

# *LOGGER S5021*

**Dual channel 0-5V logger**

**Instruction manual**

## Instruction manual for use of 0–5 V voltage logger S5021

Logger is designed for measurement and logging of signal from up to two external transducers with output voltage 0 to 5 V dc. At the same time logging of the binary signal state from external contact is enabled. Transducer and the binary signal are connected via a connector. Transducer should be powered from external source. Measured values are stored in selectable time interval to internal nonvolatile memory and can be displayed on the LCD. Voltage values can be recalculated to real physical values and units by means of the PC program. All logger control and setting are performed from the PC and password is applicable. It is enabled to switch ON and OFF the logger by delivered magnet (this possibility can be in configuration disabled). Start/stop magnet enables also to clear the minimum and maximum value memory. It is also enabled to program automatic start in certain day and time (for one month forward). Switching ON and OFF of the logger is enabled also by external binary signal.

Minimum and maximum measured values can be displayed (display switches to actual measured values and min/max values automatically). It is also possible to operate logger with switched OFF display. Short display of actual measured values is enabled by means of magnet.

Switched ON logger every 10 seconds (independently on logging interval) updates MIN/MAX memory, compares measured values with two adjustable limits and exceeding of limits is indicated on the LCD (alarm function). Also memory alarm mode is selectable, when alarm is indicated permanently till alarm memory reset. Alarm evaluation is possible to disable. Binary channel has no alarm function.

Logging mode can be adjusted as non-cyclic, when logging stops after filling the memory. In cyclic mode oldest stored values are overwritten by new. In addition logging mode can be selected when logging is active only if measured value is out of adjusted alarm limits.

Stored values can be transferred from logger memory to the PC by means of communication adapter. Communication adapter can be connected to the logger permanently – data logging is not interrupted even if data download appears.

Logger evaluates minimum battery voltage and its drop below allowed limit is indicated on the display. At the same time value of remaining battery capacity is available by means of the PC program and appears on the logger LCD in % (every time after switch ON).

### Technical parameters:

Measuring range: 0 to 5 V dc

Effective resolution: 13 bits

Accuracy:  $\pm 0.2$  % FS

Input resistance: approximately 100k ohms

Signal for binary input: from potential-less contact or two-state voltage signal

Minimum pulse duration on binary input: 500 ms (shorter pulses will not be recorded)

Maximum frequency on binary input: 0.5 Hz (i.e maximum of 5 pulses for 10 s)

Power current of connected contact: 3  $\mu$ A (contact closed)

Voltage across open contact: maximum 3.6 V

Cable for connection of input signals: shielded

LOW voltage level on binary input: 0 to +0.2V (current from input max. 3  $\mu$ A)

HIGH voltage level on binary input: +3.0 to +30V (current to input max. 100nA)

Maximum cable length for binary input: maximum 10 m, shielded

Connector for connection of input signals: CANON 9 pins

Measuring interval, alarm evaluation, MIN/MAX memory and LCD update: 10 s

Logging interval to memory: 10 s to 24 h (20 steps)

Total memory capacity:

for non cyclic mode            32 504 records

for cyclic mode                 28 896 records

Specified values are maximum possible and can be reached only if record of binary input is disabled and record is not interrupted (since last memory erasing)

Communication with computer: via RS232 (serial port) by means of COM adapter or USB port by means of USB adapter; data transfer from logger via communication adapter is optical

Real time clock: adjustable from computer, integrated calendar including leap years

Error of internal RTC: < 200 ppm (i.e. 0.02 %, 17.28 s in 24 h)

Power: Lithium battery 3.6 V size AA

Battery life:

- typical (data download to PC is carried out about once a week): 6 years
- in continuous on-line mode with interval 1 minute: approximately 4 years
- in continuous on-line mode with interval 10 seconds: approximately 1 year

Notice: The above battery lives are valid for logger operation in temperature from -5 to +35°C. If often operated outside of the above temperature range battery life can be reduced to 75%.

Protection: IP67

Operational conditions:

- Operational temperature range: -30 to +70 °C
- Operational humidity range: 0 to 100 %RH

Specification of outer characteristics accordingly to EN33-2000-3: normal environment accordingly to appendix NM: AE1, AN1, AR1, BE1

Operational position: negligible

Logger installation: by self adhesive Dual Lock, applied to clean, flat surface

Limit condition: temperature -40 to +70 °C, humidity 0 to 100 %RH

Limit condition: maximum voltage at the input: -1 to +7 V dc

Storing condition: temperature -40 to +85 °C, humidity 0 to 100 %RH

Dimensions without connectors: 93 x 64 x 29 mm

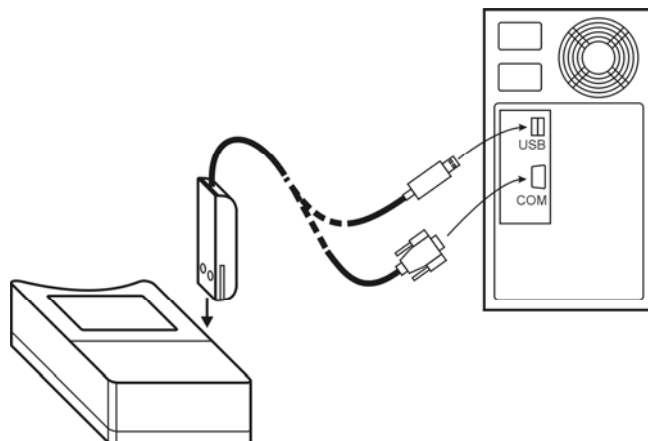
Weight including battery: approximately 130 g

Material of the case: polycarbonate

## **Logger operation**

Logger comes complete with installed battery and switched OFF. Before operation it is necessary by means of installed user PC software to set logging parameters and other features. Free user program is available to download from [www.cometsystem.cz](http://www.cometsystem.cz) . For communication with the PC a communication adapter is necessary (not included in delivery). For connection via RS232 serial port it is necessary to use COM ADAPTER, for connection via USB port it is necessary to use USB ADAPTER. Connect adapter connector to proper computer port and plug the adapter to the guide slots on the side of logger.

## Connecting logger to the computer by means of communication adapter



**Notice:** USB connector can be located also at the computer front side.

After connecting the logger to the computer reading of logger info is enabled by means of the PC software and also setting of the instrument accordingly to the user needs (menu *Configuration / Setting of instrument parameters*). Before logging start it is necessary:

- check or optionally set the logger real time clock
- select suitable logging interval (no influence to optional record of the binary signal)
- select logging mode (cyclic or non cyclic)
- switch ON binary channel (4<sup>th</sup>) if it is supposed to be recorded
- specify recalculation constants to display real physical readings a decimal point position
- switch ON the logger (or switch OFF, if it is about to be switched ON by magnet or automatically with delayed start
- enable or disable the option to switch ON the logger by magnet
- enable or disable the option to switch OFF the logger by magnet
- enable or disable the option to clear minimum and maximum value memory by magnet
- set date and time of logger automatic switching ON logger or disable this option
- optionally enable to control record by external signal (i.e. logger switch ON/OFF will be controlled by binary signal on channel 4. Required binary signal state is necessary to set at the 4<sup>th</sup> channel parameter card
- select if record runs permanently or only if alarm is active
- If alarms are about to be applied, set both limits and enable alarm
- optionally enable permanent alarm (alarm with memory)
- switch ON or OFF the display
- optionally switch ON the MIN/MAX readings to be displayed on the LCD
- reset memory of MIN/MAX values (if needed)
- check free space in data memory, optionally erase data memory of the logger
- enter password if protection against unauthorized manipulation with the logger is necessary

Logging interval between to subsequent measurements is specified by the user. Memorizing of the first value is synchronized with the internal real time clock, so the logging is performed at sharp multiples of minutes, hours and days. E.g. after starting the logging with the 15 minute interval the first value is not stored immediately, but after the internal clock gets the status of a quarter, a half or a whole hour. After starting the logging with the 6 hour interval the first value is stored at that whole hour to perform the storing also at 00.00, i.e. at the beginning of the day. First storing is performed at 6.00,12.00, 18.00 or 00.00hour - at the hour from the above nearest to the logging start. After communication with computer or after start by magnet logger automatically waits for

the nearest whole multiple of time and then first measurement is performed. This is also necessary to take into account when setting time of automatic logger switch ON.

**Notice:** If logger operates as permanently connected to the computer, using of magnet start/stop is disabled.

To enable the logger control by magnet is suitable only in cases, when possibility of unauthorized manipulation to the logger operation is eliminated.

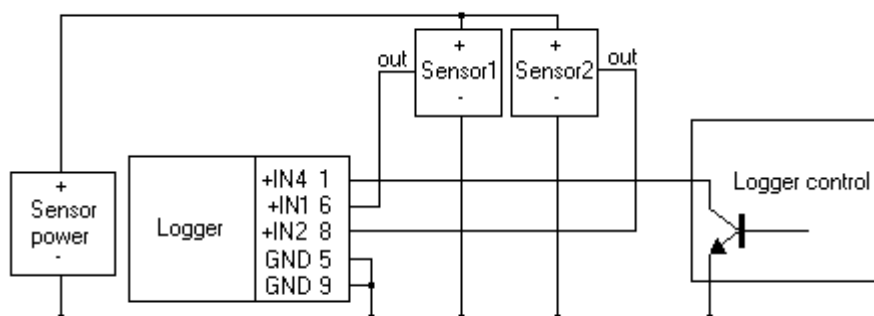
If logger is controlled by binary signal from channel 4, logger will be switched OFF with the delay up to 10s after appearance of desired binary state!

### Logger connection to voltage signal

Connect transducer output to 9pins female Canon connector by means of the shielded cable. If IP67 protection is required, it is necessary to use watertight connector (available as an optional accessory). Connect pin 6 of logger connector to positive pole of the transducer 1 voltage output. Connect pin 8 of logger connector to positive pole of the transducer 2 voltage output and pin 5 to negative poles (ground) of both transducers. Incorrect poling does not cause logger damage, but logger will measure zero voltage. Permanent incorrect poling is not allowed (increased consumption from battery). If no control by binary external signal is used, it is necessary to disable this selection from the PC – pin 1 of the connector (binary input, channel 4) can remain not connected.

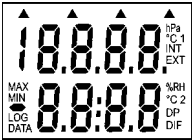
If logger will be controlled (switch ON and OFF) by external binary signal, connect output of the control device to pin 1 (binary input, channel 4) and pin 9 (signal ground). Control device output must be potential-less contact or open collector. It is necessary to enable selection "Logger control by external signal" and at the same time to select desired binary state at the card of channel 4 to start the logger. Switch ON by external signal is immediate, switch OFF with delay up to 10 s.

**Notice:** pin 9 is galvanic connected to pin 5 (input negative pole). Output of the control device must be galvanic isolated from the power source of the connected transducer or one power source for both transducer and control device must be used or two sources with common ground.

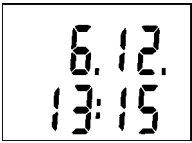


Other possibility of interconnection of logger to input signals enables optional K0945 adapter with screw terminals – please see Appendix at the end of the manual.

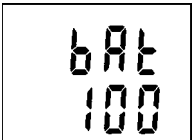
## Readings in usual operation (logger switched ON)



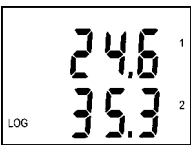
After switching ON the logger all LCD symbols are displayed for checking the display.



Then actual date and time in logger is displayed for approximately 4 s.

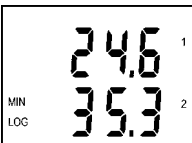


Consequently reading of estimated remaining battery capacity for approximately 2 s is displayed (values 0 to 100%). It is valid if logger is operated at temperature from -5 to +35°C. If logger is operated often outside of the above temperature range battery life can be reduced to 75%, i.e. if displayed remaining battery capacity drops below 25%, it is recommended to replace the battery.



**If display is switched ON**, actual reading of measured values is displayed. Channel 1 at the LCD upper line (symbol "1") and Channel 2 at the LCD lower line (symbol "2"). Symbol LOG indicates logging in progress – if LOG blinks, data memory is occupied for more than 90%.

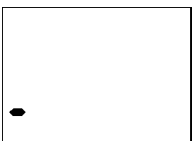
Switched ON logger permanently (with 10 s interval) updates memory of minimum and maximum values. If displaying of MIN/MAX values is selected, minimum measured values of both channels are displayed (indicated by symbol MIN) and then similarly maximum measured values of both channels (indicated by symbol MAX).



Notice: if alarm is active, no MIN/MAX reading is displayed.



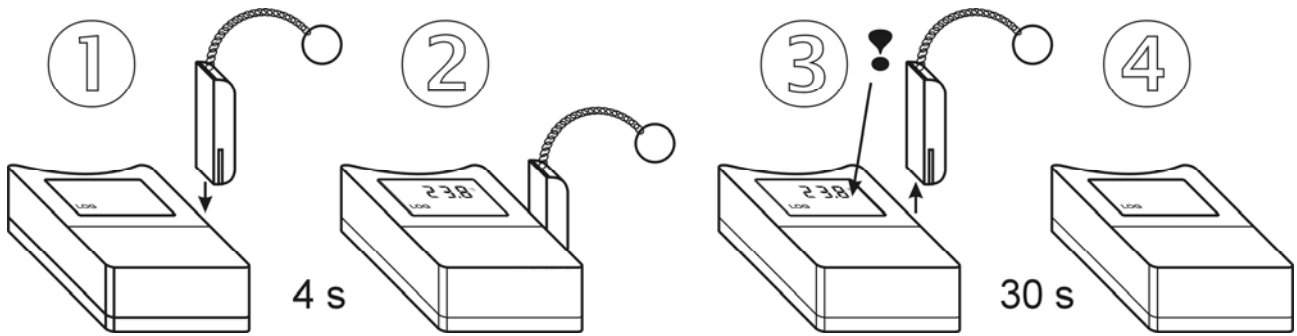
**If display is switched OFF**, all above readings are displayed up to estimated remaining battery capacity and then display goes out. If logger is switched ON symbol LOG is displayed (it blinks if memory occupation is higher than 90%).



If display is OFF and logger is in mode when record runs only when alarm is active, the LOG symbol is replaced by adjacent symbol "-" (hyphen). It appears in case, all measured values are inside of adjusted alarm limits and data logging therefore does not run. Displayed symbol indicates logger is ON.

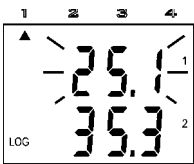
If information on actual measured values is needed, it is possible anytime to display reading display by means of the magnet (only if communication adapter is not connected permanently). Plug magnet into guide slots from logger front side for approximately 4 s and wait till reading on the display appears. If logger has enabled the function switch OFF by magnet, resp. MIN/MAX memory clear by magnet, do not remove magnet from guide slots before decimal point symbol goes out – logger would be switched OFF, resp. MIN/MAX memory would be cleared! Display reading initialized by magnet goes out automatically after 30 s. Remove magnet from slots anytime during actual reading is ON or later.

### Temporary displaying of actual reading by magnet



### Alarm indication on the display

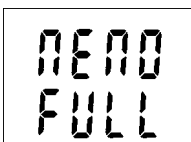
It is necessary to enable alarm function from the PC and set for each quantity lower and upper limit (there is no alarm for binary input). If measured value is inside of set limits, alarm of proper quantity is not active. If value of measured quantity gets outside of set limits, alarm of proper quantity is active and it is indicated on the display. It is possible to select "memory alarm mode" when alarm is indicated permanently up to reset from the PC.



Active alarm is indicated (if display is ON) by blinking of the value of proper quantity on the display and by an arrow at the LCD upper side. Arrow 1 indicates active alarm of channel 1 and Arrow 2 indicates active alarm of channel 2.

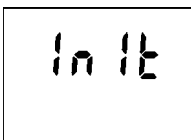
**Notice:** if logger is operated at low temperature (below approximately  $-5\text{ }^{\circ}\text{C}$ ), alarm indication by blinking can be indistinct. Indication by arrows works correctly. If alarm is active, no MIN/MAX readings are displayed (if selected).

### Messages displayed on the LCD beyond usual operation

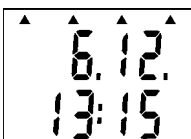


If measured value is out of the measurable or displayable range numeric reading is replaced by hyphens.

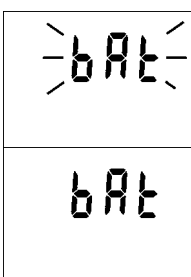
If memory is totally full filled in non-cyclic logging mode, logger is switched OFF and message MEMO FULL appears on the LCD. It appears also if logger is operated with switched OFF display.



New initialization of logger can occur in switching ON the logger (immediately after displaying of all LCD segments for checking) e.g. after replacement of totally discharged battery for new one. State is indicated by INIT reading. It can be displayed for about 12 s.



If battery voltage drop occurred since last internal clock setting below critical limit or battery disconnection for longer period than approximately 30 s, after display switch ON (during date and time display) all four arrows appears as warning to check or set it again from the computer. However all logger functions work without limitation.



If reading BAT is displayed periodically on LCD upper line (for 1 s with 10 s interval), the end of estimated battery life is coming – however logger functions are not limited. Replace battery as soon as possible!

If reading BAT is displayed permanently, battery voltage is low and logger is not possible to switch ON. If logger was switched ON before it, data

logging is stopped and logger is switched OFF. Communication with computer can temporarily work. Replace battery as soon as possible!

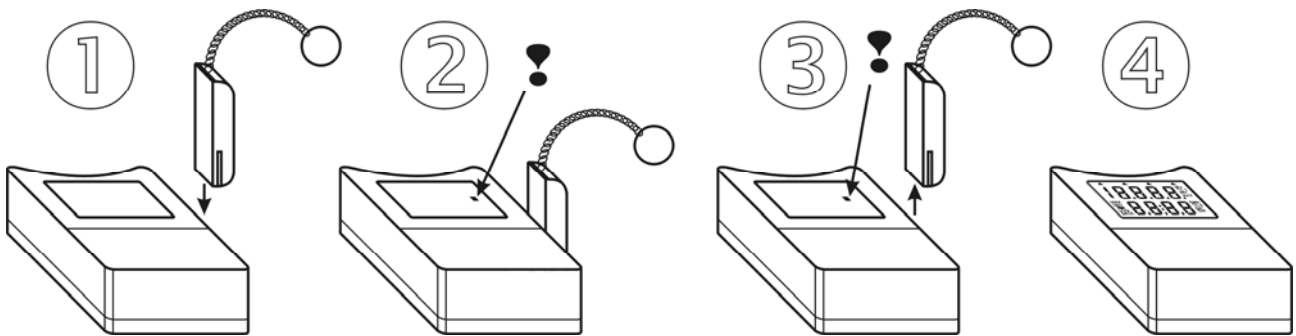
### Start / stop by magnet

The function must be enabled from the PC before. If only switching OFF by magnet is enabled, it is of course necessary to switch ON the logger from the computer.

**Notice:** It is not possible to combine function switching OFF by magnet and MIN/MAX memory clear by magnet! User software enables only one of them to select.

#### *Switching the logger ON by magnet*

Plug magnet to guide slots from logger front side and wait approximately 1 s for decimal point appears right on LCD upper line. After appearance it is necessary immediately (till indication point is displayed) to remove magnet from guide slots and logger switches ON.



#### *Switching the logger OFF by magnet*

The procedure is identical with the above procedure for switching ON. If decimal point does not appear after 1 s, it is necessary remove the magnet and repeat the procedure.

### Reset of MIN/MAX values by magnet

Function enables to clear MIN/MAX values by magnet without using computer. It is necessary to enable the function from the PC software before.

**Notice:** It is not possible to combine this function with function of switching logger OFF by magnet! User software enables to select only one of them (or none).

Plug magnet to guide slots from logger front side and wait approximately 1 s for decimal point appears right on LCD upper line. After decimal point appearance it is necessary immediately (till indication point is displayed) to remove magnet from guide slots. Reading CLR MIN MAX appears for several seconds and MIN/MAX values will be cleared.

### Battery replacement

Low battery is indicated on the display by blinking of reading "BAT". It can be displayed permanently, if battery voltage is too low. Replace the battery for new one. If logger is operated often in temperature below  $-5^{\circ}\text{C}$  or over  $+35^{\circ}\text{C}$  and PC program indicates remaining battery capacity below 25% it is also recommended to replace the battery. Applied is Lithium battery 3.6 V, size AA. Battery is located under logger lid.

**Warning:** near battery fragile glass reed contact is located – be careful not to damage it. Be careful in battery replacement!



### ***Replacement procedure:***

- switch off the logger by the PC program or by magnet (if low battery allows)
- unscrew four corner screws and remove the lid
- remove old battery by pulling the glued tape
- insert new battery **respecting the correct polarity** (see symbols + and – near battery holder). If you connect new battery up to 30 s, all logger settings remain unchanged. In the opposite case check by means of PC program all settings, especially the real time clock in logger. **Attention, inserted battery with incorrect polarity causes logger damage!**
- put the lid back again and screw four screws. Be careful to have the rubber sealing properly in the slot and tighten the screws properly to ensure the water resistance of the instrument.
- connect logger to the computer and **write to it the information on battery replacement** (menu Configuration/Battery replacement). This step is necessary to evaluate properly the remaining battery capacity.

**Old battery or logger itself (after its life) is necessary to liquidate ecologically!**

### **Instruments passed the following electromagnetic compatibility (EMC) tests:**

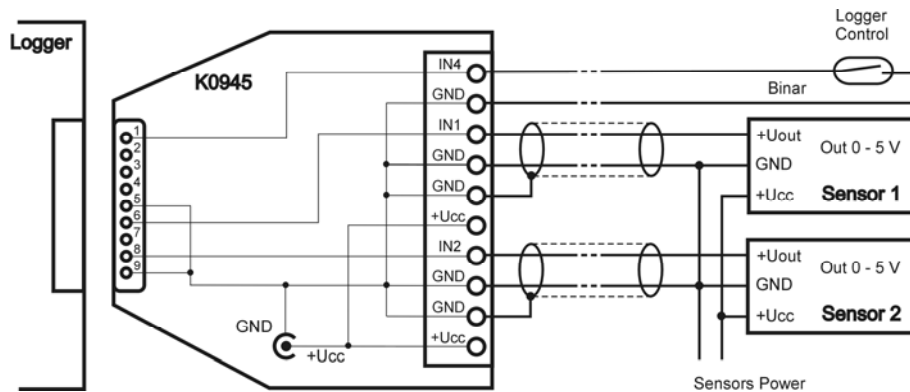
radiation: EN 55022	class B
immunity: EN 61000-4-2	(levels 4/8 kV, class A)
EN 61000-4-3	(intensity of electromagnetic field 3 V/m, class A)
EN 61000-4-4	only types with external probes (levels 1/0,5 kV, class A)
EN 61000-4-6	only types with external probes (intensity of electromagnetic field 3 V/m, class A)

## APPENDIX

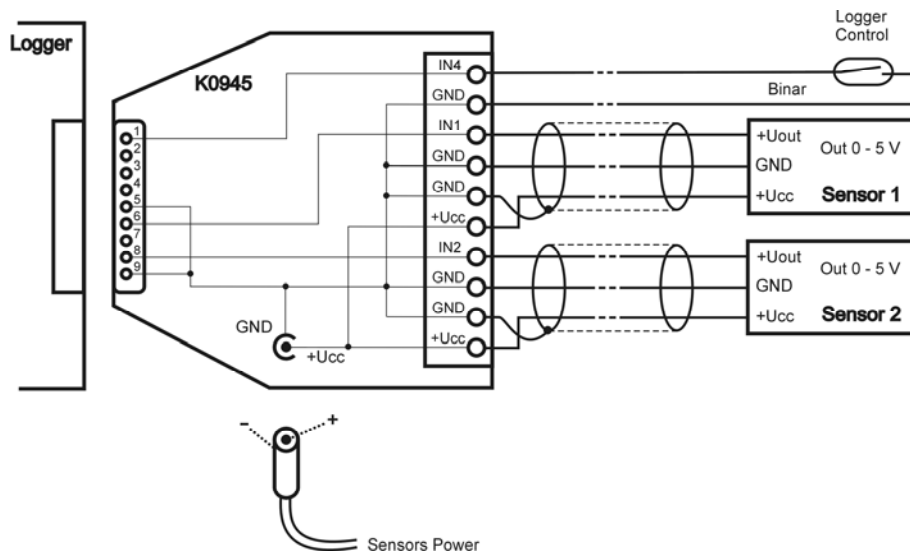
### Interconnection of logger to input signals by means of optional K0945 adapter with screw terminals

If no protection against water is required, input signals can be easily connected by means of the K0945 adapter (optional accessory). Plug adapter to logger Canon connector and connect input signals to screw terminals in accordance with drawings below. The IP rating is only IP20 and the IP rating of the logger (IP67) is not possible to apply.

*Connection to sensor signals. Power supply is located near the sensor:*



*Connection to sensor signals. Power supply is located near the logger:*



At this case sensors are possible to be powered e.g. from ac/dc adapter, connected via coaxial power connector to K0945 adapter. Supply voltage and the power of the applied ac/dc adapter depend on type of connected sensors.