GENERAL SPECIFICATION

gazex®

Warsaw

FLAMEPROOF GAS DETECTORS

DEX® /F

models: **DEX-*nn*/N,**
DEX-*n*E/N,
DEX-*nn*.K
DEX-*n*R *series U1*

where "n" is a natural number coding type of gas

GENERAL PURPOUSE

Detector **DEX®/F…** can be used for perpetual monitoring of premises for combustion and toxic gases. Process of monitoring is based on on-line measurement of gas concentration in air. At the moment when concentration exceeds a precisely determined two thresholds, alarms go on and the control outputs are activated.

Detector **DEX®/F** can be used in all places specified as :

II 2 G (according Directive 94/9/EC -ATEX).

All detectors are made according to Polish and European Standards **PN-EN 60079-0:2006(U)** and **PN-EN 60079-1:2008.** All DEX are equipped with individual production certificate and calibration certificate.

DEX®/F can operate only with control units type MD… made by GAZEX.

CERTIFICATE : No. KDB 04ATEX133**, issued by** GIG KD "Barbara" CE 1453

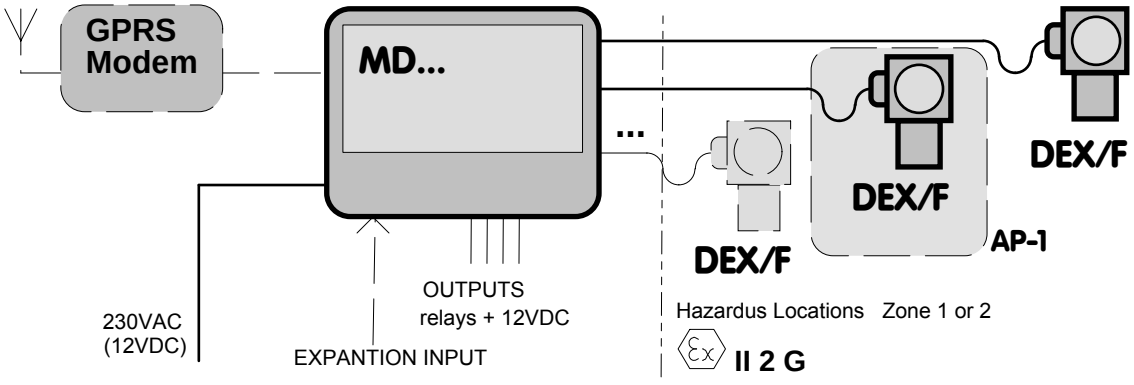
Body type (make)	*mark*	*Body type (make)*	*mark*
FA-B	Ex d IIB T6	**F4**, F4S, F4-HT	Ex d IIB T4
FA-C2	Ex d IIC T6	F4-C, **F4-CY**, F4S-C	Ex d IIC T4

***bold** font = standard make*

OPERATIONAL FEATURES

- easy exchangeable sensor unit and easy maintenance = low cost operation
- easy change of detection gas or calibration of detector
- built in temperature compensation
- semiconductor or catalytic or infra-red sensor for combustible gases or electrochemical sensor for toxic gases or oxygen
- high temperature (up to +80°C) version available

TYPICAL SYSTEM CONFIGURATION



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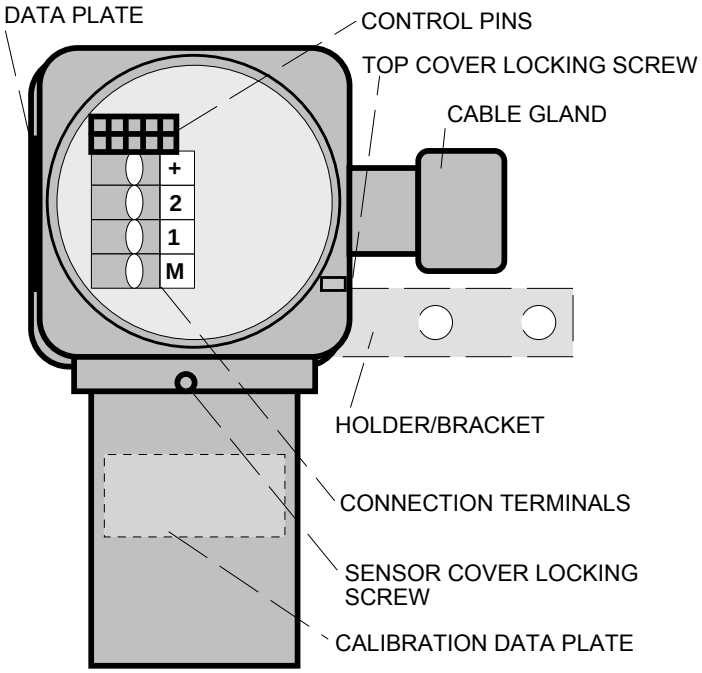
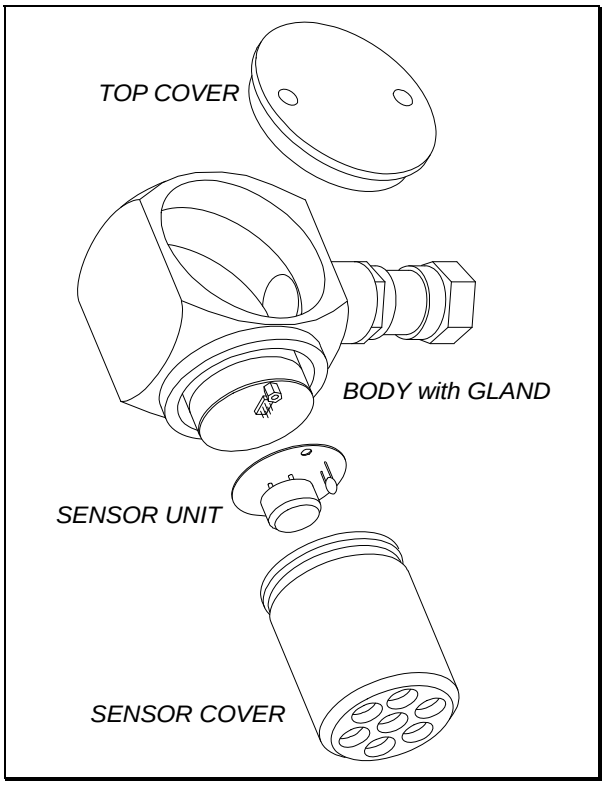
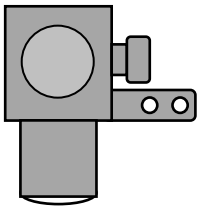
DETECTORS ELEMENTS

OPEN TOP COVER VIEW
(recommended installation position)

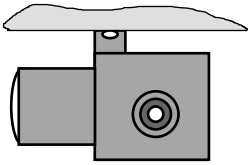




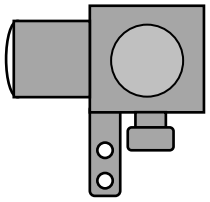
INSTALLATION POSITION



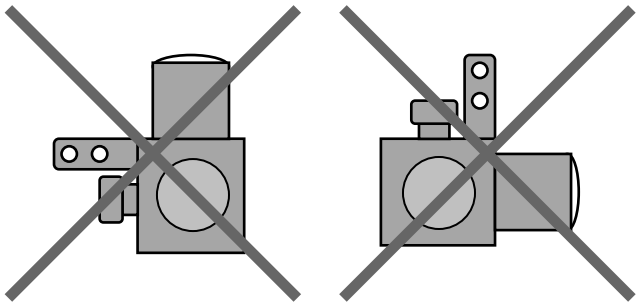
recommended - vertically



models …nn, *n*E/N, *n*R: allowed – horizontally
models …*nn.K*: not recommended



NOT ALLOWED:



SELECTING TABLES

TABLE 1.1.nn. Detectors **DEX-*nn*** and **DEX-*nn*/N** with semiconductor sensors:

SYMBOL			Concentration RANGE							calibration period		
model	Standard make (body type)	sensor unit No	gas	range and selectivity	min A1 (recommended)*** *	max A2 (recommended)	max overload (<1min/30min)	STANDARD CALIBRATION*** A1/A2	unit	recommended max **[months]**	optimal **[months]**	Live time in clean air. **[years]**
1	2	3	4	5	6	7	8	8A	9	10	11**	12
DEX-11	*F4*	*11*	*HC*	*W*	*0,01*	*40*	*100*	*x*	*%LEL*	*36*	*12*	*10*
DEX-12/N	F4*	12N	Methane	W+SL	0,01	40	100	10/30 (p2) or 20/40 (p2)	*%LEL*	36	12	10
DEX-15/N	F4*	15N	propane, butane	W+SL	0,01	40	100	10/30 (p2) or 20/40 (p2)	*%LEL*	36	12	10
DEX-22/NL	F4	22NL	CO	N+SL	20	1000	2000	20/100 (s15)	ppm	36	12	10
DEX-31	F4	31	Solvents	W	0,01	40	50	x	*%LEL*	36	12	10
DEX-41	F4	41	ammonia	W	300	5000	10000	x	ppm	36	12	10
DEX-61	F4	61	HFC (Freons)	W	100	3000	10000	x	ppm	36	12	10
DEX-71-CY	F4-CY	71	H2,acethylene	W	0,01	40	100	20/40 (p2) H2	*%LEL*	36	12	10
DEX-71-C2	*FA-C2*	*71*	H2,acethylene	*W*	*0,01*	*40*	*100*	*20/40 (p2) H2*	*%LEL*	*36*	*12*	*10*

*- standard AL housing (optionally – MO or SIS)
**- also recommended before each important measurement
*** - "s15" – time weighted average for 15 minutes; "p2" – two thresholds calibration
****value fitted to customer requirements

In red – non standard make, according to customer requirements

SYMBOLS (col.5): N – low concentrations, S – medium concentrations
W – high concentrations, SL – higher selectivity
SLK – selective (based on information from sensor Producer)

Others Detectors with FA-C2 body type marked DEX-nn-C2 for working in hazardous locations with group IIC gases (hydrogen, acetylene, CS2, hydrazine) are equipped with special permanent cable gland and approximately 10m connection cable. Special Ex box is required for extension of cable.

TABLE 1.1.nE. Detectors **DEX-nE/N** with electrochemical sensors:

SYMBOL			Concentration RANGE							calibration period		
MODEL	Standard make (body type)	sensor unit No	gas	range and selectivity	Standard range	max A2 (recommended)	Max overload (<1min / 8h)	STANDARD CALIBRATION* A1/A2	unit	recommended max **[months]**	optimal **[months]**	Live time in clean air. **[years]**
1	2	3	4	5	6	7	8	8A	9	10	11**	12***
DEX-2E/N	F4	2E/N	CO	N + SLK	20 ÷ 500	300	1500	nds/ndsch	ppm	12	6	2
DEX-4E/N1	F4	4E/N1	ammonia	N + SLK	5 ÷ 100	60	200	nds/ndsch	ppm	6	3	2
DEX-4E/N2	F4	4E/N2	ammonia	N + SLK	5 ÷ 100	60	200	nds/ndsch	ppm	6	3	2
DEX-5E/N	F4	5E/N	H2S	N + SLK	5 ÷ 100	60	500	nds/ndsch	ppm	6	3	2
DEX-7E/N-CY	F4-CY	7E/N	H2	N + SLK	50 ÷ 1000	600	2000	x	ppm	6	3	2
DEX-9E/N	F4	9E/N	O2	W + SLK	0,5 ÷ 25	25	30	19/18	% v/v	24	12	2

nds/ndsch – TWA/STEL according to polish regulations/standards
Cross-sensitivity data for electrochemical sensors are available on request.

TABLE 1.1.nnK. Detectors **DEX-nn.K** with catalytic sensors:

SYMBOL			Concentration RANGE							calibration period		
model	Standard make (nnK body type)	sensor unit No	gas	range and selectivity	min A1 (recommended)	max A2 (recommended)	max overload (<1min/30min)	STANDARD CALIBRATION *** A1/A2	unit	recommended max **[months]**	optimal **[months]**	Live time* in clean air. **[years]**
1	2	3	4	5	6	7	8	8A	9	10	11**	12
DEX-11.K	F4	11K	HC	W	10	60	110	20/40(p2) methane	%LEL	6	3	5
DEX-15.K	F4	15K	propane, butane	W	10	60	110	20/40(p2) LPG	%LEL	6	3	5
DEX-21.K	F4	21K	CO	W	10	60	110	x	%LEL	6	3	5
DEX-31.K	F4	31K	solvents	W+SL	15	60	110	20/40(p2) n-hexane, 20/40(p2) n-octane, 20/40(p2) xylene	%LEL	6	3	5
DEX-41.K	F4	41K	ammonia	W+SL	3	60	110	x	%LEL	6	3	5
DEX-71.K-CY	F4-CY	71K	H2,acethylene	W	10	60	110	x	%LEL	6	3	5
DEX-72.K-C2	FA-C2	72K	H2	W+SL	3	60	110	x	%LEL	6	3	5
DEX-80.K	F4	80K	Ar, He, CO_2****	W	10	100	100	x	% v/v	6	3	5

***** - silicone and sulfur compounds dependency
****** - also recommended before each important measurement
******* - „p2" = two thresholds calibration
******** - detector with thermal conductivity sensor

Cross-sensitivity data for catalytic sensors are available on request

TABLE 1.1.nR. Detectors **DEX-*n*R** with Infra-Red sensor:

SYMBOL			Concentration RANGE							calibration period		
model	Standard make (body type)	sensor unit No	gas	range and selectivity**	min A1* (recommended)	max A2 (recommended)	max overload (<1min/30min)	STANDARD CALIBRATION *** A1/A2	unit	recommended max **[months]**	optimal **[months]**	Live time in clean air. **[years]**
1	2	3	4	5	6	7	8	8A	9	10	11	12
DEX-1R	F4	1R	HC	W + SL	10	100	**++**	x	%LEL	36	12	>5
DEX-1R2	F4	1R2	Methane	W + SL	5	100	**++**	20/40 (p2)	%LEL	36	12	>5
DEX-1R5	F4	1R5	Propane, butane	W + SL	5	100	**++**	20/40 (p2) propane	%LEL	36	12	>5
DEX-3R	F4	3R	solvents	W + SL	10	100	**++**	20/40 (p2) n-hexane, 20/40 (p2) n-octane	%LEL	36	12	>5
DEX-3R2	F4	3R2	alcohols	W + SL	10	100	**++**	x	%LEL	36	12	>5
DEX-8R	F4	8R	CO_2	W + SL	0,2	5	100	x	%v/v	36	12	>5

++ - no limits
*) – sensor can be selected according to application
**) - cross-sensitivity data for Infra-Red sensors are available on request (SL = factors on request, W= wide range)
*****)** - „p2" = two thresholds calibration

TECHNICAL SPECIFICATION

COMMON SPECIFICATIONS for all models **TABLE 2.1.**

Supply voltage	9V DC nominal, range: 6.0 ÷ 9VDC, for F4, F4CY, F4S, F4S-C make range: 6.0 ÷ 12.0VDC; shortly (<30s/1h): 6.0 ÷15.0V DC
Supply current	model DEX-*nn…* typical:150mA (max 190mA), model DEX-*n*E/N typical: 20mA model DEX-*nn*.K typical:180mA model DEX-*n*R typical: 90mA
Allowed operating temperature	absolute allowed ratings (according to ATEX Certificate, non-metrological conditions): -30°C ÷ +50°C for all type of body except F4-HT; -30°C ÷ +80°C for body F4-HT; -30°C ÷ +45°C for body FA-B, F4, F4S in additional AP-1 case
Gas sensor	model DEX-*nn…* – semiconductor type, model DEX-*n*E/N – electrochemical type, model DEX-*nn*.K – catalytic type, (for DEX-80: thermal conductivity type) model DEX-*n*R – Infra-Red type; all models with exchangeable sensor unit
Detected gases	see Table 1.1…
Signal outputs	pin „1" = lower threshold oc output pin "2" = higher threshold oc output
Electronic circuit	SMT, with power supply control
Dimensions	103 x 105 x 54 mm (H x W x T) – in installation position
Body material, weight	brass MO58 (PN-92/H-87025), nickel plated (approx.1.2kg) or aluminum PA6 (EN AW-2017A), anodized, models DEX-12(15)/N (approx. 0.5kg) or steel 316L (ANSI), make F4S, F4S-C, (approx.1.1kg)
Ex marking	Ex d IIB T6 for body/make FA-B; Ex d IIB T4 for body/make F4, F4S, F4-HT; Ex d IIC T6 for body/make FA-C2; Ex d IIC T4 for body/make F4-CY, F4-C, F4S-C
Certificate No.	KDB 04ATEX133 (issued by Notified Body No. 1453)

TABLE 2.1.nn. Selected specifications for model **DEX-*nn*/N**

Operating temperature	-10°C …+40°C recommended; -20°C …+45°C allowed periodically (<1h/24h); 35% …90% RH (non-condensing)
Interfering gases *	Cl_2, NO_x, oxygen deficiency (<18% vol.); fast humidity rise
Poisoning gases *	silicone and halogen compounds, high concentration of reduction gases
Response time	t_{P50} = 15 ÷ 120 sec (model dependent)
Full specification time	approx. 20 min.
Accuracy	± 15% threshold value at calibration conditions: 20(-2/+5)°C, 65(±10)% RH, 1013(±30)hPa, minimum 72h non-interrupt supply
Thermal stability of signal	± 15% threshold value at 0°C …40°C
Long-term stability	≤ ±20% of threshold value per year

*- without DEX-80.K model

TABLE 2.1.nE. Selected specifications for model **DEX-*n*E/N**

Operating temperature	for DEX-2E/N, -5E/N, -9E/N, -4E/N2: -20°C...+40°C recommended, for DEX-4E/N1: -40°C …+40°C recommended (metrological conditions only); all: -25°C …+50°C allowed periodically (<1h/24h); 15 …90% RH (non-condensing)
Interfering gases	list on request; oxygen deficiency (<0,5% vol.); fast humidity rise
Poisoning	overload, see Table 1.1.nE column 8
Response time	t_{90} = ~ 30sec. for DEX-9E/N; t_{90} = 30 ÷ 90 sec. for DEX-2E/N , -P5E/N, -P7E/N-CY, t_{90}= 90 ÷120 sec. for DEX-P4E/N…; full spec. time after supply start ~ 5 min.
Accuracy	± 10% measured value but not less than ± 2% of range; at calibration conditions: 20(-2/+5)°C, 65(±10)% RH, 1013(±30)hPa minimum 72h non-interrupt supply
Long term drift	~ 3% signal loss/ month; < ±5% / 2 years for -P9E/N, < ±5% / year for -P2E/N; environment dependent

TABLE 2.1.nnK. Selected specification for model **DEX-*nn*.K**

Operating temperature	-20°C …+40°C recommended; -30°C …+50°C allowed periodically (<1h/24h); 10% …90% RH (non-condensing)
Interfering gases *	Cl_2, NO_x, oxygen deficiency (<10% vol.); fast humidity rise
Poisoning gases *	silicone and halogen compounds, high concentration of reduction gases
Response time	t_{P50} = 30 ÷ 120 sec (model dependent)
Full specification time	approx. 20 min.
Accuracy	± 15% measured value but not less than ± 2% of range; at calibration conditions: 20(-2/+5)°C, 65(±10)% RH, 1013(±30)hPa minimum 72h non-interrupt supply
Thermal stability of signal	± 15% threshold value at 0°C …40°C
Long-term stability	≤ ±3% of threshold value per 6 months, at calibration conditions

TABLE 2.1.nR. Selected specifications for model **DEX-*n*R**

Operating temperature	-20°C …+40°C recommended; -30°C …+50°C allowed (over compensation range); 0…90% RH (non-condensing)
Response gases	Hydrocarbons; for DEX-8R: CO_2 only
Low response gases	Cyclohexane , Acetic acid, Cloromethane, Tetahydrothiophene, Acetaldehyde, Metyl formate, Allyl Chloride, Chloroethanol, Ethylen, Furan, Nitromethane; (without model –8R)
Gases no response	Hydrogen, Carbon Monoxide, Phenol, Dichloroethylene, Dichlorobenzene, Ammonia, Aniline, Acrylonitril; (without model –P8R)
Durability influences	Vibrations, strong mechanical shock, highly dusty atmosphere
Response time	t_{P50} = 40 ÷120 s; full spec. time after supply start ~ 15 min
Accuracy	± 10% threshold value at calibration conditions: 20(-2/+5)°C, 65(±10)% RH, 1013(±30)hPa minimum 72h non-interrupt supply
Thermal stability	± 15 % at temp. range 0°C …+40°C
Long term drift	< ±2% LEL/month; (model ...8R: <0,05%v/v /month); ≤ ±5% LEL/year (model ...8R: <0,10%v/v)

t_{P50} – response time = time to alarm under double threshold concentration level