, regular calibration of the sensor module is required to maintain the detector's measurement parameters within the specified range. The recommended calibration interval is no less than **every 6 months of detector operation (power supply)**. This calibration can be performed by an Authorised Service Centre on-site or by the Manufacturer after the sensor module is sent to them, at an extra charge.

Calibration of the detector may also be necessary after **any** significant mechanical impact or after exposure to extremely high gas concentrations exceeding the permissible instantaneous values according to Table 1.1.A. In such cases, the gas sensor may need to be replaced. This is a paid service provided by the Manufacturer!

In the constant presence of highly reducing gases, it may be necessary to periodically replace the sensor module. This is a paid service provided by the manufacturer!



**6.1.1.B** For DEX-PnE - As the electrochemical gas sensor inherently tends to lose sensitivity over time, regular calibration of the sensor module is required. This calibration can be performed, at an extra charge, by the Manufacturer on-site or after the sensor module is sent to them. The recommended calibration interval is no less than **every 6 months** (regardless of detector working/power supply time).

Calibration may also be necessary after **any** exposure to extremely high gas concentrations exceeding the values according to Table 1.1.B. column 6. In such cases, sensor replacement may be required – a paid service provided by the Manufacturer!

If operated in the constant presence of toxic gases, the detector should be calibrated at least **every 3 months**.

**6.1.2.** If it is necessary for the detector(s) to be in an atmosphere with gas concentrations exceeding any of the 'Allowed temporarily' values given in Table 1.1.A,B (column 6) or if the concentration remains above 75% of the measurement range for an extended period, the system **MUST BE SHUT DOWN**, i.e., the mains power supply should be switched off, the back-up battery (if connected) should be disconnected, and all detectors should be sealed with gas-tight polyethylene film (including the entire body). Before turning the system back on, ensure that the concentration has fallen to a level below half the detector's measuring range.



**6.1.3. NOTE:** ALL results of the periodic inspection, any malfunctions noticed in the system, system power interruptions and the detectors' operation under extreme conditions must be recorded in the **Periodic Inspection Record** attached to the MDP or the warranty rights will be lost.

**6.1.4.** When working in humid or highly corrosive environments, it is essential to monitor the condition of threaded connections (sensor covers and shields). The recommended monitoring frequency is **no less than once every 12 months**. It is crucial to remember that any corrosion pitting on the threaded surface of any part of the detector **disqualifies** the DEX enclosure as explosion-proof!



For the maintenance of the sensor shield threads and the locking screws on the cover and shield, use only technical petroleum jelly or greases without silicone additives, applying a thin layer.

## **6.2. IMPORTANT:**



Maintaining the gas permeability of the porous sinter in the cylindrical detector cover is **FUNDAMENTAL** to the PROPER operation of the detector!

Therefore, if the detector operates under particularly harsh conditions, such as:

- in environments with a very high dust level (e.g., coal dust, ash),
  - in the presence of oily vapours,
  - in the presence of paint or lacquer fumes,
- special attention must be given to keeping this shield properly clean!

**6.2.1.** The first signs of obstruction in the cylindrical detector cover are a prolonged response time to the test gas (much longer than normal!) or a complete lack of response.

In such a case, the following steps should be taken:

- Turn off the detector's power (this is essential! In systems with emergency power, turn off the power supply and **DISCONNECT THE BATTERY!**); wait approx. 10 minutes.
- Ensure that there is no explosive gas atmosphere near the detector!
- Remove the cylindrical detector cover:
  - Loosen the shield locking screw with a hex key (commonly known as Allen) (do not unscrew it completely!).
  - Manually unscrew the sensor cover by turning it counterclockwise.
- Clean the cover using a stream of compressed air directed from the inside.

If the above procedure does not significantly improve permeability, the cover should be replaced with a **NEW** one, supplied **ONLY** by the Manufacturer!!!

In cases of contamination with oil or lacquers, the cylindrical cover should be replaced with a new one.



### 6.2.2. SENSOR MODULE REPLACEMENT **WARNING!**

The procedure for removal of the sensor's cylindrical cover must be carried out with the utmost care to avoid damaging the gas sensor or the threads on the body or cover.  
DO NOT power up the system in the absence of this cover!

#### 6.2.3. Procedure for **removing** the sensor module for calibration:

- a) Remove the sensor cover as described in 6.2.1;
- b) Unscrew the screw securing the sensor module to the spacer sleeve (if the screw is stuck, hold the sleeve with pliers).
- c) Grasp the edges of the insulating board and disconnect the sensor module (along with the white filler cap, for DEX-PnK/N or DEX-PnR/N models) from the connection socket (DO NOT pull or touch the gas sensor!!!).
- d) Place the sensor board and the filler cap in a sealed polyethylene bag or container and seal it tightly.
- e) A sudden mechanical shock (e.g., dropping onto a hard surface) can permanently damage the gas sensor!
- f) Place in a box padded with soft foam for shock protection (secure the mounting screw separately to avoid damage to the sensor).
- g) Reinstall the sensor cover, lightly tightening it by hand until resistance is felt (excessive force may damage the anti-corrosion layer on the threaded surfaces!).
- h) Tighten the SHIELD LOCKING screw in the detector's body.
- i) Do NOT power on the detector until the sensor module is installed.

#### 6.2.4. Procedure for installing the sensor module (with the power off!)

- j) Remove the cylindrical sensor cover;
- k) **WARNING!** For MS-PnK/N models, a sudden mechanical shock (e.g., dropping onto a hard surface) can permanently damage the gas sensor or, as often happens, alter the sensor's calibration settings, necessitating recalibration! For MS-PnR/N models, a shock risks permanent damage to the sensor!!!
- l) Grasp the edges of the sensor module board and gently connect the module to the black connection socket (DO NOT touch the gas sensor!!!), ensuring all connections enter the socket.
- m) Cover the sensor with the white filler cap (if supplied with the new module) and screw the sensor board into the spacer sleeve (do not apply excessive force!).
- n) Reinstall the sensor cover to the detector body, lightly tightening it by hand until resistance is felt.
- o) Tighten the SHIELD LOCKING screw in the body with a hex key.

After installing the cylindrical sensor cover, replace the grey (or yellow) calibration label with a new one (provided with the new sensor module or the recalibrated sensor module).



**NOTE: for periodic calibration, check or complaint regarding the sensor – DO NOT remove and return the entire detector to the Manufacturer and ONLY THE SENSOR MODULE !!!**

#### 6.3. Spare parts available for the DEX detector:

- a) sensor module (with calibration for a specific medium);
- b) sensor shield with porous sinter made of bronze or stainless steel;
- c) a set of service keys and locks (hex key, cover 'U' key/handle for the cover, cover locking screw, sensor shield locking screw);
- d) simple mounting bracket made of stainless steel + 2 screws for securing to the detector body;
- e) 5mm copper ring terminal for crimping the wire connected to the equipotential bonding point in the explosion hazard zone.

### 6.4. STORAGE OF DEX®

DEX-PnK/N and DEX-PnR/N detectors should be stored powered off in a place free from vibrations, moisture, dust, exhaust fumes, free of any chemically active substances (especially those containing silicones and derivatives), in a tightly sealed polythene bag. Storage temperature: -20°C to +50°C. Always store the DEX with the short calibration certificate attached. Calibration is required after a period of 36 months from the production date.



DEX-PnE/N detectors should be stored in a place free from vibration, moisture, dust, fumes, chemically active substances, gases with concentrations exceeding the upper measurement range values from Table 1.1.B. column 6, in a gas-tight polyethylene bag. Storage temperature: -20°C to +30°C.



The sensor module should be calibrated every 6 months calculated from the date of manufacture.

**6.5. PLEASE NOTE:** Due to the continuous improvement of our products and our desire to provide the most complete, detailed information possible on them and to provide the know-how necessary for the correct, long-term operation of our products based on our customers' experiences to date, GAZEX reserves the right to make minor changes to the technical specifications of the products supplied, while such changes and not included in this User Manual, and to modify the latter. For this reason, please verify and confirm with the Manufacturer that your User Manual is up to date (please state the exact type/design and model of the device in use and the manual edition number – from the footer of the document).

**6.6. NOTE:**

**THE FREQUENCY OF PERIODIC INSPECTIONS** of the gas detection system with MD... modules should be determined by the operating conditions, the type of detectors used, and the importance of the system/facility in the opinion of the User:

1) It is recommended to conduct a **PERIODIC INSPECTION OF THE SYSTEM** **after every replacement of a sensor module or calibration of any detector** in the system (the frequency depends on the calibration period recommended in the technical parameters of the respective detector models).

2) Additionally:

A. **Recommended** frequency of periodic SYSTEM inspections **every 3 months**:

- for systems with detectors operating in heavily dusty, humid environments, where gas background is frequently present, and
- for extensive systems containing a significant number of detectors.

B. **Normal** frequency of periodic SYSTEM inspections **every 6 months**:

- for systems with detectors operating in generally stable conditions, without exposure to a constant gas background, and
- for systems controlling gas valves.

C. **Reduced** frequency of periodic SYSTEM inspections **every 12 months**:

- for systems with detectors operating in normally clean atmospheres and stable conditions, and
- for systems containing a small number of detectors/devices.

A Periodic System Inspection should also be conducted EVERY TIME after the occurrence of particular conditions in the detection system operation, such as:

- periodic extreme operating conditions for detectors, e.g., high gas concentrations (over 50% LEL or more than 75% of the temporarily permissible concentration range or measurement range), extremely high or very low temperatures (close to the recommended operating temperature limits), high periodic dust levels, or sustained humidity increase (at the condensation threshold);
- presence of high concentrations of gases other than the calibration gas, which were not anticipated in the monitored zone;
- extended operation in the A2 (or A3) alarm status;
- after a power outage of more than approx. 3 days;
- after voltage surges or strong disturbances in the electrical installation;
- after maintenance or installation work that could affect the system's operation or configuration (e.g., painting; floor maintenance; changes in the number, placement, or power supply of system devices, etc.).



**PLEASE NOTE:** The above-mentioned frequency of System inspections can be considered to be in line with good engineering practice, based on over 30 years of experience of the Manufacturer. However, it should be emphasised that in the specific conditions of a given Customer, this frequency **may be subject to modification**, based on the principle that the more important the system is (for the Customer/User), i.e., the more the Customer cares about efficient, failure-free operation of the facility where the system is used, the more frequently the system should be inspected. When expecting to increase the level of operational safety of their facility, the Customer should inspect the detection system more frequently, e.g. every 4 weeks or prior to each important event/measurement. On the other hand, where the role of the detection system is considered to be less important or based on the Customer's own assessment of the reliability of the facility's components, the Customer/User may decide to extend the inspection period e.g. to 6 months.

**THE INSPECTION INTERVAL MUST NOT EXCEED 12 MONTHS!**



## 7. WARRANTY TERMS AND CONDITIONS

The device is covered by the Gazex Standard Warranty 3 years plus (SGG3Y+) in Poland according to the terms and conditions of SGG3Y+ available at [www.gazex.pl](http://www.gazex.pl). Selected extracts from the SGG3Y+ terms and conditions:

1. GAZEX guarantees the efficient operation of devices of its own manufacture for the period up to the end of the year in which the device was manufactured and for another three years.
- 1.1. The year of manufacture is determined on the basis of the device's nameplate (*warranty cards are not issued!*).
  - 1.2. If the nameplate is illegible – the year of manufacture will be determined on the basis of the serial number or the code labels on the components (*if any*) together with the records in the GAZEX electronic manufacturing surveillance system. Such verification is subject to a charge. The fee is PLN 50.00 net for each started verification of a batch of up to 10 devices.
  - 1.3. Non-identifiable devices, i.e. with a damaged/illegible nameplate or no nameplate at all and with the GAZEX logo removed/covered permanently, shall not be subject to the warranty.
  - 1.4. The SGG3Y+ warranty covers all devices manufactured by GAZEX after 1 January 2021 which display the year of manufacture '2021' or later on the nameplate.
- ...
4. The warranty does not cover damage caused by:
- a) mechanical shock, vibration and effects, thermal effects and chemical effects;
  - b) damages resulting from improper storage, faulty installation or improper operating conditions contrary to the device's User Manual;
  - c) failure to carry out periodic maintenance or by other negligence;
  - d) deliberate action by the user, third parties or persons not authorised to carry out repairs;
  - e) lightning, power line surges, or electrostatic charges;
  - f) force majeure or other events beyond the Manufacturer's control.
- Consumables including, but not limited to, fuses, batteries, built-in batteries, gas sensors (which are covered by the GAZEX OGG+ Limited Warranty), porous sintered components are not covered by the warranty.
- ...
6. The warranty rights cease to apply in the following cases:
- a) damage to the factory seals, service seals or identification marks on the device/components;
  - b) interference with the device's internal systems or making any other changes to the device or control software or when the device is operated with non-original components not supplied by GAZEX;
  - c) failure to carry out periodic maintenance activities, confirmed by systematic entries in the Periodic Inspection Record (enclosed with the device or devices cooperating with it) and indicated as necessary in the device's User Manual.

The full terms and conditions of SGG3Y+ are available at [www.gazex.pl](http://www.gazex.pl).

FAILURE TO COMPLY with all the terms and conditions of installation and operation of the detector as described in this manual (which shall include keeping the Periodic Inspection Record) will result in the loss of warranty rights.

An extended version of the Periodic Inspection Record is available in .pdf format at: [www.gazex.pl](http://www.gazex.pl).

There is a possibility to extend the warranty to 5 years – Gazex Extended Warranty 5 year plus (RGG5Y+), according to the terms and conditions of RGG5Y+ available at [www.gazex.pl](http://www.gazex.pl).

Sensor modules in DEX/P detectors are covered by the GAZEX Limited Warranty plus (OGG+) for a period of:

- **3 months** from the date of purchase on the invoice, but not more than **6 months** from the date of manufacture/packaging – MS sensor module with electrochemical sensors;
- **12 months** from the date of purchase on the invoice, but not more than **18 months** from the date of manufacture/packaging – MS sensor module with catalytic or Infra Red optical sensors;

If the date of sale cannot be determined or verified, the warranty period is assumed to start from the packaging/shipping date or calibration date on the Short Calibration Certificate in accordance with the OGG+ terms and conditions available at [www.gazex.pl](http://www.gazex.pl).

### PLEASE NOTE:

Any complaints require that a warranty repair request or post-warranty repair request is registered on: <https://www.gazex.com/pl/serwis>

### WARNING:



The DEX® detector is marked with a special, NON-REMOVABLE nameplate, resistant to chemical agents and capable of withstanding a very wide range of temperatures. **However, it must be protected from mechanical damage!**



**It is FORBIDDEN to remove or cover the nameplate, the Manufacturer's identification marks, original symbols, and informational labels, or to attach other labels or markings to the detector's enclosure. Any inventory or informational labels from the User should be placed next to the installed detector, on the mounting bracket, or hung on the connecting cable.**

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# **MAINTENANCE SCHEDULE for DEX/P Detector – Recommended for Normal Operating Conditions**

v2506

ACTIVITY	OPERATIONAL CHECK	GAS SENSOR CALIBRATION	INSPECTION AND MAINTENANCE OF THREADED CONNECTIONS	INSPECTION OF SENSOR COVER PERMEABILITY	INSPECTION OF DETECTOR BODY SEALING
APPLICABLE TO	Detector	Sensor module MS	Threads on detector cover and sensor shield, locking screw threads	Sensor shield with porous sinter (stainless steel or bronze)	Cable gland and detector cover
BASIC TOOLS REQUIRED FOR MAINTENANCE	x	1.5 mm hex key (Allen) <i>(provided with DEX)</i> ; Phillips screwdriver (PH1), flathead screwdriver, GTS-DEX set <i>(for MS replacement)</i>	'U' handle and 1.5mm hex key (Allen) <i>(provided with DEX)</i> ; clean cotton cloth	1.5mm hex key (Allen) <i>(provided with DEX)</i> , can of compressed air	Adjustable wrench (minimum adjustment range 24-26mm); 'U' handle and 1.5mm hex key (Allen) <i>(provided with DEX)</i>
SPECIALISED TOOLS/MATERIALS REQUIRED FOR MAINTENANCE	Test cap TC-DEX <i>(supplier: GAZEX)</i> , test gas cylinder with regulator and flow meter <i>(GTS-DEX set)</i>	NEW or recalibrated sensor module OR calibration set CS <i>(available only from Manufacturer or Authorised Service Centre)</i>	x	For possible replacement: new sensor shield with porous sinter (stainless steel or bronze, <i>supplier: GAZEX</i> )	For possible replacement: gasket for detector cover <i>(supplier: GAZEX)</i>
CONSUMABLE MATERIALS FOR MAINTENANCE	Test gas	Test gas <i>(for MS replacement)</i> or calibration gas <i>(for CS)</i>	Technical petroleum jelly or ceramic grease <i>(recommended for aluminum housing)</i>	Compressed air	x
RECOMMENDED INTERVAL <i>(not exceeding)</i>	<b>3 or 6 months</b> OR <b>Each time</b> after presumed exposure to high gas concentrations OR <b>Each time</b> after at least 3 days of power interruption <i>(not applicable to DEX-PnKL/N and DEX-P)</i>	<b>36 or 12 or 6 months</b> <i>(as per Tables 1.1...)</i> OR <b>3 months</b> in the presence of gas background OR <b>Each time</b> after exposure to extremely high gas concentrations	<b>12 months</b>	<b>12 months</b> OR <b>3 months</b> in dusty environments or in the presence of oily vapours in the monitored room OR <b>Each time</b> there is a negative operational check result	<b>12 months</b> OR <b>3 months</b> in a humidified monitored room

*This table is a synthetic summary of the recommendations in this User Manual. Details of selected operations are described in the Manual.*