

INSTRUCTION MANUAL



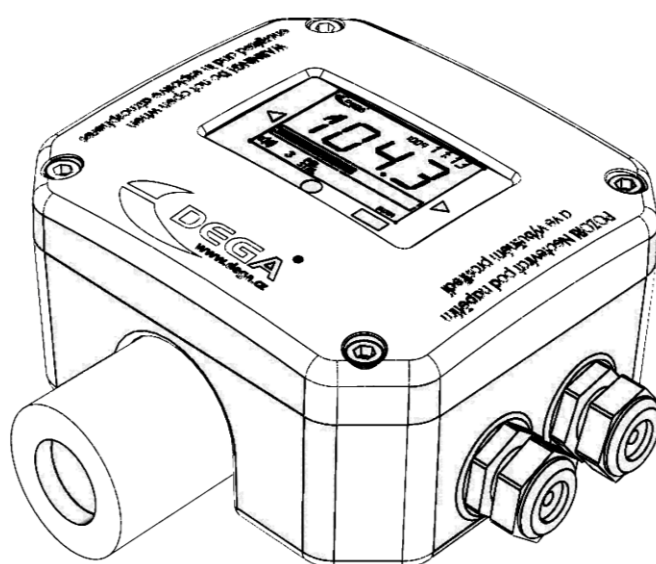
Gas Detection Transmitter

DEGA NSx-yL III LCD



ISO 9001:2008

Quality Management Systems
Système de Qualité
www.sgs.com



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For your safety

Beware of static electricity



Electronic components are sensitive to static electricity. Do not touch them directly - they may get damaged.

The device is intended to be installed by a trained person



The product is designed for installation only by a certified technician. The manufacturer is not liable for damages resulting from incorrect or improper handling.

In case of malfunction, immediately unplug from the power supply



If you notice an unusual smell or smoke emitting from the product, unplug it from the power supply, battery backup and all other attachments. Continued operation could result in injury or property damage. After disconnecting, have the device inspected at an authorized dealer or manufacturer.

Do not open the transmitter and do not replace the sensors in the transmitter in a potentially explosive atmosphere



Opening the cover and replacing the sensor in the transmitter in a potentially explosive atmosphere can cause an explosion. If service is necessary, first unplug the device from the power supply. After that the device may be disassembled and the sensors may be replaced.

Do not disassemble the product and ensure against it's contact with water



Contact with internal components of the product may cause an electric shock. In case of any malfunction entrust the servicing of the product exclusively to a certified service centre. Contact with water can create a short circuit in the product and consequent damage to property or personal injury.

Use appropriate cable types



To ensure compliance with the parameters of the product, only use cable types recommended in this guide.

Dispose of used products and transmitter sensors with respect to the environment



Transmitter sensors contain hazardous substances. Dispose of them in accordance with the current legislation on environmental protection.

Use the transmitter only with the appropriate certified DEGA products



The device is certified as functionally and technically qualified only with original "DEGA" accessories. In case of using the device with any other products the manufacturer is not liable for any damages that may occur.


Undertake regular functional checks and calibrations of the transmitter



Perform regular "CALIBRATION" (setting the detection limits, checking the responsiveness of the sensor, checking the functionality of the transmitter) and "OPERATIONAL AND FUNCTIONAL CHECKS" of the entire detection system (sensor excitation with subsequent control of optical and audible alarms, triggering fans, shutdown technology, etc.). Perform calibration and operational and functional checks only at certified service centers with a valid certificate of competence or the manufacturer.

Warning: The transmitter automatically checks its calibration period - the period of validity of its calibration. After 12 months since the last calibration (Max. calibration period) the transmitter will transmit this fact to the host system. The transmitter must be calibrated immediately at a certified service center with a valid certificate of competence or the manufacturer. See section "Monitoring the calibration periods".

Technical data and information

Supply voltage:	24 V nominal, operational range 8-30 V
Cable connections via 4-20 mA:	shielded cable 3 x 1 mm (max. 1200 m) shielded cable 3 x 1,5 mm (max. 2400 m)
Cable connections via RS485:	shielded cable 4 x 0,8 mm (max. 1200 m) - see section "Installation of cabling for RS485"
Output:	4 - 20 mA RS485 - protocol DEGA, or MODBUS
Communication speed of RS485:	9,6 kB
Functional safety EN61508:	SIL 2
Marking according to ATEX:	 II 2 G Ex d IIB+H2 T6 Gb Tamb:-40°C+60°C II - class environment - non-mining environment 2 G - explosive atmospheres - zone 1 Ex d - type of protection - flameproof enclosure „d“ IIB+H2 - gas group T6 - temperature gas group Gb - type of protection according to EPL Tamb - operating temperature range
Dimensions without bushings:	150x170x65 mm (WxHxD)
Weight:	2,1 kg

Capacity of the internal memory of history: 44 days at 60s recording interval

Interval record storage memory: 60 s (adjustable range 1-255 s)

Consumption/input at 24V (output RS485)

DEGA NSx-EL III LCD 45 mA/1,1 W

DEGA NSx-CL III LCD 90 mA/2,2 W

DEGA NSx-IL III LCD 70 mA/1,7 W

DEGA NSx-SL III LCD 90 mA/2,2 W

Consumption/input at 24V (output 4-20mA)

DEGA NSx-EL III LCD 65 mA/1,6 W

DEGA NSx-CL III LCD 110 mA/2,7 W

DEGA NSx-IL III LCD 90 mA/2,2 W

DEGA NSx-SL III LCD 110 mA/2,7 W

Response time (T90)

DEGA NSx-EL III LCD max. 180 s - based on sensor type

DEGA NSx-CL III LCD max. 15 s

DEGA NSx-IL III LCD max. 15 s

DEGA NSx-SL III LCD max. 30 s

Warm-Up time

DEGA NSx-EL III LCD max. 180 s

DEGA NSx-CL III LCD max. 30 s

DEGA NSx-IL III LCD max. 15 s

DEGA NSx-SL III LCD max. 180 s

Time to stabilize (>5day without power)

DEGA NSx-EL III LCD Up to several hours - based on sensor type

DEGA NSx-CL III LCD max. 1 h

DEGA NSx-IL III LCD max. 30 min

DEGA NSx-SL III LCD max. 5 h

Sensor lifetime in a clean environment

DEGA NSx-EL III LCD 1-3 years

DEGA NSx-CL III LCD 3-6 years

DEGA NSx-IL III LCD 5 + years

DEGA NSx-SL III LCD 3-6 years

Operational conditions

Ambient temperature: -40°C to +85 °C

Relative humidity: 0-95 % RH

Air pressure: 86 - 108 kPa

Flow of ambient air: max. 2 m/s - flow directly to the sensor is not allowed

Protection level with a cover: IP 64, with a DEGA WATER CAP IP66 cover

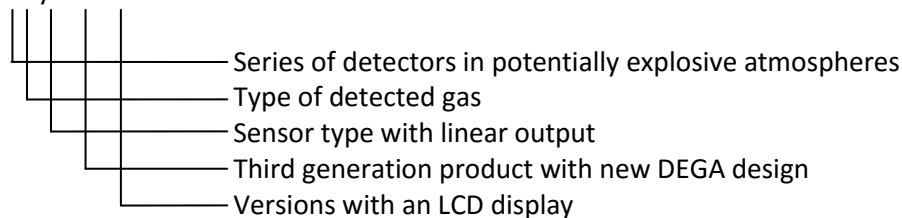
Location: BE3N2 - explosive atmospheres - zone 1 (2 G)

Terminology

The marking system for sensors DEGA NSx-yL III LCD:

Gas sensor DEGA

NSx-yL III LCD



DEGA NSx-EL III LCD with an electrochemical sensor

They operate on the principle of change of electrical parameters on the electrodes stored in electrolyte, due to oxidation/reduction reactions of the detected gas on its surface. These sensors have good selectivity and the ability to detect very low concentrations of toxic gases.

DEGA NSx-CL III LCD with a catalytic sensor (Pelistor)

They operate on the principle of catalytic combustion - gas concentration is measured based on the amount of heat released in a controlled combustion reaction. The reaction is supported by a suitable temperature and the presence of a catalyst. These sensors can be used to detect a broad range of flammable gases. The sensors are characterized by fast response, a long lifetime and high stability. A minimum of 10% of Oxygen in the air is required for its proper function.

DEGA NSx-IL III LCD with an infrared sensor (NDIR)

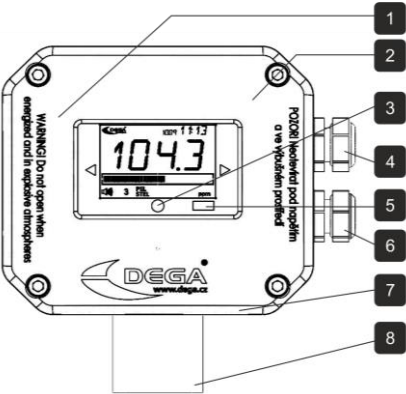
Top quality scanning method. They operate on the principle of infrared spectroscopy. The sensors have excellent selectivity in organic matter, do not require any oxygen in the atmosphere and are resistant to catalyst poisons (sulfur and silicon compounds) which cause a change of sensitivity of catalytic sensors. The sensors are characterized by high stability and a long lifetime.

DEGA NSx-SL III LCD with a semiconductor sensor

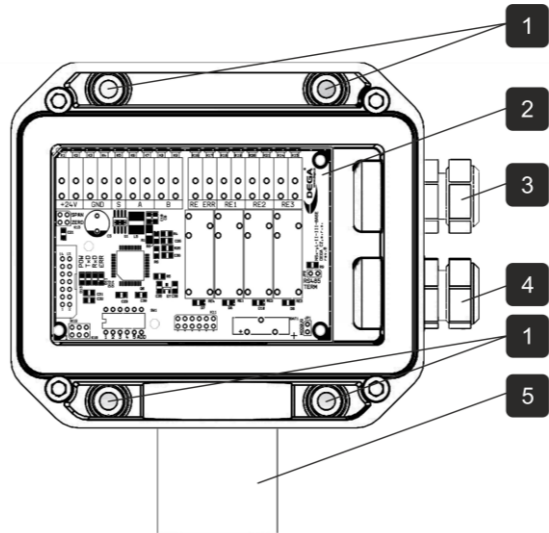
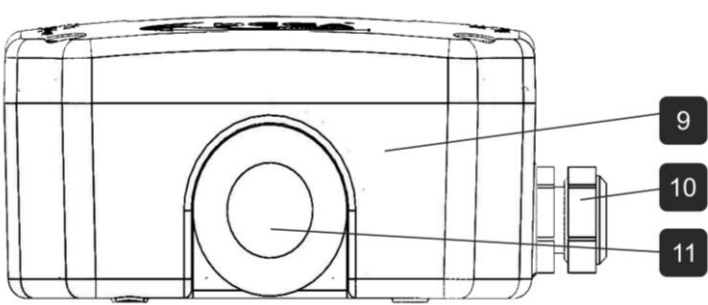
Cheapest method of scanning. They operate on the principle of changes in electrical conductivity of semiconductors by changing the concentration of the detected gas. Their advantage is a long lifetime in a clean environment and a wide range of different types of gases and vapors. Their disadvantage is their low selectivity - the sensor largely responds to other gases for which it is not calibrated.

Other types:
 DEGA NSx-yL III basic version
 DEGA NSx-yL III LCD RE - with an LCD display and a quad relay
DegaConfig - sensor adjusting software enabling it's full configuration and calibration.

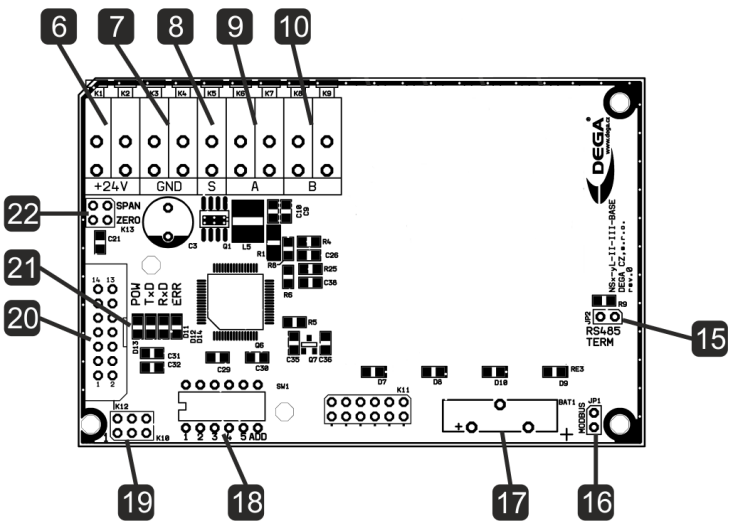
Product description



- | | | | |
|---------------------------------------|-----------------------------------|--|---|
| 1 Magnetic control „BACK“ | 2 Magnetic control „FRONT“ | 3 Ex „d“ bushing | 4 Magnetic control „ENTER/EXIT“ |
| 5 IrDa interface | 6 Optional Ex „d“ bushing | 7 Body of the removable sensor | 8 Cover against splashing water (optional accessories) |
| 9 Body of the removable sensor | 10 Ex „e“ bushing | 11 Cover against splashing water (optional accessories) | |



- | | | | |
|---------------------------------------|---|--|---------------------------------------|
| 1 Mounting holes | 2 PCB electronics | 3 Ex „e“ bushing | 4 Optional Ex „e“ bushing |
| 5 Body of the removable sensor | 6 Power supply terminal block+24V DC | 7 Power supply terminal block GND | 8 Signal terminal block 4-20mA |
| 17 Battery CR2032 | 18 DIP switch for the RS485 adress | 19 Programming connector | 20 LCD display connector |
| 21 Status LED | 22 Calibration jumpers | | |



Installation, assembly and disassembly of the transmitter

Before assembling, read the valid instalation standarts EN 60079-29-2 (Selection, instalation, use and maintenance of detectors for combustibile gases and oxygen) and EN 45544-4 (Guildelines for the selection, installation, use and maintenance of detectors of toxic substances).
 In explosive environments the electrical installation must be performed according to DIN EN 60079.14 (Electrical instalation in hazardours areas)

Secure that the sensor is reachable by air. The transmitter must be in a free area with no obstacles in its way (furniture etc.) Ensure that the input of the sensor cannot be polluted by layers of dust or other contamination.

1. Assembly of the transmitter

The transmitter consists of four parts - the body of the transmitter, the removable sensor and Ex „d“ bushings.

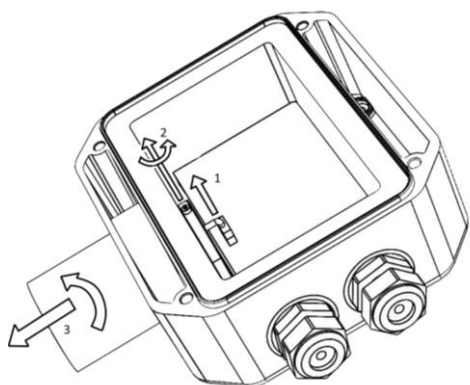
Transmitter assembly procedure is as follows:

- Disassemble the transmitter with the four hexagon socket screws 4mm
- Disconnect the LCD motherboards
- Mount the transmitter on a flat surface with four 6mm fasteners in height above the floor with the gas entrance facing downwards, as specified by the detected substance
- Direct the cable trough the bushing
- Connect the cabling to the terminal block. When using the second Ex „d“ bushing, dismount the Ex „d“ blind plug. It is allowed to use only Ex „d“ bushings with M20x1,5 threads
- Connect the LCD
- Assemble the transmitter with the four hexagon sockets screws 4mm

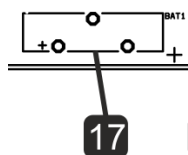
2. Replacement of the sensor module

This activity must not be performed when the sensor is energized.

In case of need to replace the sensor module with a new piece, unscrew and remove the cover. Disconnect the sensor module cable from the PCB (1), loosen the sink screw (2) and unscrew the steel cylinder with the sensor (3). Screw the new sensor module, retain it with the sink screw and connect the cable to the PCB. Finally, mount the cover and connect to the power supply.



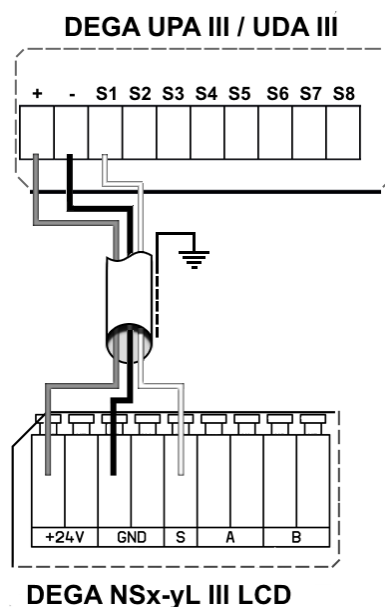
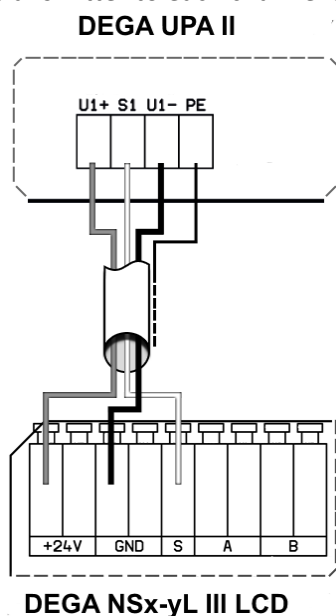
3. Replacement of the battery



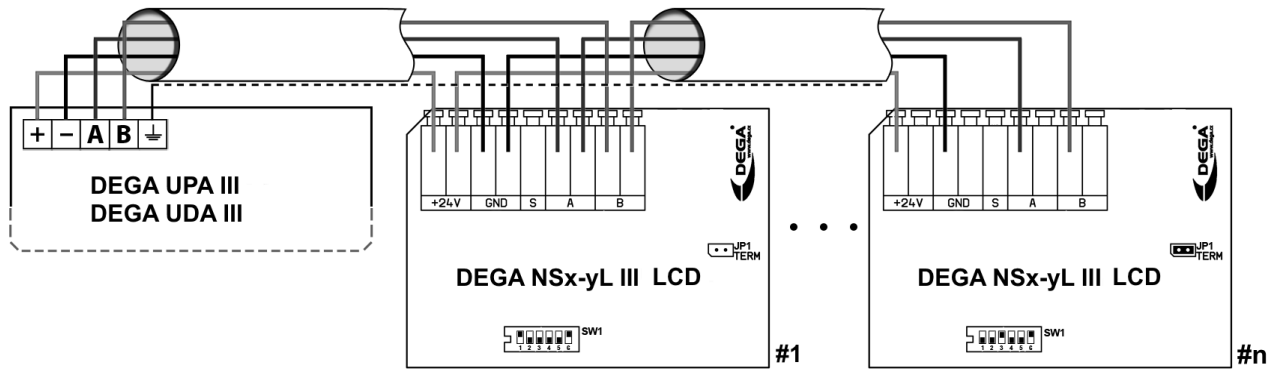
Životnost baterie ve snímači je asi 5 let. Po této době již nemusí být některé funkce detektoru zachovány. Baterii vyjmeme z držáku a nahradíme ji typem **Panasonic BR2032**. Výměnou baterie ve snímači, který není pod napájením, dojde k vymazání interních hodin.

4. Connecting the transmitter via current loop to the controller DEGA UPA II DEGA UPA III a DEGA UDA III

Connect one transmitter to each channel of the controller as shown in the picture below



5. Connecting the sensor via RS485 to the controller DEGA UPA III/UDA III



6. Installation of wiring for RS485

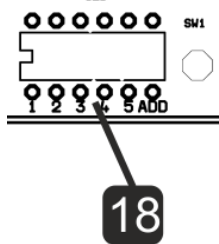
Wiring must be done using bus topology and according to the RS485 principles.

Maximum number of connected transmitters per controller channel is 16 (may be less depending on the configuration of the controller), while the total length of the connecting cable (electrical distance between the controller and the last transmitter) should not exceed 1200 meters. Due to voltage disposals caused by each transmitter, the maximum addition of distances must be $L1+L2+L3+...+L16$:

Cable type	NSx-CL III LCD	NSx-IL III LCD	NSx-SL III LCD	NSx-EL III LCD
Shielded 4x0,8mm	1,7 km	2,3 km	2,3 km	3,4 km
Shielded 4x1mm	2,7 km	3,5 km	3,5 km	5,2 km
Shielded 4x1,5mm	4,9 km	5,9 km	5,9 km	9,2 km
Shielded 4x2,5mm	8,1 km	10,9 km	10,9 km	16,2 km

Selecting the appropriate type of cable depends on the fire report and the protocol for determining external influences.

7. Setting the RS485 adress of the transmitter



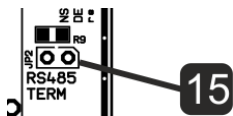
Each transmitter must have a unique adress within the entire bus, otherwise there will be communication collisions and malfunctions.

The transmitter adress can either be set internally using the DegaConfig program or using the DIP switch on the PCB.

If the position 6 (labeled ADD) is in the ON position, then the adress according to the setting of pins 1-5 is considered. Otherwise the adress set in DegaConfig is considered.

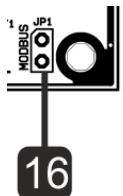
The adress can be set from range 1-31 using binary values. A table with DIP settings for individual addresses is listed in the attachment "Chart for setting the transmitter adress"

8. Terminating resistor



According to the RS485 specifications, the last device on the bus must be ending with a terminating resistor 120R. Plug a jumper on the JP2 connector of the last device on the bus to include the 120R terminating resistor. In the default configuration the jumper connector is not plugged.

9. Communication protocol switch DEGA/MODBUS



Plugging a jumper in the JP1 connector will switch from the DEGA communication protocol to the MODBUS communication protocol.

Transmitter functions

The detector's motherboard is equipped by status LEDs, which help in detecting problems during the installation.

LED „POW“ shines at correct power

LED „TxD“ flashes when transmitting a packet via RS485

LED „RxD“ flashes when a packet is correctly recieved via RS485

LED „ERR“ shines/flashes in case of malfunction or substandart situations

1. Turning on the transmitter


After turning on the power the LED "POW" starts shining and the LED "ERR" starts flashing, indicating a forming sequence of the sensor and automatic testing procedures, which can take up to 180s depending on the sensor used. The output of the current loop is 1mA. During this sequence, testing of internal electronics and stabilization of the sensor in order to eliminate false alarms after turning on, is taking place. At this time, the display only shows the time to the beginning of the measurement loop.

After completion of the formation, a 4mA current begins to flow on the output of the current loop and the transmitter starts working according to it's settings.

2. Gas detection


The transmitter continuously measures the detected gas concentration in the atmosphere and converts it's current value into a 4-20 mA signal or transmits it's value to the evaluation unit via DEGA/MOBUS protocol.

3. Malfunction

In case of malfunction the LCD displays the measured concentration, an error code and a key symbol . On the PCB this condition is indicated by the yellow „ERR“ LED. The meaning of each error code is included in the attachment "Table of error codes"

4. Monitoring the calibration periods

The transmitter continuously checks the calibration validity of the connected sensor.

After 12 months since the last calibration (Max. calibration interval) the LED "ERR" starts flashing and an inscription  starts flashing on the LCD display. The connected sensor must be calibrated immediately. The transmitter will transmit the information about the ending calibration via current loop. The transmission will be the following: 10s transmitting a 4-20mA signal informing about the actual gas concentration following a 1 second interval of 2mA current.

5. Reading the record of measured concentrations and alarms

The transmitter periodically after 60s stores the current detected concentration into it's internal memory. The internal memory retains data from the last 64260 measurements (cca 44 days). In order to read this information, the program DegaConfig is required. Refer to the DegaConfig program instruction.

Transmitter controls

Transmitters equipped with an LCD display can be controlled by the magnetic contact located on the sides of the display


1


2










3






4






5













CALIBRATION REQUIRED 


















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7

8

9

10

1

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5

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9

11

13

15

Warning: calibration required

Data display

Channel number (adress)

Calibration icon

Measured value

Measured value units

Alarm STEL (exceeding short-term exposure limit)

Alarm indication

2

4

6

8

10

12

14

Warning: Service is required

Time display

Activated magnetic control

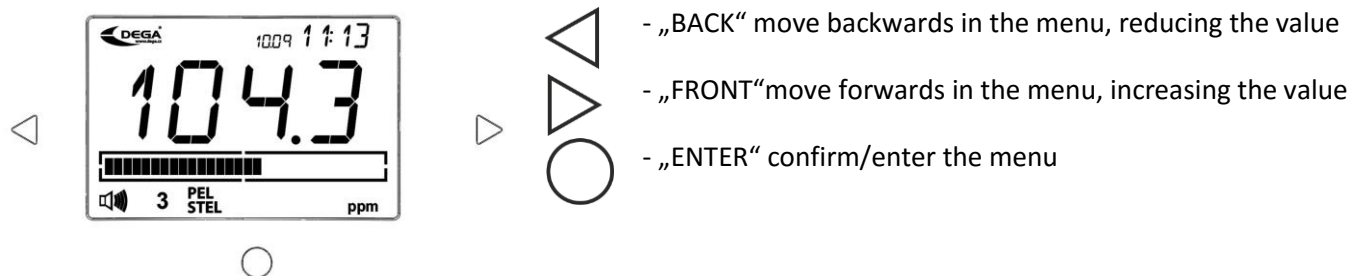
Communication with the control panel in progress

Bar graph of the measured value

Alarm PEL (exceeding long-term exposure limit)

Reached alarm level

8



Placing a magnet into the indent „○“ for 2s, activates the magnetic control, which is displayed by the icon „⦿“ on the LCD.






Reaching level 4 alarm with catalytic and semiconductor sensors causes a ratchet phenomenon, where even after recovery from gas leak, the sensor is still in level 4 alarm and needs to be manually reset by pressing „○“.

Main menu structure:

```



Menu entry
|
History->-Information->-Settings->- Test->- Exit
|-----<-----|






```

Menu	Display	Description
History	 HIST [⦿]	Browsing the alarm history
Information	 INF [⦿]	Information about transmitter settings
Settings	 SET [⦿]	Transmitter configuration
Test	 TEST [⦿]	Testing the transmitter functions
Exit	 EXIT [⦿]	Return to normal operation

1. History menu „HIST“








Browsing the history




Menu	Display	Description
History of all alarms	 HIST [⦿] ALARM [⦿]	Use „◀▶“ to go trough individual alarms. Displays the date and time of the alarm. Return to the history menu „○“
Highest concentration in the past hour	 HIST [⦿] HI 1 [⦿]	Displays the highest measured concentration and alarm for the past hour. Return to History menu „○“

Highest concentration in the past 8 hours	 HIST HI 8 [°]	Displays the highest measured concentration and alarm for the past 8 hours. Return to History menu „○“
Highest concentration in the past 12 hours	 HIST HI 12 [°]	Displays the highest measured concentration and alarm for the past 12 hours. Return to History menu „○“
Highest concentration in the past 24 hours	 HIST HI 24 [°]	Displays the highest measured concentration and alarm for the past 24 hours. Return to History menu „○“
Highest concentration stored in the memory	 HIST HI AL [°]	Displays the highest measured concentration and alarm, that is stored in the memory. Return to History menu „○“
Exit	 HIST EXIT [°]	Return to the main menu

2. Information menu „INF“









Information about settings. Sequentially displays the following information. Access previous information by pressing „○“

Menu	Display	Description
Date of next calibration	 10.09.2015 NCAL [°]	Displays the date of the next calibration
Date of last calibration	 10.09.2015 LCAL [°]	Displays the date of the last calibration
Power voltage	 VOLT 24.0 [°]	Displays the power voltage
Temperature	 TEMP 24.1 [°] °C	Displays the chip temperature (about 15°C higher than the ambient temperature)
RS485 device adress	 ADDR 1 [°]	Displays the device adress
Range up to	 RNG 0500 [°] ppm	Measured concentration value corresponding to 20mA current
Alarm level 1	 1 0075 [°] ppm	Displays alarm level 1



Alarm level 2	 0150 [°] 2 ppm	Displays alarm level 2
Alarm level 3	 0225 [°] 3 ppm	Displays alarm level 3
Alarm level 4	 0300 [°] 4 ppm	Displays alarm level 4


3. Settings menu „SET“

Protected by password 0004. By entering a wrong password, the transmitter returns to measurement mode. The password can be changed in the menu SET->PSWD.

Menu	Display	Description
Calibration	 SET CAL [°]	Sensor calibration
Setting the alarms	 SET SETR [°]	Setting the alarms
Setting the range of the 20mA current loop	 SET SETR [°]	Setting the range of the 20mA current loop
Changing the password	 SET PSWD [°]	Changing the password
Setting the year	 SET YEAR [°]	Setting the year
Setting the date	 SET DATE [°]	Setting the date
Setting the time	 SET TIME [°]	Setting the time
Exit	 SET EXIT [°]	

Calibration

- a) Connect fresh air to the sensor input. The icon „“ flashes. After the value stabilizes, move onto the next step using „“

- b) Using „◀▶“ select the concentration of the calibration gas, confirm „○“
- c) Connect the calibration gas to the sensor input. The icon „“ flashes. **Wait until the value stabilizes and confirm „○“**
- d) Using „◀▶“ switch between „YES“ - save calibration, or „NO“ - return to the Settings menu. Confirm the selected option „○“
- e) In case of saving a new calibration, the transmitter will restart.

Setting the alarms

- a) Using „◀▶“ select the concentration for alarm 1. Confirm „○“
- b) Using „◀▶“ select the concentration for alarm 2. Confirm „○“
- c) Using „◀▶“ select the concentration for alarm 3. Confirm „○“
- d) Using „◀▶“ select the concentration for alarm 4. Confirm „○“
- e) Using „◀▶“ switch between „YES“ - save settings, or „NO“ - return to the Settings menu. Confirm the selected option „○“

Setting the range of the 20mA current loop

- a) Using „◀▶“ select the concentration appropriate to 20mA range. Confirm „○“
- b) Using „◀▶“ switch between „YES“ - save settings, nebo „NO“ - return to the Settings menu. Confirm the selected option „○“

Changing the password

- a) Using „◀▶“ select a number in thousands. Save the selected number „○“
- b) Using „◀▶“ select a number in hundreds. Save the selected number „○“
- c) Using „◀▶“ select a number in tens. Save the selected number „○“
- d) Using „◀▶“ select a number in units. Save the selected number „○“
- e) Using „◀▶“ switch between „YES“ - save settings, nebo „NO“ - return to the Settings menu. Confirm the selected option „○“

Setting the year

- a) Using „◀▶“ select a number in thousands. Save the selected number „○“
- b) Using „◀▶“ select a number in hundreds. Save the selected number „○“
- c) Using „◀▶“ select a number in tens. Save the selected number „○“
- d) Using „◀▶“ select a number in units. Save the selected number „○“
- e) Using „◀▶“ switch between „YES“ - save settings, nebo „NO“ - return to the Settings menu. Confirm the selected option „○“

Setting the date

- a) Using „◀▶“ select a number in thousands. Save the selected number „○“
- b) Using „◀▶“ select a number in hundreds. Save the selected number „○“
- c) Using „◀▶“ select a number in tens. Save the selected number „○“
- d) Using „◀▶“ select a number in units. Save the selected number „○“
- e) Using „◀▶“ switch between „YES“ - save settings, nebo „NO“ - return to the Settings menu. Confirm the selected option „○“




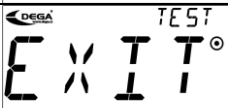
Setting the time

- a) Using „◀▶“ select a number in thousands. Save the selected number „○“
- b) Using „◀▶“ select a number in hundreds. Save the selected number „○“
- c) Using „◀▶“ select a number in tens. Save the selected number „○“

- d) Using „◀▶“ select a number in units. Save the selected number „○“
- e) Using „◀▶“ switch between „YES“ - save settings, nebo „NO“ - return to the Settings menu. Confirm the selected option „○“

4. Test menu „TEST“

Protected by password 0004. By entering a wrong password, the transmitter returns to measurement mode. The password can be changed in the menu SET->PSWD.

Menu		
4.20 mA current loop test		Using „◀▶“ set the output current in a 4-22 mA range. Return to Test menu „○“
Digital communication test		Using „◀▶“ set the concentration broadcasted via RS485 in measuring range of the sensor.. Return to Test menu „○“
Transmitter restart		Using „◀▶“ switch between „YES“ - for restart, or „NO“ for returning to Test menu. Confirm „○“.
Return to main menu		Return to main menu

Operation, maintenance, inspection and service of the transmitter

1. Usage limits

To maintain proper operation of the transmitter it is necessary to respect the fact, that step changes of humidity, condensation or rapid changes of pressure can cause incorrect indication of the measured value. Each sensing technology is suited for different methods of application, which is described below. All sensors are characterized by a smaller or larger cross-sensitivity to other gases than those which are set. Therefore before processing project documentation we recommend to have the air in the deployment area of the detection system analyzed.

a) **catalytic sensors:** Trace amount of vapors of silicon compounds and sulfur compounds cause a permanent loss of sensitivity, which requires recalibration or replacement of the sensor. Longterm crossing of the measuring range causes a decrease in sensitivity. In case of an atmosphere having an oxygen content of less than 17%, there will be an underestimation of the measured value. In case of an atmosphere having an oxygen content of more than 25%, there will be an overestimation of the measured value.

b) **electrochemical sensors:** Constant exposure to toxic gases or short-term exposure to gases, which greatly exceed the maximum range of the sensor, can damage the electrochemical sensor, which requires recalibration or replacement. High temperature along with low relative humidity have a negative effect on the sensor's lifetime. In case of an atmosphere having an oxygen content of less than 1% for longer than 1 hour, there will be an underestimation of the measured value.

c) **infrared sensors:** Vapor acids and alkalis can etch the optical system and distort the measurements. A check or a calibration may be necessary.

d) **semiconductor sensors:** Short-term exposure to gases or vapors of organic solvents, which greatly exceed the maximum range of the sensor, may damage the sensor and a recalibration or replacement may be required. In case of an atmosphere having an oxygen content of less than 18%, there will be an underestimation of the measured value.

2. Operation

To maintain proper operation of the transmitter it is necessary to respect the fact, that the presence of certain concentrations of gases or vapors, other than those for which the sensor is set, can cause an alarm, even if the concentration of the gas does not exceed the set level. Given the range of disturbing gases or vapors (diluent, exhaust gases, vapors of organic substances, disinfectants, etc.) a generally allowable concentration of interfering gases can not be determined. Data on cross-sensitivity to certain gases are included at the appropriate sensors. Therefore before processing project documentation we recommend to have the air in the deployment area of the detection system analyzed.

3. Operation/Maintenance

In case of contamination the surface can be cleaned with a slightly moistened cloth.

The sensors have a different lifetime depending on the sensing technology used, and environmental conditions.

Characteristics of the sensors vary over time. Therefore it is required to perform regular checks and calibrations, which can be done in two ways:

- a) **1x every six months** carry out a „**calibration**“ and **functional control** - adjust the sensitivity of the sensor using calibration gas and check the functionality of the system. The exact interval depends on the purity of the environment, required accuracy and the occurrence of disturbing gases in the atmosphere.
- b) **1x every twelve months** carry out a „**calibration**“ - adjust the sensitivity of the sensor using calibration gas and check the functionality of the system. The exact interval depends on the purity of the environment, required accuracy and the occurrence of disturbing gases in the atmosphere. Also carry out a „**functional control**“ **1 x every three months** - checking the function of the entire detection system using a test gas, which does not exceed the range of the sensor.

We recommend using gas intended for laboratory use.

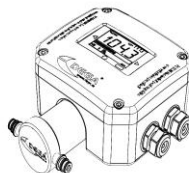
For the „functional control“ do not use means for testing fire alarm detectors!

Perform calibration only at certified service centers with a valid certificate of competence or the manufacturer.

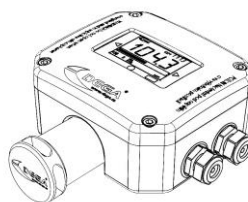
For the Czech Republic only DEGA CZ s.r.o.

Accessories and basic types of transmitters

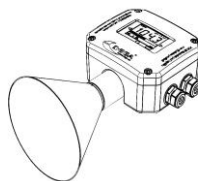
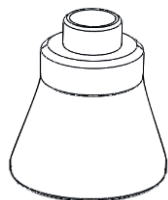
1. Calibration adapter/connection to the gas pump DEGA GAS INLET



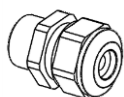
2. Cover against splashing water DEGA WATER CAP



3. Funnel for gas collection DEGA COLLECT CAP



4. Additional Ex „d“ bushing DEGA BUSHING



M20x1,5 for cables having an outer diameter of 6,5-12 mm

M20x1,5 for cables having an outer diameter of 10-14 mm

Basic type of transmitters

1. Transmitters with a catalytic sensor NSx-CL III LCD

Transmitter type	Detected gas	Measurement range	Measurement of current loop (4-20mA)	Standard alarm setting	Resolution	Calibration gas
DEGA NSM-CL III LCD	Methane (CH ₄) Natural gas CNG	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1% LEL	Methane 0,88 %
DEGA NSP-CL III LCD	Butane (C ₄ H ₁₀) Propan-Butane LPG	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1% LEL	Butane 0,32 %
DEGA NSH-CL III LCD	Hydrogen (H ₂)	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1% LEL	Hydrogen 0,8 %
DEGA NSB-CL III LCD	Gasoline vapors	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1% LEL	Hexane 0,18 %
DEGA NSL-CL III LCD	Other flammable and combustible gases and vapors according to the selectivity of the sensor	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1% LEL	According to the selectivity of the sensor

2. Transmitters with an electrochemical sensor NSx-EL III LCD

Transmitter type	Detected gas	Measurement range	Measurement of current loop (4-20mA)	Standard alarm setting	Resolution	Calibration gas
DEGA NSC-EL III LCD	Carbon Monoxide (CO)	0- 1000 ppm	0-130 ppm	1.st.26 ppm, 2. st. 45 ppm, 3st.:87ppm, 4 st. 130 ppm ALARM "PEL": a)according to ČSN 50 291 120min./30ppm Application: Detection in residential buildings b) According to ČSN 73 6058: 30min. / 87 ppm Applications: Underground garages c) according to Government regulation č.321/2007 : 8h/26 ppm Application: Working staff environment	1 ppm	Carbon Monoxide 130 ppm
DEGA NSA-EL III LCD	Ammonia (NH ₃)	0-1000 ppm 0-100 ppm	0-300 ppm 0-50 ppm	1. st. 75 ppm, 2. st.150 ppm 3. st. 225 ppm, 4. st.300ppm 1. st. 14 ppm, 2. st.18 ppm 3. st. 27 ppm, 4. st. 47 ppm ALARM "PEL" 20 ppm/8h	1 ppm 0,1 ppm	Ammonia 300 ppm
DEGA NSCL-EL III LCD	Chlorine (Cl ₂)	0-20 ppm	0-5 ppm	1. st. 0,3 ppm, 2. st.0,5 ppm 3. st. 1,5 ppm, 4. st. 3 ppm ALARM "PEL" : 0,2 ppm/8h	0,1 ppm	Chlorine 5 ppm
DEGA NSO-EL III LCD	Oxygen (O ₂)	0-30 % vol.	0-30 % obj	1. st. 19% vol., 2. st.18% vol. 3. st. 16% vol., 4. st. 15% vol. or 1. st. 23% vol., 2. st.24% vol. 3. st. 26% vol., 4. st. 27% vol.	0,1 %	Air
DEGA NSO3-EL III LCD	Ozone (O ₃)	0-5 ppm	0-0,2ppm	1. st. 0,1 ppm, 2. st. 0,13 ppm 3. st. 0,17 ppm, 4. st. 0,2 ppm ALARM "PEL" 0,05 ppm/8h	0,01ppm	Ozone 0,3 ppm
DEGA NSHCL-EL III LCD	Hydrogen chloride (HCl)	0-20 ppm	0-10ppm	1. st. 4,9 ppm, 2. st. 6 ppm 3. st. 8 ppm, 4. st. 9,3 ppm ALARM "PEL" 5,43 ppm/8h	0,1 ppm	Hydrogen chloride 10 ppm
DEGA NSH2S-EL III LCD	Hydrogen sulfide (H ₂ S)	0-50 ppm	0-15ppm	1. st. 6,5 ppm, 2. st. 8 ppm 3. st. 10 ppm, 4. st. 13 ppm ALARM "PEL" according to Government regulation č.321/2007 : 8h/7,1 ppm	0,1 ppm	Hydrogen sulfide 15 ppm
DEGA NSNO2-EL III LCD	Nitrogen dioxide (NO ₂)	0-20 ppm	0-15ppm	1. st. 5 ppm, 2. st. 7 ppm 3. st. 8 ppm, 4. st. 10 ppm ALARM "PEL" 4,94 ppm/8h	0,1 ppm	Nitrogen dioxide 15 ppm
DEGA NSNO-EL III LCD	Nitric oxide (NO)	0-250 ppm	0-15ppm	1. st. 5 ppm, 2. st. 7 ppm 3. st. 8 ppm, 4. st. 10 ppm ALARM "PEL" 7,57 ppm/8h	0,1 ppm	Nitric oxide 15 ppm
DEGA NSS-EL III LCD	Sulfur dioxide (SO ₂)	0-20 ppm	0-3,5 ppm	1. st. 1,7 ppm, 2. st. 2 ppm 3. st. 2,5 ppm, 4. st. 3,5 ppm ALARM "PEL" 1,91 ppm/8hod	0,1 ppm	Sulfur dioxide 4 ppm
DEGA NSCH-EL III LCD	Formaldehyde (CH ₂ O)	0 - 10 ppm	0-0,7 ppm	1. st. 0,3 ppm, 2. st. 0,5 ppm 3. st. 0,6 ppm, 4. st. 0,7 ppm	0,01 ppm	Formaldehyde 1 ppm

DEGA NSC2H4-EL III LCD	Ethylene (C ₂ H ₄)	0 - 10 ppm	0-10 ppm	1. st. 1,7 ppm, 2. st. 5 ppm 3. st. 7 ppm, 4. st. 10 ppm	0,1 ppm	Ethylene 10 ppm
DEGA NSC2H4O-EL III LCD	Ethylene oxide (C ₂ H ₄ O)	0 – 10 ppm	0-1,5 ppm	1. st. 0,5 ppm, 2. st. 0,8 ppm 3. st. 1,2 ppm, 4. st. 1,5 ppm	0,1 ppm	Ethylene oxide 2 ppm
DEGA NSH-EL III LCD	Hydrogen (H ₂)	0 - 1000 ppm	0-400 ppm	1. st. 100 ppm, 2. st. 200 ppm 3. st. 300 ppm, 4. st. 400 ppm	1ppm	Hydrogen 400 ppm
DEGA NSHCN-EL III LCD	Hydrogen cyanide (HCN)	0 - 100 ppm	0-8,3 ppm	1. st. 2,5 ppm, 2. st. 5,0 ppm 3. st. 6,2 ppm, 4. st. 8,3 ppm	1 ppm	Hydrogen cyanide 10 ppm
DEGA NSPH3-EL III LCD	Phosphine (PH ₃)	0 - 5 ppm	0-0,2 ppm	1. st. 0,06 ppm, 2. st. 0,1 ppm 3. st. 0,15 ppm, 4. st. 0,2 ppm	0,1 ppm	Phosphine 0,3 ppm
DEGA NSSIL-EL III LCD	Silane (SiH ₄)	0 - 50 ppm	0-5 ppm	1. st. 2 ppm, 2. st. 3 ppm 3. st. 4 ppm, 4. st. 5 ppm	0,1 ppm	Silane 6 ppm
DEGA NSCLS-EL III LCD	Chlorine dioxide (ClO ₂)	0-1 ppm	0-0,2 ppm	1. st. 0,06 ppm, 2. st. 0,1 ppm 3. st. 0,15 ppm, 4. st. 0,2 ppm	0,01 ppm	Chlorine dioxide 0,3 ppm
DEGA NSL-EL III LCD	Other chemical substances according to customer requirements	Depending on the type of sensor		According to chemical substance	According to chemical substance	According to chemical substance

3. Transmitters with an infrared sensor NSx-IL III LCD

Transmitter type	Detected gas	Measurement range	Measurment of current loop (4-20mA)	Standard alarm setting	Resolution	Calibration gas
DEGA NSCO2-IL III LCD	Carbon dioxide (CO ₂)	0-5 % vol.	0-2,5 % vol.	1. st. 0,5%, 2. st. 1% 3. st. 2%, 4. st. 2,5%	0,1 %	Carbon dioxide 2,5%
DEGA NSM-IL III LCD	Methane (CH ₄) / Natural gas / Coal gas / CNG	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Methane 0,88%
DEGA NSP-IL III LCD	Butane / LPG / Propane-Butane	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Butane 0,32 %
DEGA NSB-IL III LCD	Gasoline vapors	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Hexane 0,18 %
DEGA NSE-IL III LCD	Etane	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Etane 20% LEL
DEGA NSET-IL III LCD	Ethanol	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Ethanol 20% LEL
DEGA NSEY-IL III LCD	Ethylene	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Ethylene 20% LEL
DEGA NSO-IL III LCD	Oxid etenu	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Oxid ethenu 20% LEL
DEGA NSH-IL III LCD	Hexane	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Hexane 20% LEL
DEGA NSR-IL III LCD	Bromomethane	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Bromomethane 20% LEL
DEGA NSN-IL III LCD	Nitrous oxide	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Nitrous oxide 20% LEL
DEGA NST-IL III LCD	Pentane	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Pentane 20% LEL
DEGA NSPR-IL III LCD	Propene	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Propene 20% LEL
DEGA NSL-IL III LCD	Other flammable and combustible gases and vapors according to the selectivity of the sensor	0–100% LEL	0-20% LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1% LEL	According to the selectivity of the sensor

4. Transmitters with a semiconductor sensor NSx-SL III LCD

Transmitter type	Detected gas	Measurement range	Measurment of current loop (4-20mA)	Standard alarm setting	Resolution	Calibration gas
DEGA NSC-SL III LCD	Carbon monoxide (CO)	0- 1.000 ppm	0-130 ppm	1. st. 26 ppm, 2. st. 45 ppm 3. st. 68 ppm, 4. st. 87 ppm	1 ppm	Carbon monoxide 130 ppm
DEGA NSM-SL III LCD	Methane /CNG / Natural gas	0–100 % LEL	0-20 % LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Methane 0,88 %
DEGA NSP-SL III LCD	Butane / LPG / Propane-Butane	0–100 % LEL	0-20 % LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Butane 0,32 %
DEGA NSA-SL III LCD	Ammonia (NH ₃)	0-1.000 ppm	0-300 ppm	1. st. 75 ppm, 2. st.150 ppm 3. st. 225 ppm, 4. st. 300ppm	1 ppm	Ammonia 300ppm
DEGA NSB-SL III LCD	Gasoline and diesel vapors	0–100% LEL	0-20 % LEL	1. st. 5% LEL, 2. st. 10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Hexane 0,18%
DEGA NSF-SL III LCD	Freon R134a	0–600 ppm	0-600 ppm	1. st. 150ppm, 2. st.300 ppm 3. st. 450 ppm, 4. st. 600ppm	1 ppm	R134a 600ppm

DEGA NSH-SL III LCD	Hydrogen (H ₂)	0-100% LEL	0-20 % LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	Hydrogen 0,8%
DEGA NSY-SL III LCD	Acetylene (C ₂ H ₂)	0–100% LEL	0-20 % LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1%	Acetylene 20 % LEL
DEGA NSR-SL III LCD	Refrigerants: R401A, R404A, R407C, R32, R410A, R12, R22	Depending on the type of refrigerant	Depending on the type of refrigerant	Depending on the type of refrigerant	1 ppm	Depending on the type of refrigerant
DEGA NSHFO-SL III LCD	2,3,3,3- Tetrafluoroprop- 1-ene, HFO-1234yf	0 – 20.000 ppm	0-20 ppm	1. st. 10 ppm, 2. st. 13 ppm 3. st. 16 ppm, 4. st. 20 ppm	1 ppm	HFO1234yf 20ppm
DEGA NSL-SL III LCD	Other flammable and combustible gases and vapors according to the selectivity of the sensor	0 – 100 % LEL	0-20 % LEL	1. st. 5% LEL, 2. st.10% LEL 3. st. 15% LEL, 4. st. 20% LEL	0,1 %	According to the detected substance

LEL - Lowest explosion level

ALARM "PEL": Permitted exposure limit - maximal permitted value of the average concentration over time.

Alarm settings can be chosen freely according to customer requirements in measurement range.

Attachments

1. Chart for setting the transmitter adress

adress	1	2	3	4	5
1	ON	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	OFF
6	OFF	ON	ON	OFF	OFF
7	ON	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	OFF
9	ON	OFF	OFF	ON	OFF
10	OFF	ON	OFF	ON	OFF
11	ON	ON	OFF	ON	OFF
12	OFF	OFF	ON	ON	OFF
13	ON	OFF	ON	ON	OFF
14	OFF	ON	ON	ON	OFF
15	ON	ON	ON	ON	OFF

adress	1	2	3	4	5
16	OFF	OFF	OFF	OFF	ON
17	ON	OFF	OFF	OFF	ON
18	OFF	ON	OFF	OFF	ON
19	ON	ON	OFF	OFF	ON
20	OFF	OFF	ON	OFF	ON
21	ON	OFF	ON	OFF	ON
22	OFF	ON	ON	OFF	ON
23	ON	ON	ON	OFF	ON
24	OFF	OFF	OFF	ON	ON
25	ON	OFF	OFF	ON	ON
26	OFF	ON	OFF	ON	ON
27	ON	ON	OFF	ON	ON
28	OFF	OFF	ON	ON	ON
29	ON	OFF	ON	ON	ON
30	OFF	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

2. Table of error codes

code	cause	solution
1	Sensor is not present (EEPROM is not communicating)	Disconnect and reconnect the sensor, then restart the sensor by disconnecting and reconnecting the power
2	Unknowns sensor type	Contact the manufacturer
3	Type 2 sensor type ID not found in the table setting LMP91000	Contact the manufacturer - FW update required
4	CRC does not match the sensor EEPROM	Sensor error - contact the manufacturer
5	LMP91000 does not respond	Sensor error - contact the manufacturer
6	The set sensor ID does not match with the connected sensor	Checking the configuration of the sensor required
7	Reserved	Reserved
8	EL sensor test error	Sensor error
9	Transmitter is in preheating mode	Wait a few minutes, the transmitter will automatically enter measurement mode
10	Reserved	
11	reserved	
12	Error reading the internal FLASH	Restart the transmitter. If the error persists, contact the manufacturer
13	Error reading the internal FLASH	Restart the transmitter. If the error persists, contact the manufacturer
14	Error reading the internal FLASH	Restart the transmitter. If the error persists, contact the manufacturer
15	Sensor error	Replace the sensor
16	The device exceeded the maximum calibration interval by 50%	Calibration is necessary
129	The measured value exceeds the range of -10%	If the error persists, contact the manufacturer
130	The result of the AD conversion is out of range	Contact the manufacturer

3. Signalization transmitted by the current loop 4-20mA

Measurement: The measure concentration is directly proportional to 4-20mA current output

Exceeding the range of measured concentrations: Current output ranges from 20-22mA

End of valid calibration: Current output transmits the actual measured concentration for 9s in a 4-20mA range and for 1s 2mA current

Malfunction: Current output will be set to 0,5mA

Provádění servisního zásahu (žhavicí sekvence senzoru): Proudový výstup se nastaví na 1mA

General warranty terms and conditions

When following the instructions for installation, operation and maintenance, the manufacturer guarantee 24 months from the date of receipt for the product. Should the product purchased be put into operation by an entity other than the seller, the warranty period commences from the date that the product is put into operation, provided that the buyer ordered its commissioning within three weeks of its receipt. The customer expressly acknowledges that during the warranty period that extends beyond the length of the warranty period that is specified in the Commercial Code (the statutory warranty) s/he can neither require replacement of the product nor may s/he withdraw from the contract.

1. When claiming a product defect it is necessary to submit a proof of purchase that contains the following information: name and surname, name and business name, address and the warranty card, if the buyer received one from the seller. The validity of the warranty shall not be affected by non-compliance with the obligations related to the issuance of the warranty card.
2. Claims concerning the product (for a warranty repair only complete devices are accepted) may be filed during the warranty period only with the seller from which it was purchased; subsequently the seller is required to forward the product to an authorised service centre or to the manufacturer.
3. A condition for the recognition of the rights under the warranty is the installation of the product having been undertaken by an authorised person in possession of a valid certificate from the manufacturer.
5. Claims regarding a product defect that can be dealt with reasonably quickly and without additional consequences will be resolved by remedying the defect (repair) or by replacement of the product part, because in such a case it is a contradiction of the standard norms that the entire product shall be replaced (§ 616, paragraph 4 of the Commercial Code).
6. The buyer who exercises the right of warranty repair is not entitled to the return of the parts that have been replaced.
7. The warranty period can be extended for up to 48 months and its validity can be extended beyond the standard length on the basis of the conclusion of an individual warranty contract. Further information may be obtained through a specific business meeting.

This warranty is not applicable to:

- a product that has not **been put into operation by the manufacturer or by a certified employee** in possession of a valid certificate issued by the manufacturer
- A product that did not have regularly performed calibrations and functional checks by the manufacturer or by a certified employee in possession of a valid certificate issued by the manufacturer.
- damage caused by fire, water, static electricity, power surges in the electric supply or in the public network, accident, improper use of the product, wear and tear
- contamination of the product and its subsequent cleaning
- damage caused by **improper installation, any adjustment, modification** or improper manner of use inconsistent with the instruction manual, the technical standards or the applicable safety regulations in the Czech Republic
- damage to the product during transportation caused by improper handling or handling of the product in a manner contrary to the advice provided in the instruction manual
- DEGA products that have **been used in association with other than original DEGA products**, including consumables and accessories
- bearing additional parts or consumables (e.g. a foil label, seal, etc.), that are detrimental to normal wear and tear during operation, together with wear and tear of the product and its parts caused by their normal use

For the complete version of the general business conditions and of the claims procedure go to www.dega.cz

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User Manual ver.: 01DEGANSx-yLIII LCD 070915

