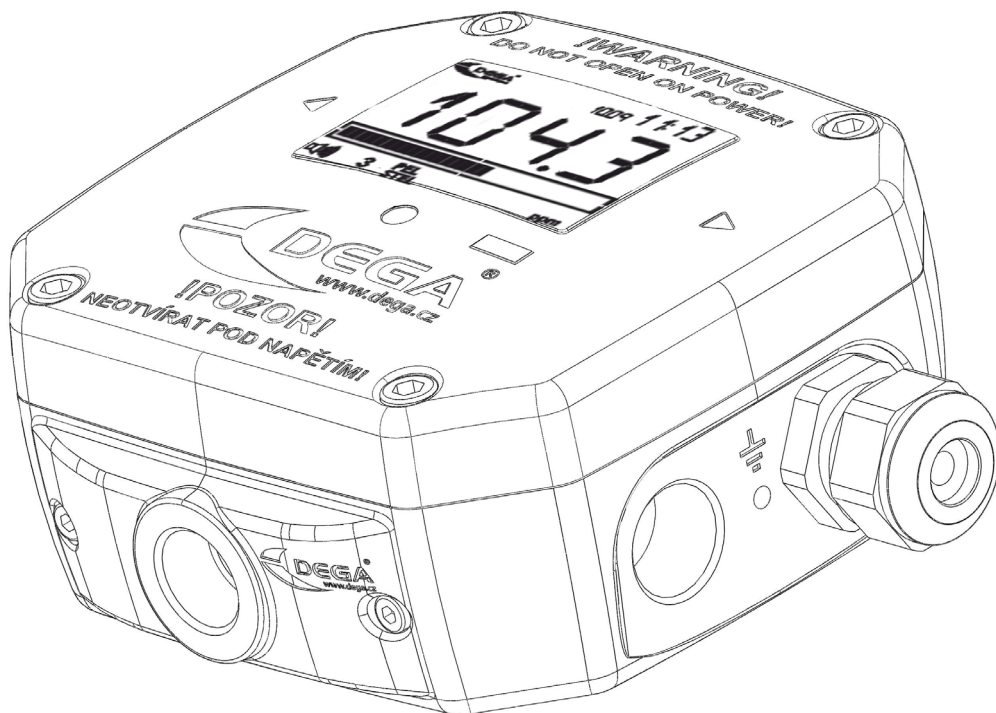


# INSTRUCTION MANUAL



Gas detector

## DEGA NS II LCD / NS II LCD RE



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DEGA CZ s.r.o. bears no liability for any damage resulting from use of this device

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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, immediately 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 detector and do not replace the sensors in the detector in a potentially explosive atmosphere

 Opening the cover and replacing the sensor in the detector 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 (certified partner or manufacturer).


## Do not disassemble the product and ensure against the contact of its internal components 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 of internal components with water can create a short circuit in the product and consequent damage of the product, damage to property or personal injury.


## Use appropriate cable types

 To ensure compliance with the parameters of the product, use only the recommended cables described in this manual to connect the product to other devices or power.


## Use suitable screws

 The screws used for fixing the lid of the fixed shutter must have a strength class of at least A4-80.


## Use only verified values of structural joints

 The verified values of the maximum width and minimum length of the structural joints of this conclusion are different from the corresponding minimum or maximum values given in the technical standard. The manufacturer must be contacted for information on joint dimensions.


## Dispose of used products and detector sensors with respect to the environment

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


## Use the detector 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 detector

 Perform regular "CALIBRATION" (setting the detection limits, checking the responsiveness of the sensor, checking the functionality of the detector) 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.


## Certification according to standards

 Certification according to the regulations CSN EN 60079-29-1 and ČSN EN 50271 applies only to NSM-CL II.


## Special condition

 The device must be installed in such a way that the sensor part is facing downwards.

## Special condition

 The product must be used in an environment with a degree of pollution of at most 2 as defined in IEC 60664-1.

## Special condition

 The detectors type NSx-yL II LCD, NSx-yL II LCD RE and NSx-PID II LCD, NSx-PID II LCD RE were submitted to resistance to impact tests corresponding to low risk of mechanical danger.

### Special condition



The overvoltage protection must be set to a level not exceeding 140 % of the peak supply voltage on the device's power terminals.

### Mechanical damage



NSx-yL II LCD RE detectors have reduced impact and damage resistance. They must be protected by additional means (mechanical barrier, suitable location).

**Warning:** The detector automatically checks its calibration period - the period of validity of its calibration. After 12 months since the last calibration (max. calibration period) the detector will transmit this fact to the host system. The detector 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. 400 m) – see section "installation of wiring for RS485"		
Output:	4 - 20 mA, RS485 - protocol DEGA, or MODBUS 4 x NC contact 30 V/3 A Piezo buzzer		
Type of environment	ZONE 2, IIC, T4 (T5)		
ATEX certificate:	FTZÚ 15 ATEX 0041X		
IECEX certificate:	IECEX FTZU 20.0022X		
Marking according to ATEX:	NSx-EL II LCD / RE		II 3G Ex ec nC IIC T5 Gc Tamb: 0°C- +40°C
	NSx-CL II LCD / RE		II 3G Ex db ec nC IIC T5 Gc Tamb: 0°C- +40°C
	NSx-IL II LCD / RE		II 3G Ex db ec nC IIC T4 Gc Tamb: 0°C- +40°C
	NSx-PL II PID LCD / RE		II 3G Ex ic ec nC IIC T4 Gc Tamb: 0°C- +40°C
	<b>II</b> - class environment - non-mining environment <b>3 G</b> - explosive atmospheres - zone 2		
	<b>Ex db ec</b> – protection type - flameproof enclosure "d", secured "ec", intrinsically safe "ic", encapsulated "nC"		
	<b>IIC</b> - gas group <b>T4/T5</b> - temperature gas group <b>Gc</b> - type of protection according to EPL		
	<b>Tamb</b> - ambient temperature range		

Dimensions and weight without cable glands:	140 x 140 x 70 mm (WxHxD)
Weight:	0,8 kg
Capacity of the internal memory of history:	34 days at 60 s recording interval
Interval record storage memory:	60 s (adjustable range 1-255 s)
Dead band:	max 5 % of range

### Consumption/input at 24 V (output RS485)

DEGA NSx-EL II LCD	90 mA/2,2 W
DEGA NSx-CL II LCD	135 mA/3,3 W
DEGA NSx-IL II LCD	115 mA/2,8 W
DEGA NSx-SL II LCD	135 mA/3,3 W
DEGA NSx-PID II LCD	135 mA/3,3 W

### Warm-Up time

DEGA NSx-EL II LCD	some sensors max. 72 hours
DEGA NSx-CL II LCD	max. 34 s
DEGA NSx-IL II LCD	max. 15 s
DEGA NSx-SL II LCD	max. 15 s
DEGA NSx-PID II LCD	max. 15 s

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

DEGA NSx-EL II LCD	110 mA/2,7 W
DEGA NSx-CL II LCD	155 mA/3,7 W
DEGA NSx-IL II LCD	135 mA/3,3 W
DEGA NSx-SL II LCD	155 mA/3,7 W
DEGA NSx-PID II LCD	155 mA/3,7 W

### Time to stabilize (>5 day without power)

DEGA NSx-EL II LCD	some sensors max. 72 hours
DEGA NSx-CL II LCD	max. 1 h
DEGA NSx-IL II LCD	max. 30 min
DEGA NSx-SL II LCD	max. 30 min
DEGA NSx-PID II LCD	max. 30 min

### (RE)ponse time (T90)

DEGA NSx-EL II LCD	max. 180 s - based on sensor type
DEGA NSx-CL II LCD	max. 15 s
DEGA NSx-IL II LCD	max. 15 s
DEGA NSx-SL II LCD	max. 30 s
DEGA NSx-PID II LCD	max. 60 s

### Sensor lifetime in a clean environment

DEGA NSx-EL II LCD	2 years
DEGA NSx-CL II LCD	2 years
DEGA NSx-IL II LCD	5 years
DEGA NSx-SL II LCD	2 years
DEGA NSx-PID II LCD	5000 hours

## Operational and storage conditions

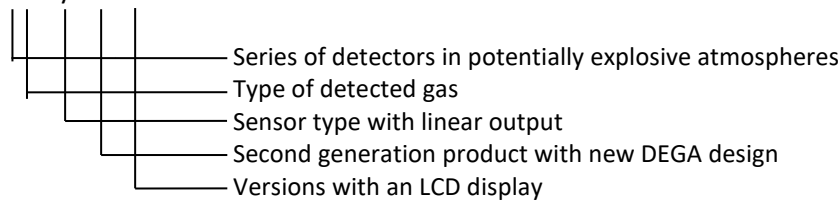
Ambient temperature:	0 °C to +40 °C
Relative humidity:	0-95 % RH
Air pressure:	80-120 kPa
Flow of ambient air:	max. 2 m/s - flow directly to the sensor is not allowed
Protection level with a cover:	IP 54, with a DEGA WATER CAP IP 66 cover
Location:	BE3N2 - explosive atmospheres - zone 2

## Terminology

### The marking system for detector DEGA NSx-yL II LCD:

Gas detector DEGA

NSx - yL II LCD



### DEGA NSx-EL II 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 II 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 their proper function.

### DEGA NSx-IL II 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 in catalytic sensors. The sensors are characterized by high stability and a long lifetime.

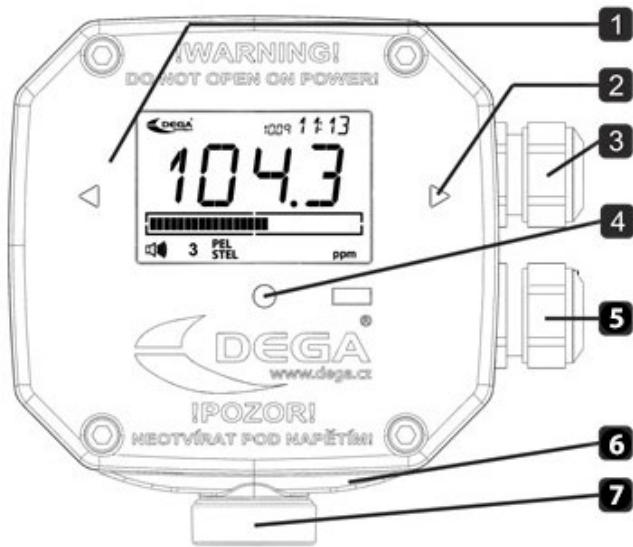
### DEGA NSx-SL II LCD with a semiconductor sensor

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.

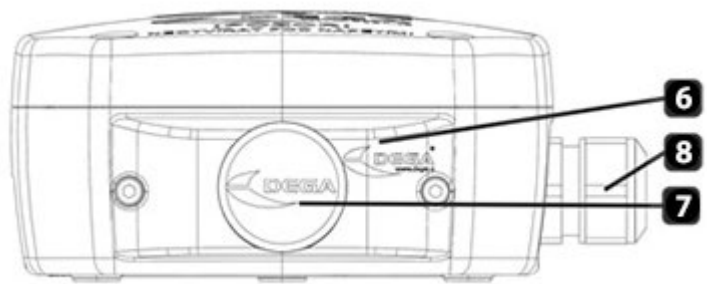
### DEGA NSx-PL II LCD PID with photoinitiator sensor (PID)

Sensitive scanning method to detect a wide range of VOC - volatile organic compounds. The sensor non-selectively detects all VOCs in the air already at concentrations in ppm.

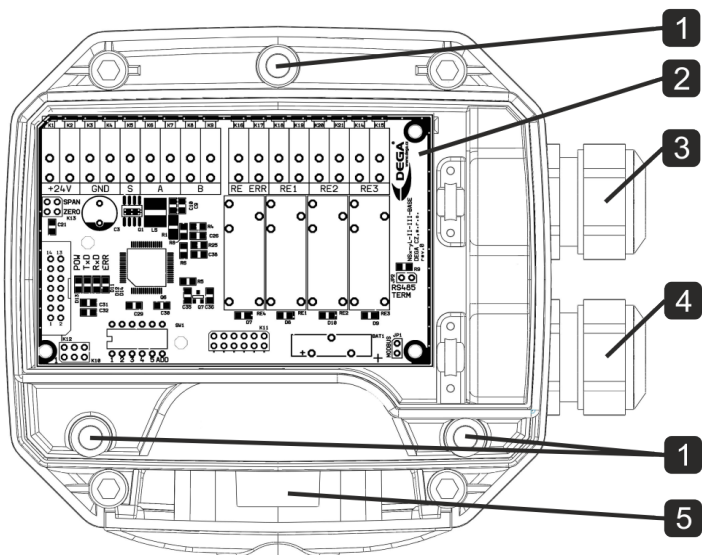
# Product description



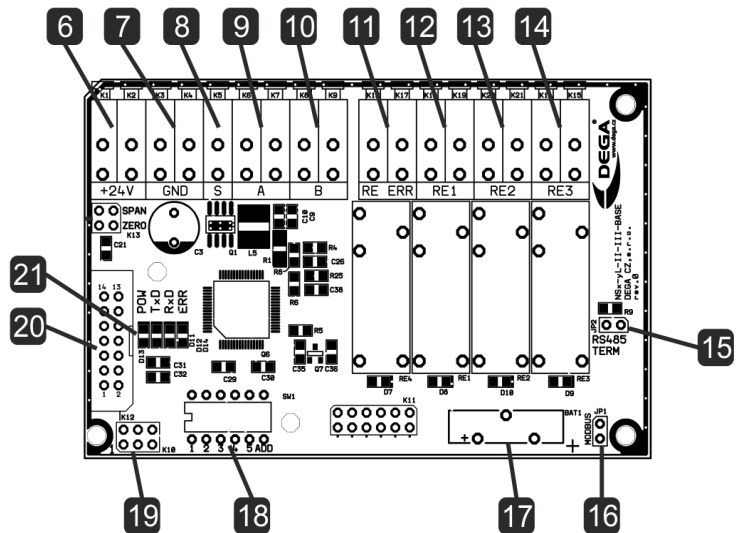
- 1** Magnetic control „BACK“
- 2** Magnetic control „FRONT“
- 3** Ex „e“ cable gland
- 4** Magnetic control „ENTER/EXIT“
- 5** Optional Ex „e“ cable gland
- 6** Body of the removable sensor
- 7** Cover against splashing water (optional accessories)



- 6** Ex „e“ cable gland
- 7** Magnetic control „ENTER/EXIT“
- 8** Ex „e“ cable gland



- 1** Mounting holes
- 2** PCB electronics
- 3** Body of the removable sensor
- 4** Body of the removable sensor
- 5** Body of the removable sensor
- 6** Power supply terminal block +24 VDC
- 7** Terminal block RS485 A
- 8** Terminal block RS485 B
- 9** Expanding contact relay 2
- 10** Expanding contact relay 3
- 11** Battery CR2032
- 12** DIP switch for the RS485 address
- 13** Status LED



- 6** Ex „e“ cable gland
- 7** Power supply terminal block GND
- 8** Signal terminal block 4-20 mA
- 9** Expanding contact relay ERROR
- 10** Expanding contact relay 1
- 11** Jumper connector of the terminal resistor RS485
- 12** Jumper connector of the communication protocol (DEGA/MODBUS)
- 13** Programming connector
- 14** LCD display connector
- 15** Ex „e“ cable gland
- 16** Optional Ex „e“ cable gland
- 17** Power supply terminal block +24 VDC
- 18** Terminal block RS485 A
- 19** Terminal block RS485 B
- 20** Expanding contact relay 2
- 21** Expanding contact relay 3

# Installation, assembly and disassembly of the detector

Before assembling, read the valid installation standards EN 60079-29-2 (Selection, installation, use and maintenance of detectors for combustible gases and oxygen) and EN 45544-4 (Guidelines 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 installation in hazardous areas).

Secure that the sensor is reachable by air. The detector 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.

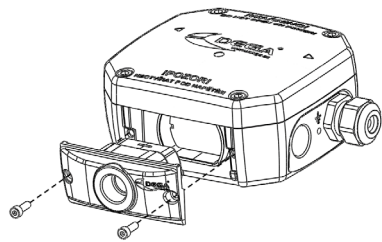
## 1. Assembly of the detector

The detector consists of four parts - the body of the detector, the removable sensor and Ex „e“ cable glands.

Detector assembly procedure is as follows:

- a) Disassemble the detector with the four 5 mm hexagon socket screws
- b) Mount the detector on a flat surface with four 6 mm fasteners in height above the floor with the gas entrance facing downwards, as specified by the detected substance.
- c) Pull the cable through the cable gland and, if necessary, secure it with a cable bridle.
- d) Connect the wiring to the terminal block of the sensor according to the chapters "Connecting the detector to the controllers". When using the second ex . „e“ cable gland, drill a hole with a diameter of max 16 mm. Only certified Ex "e" cable glands with the M20x1,5 thread are allowed. **While drilling make sure to not damage the detector electronics.**
- e) Assemble the detector with the four 5 mm hexagon sockets screws.

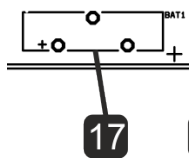
## 2. Replacement of the sensor module



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. On the sensor module, unscrew a pair of 3 mm hexagon socket screws and remove the sensor module using a tool to prise it from the inside. Carefully insert a new module - the pins may not be bent. Secure with a pair of screws and slide the cover on the device, then secure it.

## 3. Replacement of the battery

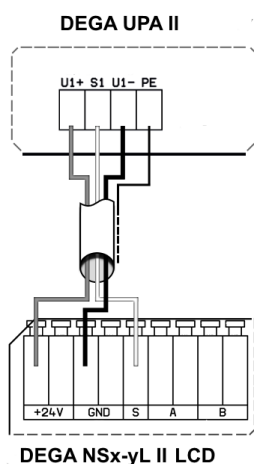


Panasonic	BR2032
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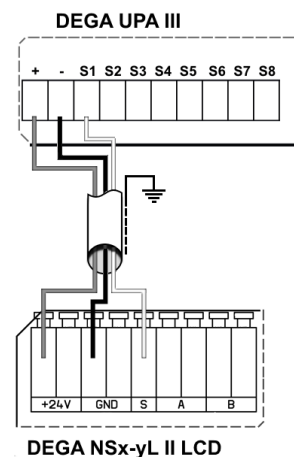
The battery lifetime in the sensor is approximately 5 years. After this time some functions of the detector may not work properly. Remove the battery from the holder and replace it with one of the recommended types. Replacing the battery in the detector, which is not connected to the power, will erase the internal clock.

## 4. Connecting the detector via current loop to the controller DEGA UPA II/DEGA UPA III

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

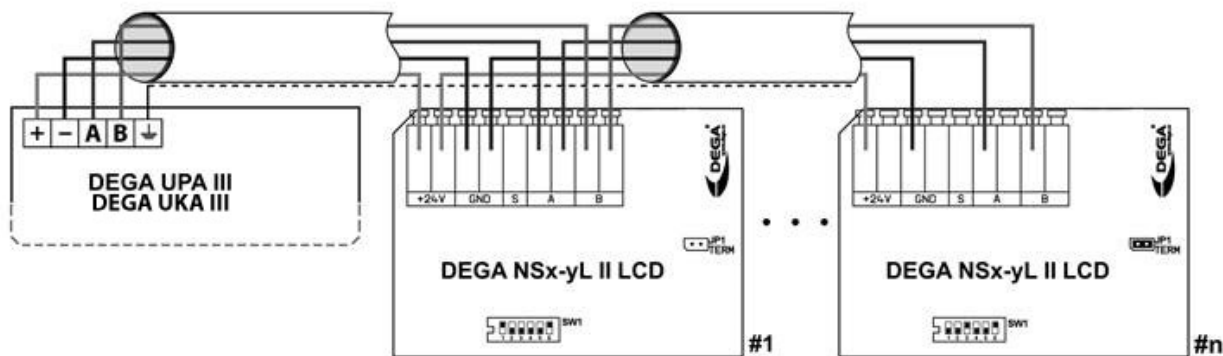


DEGA NSx-yL II LCD



DEGA NSx-yL II LCD

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



6. Installation of wiring for RS485 and power supply

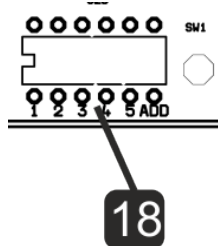
Wiring must be installed using bus topology and in compliance with the RS485 policy.

The 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 controller (electrical distance between the controller and the last transmitter) should not exceed 400 meters.

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

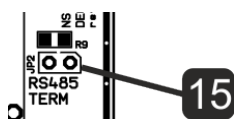
**MODBUS** – detailed instructions for MODBUS, see separate document „Modbus communication for the DEGA NS II (LCD) NS III (LCD) gas transmitter”.

7. Setting the RS485 address of the detector



Each detector must have a unique address within the entire bus, otherwise there will be communication collisions and malfunctions. The detector address 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 address is set according to the setting of pins 1-5. Otherwise the address set in DegaConfig is accepted. The address can be set from in the range of 1-31 using binary values. A table with DIP switch settings for the individual addresses is provided in Attachment 1.

8. Terminal resistor



According to the RS485 specifications, the last device on the bus must end with the termination resistor 120 R. Plug a jumper on the JP2 connector of the last device on the bus to include the 120 R 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.

## Detector 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 received via RS485
- LED „ERR“ shines/flashes in case of malfunction or substandard situations

### 1. Turning on the detector


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 180 s depending on the sensor used. The output of the current loop is 1 mA. During this sequence, testing of internal electronics and stabilization of the sensor in order to eliminate false alarms after turning on takes place. At this time, the display only shows the time to the beginning of the measurement loop.

After completion of the formation, a 4 mA current begins to flow on the output of the current loop and the detector starts working according to its settings.

### 2. Gas detection

The detector continuously measures the detected gas concentration in the atmosphere and converts its current value into a 4-20 mA signal or transmits its value to the evaluation unit via DEGA/MODBUS protocol. The display shows the current measured concentration and alarm status.


### 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 orange „ERR“ LED. The meaning of each error code is listed in Attachment 2.

### 4. Monitoring the calibration periods

The detector 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

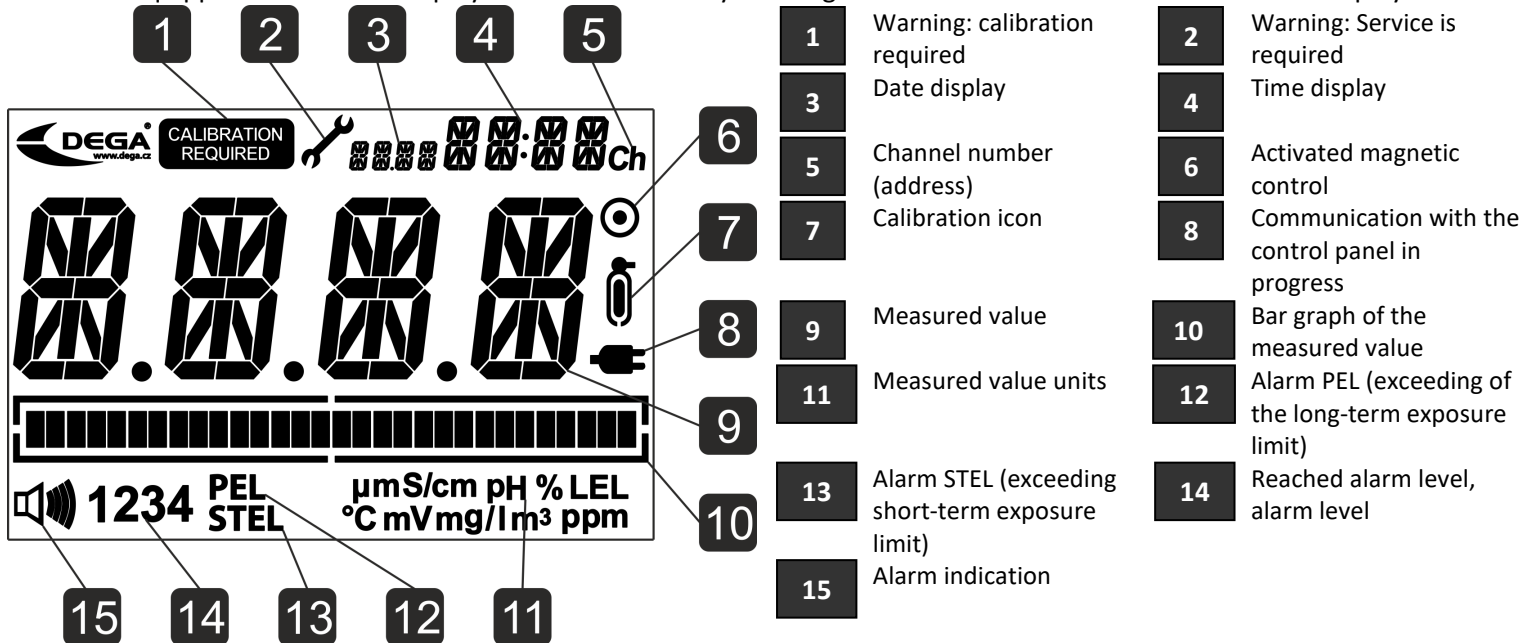
 starts flashing on the LCD display. The connected sensor must be calibrated immediately. The detector will transmit the information about the ending calibration via current loop. The transmission will be as follows: 10 s of transmitting a 4-20 mA signal informing about the actual gas concentration followed by a 1 second interval of 2 mA current.

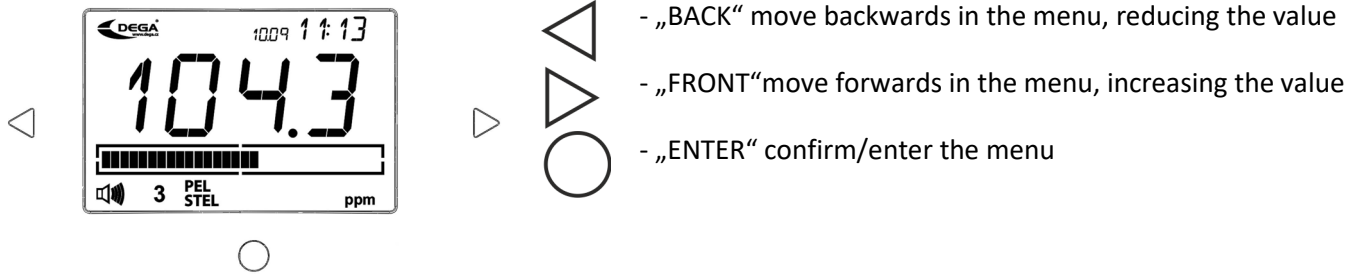
### 5. Reading the record of measured concentrations and alarms

The detector periodically after 60 s stores the current detected concentration into it's internal memory. The internal memory retains data from the last 64260 measurements (cca 34 days). In order to read this information, the program DegaConfig is required. Refer to the DegaConfig program instruction.

## Detector controls

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

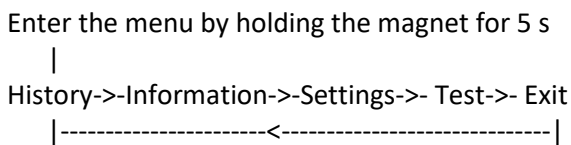




Placing a magnet into the indent „○“ for 5 s activates the magnetic control, which is displayed by the icon „⊙“ on the LCD.

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

**Main menu structure:**


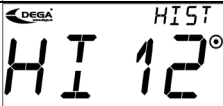


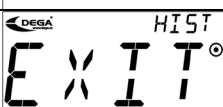


Menu	Display	Description
History		Browsing the alarm history
Information		Information about detector settings
Settings		Detector configuration
Test		Testing the detector functions
Exit		Return to normal operation

**1. History menu „HIST“**



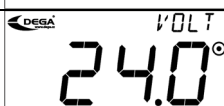

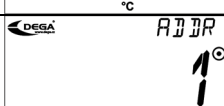


Browsing the history




Menu	Display	Description
History of all alarms		Use „◀▶“ to go through individual alarms. Displays the date and time of the alarm. Return to the history menu „○“
Highest concentration in the past hour		Displays the highest measured concentration and alarm for the past hour. Return to History menu „○“

Highest concentration in the past 8 hours		Displays the highest measured concentration and alarm for the past 8 hours. Return to History menu „○“
Highest concentration in the past 12 hours		Displays the highest measured concentration and alarm for the past 12 hours. Return to History menu „○“
Highest concentration in the past 24 hours		Displays the highest measured concentration and alarm for the past 24 hours. Return to History menu „○“
Highest concentration stored in the memory		Displays the highest measured concentration and alarm, that is stored in the memory. Return to History menu „○“
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		Displays the date of the next calibration
Date of last calibration		Displays the date of the last calibration
Power voltage		Displays the power voltage
Temperature		Displays the chip temperature (about 15°C higher than the ambient temperature)
RS485 device address		Displays the device address
Range up to		Measured concentration value corresponding to 20mA current
Alarm level 1		Displays alarm level 1











Alarm level 2	 0150 <sup>⊙</sup> 2 ppm	Displays alarm level 2
Alarm level 3	 0225 <sup>⊙</sup> 3 ppm	Displays alarm level 3
Alarm level 4	 0300 <sup>⊙</sup> 4 ppm	Displays alarm level 4

### 3. Settings menu „SET“
















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

Menu	Display	Description
Calibration	 SET CAL <sup>⊙</sup>	Sensor calibration
Setting the alarms	 SET SETR <sup>⊙</sup>	Setting the alarms
Setting the range of the 20 mA current loop	 SET SETR <sup>⊙</sup>	Setting the range of the 20 mA current loop
Changing the password	 SET PSWD <sup>⊙</sup>	Changing the password
Setting the year	 SET YEAR <sup>⊙</sup>	Setting the year
Setting the date	 SET DATE <sup>⊙</sup>	Setting the date
Setting the time	 SET TIME <sup>⊙</sup>	Setting the time
Exit	 SET EXIT <sup>⊙</sup>	Returning one level up







## Calibration

- Connect fresh air to the sensor input. The icon „“ flashes. After the value stabilizes, move onto the next step using „“
- Using „ “ select the concentration of the calibration gas, confirm „“
- Connect the calibration gas to the sensor input. The icon „“ flashes. **Wait until the value stabilizes and confirm** „“
- Using „ “ switch between „YES“ - save calibration, or „NO“ - return to the Settings menu. Confirm the selected option „“
- In case of saving a new calibration, the detector will restart after 5 s.
















## Setting the alarms

- Using „ “ select the concentration for alarm 1. Confirm „“
- Using „ “ select the concentration for alarm 2. Confirm „“
- Using „ “ select the concentration for alarm 3. Confirm „“
- Using „ “ select the concentration for alarm 4. Confirm „“
- Using „ “ switch between „YES“ - save settings, or „NO“ - return to the Settings menu. Confirm the selected option „“
















## Setting the range of the 20 mA current loop

- Using „ “ select the concentration appropriate to 20 mA range. Confirm „“
- Using „ “ switch between „YES“ - save settings, or „NO“ - return to the Settings menu. Confirm the selected option „“
















## Changing the password

- Using „ “ select a number in thousands. Save the selected number „“
- Using „ “ select a number in hundreds. Save the selected number „“
- Using „ “ select a number in tens. Save the selected number „“
- Using „ “ select a number in units. Save the selected number „“
- Using „ “ switch between „YES“ - save settings, or „NO“ - return to the Settings menu. Confirm the selected option „“

## Setting the year

- Using „ “ select a number in thousands. Save the selected number „“
- Using „ “ select a number in hundreds. Save the selected number „“
- Using „ “ select a number in tens. Save the selected number „“
- Using „ “ select a number in units. Save the selected number „“
- Using „ “ switch between „YES“ - save settings, or „NO“ - return to the Settings menu. Confirm the selected option „“

## Setting the date

- Using „ “ select a number in thousands. Save the selected number „“
- Using „ “ select a number in hundreds. Save the selected number „“
- Using „ “ select a number in tens. Save the selected number „“
- Using „ “ select a number in units. Save the selected number „“
- Using „ “ switch between „YES“ - save settings, or „NO“ - return to the Settings menu. Confirm the selected option „“




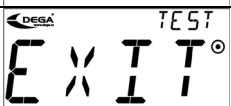
## Setting the time

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

## 4. Test menu „TEST“

**Protected by password 0004.** By entering a wrong password, the detector 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 4-20 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 „○“
Detector 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 detector

### 1. Usage limits

To maintain proper operation of the detector, 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, as described below. All sensors are characterized by a smaller or larger cross-sensitivity to other gases than those they are set for. Therefore we recommend that you have the air in the deployment area of the detection system analyzed before processing project documentation.

- 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. Long term crossing of the measuring range causes a decrease in sensitivity. In case of an atmosphere with oxygen content of less than 17 %, the measured value will be undervalued. In case of an atmosphere with oxygen content of more than 25 %, the measured value will be overvalued.
- 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 with oxygen content of less than 1 % for longer than 1 hour, the measured value will be undervalued.
- infrared sensors:** Acids and alkali vapors may etch the optical system and distort the measurements. A check or a calibration may be necessary.
- 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.

e) **photoionization sensors:** the UV lamp or sensor must be replaced regularly, its clogging may cause loss of signal.

## 2. Operation

To maintain proper operation of the detector 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 set off, 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 respective sensors. Therefore we recommend to that you have the air in the deployment area of the detection system analyzed before processing project documentation.

## 3. Operation/Maintenance

In case of contamination the surface can be cleaned with a slightly moistened cloth. The connected transmitters require performing of regular calibrations.

### Recommended Default settings:

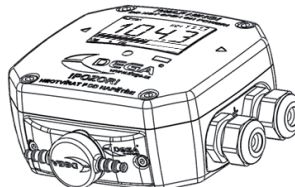
**1 x every 6 months** carry out a „**calibration**“ - adjust the sensitivity of the sensor using calibration gas and check the functionality of the system. The exact interval depends on the purity of the environment, required accuracy and the occurrence of disturbing gases in the atmosphere.

The calibration interval can be changed by the DEGA Config software.

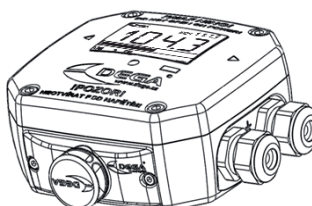
Perform calibration only at certified service centers with a valid certificate of competence or the manufacturer.  
For the Czech Republic only DEGA CZ s.r.o.

## Accessories

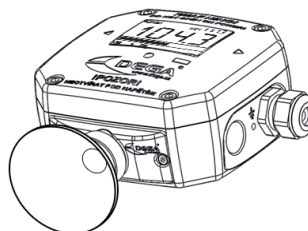
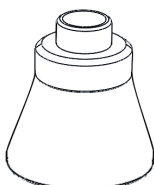
### 1. Calibration adapter/connection to the gas pump DEGA GAS INLET



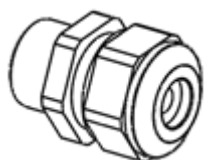
### 2. Cover against splashing water DEGA WATER CAP



### 3. Funnel for gas collection DEGA COLLECT CAP



### 4. Additional Ex „e“ cable gland DEGA CABLE GLAND for NS II LCD



M20x1,5

# Gas specifications

Gas	Formula	CAS	Measuring range
Acetylene	C <sub>2</sub> H <sub>2</sub>	74-86-2	0-100 % LEL
Ammonia	NH <sub>3</sub>	7664-41-7	0-100 ppm
Ammonia	NH <sub>3</sub>	7664-41-7	0-1000 ppm
Ammonia	NH <sub>3</sub>	7664-41-7	0-10000 ppm
Ammonia	NH <sub>3</sub>	7664-41-7	0-500 ppm
Ammonia	NH <sub>3</sub>	7664-41-7	0-5000 ppm
Ammonia	NH <sub>3</sub>	7664-41-7	0-2000 ppm
Bromine	Br	7726-95-6	0-20 ppm
Bromine	Br	7726-95-6	0-200 ppm
Butane / Propan-Butane / LGP	C <sub>4</sub> H <sub>10</sub>	106-97-8	0-100 % LEL
Carbon dioxide	CO <sub>2</sub>	124-38-9	0-5 % vol.
Carbon dioxide	CO <sub>2</sub>	124-38-9	0-100 % vol.
Carbon monoxide	CO	630-08-0	0-1000 ppm
Carbon monoxide	CO	630-08-0	0-200 ppm
Carbon monoxide	CO	630-08-0	0-500 ppm
Carbon monoxide	CO	630-08-0	0-2000 ppm
Ethane	C <sub>2</sub> H <sub>6</sub>	74-84-0	0-100 % LEL
Ethanol	C <sub>2</sub> H <sub>5</sub> OH	64-17-5	0-100 % LEL
Ethylene	C <sub>2</sub> H <sub>4</sub>	74-85-1	0-10 ppm
Ethylene	C <sub>2</sub> H <sub>4</sub>	74-85-1	0-200 ppm
Ethylene	C <sub>2</sub> H <sub>4</sub>	74-85-1	0-1500 ppm
Ethylene	C <sub>2</sub> H <sub>4</sub>	74-85-1	0-100 % LEL
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	75-21-8	0-10 ppm
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	75-21-8	0-100 ppm
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	75-21-8	0-1000 ppm
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	75-21-8	0-500 ppm
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	75-21-8	0-100 % LEL
Formaldehyde	CH <sub>2</sub> O	50-00-0	0-10 ppm
Formaldehyde	CH <sub>2</sub> O	50-00-0	0-50 ppm
Formaldehyde	CH <sub>2</sub> O	50-00-0	0-1000 ppm
Hexane (Petrol)	C <sub>6</sub> H <sub>14</sub>	110-54-3	0-100 % LEL
Hydrogen	H <sub>2</sub>	1333-74-0	0-100 % LEL
Hydrogen	H <sub>2</sub>	1333-74-0	0-1000 ppm
Hydrogen	H <sub>2</sub>	1333-74-0	0-4000 ppm
Hydrogen	H <sub>2</sub>	1333-74-0	0-40000 ppm
Hydrogen bromide	HBr	10035-10-6	0-20 ppm
Hydrogen bromide	HBr	10035-10-6	0-200 ppm
Hydrogen cyanide	HCN	74-90-8	0-50 ppm
Hydrogen fluoride	HF	7664-39-3	0-10 ppm
Hydrogen chloride	HCl	7647-01-0	0-20 ppm
Hydrogen chloride	HCl	7647-01-0	0-200 ppm

Gas	Formula	CAS	Measuring range
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	7722-84-1	0-100 ppm
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	7722-84-1	0-500 ppm
Hydrogen sulfide	H <sub>2</sub> S	7783-06-4	0-50 ppm
Hydrogen sulfide	H <sub>2</sub> S	7783-06-4	0-500 ppm
Hydrogen sulfide	H <sub>2</sub> S	7783-06-4	0-100 ppm
Hydrogen sulfide	H <sub>2</sub> S	7783-06-4	0-2000 ppm
Chlorine	Cl <sub>2</sub>	7782-50-5	0-20 ppm
Chlorine	Cl <sub>2</sub>	7782-50-5	0-200 ppm
Chlorine dioxide	ClO <sub>2</sub>	10049-04-4	0-50 ppm
Methane	CH <sub>4</sub>	74-82-8	0-100 % LEL
Nitric oxide	NO	10102-43-9	0-25 ppm
Nitric oxide	NO	10102-43-9	0-250 ppm
Nitric oxide	NO	10102-43-9	0-1000 ppm
Nitrogen dioxide	NO <sub>2</sub>	10102-44-0	0-20 ppm
Nitrogen dioxide	NO <sub>2</sub>	10102-44-0	0-100 ppm
Nitrogen dioxide	NO <sub>2</sub>	10102-44-0	0-500 ppm
Nitrous oxide	N <sub>2</sub> O	10024-97-2	0-1 % vol.
Organic acids	RCOOH		0-100 ppm
Other flammable and combustible gases and vapors	HC		0-100 % LEL
Oxygen	O <sub>2</sub>	17778-80-2	0-1 %
Oxygen	O <sub>2</sub>	17778-80-2	0-30 %
Ozone	O <sub>3</sub>	10028-15-6	0-5 ppm
Ozone	O <sub>3</sub>	10028-15-6	0-100 ppm
Pentane	C <sub>5</sub> H <sub>12</sub>	109-66-0	0-100 % LEL
Phosphine	PH <sub>3</sub>	7803-51-2	0-5 ppm
Phosphine	PH <sub>3</sub>	7803-51-2	0-20 ppm
Phosphine	PH <sub>3</sub>	7803-51-2	0-200 ppm
Phosphine	PH <sub>3</sub>	7803-51-2	0-2000 ppm
Propylene	C <sub>3</sub> H <sub>6</sub>	115-07-1	0-100 % LEL
Refrigerant	R		0-2000 ppm
Refrigerant	HFO	754-12-1	0-2000 ppm
Silane	SiH <sub>4</sub>	7803-62-5	0-1 ppm
Sulfur dioxide	SO <sub>2</sub>	7446-09-5	0-20 ppm
Sulfur dioxide	SO <sub>2</sub>	7446-09-5	0-200 ppm
Sulfur dioxide	SO <sub>2</sub>	7446-09-5	0-2000 ppm
Sulfur dioxide	SO <sub>2</sub>	7446-09-5	0-100 ppm
Sulfur dioxide	SO <sub>2</sub>	7446-09-5	0-1000 ppm
Sulfur dioxide	SO <sub>2</sub>	7446-09-5	0-10000 ppm
Volatile organic compounds	VOC		0-20 ppm (el. sensor)
Volatile organic compounds	VOC		0-3000 ppm - according to gas (PID sensor)

# Add-on modules

Product code	Name	Product description
30200003	DEGA NS II Relay Modul	Internal 4-relay, 250 V/10 A
30200010	DEGA NS II RS485	Internal output RS485
30200011	DEGA NS II Buzzer	Internal buzzer on PCB, 4 VDC, 7 VDC, 30 mA, 88 dB

# Attachments

## 1. Chart for setting the detector address

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

address	1	2	3	4	5	6
17	ON	OFF	OFF	OFF	ON	ON
18	OFF	ON	OFF	OFF	ON	ON
19	ON	ON	OFF	OFF	ON	ON
20	OFF	OFF	ON	OFF	ON	ON
21	ON	OFF	ON	OFF	ON	ON
22	OFF	ON	ON	OFF	ON	ON
23	ON	ON	ON	OFF	ON	ON
24	OFF	OFF	OFF	ON	ON	ON
25	ON	OFF	OFF	ON	ON	ON
26	OFF	ON	OFF	ON	ON	ON
27	ON	ON	OFF	ON	ON	ON
28	OFF	OFF	ON	ON	ON	ON
29	ON	OFF	ON	ON	ON	ON
30	OFF	ON	ON	ON	ON	ON
31	ON	ON	ON	ON	ON	ON
32	OFF	OFF	OFF	OFF	OFF	ON

## 2. Conversion between volumetric concentration and lower explosion limit of methane

$$\%DVM = \frac{\%obj}{4,4} * 100$$

%DMV – level of lower explosion limit concentration in %  
 %obj – volume sample of gas  
 4,4 – lower explosive limit of methane (4.4 % by volume)

## 3. 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	Unknown sensor type	Contact the manufacturer
3	Type 2 sensor ID not found in the settings table LMP91000	Contact the manufacturer - FW update required
4	the EEPROM sensor CRC does not match	Sensor error - solve via DEGA Config
5	LMP91000 not responding	Sensor error - contact the manufacturer
6	The set sensor ID does not match the connected sensor	Checking the configuration of the sensor required - solve via DEGA Config
7	Reserved	Reserved
8	EL sensor test error	Sensor error
9	Detector is in preheating mode	Wait a few minutes, the detector will automatically enter measurement mode
10	Reserved	
11	reserved	
12	Error reading the internal FLASH	Restart the detector. If the error persists, contact the manufacturer
13	Error reading the internal FLASH	Restart the detector. If the error persists, contact the manufacturer
14	Error reading the internal FLASH	Restart the detector. 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, recalibration required
130	The result of the AD conversion is out of range	Recalibration required

#### **4. Signalization transmitted by the current loop 4-20 mA**

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

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

**End of valid calibration:** Current output transmits the actual measured concentration for 10 s in a 4-20 mA range and for 1 s 2 mA current

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

**Maintenance (sensor preheating sequence):** Current output will be set to 1 mA

#### **5. Package content**

1 x NS II LCD body

1 x NS II LCD sensor unit

# General warranty terms and conditions

**When following the instructions for installation, operation and maintenance, the manufacturer guarantees 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 of the item containing the following information: name and surname, name and business name of the seller, his identification number, in case of a legal person their name, identification number and registered office, in case of a physical person their name, surname, place of residence and warranty certificate, provided 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 authorized 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 authorized 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 concerned product part, because in such a case replacing the entire product would contradict the standard norms (§ 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 detector 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
- **calibration of sensors**, i.e. setting detection limits
- **wear or damage of the detector sensors, including the necessity of their replacement**
- wear parts and consumables (such as the key for removing the sensor, seals, etc.), which 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](http://www.dega.cz)

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