

User Manual

Display for Gas Detector

SC-LCD

No: 207 26

This user manual includes:

Instructions for assembly, installation, putting into operation, use, operation, setting, maintenance and service, disassembly and disposal, and specifications

Keep this manual for future reference!

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User manual:

This manual includes instructions for assembly, installation, putting into operation, use, utilization, operation, setting, maintenance and service, disassembly and disposal, and specifications.

All workers performing installation, putting into operation, operation, maintenance and service must be provably familiarized with this manual. Keep this manual for future reference



Warning!

- **This manual applies to the product put into market after 1 January 2015. Changes in labelling, ordering, control etc. have been made. Ask for respective version of the user manual for older product versions.**

Use

- The SC-LCD display is designed for displaying volume concentrations of combustible gases of CH₄, C₂H₆, C₃H₈, C₄H₁₀, C₅H₁₂, C₆H₁₄, C₂H₂, CO, H₂, NH₃ in the air from a connected detector ranging from 0 to 5% vol. or 0 to 100% LEL. The explosion-proof version (I M1 Ex ia I Ma, II 1G Ex ia IIC T4 Ga, II 1D Ex ia IIIC T87°C Da) can be used in explosion-risk areas in coal mines or in zones 1, 2, 21 and 22.
- The additional SC-LCD display is used in cases when the detector is installed in an inaccessible place (e.g. on a ceiling), i.e. out of reach of the operator. SC-LCD is designed so that all signals from the detector go through the display to a connected device.

Description and operation

- The device is placed in a polyester box with antistatic finishing. It includes two cable glands, mounting trays, display, setting buttons and LEDs. It enables turning the backlight of the display.
- All signals from the detector go through the display to a connected device (power supply unit) that supplies the display and in parallel also the detector. The display uses the analogue output of the detector, enables communication but it does not use the digital output of the detector.
- The analogue output is intended for measuring. It must be set in the same way as the analogue output of the detector (voltage or current output with the adjustable range from 0 to 5.0V or 22.0mA). The measured concentration is displayed. The analogue signal serves also for transferring information about the special status, running calibration and overrange.
- The display software checks the external power supply (8-30V), internal power supply (3-3.3V) and the device for temperature and checks the memories internally (FLASH, RAM and FRAM). The software calculates and checks the sensor for age and calibration (when the display is ON), saves the values into the internal memory (every minute cyclically for 24 hours) etc.
- All settings, calibration, readout of current quantities and values from the memory are operated with two buttons on the box side. Legends on the display can be in Czech, Russian or English. The setting mode is accessed after four-digit code is entered.
- The RS485-IS communication (protocol MODBUS ASCII or RTU) enables readout of current values of concentration, internal temperature, internal and external voltage, operating state of the display or history of these data from the internal memory (they are saved every minute cyclically for 24 hours).
- The detector with the display device can be connected to the DKD and PNS systems or other systems using a current, voltage, frequency signal or using the MODBUS ASCII or RTU protocol.
- Up to 5 SC-LCD displays can be theoretically interconnected in series, which is practically limited

by the low power of the intrinsically safe power supply unit.



Warning!

- The leakage current in the cable in case of the current analogue input or the voltage drop in case of the voltage analogue input can result in an error of measurement.
- The warning “Alarm” LED is not of a latch type. The self-holding alarm function (up to 100% of LEL or range) must be implemented in a connected device.
- A qualified person must carry out the installation, assembly and setting.
- The specific application, use or linkage to other devices might develop further requirements for operation, checks and maintenance of SC-LCD. These may be implied by relevant standards and technical recommendations concerning an application, operating assembly or a functional group as created. Introduction of such additional requirements to the application user is the responsibility of supplier of such application, operating assembly or a functional group.

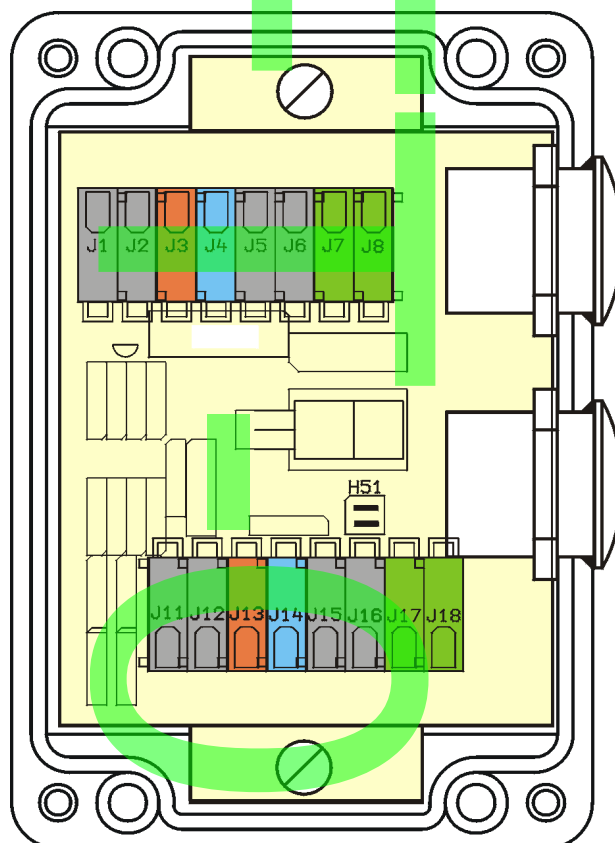


Warning! Special conditions of use

- The equipment is designed for low mechanical load conditions. Special attention shall be paid to the location of the equipment and/or it should be additionally protected against mechanical damage.
- The equipment must be protected from direct UV radiation.
- When used in the IIC group, the installation and maintenance must eliminate the possibility of danger from electrostatic discharge. This especially applies to inspection glasses and glands.
- The action of oils, greases, hydraulic liquids and similar chemical agents on the equipment must be minimized.
- Group III, D, dusts.
 - The version with mechanical push-buttons must not be used. The version controlled by a magnet must be used.
 - A version using connectors cannot be used.
- The enclosure of the equipment consists of a box, a head, a display eye-slit cover, a display eye-slit and an eye-slit for LED, a gland or a connector. The version with a separate connecting area also has a box of the area. It is only allowed to open the lids of the boxes, release the bushing for inserting the cable and connect the cable to the connector. It is prohibited to dismount the other components forming the enclosure and to dismount the top PCB with the display.
- If metal parts are fixed to the equipment, they are sealed with a permanent seal; the seal can only be renewed by the manufacturer or an authorized service.
- Do not expose the equipment to extremely strong sources of magnetic fields. Push-buttons can be self-actuated or the equipment may malfunction.

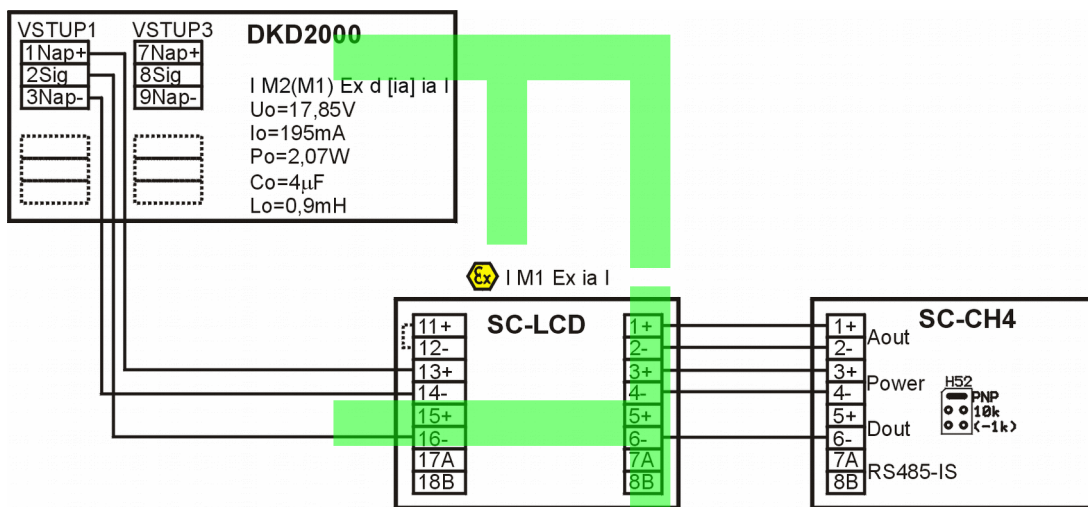
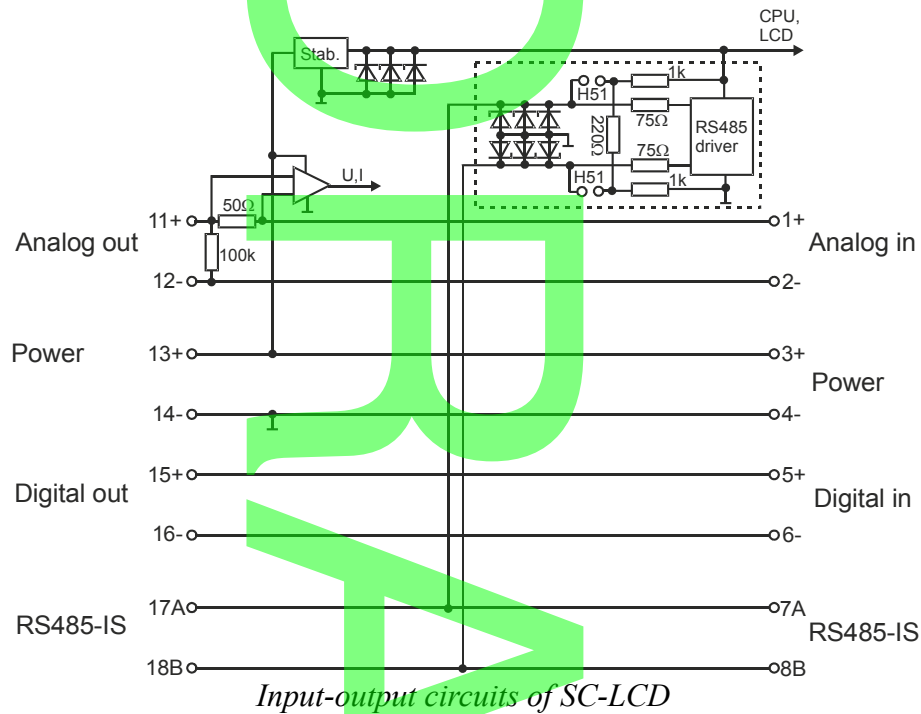
Installation and assembly

1. Select the place to install the display to minimize shocks, mechanical stresses, interfering electromagnetic fields, temperature and moisture conditions. Check the box, cable glands and packings for good condition before using. Attach SC-LCD onto a solid base through mounting trays with 4 Ø4mm screws or directly through the holes in the box.
2. The display must be installed in explosion-risk areas in accordance with this user manual, local operating instructions, EN 50303, EN 50394-1, EN 60079-0, EN 60079-11, EN 60079-25, EN 61241-0, EN 61241-11 and other valid regulations and standards.
3. Connect the analogue output of the detector to the screwless terminals 1 and 2.
Connect the analogue input of the connected device to terminals 11 and 12.
Connect the supply voltage 8-30V from the approved intrinsically safe power supply unit to terminals 13 and 14.
The terminals 3 and 4 enable parallel power supply of the detector from the same power supply unit.
The transistor output of the detector from terminals 5 and 6 is to terminals 15 and 16.
The communication conductors A and B shall be connected to terminals 7, 8, 17 and 18. The bus can be ended with two jumpers to H51. The max. cross-section of connecting wires is 2.5mm² for a wire and 1.5mm² for a segmental conductor, the wire stripping length is 5-6 mm. The conductor ends must not be free-standing. When handling, pay close attention, do not damage the electronics.
4. The cable diameter in the M20 gland can be 6-12mm; glands given in the table in the paragraph for orders can be ordered for a different cable cross-section. It is used only for a firm-installed cable. Tighten the gland properly, it must grip and seal the cable sufficiently. Reduce the tensile and torsional stress of the cable in place of the gland during installation. After the installation put the box cover on and seal properly.
5. Set the required parameters of the display according of the following chapter.

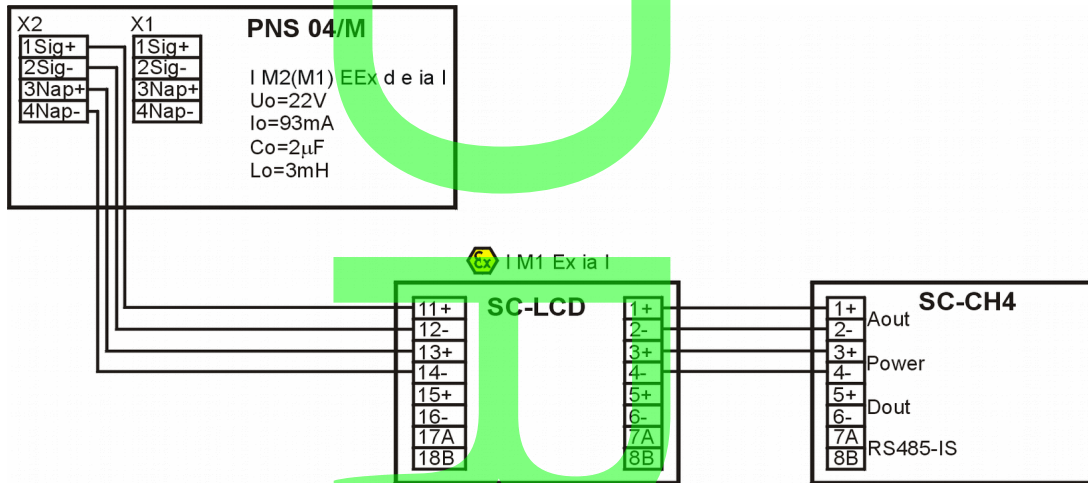


Terminal block and setting jumpers of SC-LCD

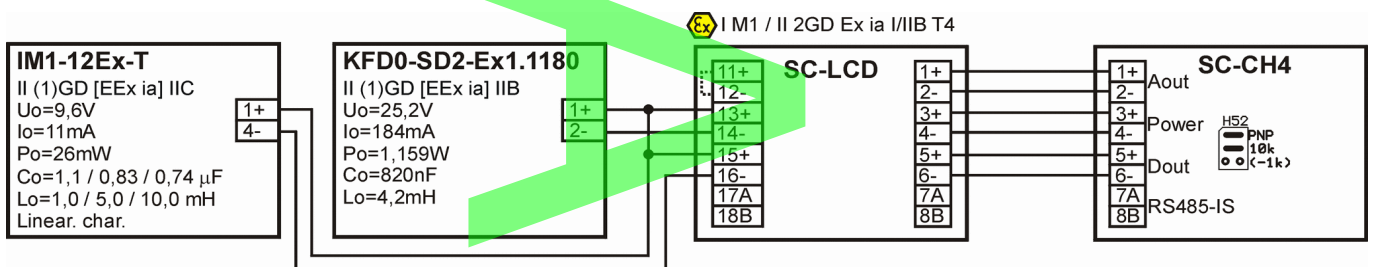
Examples of connection



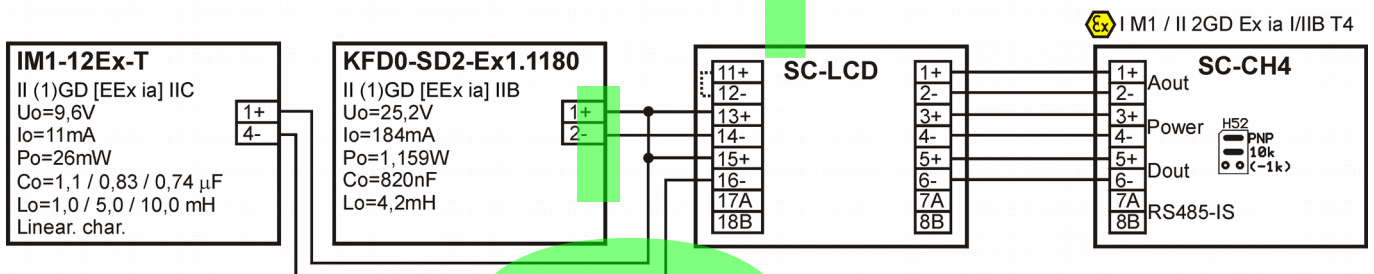
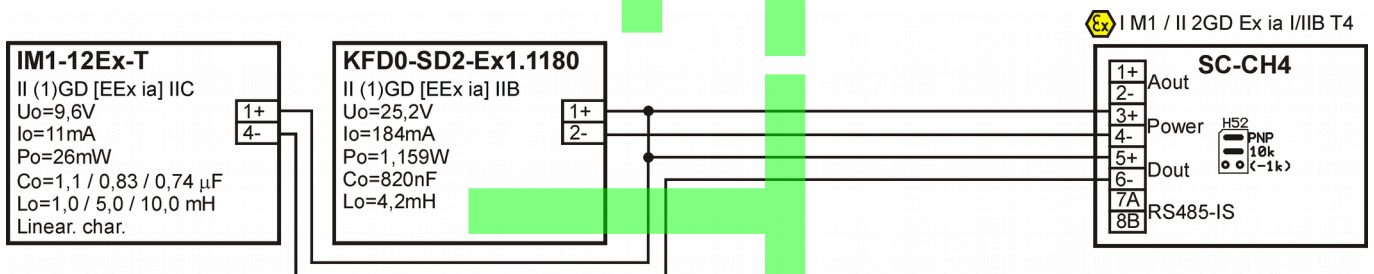
Example of wiring including the mine data concentrator DKD2000, detector SC-CH4 and SC-LCD. The frequency output of SC-CH4 is set at 200-600Hz and synchropulse at 200 μ s. The jumper wire H52-PNP connects the harness 3 and 5 internally. The current output for SC-LCD has the range of 0.2-1mA or 1-5mA and the harnesses 11 and 12 are connected inside SC-LCD. The assembly can be connected only to 80mA inputs 1 and 3. Max. resistance of the supply line loop of DKD2000 from the surface feeder is 450 Ω for 1 detector and 300 Ω for 2 detectors.



Example of wiring including the box PNS 04/M, detector SC-CH4 and SC-LCD. The current output of SC-CH4 is set at 0.2-1mA. Max. resistance of the supply line loop of PNS from the surface feeder is 800Ω.

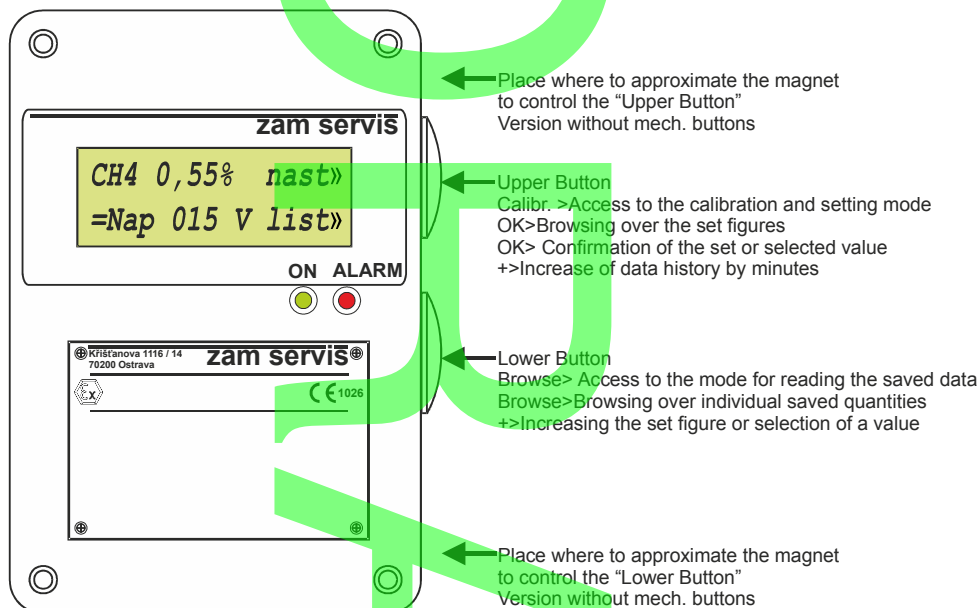


Example of wiring including an isolating switching amplifier, intrinsically safe power supply unit, detector SC-CH4 and SC-LCD. SC-CH4 has set a frequency output. The NAMUR output is realised by a jumper wire H52-10k. The range of the current output for SC-LCD is 0.2-1mA or 1-5mA and the harnesses 11 and 12 are connected inside SC-LCD.



Example of wiring with disconnecting switching amplifier, an intrinsically-safe source and an additional display. SC-CH4 has a frequency output set. The H52-10k jumper ensures the output of NAMUR type. The current output for SC-LCD has the range of 0.2-1mA or 1-5mA and bundles 11 and 12 are joined inside the SC-LCD.

Operation and setting of SC-LCD



All settings, calibration, readout of current quantities and values from the memory are operated using two buttons on the box side. To preserve sufficient IP protection, the push-buttons are replaced with reed contacts. These contacts are controlled by means of approximating the magnet held in hand and they functionally substitute push-buttons. A suitable place for approximating the magnet is situated on the right side near screws on the lid; the exact place and distance needs to be tested. A version with mechanical push-buttons can only be produced on the basis of a special order. **The version with mechanical push-buttons cannot be used for group III – dusts; it can only be used for groups I and II!**

During the setting the SC_LCD operation is not limited in any way and it is fully functional according to the original setting. Thanks to this, parameters can only be checked without influencing the function of the display. If push-buttons are not used for more than 4 minutes, the detector starts the selected mode and changes over to the display of the basic screen.

When a parameter (calibration, the setup of switching values etc.) is changed by means of the RS485 interface, the check of correctness must be performed by the readout of the set parameters on the equipment or by back uploading from the equipment and manual verification of the received values with the set ones.

Access to the setting mode

When the screen is in the measurement mode, enter the setting mode by pressing the upper button **nast»**. The first selection is the language screen. Use the lower button **+»** to select Czech, Russian or English. Confirm the selection using the upper button **OK»**.

CH4 0,55% setup» =Sup 015 V list»	Language OK» ENGLISH +»	Enter Code OK» 0000 +»
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Then enter the four-digit access code. Change the figures using the lower button **+»**. Using the upper button **OK»** go through the figures and confirm the resulting code. When the code has not been changed, the default value set by the manufacturer is 0000. If the correct code is not entered, the screen will return to the measurement mode.

If you forget your access code, it is possible to restore it by default setting in the service centre only.

Setting of SC-LCD measurement

Temperature compensation

You can set parameters of measurement by entering **YES** or you can leave them out by **NO**. To select **YES** or **NO** use the lower button **+>**; to confirm the selection use the upper button **OK>>**. When production values were saved in the previous setting mode or the display is being programmed for the first time, you can calibrate (specify) the internal temperature sensor. Carry out this specification when the device is cold and turned on only shortly because the internal temperature is a slightly higher during operation. Set the box temperature measured with a precise thermometer ($\pm 1^\circ\text{C}$).

Set. Measur? OK>> YES +>	Calibr. Temp OK>> 025 C +>
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Now it is possible to select which gas will be measured by the display and shown on the display and whether the units of % vol. (% of gas volume in the air) or % LEL (% of the gas lower explosion limit) are used. The range of measurement for the analogue input can also be adjusted.

Gas Type OK>> CH4 +>	UNITS OK>> %vol +>	Range Measur OK>> %vol 05,00 +>
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Analogue input

Select the current or voltage analogue input. Then set the min. value that will correspond to 0% vol. and the max. value that will correspond to the measuring range. The minimum and the maximum can be set in the range of 0-22.0mA or 0-5.0V. The standard range of 4 - 20mA can be energy-consuming therefore the ranges of 0.2-1mA, 1-5mA or 0.4-2V are used. The selected range must correspond to the range of the connected detector.

Analog Input OK>> CURRENT %CH4 +>	MinAnalogVal OK>> 0%CH4: 04,0mA +>	MaxAnalogVal OK>> 5%CH4: 20,0mA +>
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Signalization LED

You can set a limit concentration to light up the red "ALARM" LED in the range from 0 to 15% vol. The signalization up to 100% LEL or range is not of a latch type, and therefore after the danger passes off, the LED will go out.

SignalingLED OK>> 1,00% +>

Other setting of SC-LCD

Backlight

Now you can set other (additional) parameters by entering **YES** or you can leave them out by entering **NO**. At first you can set the display backlight mode. The display can always be turned on, turned off or turned on only for 5 sec after the button is pressed. The turned off backlight saves 13mA of the consumption.

You can also set the double-high type size of the screen in the measurement mode.

Other Set.? OK» YES +»	Backlight OK» ALWAYS LUMIN. +»	Bigger LCD ? OK» NO +»
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Code, new sensor

You can set a new four-digit input code for access to the setting mode. Keep back the input code, so that only authorized persons can access to the setting mode.

You can set a new sensor after it is replaced in the detector. This setting resets the sensor age counter.

New Code? OK» YES +»	Enter Code OK» 1234 +»	New Sensor? OK» NO +»
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Special status

You can set the analogue input value (0-24.2mA or 0-5.5V) by which the connected detector signals a special status. The special status of the detector occurs in case of an error of a memory, supply voltage, measurement, and temperature, or when the sensor or the calibration is old.

You can set the analogue input value (0-24.2mA or 0-5.5V) by which the connected detector signals that the calibration is running. To detect the running calibration, the connected detector must signal the calibration with the same signal or reversed analogue output for 60 sec at least.

SpecialState OK» 0,00mA +»	Calibr.State OK» 0,00mA +»
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Limits of calibration, sensor and network address

You can set the calibration age limit (0-255 days). If it is more than 0 and the display does not detect the calibration during this time, the display will indicate the “Old calibration” special status.

You can set the sensor age limit (0-255 weeks). If it is more than 0 and the new sensor is not set during this time, the display will indicate the “Old sensor” special status.

You can set the network address on the MODBUS (1-247). Every device in the RS485-IS network must have a different network address.

Calibr.Limit OK» 030day +»	Sensor Limit OK» 000wek +»	NetworkAddr. OK» 002 +»
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Factory setting of parameters

If the measurement setting and other setting were left out, you can load the factory (default) setting of all parameters. You can calibrate the temperature sensor after you save the factory values and enter the setting mode for the first time.

ManufactSet? OK» YES +»



After saving the factory settings, it is necessary to set the correct gas type!!!

Saving the settings

In the end, you can save each of the above set values in the memory. After you enter YES, you will be asked again and after you enter YES once again, all of the data will be saved in the memory and the display device will be reset according to the new parameters and changed over to the measurement mode

Save Values? OK»
YES +»

Really Save? OK»
YES +»

WRITTING.....

Reading the saved data

SC-LCD saves measured values of concentration, internal temperature, internal and external voltage and operating status every minute cyclically for 24 hours. You can read the data through RS485-IS (the protocol is compatible with MODBUS ASCII or RTU) or on the display if you do not know the code.

When the screen is in the measurement mode, you can change over to the reading mode to read saved data by pressing the lower button **list»**. With the upper button **+»**, you can move the data history minute by minute. With holding the button **+»**, the time moves more quickly. If the power supply was restarted, then the time data is not unique, which is indicated by the question mark.

CH4 0,55% setup»
=Sup 015 V list»

Befor00h00Min +»
CH4 0,55% list»

Befor02h34Min?+»
CH4 0,55% list»

By pressing the lower button **list»**, you can select the individual quantities (concentration, temperature, internal voltage, external voltage).

Befor01h50Min +»
CH4 1,85% list»

Befor01h50Min +»
Temp 035 C list»

Befor01h50Min +»
3Sup 3,12V list»

Befor01h50Min +»
=Sup 016 V list»

By pressing the lower button **list»** once again, you can display the current age of calibration and sensor. After you press the button **list»** once again, the screen will change over to the measurement mode.

Calibr Old
012day list»

Sensor Old
038wek list»

List of SC-LCD parameters

No.	Name	Possible range of values	Production value	Common used values
1	Language	CZ,RU,EN	CZ	CZ,RU,EN
5	Gas type	CH ₄ , C ₂ H ₆ , C ₃ H ₈ , C ₄ H ₁₀ , C ₅ H ₁₂ , C ₆ H ₁₄ , C ₂ H ₂ , CO, H ₂ , NH ₃	CH₄	CH ₄ , H ₂
6	Units	% vol. % LEL	% vol.	% vol. % LEL
7	Range	0...15.00% vol.	5.00%	5.00%, 4.00%
8	Analogue Input	Current Voltage	Current	Current
9	MinAnalogVal	0...22.0mA 0...5.0V	0.2mA	0.2mA 1mA 4mA 0.4V
10	MaxAnalogVal	0...22.0mA 0...5.0V	1mA	1mA 5mA 20mA 2V
11	SignalingLED	0...15.00%	1.0%	0...1.50%
13	Backlight	Always ON Never ON 5sec after button is pressed	Never ON	Never ON
14	Big LCD	No, Yes	No	No, Yes
16	Input Code	0000...9999	0000	xxxx
18	Special Status	0...24.2mA 0...5.5V	0	0mA 0V
19	Calibr. Status	0...24.2mA 0...5.5V	0	0.1mA 0.5mA 2mA 0.2V
20	Calibr. Limit	0...255 days	0 days	10days 20days 40days
21	Sensor Limit	0...255 weeks	0 weeks	100, 150, 200 weeks
22	NetworkAddr.	1...247	2	1-247

General troubles of SC-LCD Display

Trouble description	Possible solution
Green LED "ON" is not lighting	Measure the supply voltage on terminals 13 and 14. Check that the electronics is not damaged or flooded.
LCD does not show anything	Measure the supply voltage on terminals 13 and 14. Restart the power supply. Check that the electronics is not damaged or flooded.
Display data differs from the detector data noticeably	For the current input, check that the sensing resistance incl. the line corresponds to the allowed value according to the detector manual and leakage resistance of the cable is $>100x$ sensing resistance. For the voltage input, check that the loading resistance is $<50k\Omega$ and is $>100x$ line resistance. If the current signal does not go through the display into the next device, interconnect the harnesses 11 and 12. If the analogue signal source is floating or it is supplied from a different power supply unit, interconnect the harnesses 2 and 4. Check that the electronics is not damaged or flooded.
Display in RS485 does not communicate	Verify that each of the network devices has a different network address and terminating resistors are set at the bus ends. Interchange the conductor A and B. Interconnect the device using a GND conductor. Check the master system for configuration. Check that the electronics is not damaged or flooded.
The detector does not respond to buttons; it has a special status value at the analogue output and some of the special statuses are reported on the display unit.	The calibration limit or sensor age limit have been exceeded or another special status is signaled. Some of the special statuses can be cancelled by performing calibration through the RS485 interface whereas others by repair at the manufacturer. Special statuses are described in a separate table.

Troubles and special statuses detected by the SC-LCD

If there are more special statuses at the same time, the special status with the highest priority is reported on the display and in the communication protocol. Statuses in the table are sorted according to priority; the first is the status with the highest priority.

State	Screen	Trouble description	Possible solution
47-0	CH4 0,55% ERROR FLASH!!!!13456	Critical error of program memory. Displayed concentration may be wrong.	Restart the power supply unit. Check that there is no device with very high interference intensity in proximity.
47-1	CH4 0,55% ERROR RAM !!!!!00456	Critical error of data memory. Displayed concentration may be wrong.	Restart the power supply unit. Check that there is no device with very high interference intensity in proximity.
47-2	CH4 0,55% ERROR FRAM !!!!!03456	Setting memory could not repair by itself. Displayed concentration may be wrong.	Restart the power supply unit. Check that there is no device with very high interference intensity in proximity. Try to save the new values in the memory.
44	CH4 0,55% ERROR =SUPPLY!!! 007 V	External supply voltage is out of range 8 - 30V. Displayed concentration may be wrong.	Use a more suitable power supply unit. Decrease the distance from the power supply unit. Increase cross-sections of supply wires. Check that the electronics is not damaged or flooded.
45	CH4 0,55% ERROR 3VSUPPLY! 2,90V	Internal supply voltage is out of range 3.0 – 3.3V.	Restart the power supply unit. Check that the electronics is not damaged or flooded.
38	CH4 0,55% ERROR TEMPERAT.! 063°C	Internal temperature is out of range -40°C...- +60°C.	Increase the distance of the device from the heat sources. Save production settings and calibrate the temperature sensor.
46	CH4 ?,??% setup» SpecialState!!!!	Connected detector indicates a special status with the analogue output.	Check the connected detector. Check the analogue output.
36	CH4 ?,??% setup» CalibrInProgress	Connected detector indicates running calibration with the analogue output.	Check the connected detector. Check the analogue output.
37	CH4 ?,??% setup» EXCEEDED RANGE	Analog value from the detector is out of measurement range. Detector can indicate concentration more than 5%CH ₄ .	Check the connected detector. Check the analogue output.
40	CH4 0,55% setup» Old Sensor150w	Sensor lifetime in the detector will expire.	Replace the sensor in the detector and set a new one in the detector and the display. Or set also a longer limit age of the sensor.
39	CH4 0,55% setup» Old Calibr041d	Old calibration of detector. Displayed concentration may be with error.	Calibrate the detector. Or set a longer limit age of calibration.

Operating instructions

- The measurement is unattended. The attendance of the system depends on the application. The detector is operated according to its user manual, see the control and setting of SC-LCD.

Maintenance

- Remove dust and impurities from the surface using a dry cloth, brush or broom. Then clean the surface with a cloth wetted with water with common detergents or cleaners based on alcohol.
- It is recommended to have the unit checked by personnel from the manufacturer or a relevant authorised representative once a year.

Safety functions and their verification tests

We recommend performing tests of the functions used at calibration, however at least once per 6 months. The minimum frequency of safety signal recovery is 0.4 sec.

Unless verification tests were performed after finishing maintenance, the equipment must be reset after finishing maintenance which can be performed by a short interruption of power supply.

Safety function	Verification test
Showing the concentration on the display	Check the displayed values during calibration.
Red LED	During calibration test with a gas with the concentration at least by 10% higher than the set value whether the LED turns on.

Repairs and spare parts

- All repairs and spare parts shall be provided by the manufacturer.
- The data in Addendum A is applicable to detectors equipped with connectors.

Delivery, transport and storage

Ordering code:

SC-LCD-	x	x	
		Push-buttons	B – mechanical push-buttons, cannot be used for group III, dusts. For special order only.
		Connection type	G - gland, K – M12 x 8 connector - cannot be used for group III, T – separate terminal area, terminal box
		Detector type	SC-LCD

Unless the version is specified in the order, the following will be delivered:

SC-LCD-G Display with a gland.

•Delivery includes:

- This user manual
- Copies of the Declaration of Conformity
- Product itself
- Control magnet, with the version without mechanical push-buttons only, 1 pc per 4 detectors in the delivery

•There is no cable for detectors equipped with a connector and the cable connector is not part of delivery and it must be ordered separately.

•During transport of all parts it is necessary to minimise any possible vibrations and impacts. Storage in

dry rooms at temperatures from 0 °C to 40 °C in one layer only.

•As standard, the detector is delivered with the M20 x 1.5 gland for the cable with the cross-section of 6.5 – 12 mm. The gland according to the table below can be selected for a different range. If a different gland is required, its order number must be specified.

Table of glands, cable cross-sections and packing

Cable diameter from - to	Gland	Order no.	cl. no.	Packing to the gland	Order no.
5 - 10	HSK-K-Ex M16 x 1,5	1.295.1602.50	22	HSK-V-Ex	1.296.1101.11
3 - 7	HSK-K-Ex M16 x 1,5	1.295.1602.51	22	HSK-V-Ex	1.296.0701.11
4 - 8	HSK-K-Ex M16 x 1,5	1.291.1602.50	19	HSK-V-Ex	1.296.0901.11
3 - 6	HSK-K-Ex M16 x 1,5	1.291.1602.51	19	HSK-V-Ex	1.296.0701.11
5 - 9	HSK-K-Ex M20 x 1,5	1.291.2002.51	24	HSK-V-Ex	1.296.0901.11
6.5 - 12	HSK-K-Ex M20 x 1,5	1.291.2002.50	24	HSK-V-Ex	1.296.1301.11
10 - 14	HSK-K-Ex M20 x 1,5	1.295.2002.50	27	HSK-V-Ex	1.296.1301.11
7 - 12	HSK-K-Ex M20 x 1,5	1.295.2002.51	27	HSK-V-Ex	1.296.1301.11

Reduction ring and packing instead of the gland

Reduction ring for M16 from the M20 hole	M20x1.5 / M16x1.5	RSD-INOX-Ex	1.098.2016.50
Packing instead of the gland	M20x1.5	V-Ex	1.297.2001.50
Packing instead of the gland	M16x1.5	V-Ex	1.297.1601.50

Fire safety, ecology, disposal, recycling

- Do not expose to open flame, harmful substances result from combustion.
- When used correctly in operation, it does not affect negatively to the surrounding and ecology.
- After the lifetime expires, return the product to the manufacturer for disposal. The address is given in this document.



- Electric and electronic equipment must not be disposed of as common municipal refuse. The product must be delivered to the corresponding collection point for correct processing, recovery and recycling of electric and electronic equipment.
- Ask for more detailed information about the collection point and recycling of this product from local authorities, a municipal refuse disposal firm in your place or from your dealer where you bought the product.

Manufacturer and service organization

•ZAM - SERVIS s.r.o. Křišťanova 1116/14, 702 00 Ostrava - Přívóz, phone: (00420) 556 685 111
e-mail: zam@zam.cz

Related standards, regulations and documents

LVD:

CSN 33 2000-4-41 Electrical installations of Buildings - Part 4: Protection for safety - Chapter 41: Protection against electric shoc

EN 60529 Degrees of protection provided by enclosures (IP Code)

EMC:

EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

EN 50270 Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen

ATEX:

EN 50303 Group I, Category M1 equipment intended to remain functional in atmospheres endangered by firedamp and/or coal dust

EN 60079-0 Electrical apparatus for explosive gas atmospheres - Part 0: General requirements

EN 60079-11 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

EN 60079-25 Electrical apparatus for explosive gas atmospheres - Part 25: Intrinsically safe systems

EN 60079-29-1 Explosive atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases

EN 60079-29-2 Explosive atmospheres - Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen

EN 1127-1 Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

EN 1127-2 Explosive atmospheres - Explosion prevention and protection - Part 2: Basic concepts and methodology for mining

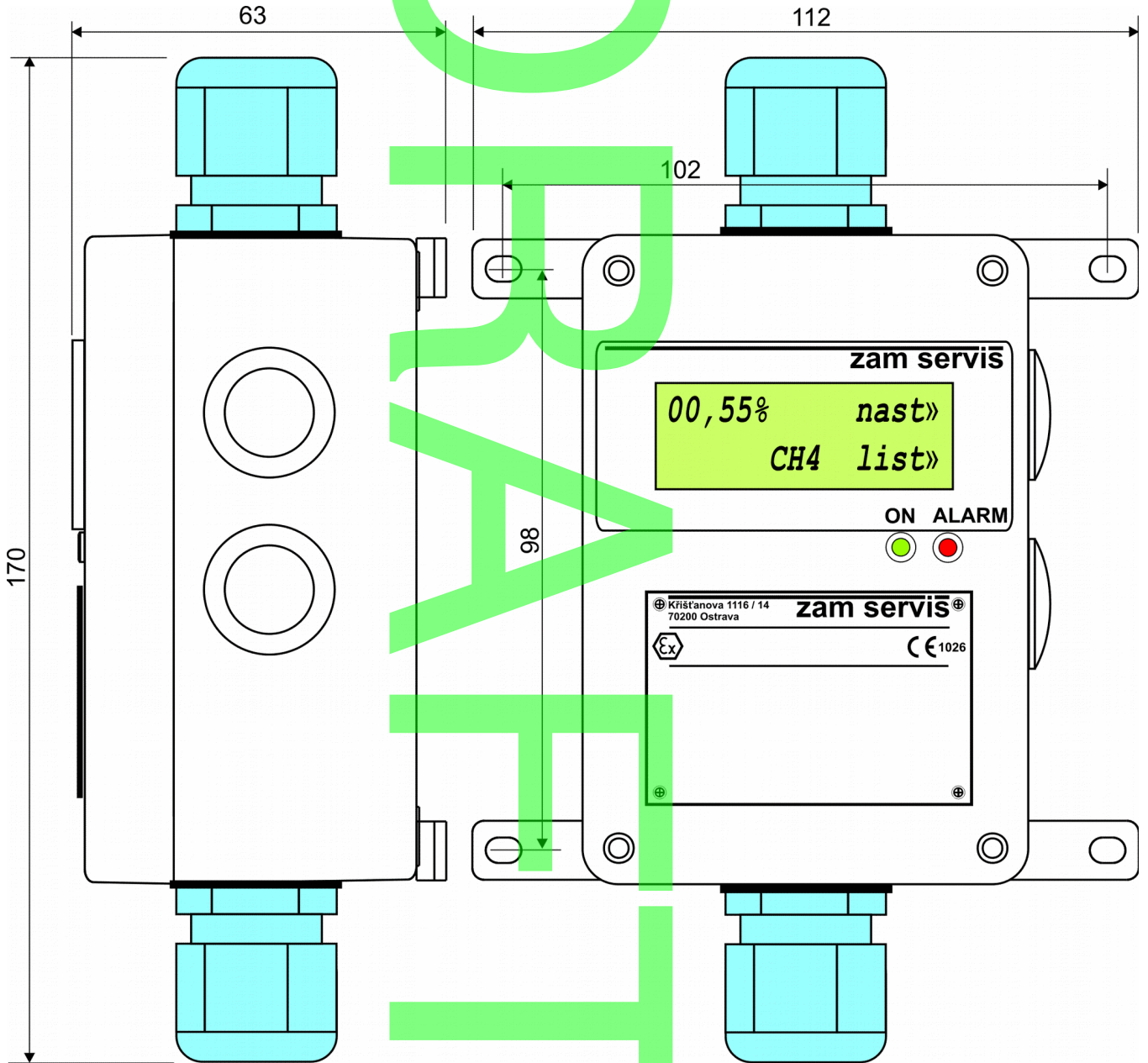
Other documents:

Communication protocol and Data Map of SC-... sensors

Technical parameters and appearance

Measurement range	0 - 5% vol. or 0...100% LEL
Ambient temperature	-20...+50°C
Relative humidity	max. 95%, no condensation
Protection	IP65
Dimensions including glands	170x112x63mm
Total weight	500g
Included electronics	100g
Max. cross-section of connecting conductors	full wire 2.5mm ² , segmental conductor 1.5mm ² wire stripping length 5-6 mm
Cable diameter in M20 gland	6.5 - 12mm
Supply voltage	8 - 30V (8 - 22V for IIC)
Current take-off	20mA (+ 13mA when the display is backlit) (+ 5mA when there is RS485 communication)
Voltage analogue input	Adjustable from 0.0 to 5.0V (overrange max. 5.5V) Input resistance approx. 100Ω Inserted into the measuring loop resistance 50Ω
Current analogue output	Adjustable from 0.0 to 22.0mA (overrange max. 24.2mA) Inserted into the measuring loop resistance 50Ω
Analog input error	<±1% range
Explosion protection	I M1 Ex ia I Ma II 1G Ex ia IIC T4 Ga II 1D Ex ia IIIC T87°C Da
Input parameters: Terminals 11/1-12/2; 13/3-14/4; 15/5-16/6;17/7-18/8	U _i =30V (I,IIA, IIB,III); U _i =22V (IIC); C _i =0; L _i =10μH P _i =3.22W or 3.3W for T _{amb} =-20°C to 40°C (I) P _i =1.25W or 1,3W for T _{amb} =-20°C to 40°C (II, III)
Output parameters: Terminals 11/1-12/2; 13/3-14/4; 15/5-16/6	U _o =30V (I,IIA, IIB,III); U _o =22V (IIC); C _o =3μF (I); Co=165nF (I,III) L _o =30mH(I), L _o =4mH (II,III); P _o =3.22W or 3.3W for T _{amb} =-20°C to 40°C (I) P _o =1.25W or 1.3W for T _{amb} =-20°C to 40°C (II, III)
Output parameters: Terminals 17/7-18/8	U _o =4.15V; I _o =149mA;P _o =155mW; Co=100μF; L _o =2mH(I,IIA, IIB,III), L _o =1mH (IIC);
	Recommended lifetime is 5 years.

Dimension drawing



Mechanical dimensions of SC-LCD

Supplement A: To sensors equipped with M12 connectors.

General

SC-... sensors may be equipped with connectors instead of cable glands. Connectors are made with 8 pins and all detector terminals are brought out to the connector.

Connectors are already mounted on the detector body by the manufacturer.

Cable connectors are delivered separately, i.e. a connector, a cable, and a connector cap separately. Assembling is carried out by the user.



Warning!

- With regard to surface distances and clearances in the connector and cable parameters, it is necessary, while connecting, to consider the fact that all inputs and outputs of the detector as well as the circuits in the connected cable are part of one intrinsically safe circuit.
- The version with connectors cannot be used in the dusty environment, group III.

Use

Connection using the connector makes it possible to promptly replace one detector with another. When replacing, it is not necessary to open the detector.

This makes it possible to calibrate detectors in workshop premises, for example. At the measurement point, you can replace the existing detector with the calibrated one and take the one which was used to the workshop and calibrate it there.

Description

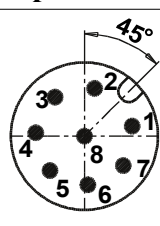
It is an M12 A-coded industry standard connector, "M12 connectors A-coded"; 8-pin connectors.

Instead of the gland on the detector body, there is a zinc/nickel-plated brass male connector with a protective cap that must be screwed in case that the connector with cable is not connected.

There is a plastic connector with a metal nut and a protective cap on the cable. The connector cap must be put on or screwed onto the connector if the connector cable is not connected to the connector on the detector body. The connector has screw-type terminals.

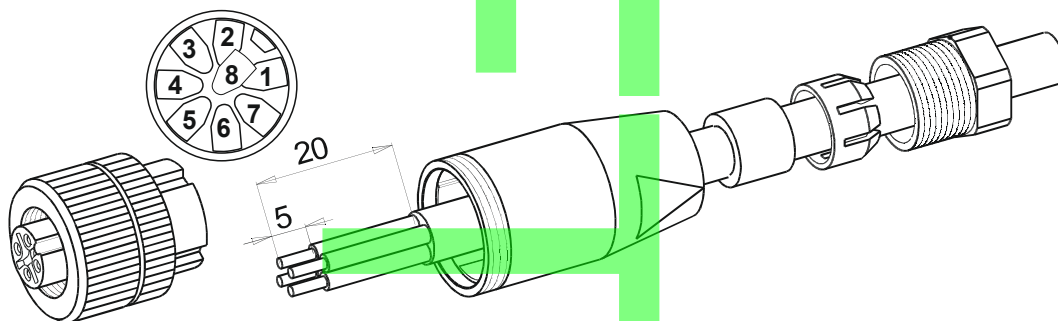
Installation and assembly

The connector on the detector body is delivered installed by manufacturer; including connector cover; pin numbering and wiring colour codes are referred to further. Connector pin numbering is consistent with detector terminal numbering.

8-pin	Pin	Colour	Terminal
	1	white	1 Analogue out +
	2	brown	2 Analogue out -
	3	green	3 Power +
	4	yellow	4 Power -
	5	grey	5 Digital out +
	6	pink	6 Digital out -
	7	blue	7 RS485A
	8	red	8 RS485B

Wiring of connectors on detector body; pins are drawn when looking into the connector.

The cable connector uses the same wiring colour codes as the connector on the detector body. Wire stripping length and connector assembling is indicated in the figure below. It is absolutely necessary to keep the lengths and after assembling the connector, tighten the connector bushing properly so that it can grip the cable jacket. Use a 2 x 0.5 screwdriver for the screw terminals. After assembling, attach the cover to the cable and secure from losing it.



Adapting the cable conductor ends, connector assembling; pins are numbered when looking at screw-type terminals,

Operating instructions



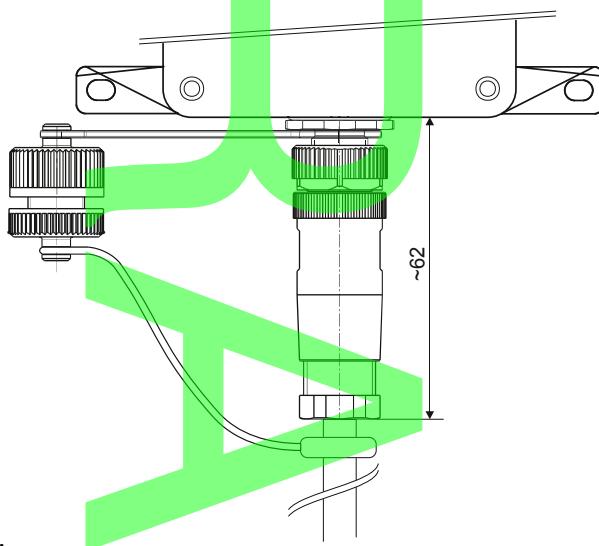
Warning!

Connectors and caps may never remain open! Either protective caps are put on the connectors or the connectors are connected and consequently, the caps of connected connectors are connected together!

Never use a pair of pliers while handling the connector!

Connection

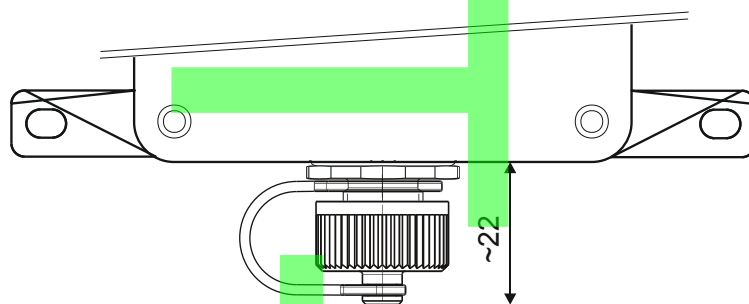
Remove the protective caps from both connectors. Make sure that no dirt is found in the connectors and their protective caps and remove the dirt if present. Slide the cable connector into the connector on the detector body and turn until locking mechanisms and connector keys are correctly matched and push all the way in. Apply adequate torque to the knurled nut on the cable connector to secure the connection. Screw the connector caps together and tighten slightly.



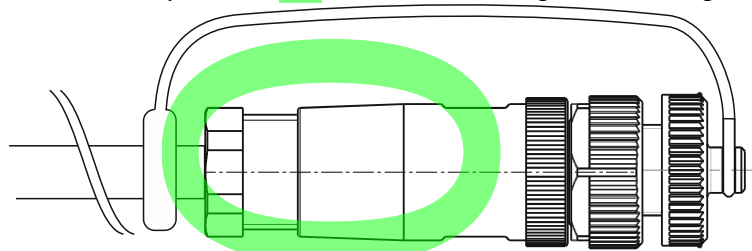
Connection of connectors and protective caps.

Disconnection

Separate the connector caps from each other by screwing them apart. Loosen the securing nut on the cable connector manually and screw out the nut as long as the connectors are disconnected from each other. Put protective caps on both connectors. To avoid damaging and dirtying of the connector cable, store it properly.

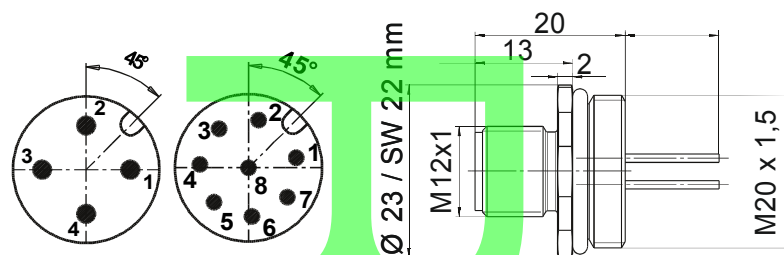


Detector body with the connector and the protective cap on.

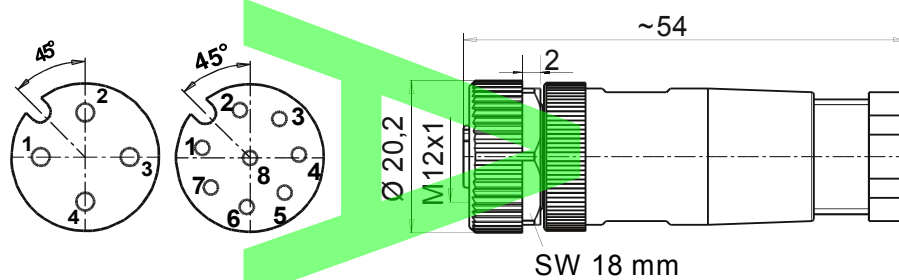


Cable connector with protective cap on.

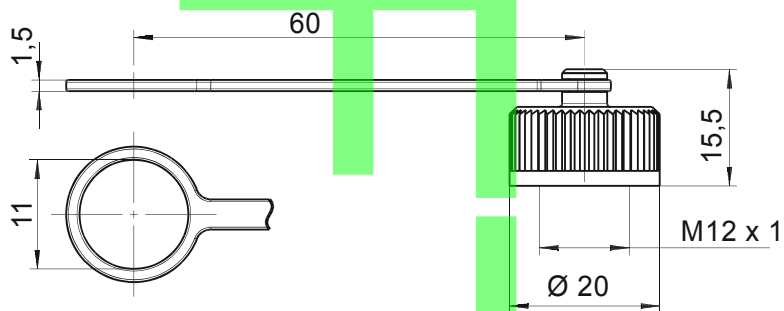
Connector figures



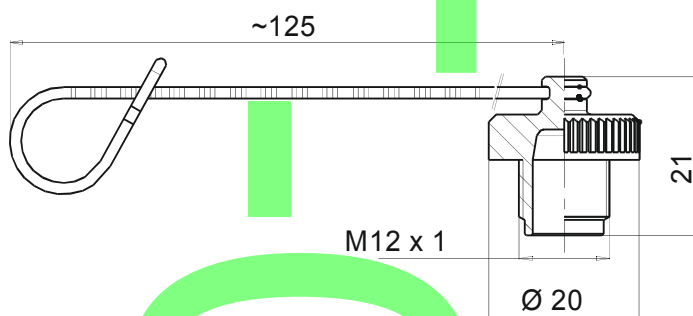
Panel-mount connector, view to the connector, dimensions.



Cable connector, view to the connector, dimensions.



Panel-mount connector cap.



Cable connector cap.

Maintenance

It is carried out similarly as described for the product.

Make sure to keep inner spaces of connectors and covers as well as threads clean!

Repairs and spare parts

The following parts are delivered.

Type	Pins	Order number	Note
Cable connector	8	99-0486-12-08	cable diameter 6–8 mm
Connector cable cap	8	08-2425-010-000	
Panel-mount connector	8	09-3481-642-08	Cut the wires short to 60mm, strip 8mm insulation off at the length of 8mm and provide them with ferrules with 0.34mm ² insulation
Connector cable cover	8	08-2989-000-000	
Cable		LiYY 8 x 0.34 φ7.8	Minimum withdrawal quantity is in hundreds of metres. Upon enquiry.

The panel-mount connector is designed for mounting onto the detector body and it is tightened at 2 to 3 Nm. Owing to its low tightening nut, it is necessary to be very careful not to damage the connector. The remaining items as described for the product.

Supplement B: Detectors equipped with a separate terminal box area, a terminal box

General

SC-... can be equipped with terminal boxes instead of glands. Terminal boxes are of the same type as the body of the detector, they are only smaller.

Terminal boxes are mounted at the manufacturer already.

Use

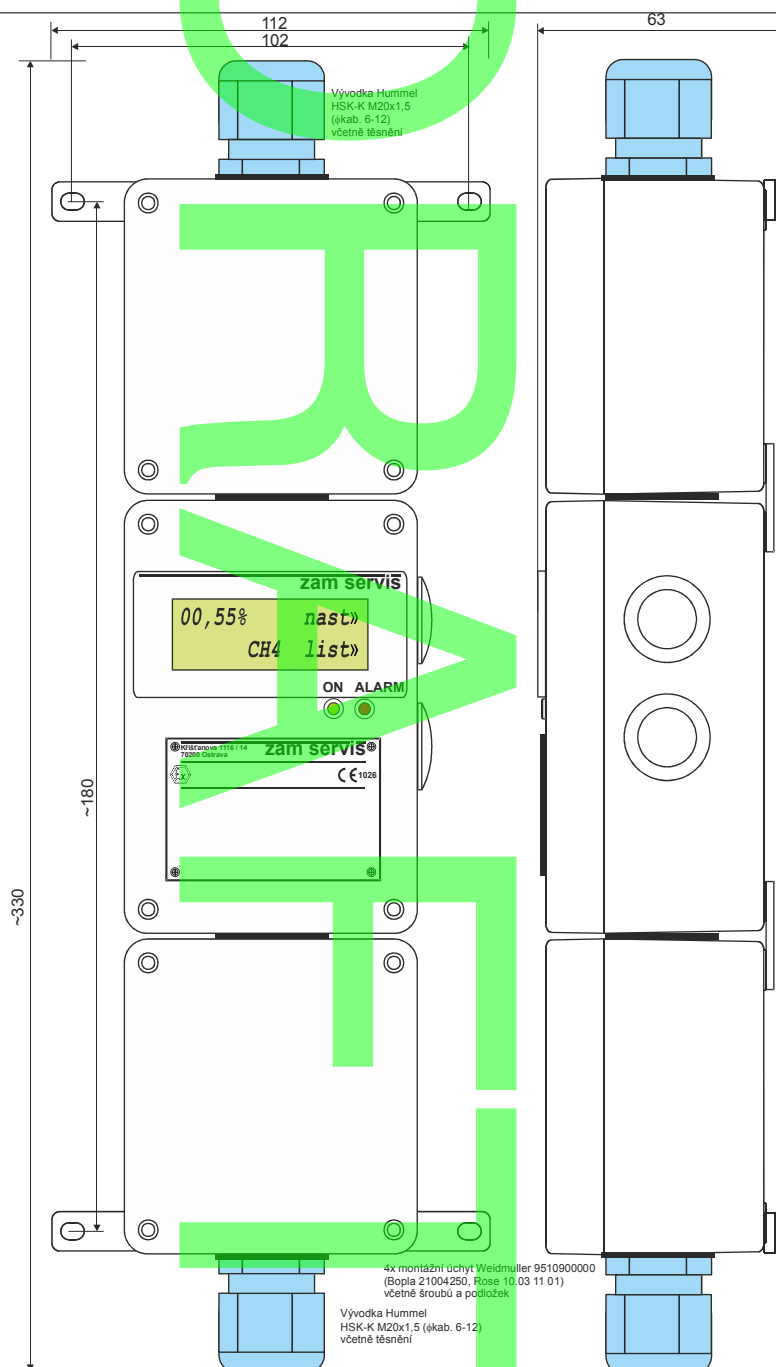
When connecting through an additional terminal box, it is not necessary to open the detector with electronics. This reduces the risk of dirtying the area and damaging the electronics.

Description

The terminal box is fixed to the detector with a threaded tube at the place of glands and reinforced with jumpers. Between walls of the terminal box and the detector there is a seal. Never dismount this joint.

In the terminal box there is the same set of terminals as in the detector. They are connected to terminals in the detector.

The terminal box is of similar design as the detector itself therefore similar conditions for installation, maintenance etc. apply.



Mechanical dimensions of SC-CH4, equipped with a separate terminal box

Document revisions

18/09/ 2012	Reformatting the document, removal of information not related to the existing software version, additional information for current software version. Modification of factory default settings. Calibration limit changed to 0 days. Description of connectors added.
18/04/2013	Formal changes, reformatting. Unification, change the type description.
03/02/2014	Detailed designation for different atmospheres.
11/12/2014	Change in labelling according to new standards, change in labelling in orders, change in push-buttons. New types of connection, glands and packing added. Ii=0.66mA added.
15/05/2015	Invalid standard deleted, small corrections in the text, corrections of texts in figures.