

HYDRO LOGGER H40

user manual version 1.01-E



Small telemetry station

FIEDLER
ELEKTRONIKA PRO EKOLOGII

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1

Use of H40

HydroLoggers H40 are suitable for building monitoring networks in the water industry, for monitoring surface and ground-water levels, in environmental monitoring projects and in many other similar applications where the small size of the instrument, its robust design and the long life of the power batteries are advantageous.

Embedded GSM/GPRS communication module

Type H40G is equipped with a built-in GSM/GPRS communication module, which is used for automatic transfer of measured and archived data to the database on the server and for possible sending of warning SMS. The communication module can also be used to remotely make any changes to the control parameters.

Very low current consumption

The modern electronic circuitry of the Hydro Logger with its very low current consumption and the controlled power supply of the connected sensor allows the device to operate without changing the battery pack for more than 10 years, even with daily automatic data transmission via GSM network to a database server on the Internet.

In applications where a GSM network is not available or automatic data transfers to the server are not required, the H40D variant, which lacks the GSM/GPRS communication module, can be used for data acquisition and archiving. In this case, the measured and archived data must be read out to a connected PC (laptop) using the MOST program.

TYPICAL APPLICATIONS

- **Measurement of levels and temperatures in boreholes and open streams**
- **Measurement of levels in sewer manholes and water reservoirs**
- **Temperature and humidity measurement**
- **Accurate measurement of up to 6 temperatures using TEP-06 transmitter and Pt100 sensors**

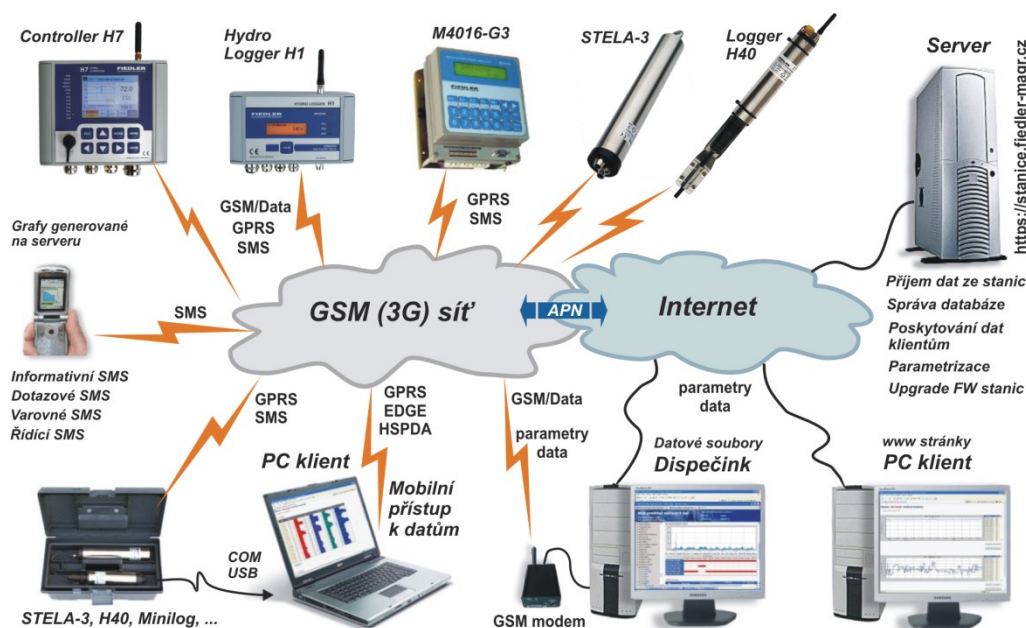
If it is necessary to monitor several different physical variables in one location, it is preferable to use telemetry stations such as STELA-3, H1 or more sophisticated units such as M4016 or H7, which have more inputs for connecting external sensors.



1.1. Automatic data collection via GPRS network

The HydroLogger H40G is equipped with a GSM/GPRS data module for automatic transfer of measured data from the instrument to the database on the server.

Automatic data collection system



ACTIVE STATIONS SYSTEM

FIEDLER telemetry stations are characterized by long battery life and very low operating costs with regular data transmission to the server. This has been achieved by a system of active stations and a passive server:

- The server is always on and waiting for data from the individual telemetry stations, which themselves determine when the data will be transmitted to the server.
- The system can receive data from multiple stations simultaneously.
- The GSM/GPRS modem in the station is switched on only for the time necessary for data transfer from the station to the server - saving power of the power battery.
- If an extraordinary event occurs at the measurement location, the station can immediately transmit this information to the server - the usual delay of cyclical calling of stations by the server is eliminated.
- The system allows the use of operationally cheap types of tariff SIM cards without a fixed IP address in the stations. The fixed IP address is usually charged for, which increases the overall operating costs of the system.

DATA SERVER SERVICES

The data server is accessible via a standard web browser. After logging in, the user can use the services of the data server, which include:

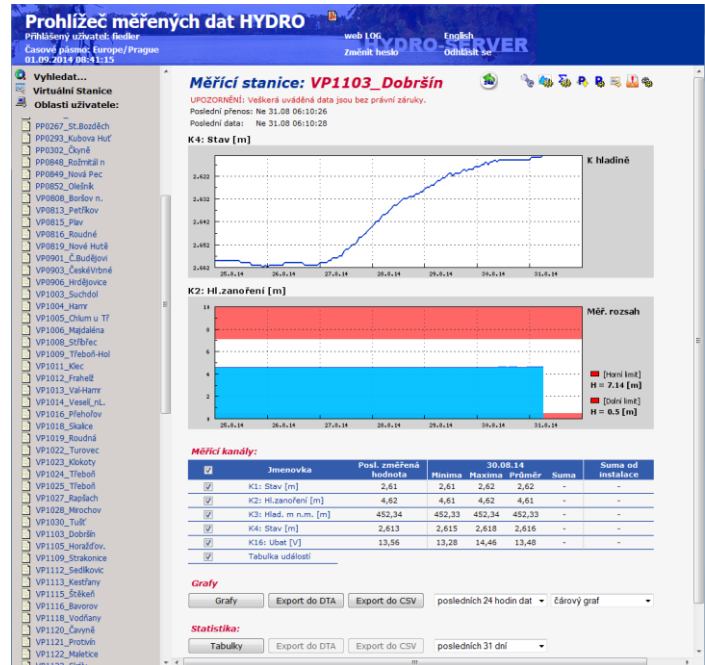
- generation of graphs and tables of measured values
- exports measured values for the selected period to the user's PC
- automatic forwarding of received data from the station to another ftp server
- printing of graphs and monthly reports including statistical summaries
- creating virtual stations that can contain differently averaged, summed or otherwise adjusted data from different real stations in one graph

- automatic sending of e-mails to preset addresses after meeting the set conditions (exceeding or dropping of the measured value over the set limits, switching on/off of the binary channel, error conditions, ...).

PARAMETERIZATION OF THE STATION REMOTELY

A special server service allows you to change the settings of the station parameters remotely over the Internet and GSM/GPRS network via the MOST program. All previous and current parameter files are stored in the server database, including the date and time of their change and the login name of the specific user who made the change.

All these services are available to the station user for a low annual fee, which is incomparable to the investment in the equipment of your own server and its regular maintenance. This makes the data collection system accessible to users of one or two telemetry stations as well as to operators of a large monitoring network.

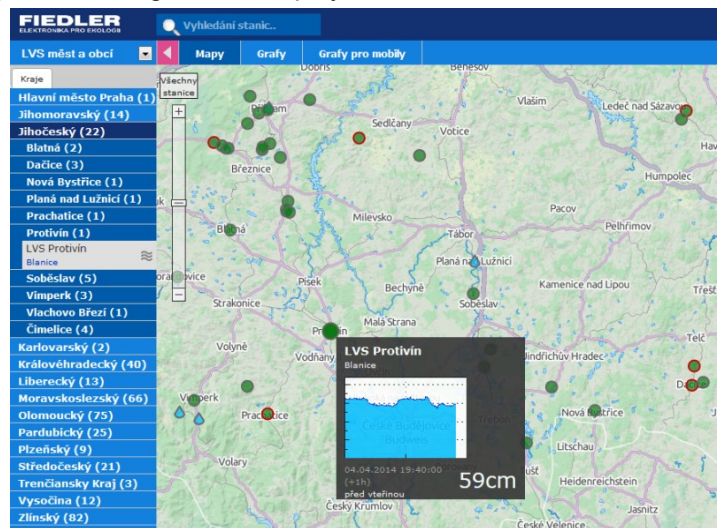


MAP VISUALIZATION

In some applications, it may be advantageous to display the location of the station and its current status on a map base. The status can be both information about the station's trouble-free operation and the measured values of the selected channel.

An example is the freely accessible server www.hladiny.cz, which displays measured data from hundreds of stations installed on rivers and streams across the country.

Incorporation of the station into the system is performed by the server administrator at the request of its owner.



2

Basic description

The Hydro-Logger H40 is characterized by its robust mechanical design, small size and modern electronic circuit concept with very low self-current consumption. It is suitable for direct use in outdoor environments as well as in permanently wet environments in waterworks.



- Recording channels** The H40 station allows you to set up to 8 recording channels K1 - K8 for measuring selected physical quantities and 8 binary channels B1 - B8 for recording states on binary inputs.
- Control channels** In addition to the recording and binary channels, the station contains 7 control channels K9 - K15 for recording the battery supply voltage, remaining battery capacity expressed in %, current drawn by the connected sensors during measurement, temperature and humidity inside the instrument.
- Data memory** The data memory can hold up to 400,000 values including date and time of acquisition. The capacity of the data memory is sufficient for several years of data recording in normal operation. When the memory is full, the oldest stored values are gradually overwritten. The data memory also records extraordinary events - receipt or sending of SMS, occurrence of an input error, data transfer to the server, etc.
- Economical operating mode** The H40 operates in a power saving mode, in which the instrument is hibernated most of the time and only wakes up and takes measurements at the set archiving interval. During the measurement period, power is supplied to the connected sensors and transducers. The magnitude of the supply voltage is adjustable from 6 to 15 VDC.
- GSM communication** The H40G telemetry station transmits the measured values via GSM/GPRS communication to a database server. In addition, the station can send warning or informative SMS and receive query or control SMS. Parameter settings can also be changed and FW upgrades can be performed via GSM/GPRS data communication.
- Parameter settings** All H40 station parameters are set via the MOST program. Parameters can be changed from a PC (laptop) via a cable connection or remotely via a web browser and data server.
- Power supply system** A 3.6V/19 Ah (H40D) or 3.6V/28 Ah (H40G) lithium battery pack is used to power the unit, with a connector for easy field replacement. This battery pack allows many years of operation of the instrument with daily transmission of measured data to the server via GSM/GPRS network. Unlike the H1, H7 or M4016 stations, the H40 station is not adapted for external power supply connection.

2.1. Overview of program procedures and functions

The following overview briefly summarizes the programming procedures and functions contained in the H40 station FW, which are fully available to the station users during its parameterization and setup. Most of these functions will be described in detail in the "Setup" chapter.

- Calculation and storage of the measured quantity in set units of measurement
 - Non-linear signals can be corrected by a 2nd order polynomial separately for each of the set channels.
 - Calculation of the remaining capacity of the power battery based on continuous measurement of the current drawn from the battery
 - Separate limit alarm for each recording channel
 - Separate gradient alarm for each recording channel
 - For the duration of an alarm on a channel, you can set a different frequency of data being written to memory and a different frequency of data being sent to the server than in the normal state.
- Communication**
- Data transmissions are performed under the FINET protocol (binary protocol with fixed frame) or Modbus RTU. Data packet transmissions over the GSM/GPRS network are performed under the TCP/IP protocol.
 - Regular sending of archived values via GPRS network to the Internet to the set IP address (to the server with the MOSTNET-SERVER program installed)
 - Phonebook for 10 recipients, up to 3 groups possible
 - Alert system based on 14 user configurable SMS messages
 - Activation of sending SMS or transferring data to the server via GPRS network periodically in time or after reaching the limit value on the measuring channel, after activation of limit or gradient alarm, in case of sensor fault, low battery voltage, after activation of binary input or on request by SMS
 - Adjustable delay and hysteresis for SMS warning limits
 - 25 query and command codes for creating a query or control SMS
 - Automatic insertion of the instantaneous value of the measuring channel into the SMS text
 - Setting the time for sending daily SMS and the day for weekly SMS
 - Automatic switching between daylight saving time and standard time, automatic time comparison with the server
 - Automatic archiving of the current parameter file on the server after each parameter change
- Operational diary**
- The event log contained in the data memory records extraordinary events (activation of selected inputs, incoming and outgoing SMS, occurrence of error signals at connected sensors, successful and unsuccessful data transmission to the server, etc.).

2.1. Mechanical design

The Hydro-Logger H40 is housed in a cylindrical stainless steel housing with a diameter of 40 mm, which is terminated on one side with a K2 connector for connecting the sensor and on the opposite side with a K1 communication connector for connecting a PC (laptop). The H40G variant of the instrument equipped with a built-in GSM/GPRS communication module has a small SMA coaxial connector next to the K1 connector for connecting an external GSM antenna.



The robust mechanical design protects the electronic circuits from external interference as well as from adverse climatic influences and is highly resistant to intentional and unintentional mechanical damage.

LEVEL METER WITH TSH22 PROBE

**Mounting bracket
DH40**

Typically, the Hydro-Logger H40 is used as a level gauge to monitor water level and temperature. In this case it is convenient to order the H40 station together with the TSH22 sensor and the DH40 stainless steel mounting bracket. The bracket includes clamps for mounting the H40 station and a screw hanger for clamping the cable of the submersible transducer (TSH22). The entire measuring assembly can then be suspended from the bracket, e.g. in a borehole. The small dimensions of the H40 station itself and the DH40 holder allow the measuring assembly to be placed in a borehole with an inner diameter of only 50 mm.



Detail of the DH40 bracket mounting holes, the DA284 filter location on the connector body and the TSH22 level sensor cable attachment.

Filter DA284

The special hydrostatic level sensor cable contains a capillary to compensate for the atmospheric air pressure acting on the submerged sensor. A semi-permeable filter located on the body of the level gauge connector prevents air moisture from penetrating the capillary to the sensor electronics and possible subsequent corrosion inside the level gauge.



2.2. Communication

Parameter setting in the station and transmission of measured data can be done either by cable from a connected PC (laptop) or remotely via a server and GSM network.

MOST PROGRAMME

All communication between the H40 and the connected PC (laptop) is done via the MOST program. Using this program, you can, for example, parameterize the station, transfer measured data from the station to the connected PC or view the current measured data. The MOST program is described in detail in chapter 4 of this manual.

Parameterization of the station

Parameterization of the station consists in creating the current parameter file for the application and then saving this parameter file to the H40 station. The MOST program is also used to archive the current station parameter file and to modify this file. A special server function can transfer the parameter file from the server via GSM/GPRS data network to the H40G station even remotely.

After purchasing a license for the MOST program, the user gets an unlimited time option to upgrade the program.

Download the current version of MOST from the station manufacturer's website:

<http://www.fiedler.company/cs/ke-stazeni/stahnout-software-most>

GSM/GPRS COMMUNICATION MODULE

The H40G telemetry station contains a GSM/GPRS communication module that usually mediates all data transmissions between the station and the user. Connecting to the station from a PC (laptop) is therefore usually not necessary.

Measured data stored in the station is automatically transferred via GPRS network to the database on the server at the specified time. Conversely, a parameter file is transferred from the server to the station if any changes to the station parameters are needed. The parameter file is transferred at the end of the data session and only if the user has changed at least one of the parameters and placed the new parameter file on the server. The MOST program is used to manage the parameter file.

CONNECTING A PC (LAPTOP) TO THE H40 DATA LOGGER

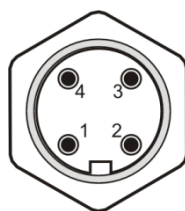
Transfer of measured data from the H40 station to a connected PC or setting of parameters in the H40 station can also be done from a PC (laptop) connected to the station with a 2 m long KP232/M12 communication cable.

On the PC side, the cable is connected via a 9-pin connector to the RS232 port. If the PC or laptop is not equipped with an RS232 connector, it is necessary to add a USB/RS232 converter (a suitable type of converter can be ordered with the station).

On the side of the H40 unit, the K1 connector type M12 is used for cable communication.



Connection cable KP232/M12



PIN	1	2	3	4
Signal	TxD	NC	GND	RxD

Connecting the pins of communication connector K1

2.3. Power supply system

The Hydro-Logger H40 is powered by a lithium battery block, which guarantees many years of operation of the device even when the measured data is transmitted to the server via GSM/GPRS network on a daily basis. The instrument is supplied with an inserted battery pack and since the instrument has an extremely long operating time when the parameters are set correctly, there is no need to replace the battery pack for the first few years of operation.

H40G A lithium battery pack with a voltage of 3.6 V and a capacity of 26 Ah is used to power the Hydro-Logger H40G (basic version with built-in GSM module). The block is composed of lithium batteries enclosed in a shrink wrap into a single unit and is equipped with a short cable ending with a connector for easy connection to the electronic board of the device.

H40D The Hydro-Logger H40D without GSM communication module contains a smaller power supply unit with a voltage of 3.6V and a capacity of 19Ah.

Integrated voltage converter

The K2 connector contains, in addition to the 485 data signals and the AV1 analog input, a program-controlled supply voltage for the connected sensor. The magnitude of the supply voltage is user adjustable from 6 to 15V DC according to the requirements of the connected sensor or measurement probe. A lower supply voltage saves battery capacity. The +Unap supply voltage is only present on pin 1 of connector K2 for a short period of time when the station requests a new measurement. The magnitude of the +Unap supply voltage, the frequency of the measurement and the supply voltage on time are adjustable parameters.

USUAL OPERATING TIME

The system of active stations and a passive server allows the GSM module to be permanently switched off and only switched on when the station requests to transfer measured data to the server or to send a warning SMS. This concept also allows the station to operate for many years without changing the power supply batteries. In a practical test, the H40G was tested to be able to perform more than 5,000 data sessions to the server (or send the same number of SMS alerts) without changing the battery pack.

With a typical archiving interval of 10 - 15 minutes with one sensor connected via RS485 or analogue input, the H40G station can operate for more than 10 years without changing the battery pack, while transmitting data to the Internet on a daily basis.

In addition to the power required for data transmissions to the server, the power supply must also cover the power consumption of the measuring probe or sensor connected to the station. However, this consumption does not consume even 10% of the total capacity of the power supply batteries during normal use of the instrument and over 90% of their energy is consumed for GSM data transfers from the station to the server.

Replacing dead batteries

The current drawn from the batteries is continuously integrated in the station and the energy drawn is continuously subtracted from the initial capacity of the power batteries. The remaining battery capacity is archived on the user-accessible control channel K13. The time record of the declining battery capacity can in many cases explain the often mysterious rapid discharge of batteries - for example, inappropriate parameter settings, a fault in the connected sensor, cable damage, etc.

When the battery pack is depleted, the user can replace it himself in the field. The detailed procedure for replacing the battery pack is given in the chapter "Service".

Notice The Hydro Logger H40 is not designed for external power supply connection.

3 Installation

*Protection against
moisture*

*Temperature
influences*

*Measuring
assemblies and
H40G+TSH22*



The installation of the telemetry assembly can be divided into its mechanical placement, including the connection of sensors and transducers, finding the optimal location of the GSM antenna and inserting the SIM card, and setting the control parameters. The detailed description and setting of the individual parameters is covered in Chapter 4.

3.1. Mechanical positioning of the telemetry assembly

If possible, then install the assembly in a location free of permanently condensing moisture. If this cannot be avoided, then extra care must be taken when connecting the connectors - to tighten them (they have a built-in O-ring). It is also advisable to treat the GSM antenna connector with silicone petroleum jelly or insulating self-adhesive or self-vulcanizing tape to seal any leaks.

The telemetry assembly should not be installed in locations where the temperature is consistently above 40 °C, as this increases the self-discharge of the power supply batteries, resulting in a shorter battery life. Conversely, low temperatures below -20 °C reduce the usable capacity of the batteries.

The measuring set H40(G) + water level and temperature sensor TSH22 is usually supplied with a stainless steel bracket DH40, which also forms a hanger for the connected sensor cable. This type of bracket is particularly suitable for placing the H40(G)+TSH22 in a borehole or narrow installation pipe with a diameter of only 50 mm.

3.2. To insert a SIM card

The station manufacturer has long been lending its own SIM cards to its products for a low monthly fee, which includes 1 MB of free data/month. The Hydro Logger H40G can therefore be supplied with an already inserted SIM card. The operating costs of the borrowed SIM card are invoiced to the station user together with the data hosting for database rental and server services.

To insert a SIM card When inserting or replacing your own SIM card, please note the following:

PIN unblocking

The SIM card must be unblocked before it is inserted into the station and the PIN code must be requested after switching on. Unblocking can be done on any mobile phone - security function.

GSM module power off

When inserting and removing the SIM card, the GSM module must be switched off from the power supply. This can be achieved, for example, by setting the GSM modem permanently off in the station parameters. It is not recommended to switch off the modem power supply by disconnecting the power connector of the battery pack, as this may affect some previously set variables (real time of the station, total leaked volumes, ...).

To access the SIM card holder

The SIM card is inserted into a flip-up holder located on the PCB next to the GSM module inside the station. This PCB is mechanically connected to the plastic cap of the cylindrical housing of the station. The cap is fitted with a sealing O-ring and is not only inserted into the cylindrical outer housing of the station, but is also secured with an M4 screw against rotation and sliding.

When opening the station, the M4 locking screw is first turned out and then the plastic cap with the PCB is pulled out of the stainless steel casing of the station. The two opposite holes on the sides of the plastic cap are for fixing the cap if the stainless steel casing of the station cannot be easily removed.

Remark:

Ordering a station including SIM card

The station can be supplied either without a SIM card or with an embedded flat-rate SIM card on long-term loan from the station manufacturer. In this case, it is a flat-rate SIM card from O2 with the M2M tariff, which already has 1 MB of data per month free of charge in the basic price of CZK 40. Any overrun of this volume is subsequently invoiced at 0.03 CZK/kB of data and sent SMS at 1.35 CZK/SMS (1.50 CZK/SMS outside O2). Invoices from the operator for the transferred data are invoiced by the station manufacturer to individual station operators and are subsequently re-invoiced to the station operators at monthly (quarterly in the case of a smaller number of stations) intervals together with the data hosting for the rental and server services.

3.3. GSM modem operational status signalling

The plastic cap of the H40G station contains a signal LED in addition to the GSM connector, communication connector and connecting cable. By the speed at which this LED flashes, the device indicates the current status of the GSM module.



Tab. 1: Signalling LED.

LED

LED status	Meaning of signalling
The LED is not lit	GSM modem is switched off - normal idle state.
Flicker 1 Hz	The GSM modem logs into the network.
Short flash once every 5 sec.	The GSM modem is logged into the network, no data transfer is taking place.
Fast flashing 2 Hz	Receiving or sending an SMS message
Fast flashing 5 Hz.	Data transfer via GPRS data network

Before data transfer from the station to the server or before sending SMS from the station, the modem of the station must be logged into the GSM network. If the GSM signal is strong enough at the location of the station antenna, the station will be logged into the network after about 20 seconds from switching on the GSM module (slow flashing of the LED).

Data transmission to the server can take from a few seconds to 5-10 minutes, depending on the amount of data transmitted and the quality of the GSM field. During the ongoing data session, the signaling LED flashes at an increased frequency of 2 Hz.

Forced switching on of the modem during installation of the station can be triggered from a PC (notebook) connected by cable under the MOST program. The procedure is described in the following text.

3.4. Antenna and its location

The Hydro Logger H40 comes with a small GSM 1dB antenna that connects to an SMA connector.

GSM field intensity

Reliable GPRS and SMS communication requires a GSM field strength of at least 8 on a scale of 0 to 31 at the antenna location. With lower signal strengths, it may happen that some GPRS data sessions do not take place at the set time, but only on other days with better conditions for GSM signal propagation.

Above-ground objects

When installing the station, it is therefore important to take care of the appropriate location of the supplied magnetic GSM antenna with respect to the GSM field strength. In most above-ground buildings, the location of the antenna is not critical and it can be mounted vertically almost anywhere on a suitable elevated location.

The simplest method of finding a suitable location for the antenna using a scale on a mobile phone gives only approximate results. Remember to use the SIM of the same operator that the telemetry set-up will be using. This method can be used wherever the GSM field strength is sufficient and no special requirements are placed on the location of the GSM antenna.



AGSM-9dB-SMA

Metal enclosed objects When installing the station outdoors, it is often the case that the station is placed in a metal enclosure, in the head of a borehole or otherwise shielded from the external GSM field. In this case, it is advantageous to use a special hemispherical antenna that is placed on the outer surface of the metal casing. This special type of antenna can be ordered together with the station from its manufacturer under the designation AGSM-3db/P-SMA. The antenna shall be fixed in a 12 mm diameter hole and secured against theft from below with an overmolding nut.



AGSM-3dB/P-SMA

Underground objects In underground objects such as sumps, transfer shafts and similar objects equipped with a metal inlet cover, it has proven useful to simply attach the magnetic antenna to the lower metal part of the inlet cover frame (the rod antenna points downwards). Only when this simple, and surprisingly often successful, solution fails, is it necessary to proceed to external antenna placement. A suitable solution may be, for example, a plastic tube (protector) with a cap that contains the supplied rod antenna. The positioning of the protector above the ground should take into account the height of the snow cover at the installation site.

More powerful GSM antennas



Directional antenna AGSM-12dB-SMA

In locations with very weak GSM signal, the supplied magnetic antenna with 6 dB gain can usually be replaced by a larger omnidirectional magnetic antenna with 9 dB gain or a small directional antenna with 12 dB gain (the long directional antenna requires precise antenna pointing and homogeneity of the electromagnetic field and its use has not been proven in practice). Beware of the usual vertical polarization in

GSM networks when installing a directional antenna! A small directional antenna 60 cm long can be ordered together with its bracket from the manufacturer of the telemetry assembly.

GSM extension cable Finding the optimal antenna location often requires experimentation, sometimes with SIM cards from other operators. A coaxial extension cable can also help, which can be ordered with the set or as an option. The length of this extension cable can range from 2 to 10 m.



Extension coaxial cable PK-GSM-5M-SMA

TREATMENT OF THE GSM ANTENNA CONNECTOR AGAINST MOISTURE PENETRATION

The used GSM antenna connector type SMA is waterproof after screwing and the mutually adhering dielectric prevents the penetration of air moisture to the central antenna conductor.

However, when installing the station in a humid environment, we recommend treating this connector joint with a suitable insulating tape or applying a thin layer of silicone petroleum jelly to the antenna connector before connecting it to the station.

GSM FIELD STRENGTH DETECTION USING MOST

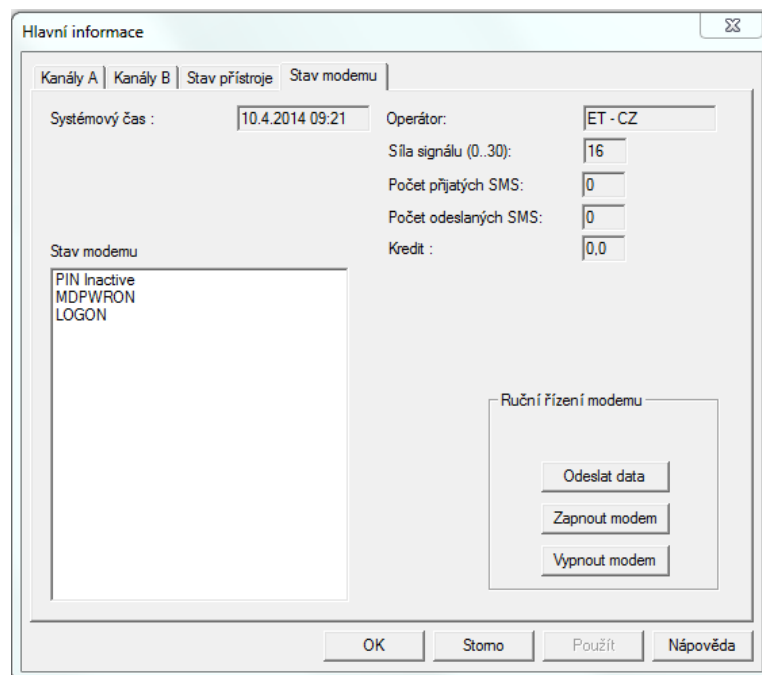
When installing the station, it is advisable to place its antenna in the place with the highest GSM field strength. The modem in the station converts the current measured field strength into a number on a scale from 0 to 30 (the higher the number, the better the location for the antenna).

Although the H40G station does not include a display or any buttons, the optimal antenna location can be found using a laptop connected to the station with a patch cable.

When looking for the optimal location of the GSM antenna, proceed as follows:

- Connect a PC or laptop with the MOST software installed to the H40G using the KP232/M12 cable.
- Start the MOST program and use the COM icon to establish communication with the station.
- In the main menu select "Info" -> "Current values" and then in the "Main information" window select the "Modem status" tab. This procedure will display the following information window on your monitor:

"Modem Status" information window



LED status indication

- The "Operator", "Signal strength" and "Modem status" fields will not be filled in until you instruct the station to log into the GSM network by pressing the "Switch modem on" button.
- During login, the signal LED will flash at a frequency of approximately 1 Hz. After the device has logged into the network, the regular flashing of the LED will change to short light pulses with a period of about 5 s and the GSM operator code and signal strength will appear in the "Modem status" information window. For reliable transmissions it is advisable to find a location for the antenna such that the field strength is 8 or more.
- After installing the antenna in the optimal location and after completing the overall parameterization of the station according to chapter 4, you can use the "Send data" button to transfer the current settings (valid parameter file) and the last measured values to the database on the server.
- **Finally, don't forget to log off the device from the GSM network by pressing the "Turn off modem" button.**

If the H40G telemetry station is located in a place with a weak GSM field, it will be forced to repeat some data calls, it will be difficult to log into the network and the result will be a reduction in the above mentioned operation time. Therefore, when installing the GSM antenna, always try to ensure its optimal location (see chapter: Installation).

3.5. Connecting sensors and transducers

RECORDING CHANNELS

The Hydro Logger H40 can record up to 8 physical quantities in its data memory. Each measured quantity occupies one recording channel K1 to K8. Unoccupied recording channels are not allocated and thus do not take up space in the data memory (so-called dynamic channel occupancy).

Recording channel settings

Any recording channel, if it is to be active, must first be set up. Setup is done via the MOST program from a PC connected by cable, or remotely via a web browser and special data server services. During setup, one input is assigned to each recording channel. In most cases, multiple recording channels can have one common input (RS485 data line).

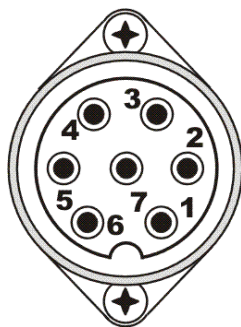
When setting the recording channel, in addition to the input, the type of the measured quantity, the measurement method, the units of measurement, the number of decimal places and other necessary parameters are selected. Setting up recording channels is covered in detail in the chapter 0.

Parameter settings .

3.5.1. Connection connector K2

The measuring probe or sensor is connected to the Hydro Logger H40 via the K2 connector, which is located in the axis of the instrument on the face of the stainless steel housing. The K2 connector is a robust 7 pin connector with a high IP66 rating. The wiring of the K2 connector tubes can be seen in the following figure and table.

4



K2 connector	Signal	Note
1	+Unap	Sensor power supply 6..15 VDC
2	AV1	analog input 0(4)-20 mA
3	NC	Unplugged
4	NC	Unplugged
5	RS485-B	RS485-B bus
6	RS485-A	RS485-A bus
7	GND	ground terminal (-sensor power supply)

Connecting the K2 connector tubes - top view of the connector

The connector connection limits the number of sensors that can be connected to the H40 and requires the addition of a cable from the sensor to the K2 connector. On the other hand, the connector connection simplifies and speeds up the installation as well as the possible servicing and calibration of the connected sensor or measuring probe.

Connector for sensors

A counter-angled connector with pins C91-K7-P for connecting a measuring probe or sensor can be ordered together with the Hydro Logger H40 from the instrument manufacturer. However, in most cases the H40 station is shipped in an assembly with the measurement probe or sensor and the mounted connector is already included in the assembly.



C91-K7-P opposed to K2 connector

Surge protection of inputs

All inputs are protected against overvoltage by an effective semiconductor barrier that eliminates induced interference pulses up to 600 W.

3.5.2. Power supply for connected sensors and transducers

+Unap In addition to the inputs, the K2 connector contains tubes for powering connected probes and sensors. The +Unap supply voltage (pin 1) is only briefly switched on during the measurement period. The measurement interval is an adjustable parameter ranging from 1 min to 24 h.

Another adjustable parameter of the unit allows you to switch on this power supply in advance of the actual measurement, so that the connected sensor can correctly adjust the size of the output signal in proportion to the physical quantity being monitored.

The +Unap supply voltage is user adjustable from 6 to 15 V and its optimum setting depends on the type of sensor or probe connected. A lower voltage setting saves the lifetime of the power supply battery.

3.5.3. Analog input AV1

Input AV1 (pin 2 on connector K2) is used to connect sensors and transducers with output signals of 4 - 20 mA, 0 - 20 mA, 1 - 5 mA, 0 - 5 mA and 0 - 1 mA.

The voltage drop across the AV input can be as low as 2 V at 20 mA. This drop should be increased by the minimum supply voltage of the connected sensor declared by its manufacturer on the +Unap power terminal. Conversely, an unnecessarily high +Unap supply voltage will excessively deplete the capacity of the power supply battery.

The analog signal supplied to the AV1 input is measured by a precision transducer with a digital filter that suppresses the interference voltage induced in the input cable and performs automatic self-calibration of the set measuring range.

The measuring sensor can be connected to the AV1 input in both two-wire (pins: +Unap, AV1) and three-wire (pins: +Unap, AV1, GND).

Connection of LMP858 level sensor with 4-20mA output

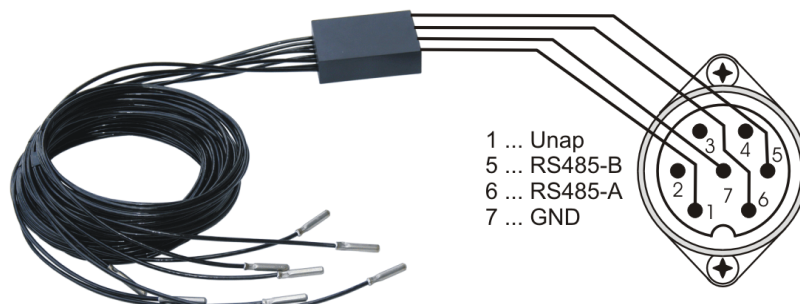


3.5.4. RS485 serial line

The RS485 communication bus is designed for connection of selected sensors and measuring transmitters that communicate under FINET, HART or Modbus RTU protocols. Such devices can be, for example, ultrasonic or submersible level sensors US1200 and TSH22, water conductivity sensors ESV11 and many other sensors and transducers listed in the table on page 28.

When setting the parameters of the selected recording channel, it is necessary to enter the communication address of the connected probe or sensor and the number of the internal channel in the connected measuring probe (details about the types of sensors and their settings can be found in chapter 4.3.1.).

TEP06 transmitter connection



4

Parameter settings

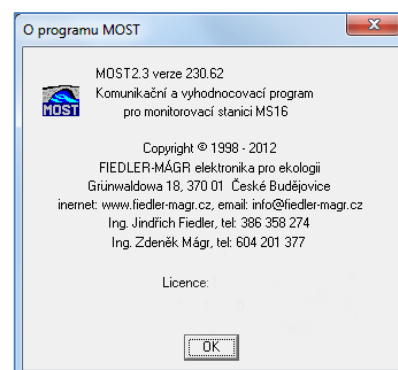
All user-accessible parameters of the Hydro Logger H40 can be read from the instrument and stored in a parameter file with the extension *.PRM. The user can further modify this parameter file, archive and write the changed parameters back to the instrument. The MOST program is designed for working with the parametric file.

Parameter setting can be done from the PC directly via RS-232 interface cable (from USB port via converter, which can be ordered together with the station), or it is possible to set parameters remotely from the server via GSM/GPRS network.

4.1. MOST programme

MOST is a universal communication, setup and evaluation program common to all FIEDLER instruments.

A detailed description of the program is given in a separate manual. The user who will use this program only for working with parameters will be satisfied with the description of individual parameter windows described in detail in the rest of this user manual.



You can get the latest version of the program on the manufacturer's website.

The MOST program is not included in the standard delivery of the telemetry set.

4.1.1. Basic rules for working with parameters



After physically **connecting the PC** to the H40 station (via cable or dial-up modem connection), the **connection** must first be made. For this purpose, either the menu in the "Communication" menu or the "COM" or "Telephone" icons are used. Both the connection and the connection are not necessary if you use the server service to set or change parameters.



When you start working with parameters, it is advisable to first read the parameters from the connected device. You can also load the parameters from the database on the server (if you have the appropriate permissions), where they are automatically saved after each change, or from a backup file on the PC.



After setting the parameters, the new parameters must be saved in the instrument. This can be done from the "communication" menu or by using the icon. When using a server, simply save the new parameter file to the server and the station will download the file at the next data communication. You can start the data communication immediately by sending an SMS message in the form: HESLO, dial0 to the station's phone number (this requires that the station's H40 modem is switched on at the time of sending the SMS).

4.2. Basic parameters

A group of basic parameters for setting station identification, measurement frequency, supply voltage control, data archiving and station communication with sensors

The screenshot shows the 'Základní' (Basic) tab of the STELA360 configuration software. The window title is 'STELA360 / FW 1.15 / STELA-3.prm'. The settings are organized into several sections:

- Instrument Identification:** 'Jmenovka přístroje' (Device Name) is 'STELA-3' and 'Identifikační číslo' (Identification Number) is '12345'.
- Security:** 'Heslo pro změnu parametrů:' (Password for parameter change) is set to '-'. A callout explains that a non-zero value blocks access.
- Time Zone:** 'Časové pásmo' (Time zone) is 'UTC+1h'. A callout explains this is for daily leakage calculations.
- Archiving:** 'Základní interval archivace' (Basic archiving interval) is '60 minut'. A callout explains this is the interval for switching the instrument on.
- Communication:** 'Sítová adresa' (Network address) is '1'. 'RS232 - PC' is '19200 Baud', 'RS485 mimo FINET' is '2400 Baud', and 'RS485 parita' is 'odd'.
- AD Converter:** 'AD převodník' (AD converter) settings include 'Počet vzorků mimo průměr' (2) and 'Počet vzorků do průměru' (2). A callout explains this is for setting altitude.
- Measurement:** 'Měření ve vrtu' (Measurement in borehole) has 'Nadm. výška odměř. bodu' (Elevation of measurement point) at '318,42 m n.m.'.
- Power and Diagnostics:** 'Napájení Unap' (Supply voltage) is '14 V'. 'Prodléva měření po zapnutí Unap' (Extends measurement after Unap) is '0,2 s'. 'Úroveň varování proudu z Unap' (Current warning level) is '50 mA' and 'Úroveň varování kapacity baterie' (Battery capacity warning level) is '30 %'. Callouts explain that delayed measurement allows for longer sensor connections and that a warning is stored when battery capacity drops below the limit.

4.2.1. Identification

Instrument nameplate The basic parameters include the instrument nameplate, which can store a maximum of 17 ASCII characters characterizing the instrument. The name tag is preferably used to visually check the affiliation of the open parameter file to the connected instrument and can be seen at the beginning of the *.dta data file, inserted into sent SMS and serves as a station identifier on the server.

Note: the "Device Name" parameter is automatically transferred to the station name on the server. Therefore, if you need to rename a station on the server, just change the name tag in the parameters and the next time the station has a data session with the server, the name of the station on the server will automatically change.

Identification number The value of this parameter serves as a station identifier on the server and is assigned by the server administrator. The *identification number* is stored together with the data in one data file and thus uniquely identifies the origin of the measured data. The parameter can take values in the range 1-65535.

Password to change parameters Setting this parameter to a non-zero integer prevents further parameter changes without knowing the password. The password value can take values from zero to 9999. A value of zero disables the control and allows unlimited overwriting of the instrument parameters.

4.2.2. Time zone

Summer time By checking the "Automatic daylight saving time" option, you allow the station to automatically adjust its internal functions during the time change, such as the regular sending of SMS messages. This way, an informative SMS message will be sent automatically at a fixed time throughout the year - for example, every Monday at 8:00 am.

The data will always be recorded in the station's memory according to standard time, regardless of the parameter selection. This is so that the time sequence of the measured values is not disturbed.

Start of the day The setting of this parameter affects the calculation of daily leakage volumes, daily precipitation, etc. The parameter is used for example when loading data in an organization using shift operation, where the calculation needs to start with the start of a new shift (e.g. at 6:00).

4.2.3. Archiving

Basic archiving interval This parameter can be set from 1 minute to 1440 minutes (1 day) and determines the frequency with which the instrument will wake up and measure the set measurement channels. Typical current consumption of a switched on station without a GSM modem on with one 4 - 20 mA sensor is around 30 mA. Between measurements, the microprocessor and with it the whole station is put into a very low power consumption mode (20 uA).

Individual measurement channels can have their own "Archiving Interval" set differently, which must be a multiple of this basic recording interval. The average of as many measurements as the basic archiving interval fits within the archiving interval of the recording channel is then stored in memory.

The H40 automatically determines the time of the first recording so that, regardless of the set archiving interval, the recording occurs at the full hour. For example, if the "Archiving Interval" is set to 10 minutes and the station starts measuring at the 13th minute of the current hour, the first memory entry will take place at the 30th minute and regularly every 10 minutes thereafter. Thus, the station will not store data at the 23rd, 33rd, 43rd, etc. minute.

Fault and emergency conditions The name of this option implies its meaning. Checking it allows to store extraordinary and unexpected conditions in the event memory, which can be, for example, disconnection of the measuring sensor, error signal of the intelligent probe, etc.

Sent messages Checking this option allows you to store information about sent SMS messages in the data memory. In addition to the sending time, the text of the sent message and the recipient's phone number are also recorded.

Note: The event memory is automatically loaded along with the reading of the data memory and its contents are stored in a file with the *.dte extension. The file name under the asterisk is the same as the measured data file name. When using the server for data acquisition, the event table is displayed last in the "GRAPH" section.

Messages received Similar to the previous choice. The checkbox enables storing the exact time of SMS messages receipt into the event memory, including their text and the sender's identification (his/her phone number).

4.2.4. Power and diagnostics

Power supply Unap The H40 is powered by a 3.6V lithium battery. This voltage would be insufficient to power most of the probes and sensors in use, so the instrument includes a step-up DC/DC converter that produces a voltage of the desired magnitude from 6 V to 15 V at its output. The "Power Unap" parameter allows you to set the optimal supply voltage according to the type of connected sensor. Setting the supply voltage too high leads to a shortened lifetime of the power supply battery. The optimum supply voltage size is 1 - 2 V higher than the minimum permissible supply voltage of the measuring sensor used (see table on page).

If several sensors with different minimum Unap voltage requirements are connected to the station, it is necessary to set the voltage according to the highest required value.

Measurement delay after switching on Unap Some sensors provide a valid measured value only after a certain period of time after the supply voltage is switched on. Examples include some ultrasonic or radar level sensors connected via a two-wire 4 - 20 mA signal. The typical rise time of these sensors ranges from 20 to 50 s, and although their use in conjunction with the H40 station is not optimal, they are often connected to these stations (river level monitoring).

The parameter value is adjustable from 0 to 125 s with a resolution of 0.5 s.

External Power Testing This parameter must remain unchecked for the station. The Hydro Logger H40 cannot be powered from an external power supply.

4.2.5. Communication speeds and protocols

RS-232 Serial interface for connecting the H40 station to a PC with the MOST program

The RS232 connection uses the FINET transfer protocol of the MOST program. The baud rate must be set to 19200 Bd.

4.3. Analog channel settings

Analog channels form the basic structure of the recording part of the H40 station. The analogue or pulse signals are measured, converted to the measured physical quantity and stored in memory in the selected units of measurement. Free channels can also be occupied by a value calculated from the values on the occupied channels (sum, difference and special functions). Each channel can have its own archiving interval and alarm limits.

By pressing the right mouse button over the selected channel, you can copy, paste or delete its parameters.

Step 1 Setup: select any free channel

Step 2: Select the measured quantity

Step 3: Select the measurement method

Activation of alarms can trigger the sending of SMS or change the basic archiving interval to an overlimit interval.

A limit alarm occurs when the measured value exceeds the upper limit or falls below the lower limit.

The channel name will be displayed on the unit display and in the SMS (diacritics are automatically suppressed before sending the SMS). The input does not have to match the channel name.

Other important parameters dependent on the measurand and the measurement method.

The overlimit interval will help to record interesting waveforms in detail.

Hysteresis prevents frequent switching on and off of the alarm.

The steepest alarm is activated on both rise and fall above the set speed.

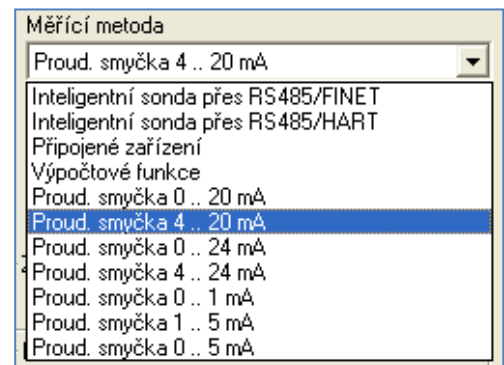
4.3.1. Setup procedure and basic parameters

Channel Each measurand occupies one channel in the station, whose parameters and memory space are fully available to this one measurand only. The user has the possibility to set a total of 8 analogue channels.

Do not confuse the channel with the input. A signal fed to one input can be processed and archived on multiple channels. Selecting the channel serial number is the first step in the setup.

Measured quantity The selection of the measurand from the offered list must be the second step, because the list of offered measurement units and measurement methods depends on the selected measurand.

Measuring method In the list of measurement methods, you need to select the appropriate signal type of the connected probe. For example, when measuring the level in a VDJ with a submersible pressure transducer with standard current output, select the method "Current. Loop 4 - 20 mA"



The measurement method called "Calculation Functions" has its place at the H40 station. With its help, it is easy to monitor the continuously calculated moving average for a configurable time interval on a separate channel and to activate the sending of a warning SMS according to this calculated value. It is usual that the archiving of this auxiliary channel is suppressed (see below). Other methods in the "Calculation functions" menu include, for example, the sum or difference of two channels.

RS485 Very often a measuring probe or sensor is connected to the telemetry station via the RS485 serial communication interface. With this method of communication between the station and the sensor, it is necessary to set the communication address of the sensor and the number of the internal measurement channel for the desired physical quantity (see overview table on the following page) in addition to the appropriate measurement method.

The measuring method **"Intelligent probe via RS485/HART"** is set for probes from BD Sensors s.r.o. , equipped with RS485 interface.

The measurement method **"Intelligent probe via RS485/FINET"** is set for FIEDLER probes and sensors equipped with RS485 interface.

Units Some quantities, such as pressure or flow, have a rich list of units in which the desired quantity can be measured, archived and displayed. Other quantities, such as rainfall or battery voltage, offer only one type of unit.

Number of decimal places An important parameter for determining the resolution of each monitored variable is the number of decimal places with which the measured variables are to be archived in the selected units of measurement. A higher number of decimal places is at the expense of the allowed range. An inappropriate choice of the number of decimal places may cause the maximum range to be exceeded, resulting in 'clipping' of out-of-range values.

The maximum possible magnitude that the measurand can take is 65535 for integers and it decreases decade by decade as the number of decimal places increases. Bipolar quantities such as temperature or voltage have half this maximum possible value. This "limitation" results from the 16-bit archiving of measured instantaneous values.

The relationship between the number of decimal places and the allowable range of the monitored variable can be seen in the following table.

Tab. 2: Maximum range of archived values

No of dec.	Resolution	Max. range of unipolar quantity	Max. range of bipolar quantity
0	1	0 ... 65535	-32767 to +32767
1	0,1	0,0 .. 6553,5	-3276.7 to +3276.7
2	0,01	0,00 .. 655,35	-327.67 to +327.67
3	0,001	0,000 .. 65,535	-32.767 to +32.767

Access This parameter determines which terminals will be used to connect the sensor. As mentioned, the H40 station has one pulse input PV1 and one current analog input AV1.

RS485-address and channel setting If you select one of the measurement methods using the RS485 serial bus, MOST will require the **"Address"** and **"Channel"** parameters to be set instead of the "Input" parameter.

The screenshot shows the configuration window for channel K8. The 'Měřicí metoda' dropdown is highlighted with a red arrow pointing to a yellow callout box. The 'Vstup' dropdown is set to 'RS485', and the 'Adr.' and 'Kan.' fields are set to '9' and '3' respectively, with a red arrow pointing to another yellow callout box. The 'Zobrazení na displeji' section has 'Akt.hodnota' checked, with a red arrow pointing to a third yellow callout box. The 'Interval archivace' is set to '60 min'.

Measurement method for communication with probes under FINET protocol

Serial number of the internal channel of the connected device

Communication address of the connected device

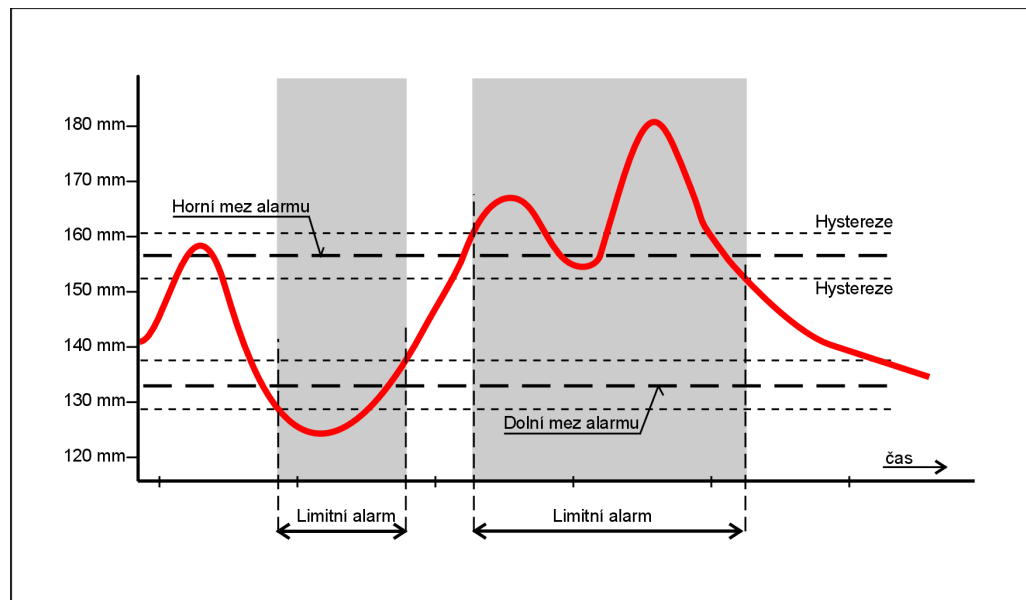
**Addresses and
measurement
channels of
sensors with RS485
output**

Type Sensors	Address	Unap [V]	FINET	Modbus	Channel	Measured quantity	Resolu- tion	Units
METEO weather sig- nal converter	1	12	✓	✓	K1	Wind speed	0,01	m/s
					K2	Wind direction	10	°
					K3	Maximum wind *	0,01	m/s
					K4	Relative humidity - sensor 1	0,01	%
					K5	Air temperature - sensor 1	0,01	°C
					K6	Relative humidity - sensor 2	0,01	%
					K7	Air temperature - sensor 2	0,01	°C
					K8	Global radiation - sensor 1	0,1	W/m ²
					K9	Integrated radiation - sensor 1*	1	W/m ²
					K10	Global radiation - sensor 2	0,1	W/m ²
					K11	Integrated radiation - 2* sensor	1	W/m ²
TEP1/K (/H)	11	6	✓		K1	Air temperature, Pt100-A sensor	0,001	°C
TEP1/H	11	6	✓		K1	Water temperature, Pt100-A sensor	0,001	°C
TEP06	4	6	✓		K1-K6	Temp. on channel K, Pt100-A sensors	0,001	°C
PTZ04 transmitter for soil strain gauges	15	6	✓		K1-K4	Tensometric soil suction pressure - 90..+80	0,01	kPa
					K5-K8	Soil temperature	0,1	°C
					K9	Atmospheric air pressure	0,1	mbar
					K10	Air temperature	0,1	°C
US1200 US4200	5	12	✓		K1	Level (1200 mm from probe = 0)	1	mm
					K2	Air temperature	0,1	°C
ESP11 pH meter	6	12	✓		K1	Water temperature	0,1	°C
					K2	pH	0,01	pH
ESR11 redox meter	7	12	✓		K1	Water temperature	0,1	°C
					K2	Redox potential	0,1	mV
ESV11 conductivity sensor	9	8	✓		K1	Water temperature	0,1	°C
					K2	Conductivity linearly temperature compensated.	1	µS/cm ²
					K3	Conductivity of non-linear comp. EN27888	1	µS/cm ²
					K4	Conductivity without temperature compensation	1	µS/cm ²
ATM01 ATM11 Atmospheric pressure sen- sor departs.	10	6	✓		K1	Atmospheric air pressure	0,1	mbar
					K2	Pt100 air temperature (ATM11)	0,01	°C
					K3	Air temperature sensor	0,1	°C
					K5	Air pressure, delta= -500,00 mbar	0,01	mbar
					K6	Air pressure converted to main sea	0,1	mbar
RVT01 RVT11 RVT13	11	6	✓		K1	Relative humidity	0,1	%
					K2	Air temperature SHT (RVT01,RVT11)	0,1	°C
					K3	Pt100 air temperature (RVT11, RT13)	0,01	°C
TSH22 pressure level sensor	14	6	✓		K1	Level	1	mm
					K2	Water temperature	0,1	°C
					K5	Level only at t> 0°C (from WF 1.05)	1	mm
PSH30 float hunger sensor.	15	6	✓		K1	Level	1	mm
					K3	Air temperature	0,1	°C

*channels are functional only when the transmitter is powered continuously
Unap ... the required minimum supply voltage of the sensor.

ALARMS

The H40 station allows you to set limit and steady-state alarm parameters for each channel. After activating the alarm, it is possible, for example, to record the measured values more frequently (even on other channels) and send warning SMS or change the interval for sending data to the server.



Limit alarms and their parameters

Limit alarm The setting limits define the area in which the measured value can move. A drop in the instantaneous value below the *Lower Limit* reduced by the *Hysteresis* or, conversely, a rise in the instantaneous value above the *Upper Limit* increased by the *Hysteresis* will cause an immediate activation of the limit alarm. The alarm can only be switched off again after the instantaneous value has returned to the allowed range narrowed on both sides by the value of the *Hysteresis* parameter. These relationships are illustrated in the previous figure.

To remember: A value within the limits is OK, an alarm occurs when the limits are exceeded by a hysteresis.

Steep alarm The steep alarm requires the input of a single parameter. This parameter is called the *Steepness Limit* and its value indicates the maximum allowable change in the monitored variable over the archiving interval. If this parameter is exceeded, either by an increase or decrease in the monitored variable, in a time less than or equal to the set archiving interval, a *Steep Alarm* will be activated on the channel.

4.3.2. Archiving

Each recording channel of the instrument has its own **Archiving Interval**, adjustable in multiples of the **Basic Archiving Interval** (it is located in the 1st tab of the parameters "Basic parameters" and is usually set to 10 min). Less important quantities can therefore be recorded at a longer interval (e.g. 1 h), thus saving both the data memory of the H40 and the time required to transfer the measured data to the server.

Note: Because the Archiving Intervals are stored in the instrument parameters as multiples of the Base Archiving Interval, a change to this Base Interval will be reflected in all Archiving Intervals for each recording channel.

Archiving suppression A zero value of the "Archiving interval" parameter will exclude the set channel from archiving. This can be preferably used for those channels that are to be used only for activating SMS alerts.

SETTING THE NUMBER OF MEASUREMENTS

The number of samples from which the final value for archiving will be calculated using the weighted average method can be set by combining the *Basic Archiving Interval* and the *Archiving Interval* for each recording channel.

Averaged value storage

The H40 station performs one measurement on all set channels at the interval specified by the *Basic Archiving Interval* parameter. If this parameter is the same as the Archiving Interval of the measuring channel, this one measured value is stored in memory at the end of the archiving interval. However, if the *Basic Archiving Interval* is set to e.g. 10 min and the *Archiving Interval* of the measuring channel to 30 min, the average value calculated from 3 measured samples is stored in the memory of the instrument every 30th minute.

The parameter settings can be seen from the following examples of settings:

Example A: Storing the current value measured at the end of every 30th minute

Basic archiving interval = 30 min

Archiving interval = 30 min

Example B: Store the average value of 6 measurements every 60th minute.

Basic archiving interval = 10 min

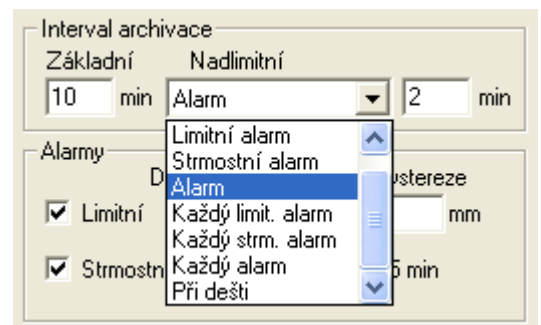
Archiving interval = 60 min

Note: Reducing the "Basic Archiving Interval" parameter below 10 minutes results in a faster discharge of the power supply battery, so set this parameter value judiciously. This note becomes less important when using an external power supply.

OVERLIMIT ARCHIVING INTERVAL

The figure shows the triggering conditions for the over-limit archiving interval. Setting it allows you to record in detail the progress of the incident on the measurement channel.

An overlimit interval (2 minutes in the example in the figure) can be triggered not only by activating an alarm on the channel itself (in the figure), but also by an alarm on another set channel.



Suppressing the recording of unimportant data

Appropriate setting of the archiving parameters allows, for example, to suppress the recording of uninteresting low values of the measured variable and to store only values that exceed the set limit.

Example 1: When measuring temperature, only store values greater than 30 °C.

Basic archiving interval = 10 minutes (in the basic parameters window)

Archiving interval = 0 (in the channel window)

Limit alarm set (Lower limit = 0, Upper limit = 28, Hysteresis = 2)

Over limit trigger condition: limit alarm

Archiving interval overlimit value = 2 minutes

Example 2: When measuring the level, record detailed values greater than 160 mm

Basic archiving interval = 1 min (in the basic parameters window)

Archiving interval = 5 min (in the channel window)

Limit alarm set (Lower limit = 0, Upper limit = 155, Hysteresis = 5)

Over limit trigger condition: limit alarm

Archiving interval overlimit value = 1 min

The *overlimit interval* is specified in minutes and cannot be greater than the value of the base Archiving Interval.

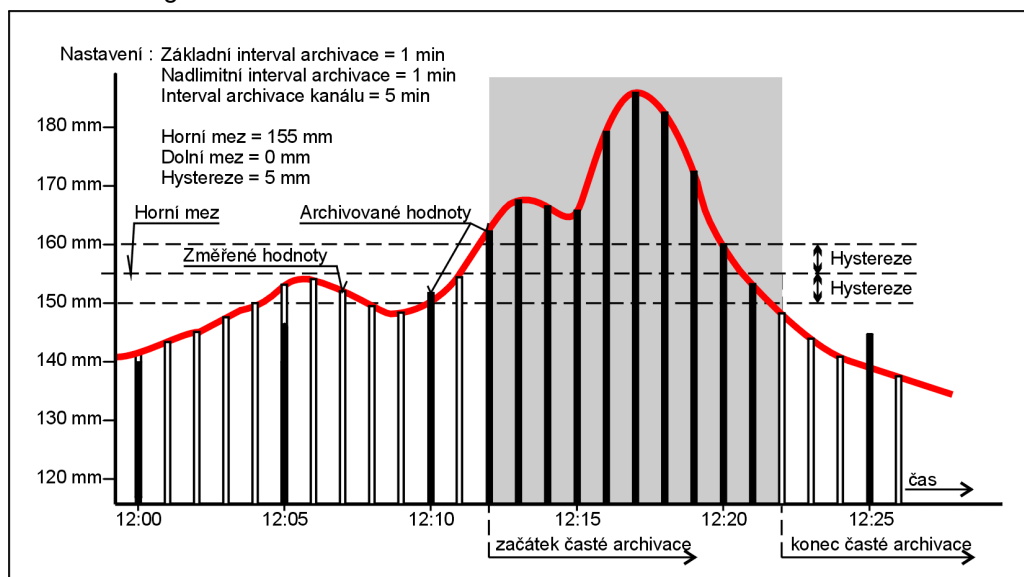


Fig. 1 Detailed record of the measurand using the Over-Limit Archiving Interval.

Note: The trigger condition for going to the "Over Limit Interval" archiving of a given channel can be a Limit or Gradient alarm on the channel itself, or a Limit or Gradient alarm on any other channel. A special trigger condition for the "Over Limit Interval" may also be the start of rain (first flip of the boat rain gauge).

4.3.3. Advanced parameters

An important step in setting up a recording channel is to call up a window with advanced parameters. The shape of this window and the type of parameters it contains depends on the selected measurand. For example, a different window is used to set up a level measurement and another simpler window opens for a temperature measurement.

EXAMPLE: LEVEL MEASUREMENT

Most commonly, the level is measured with a pressure dipping probe or an ultrasonic probe placed above the maximum level.

Output signals

The output signal of the probes is either a 4 - 20 mA current output (0 - 20 mA, 1 - 5 mA) or an RS485 serial interface. Depending on the type of output signal, select the "Measurement method" parameter and set the Input number or address for RS485 communication.

After pressing the "Advanced" button, a window opens with parameters that define the measuring range, zero offset and possible correction coefficients for calculating the level.

Signal proportional to level

Use the first option "Signal proportional to level" for most probes. You only need to set the level vs. distance calculation for older US1000 ultrasonic probes, which sent the distance of the level from the probe instead of the level.

Max. value

This parameter is set for probes with current output, where the parameter value corresponds to the maximum possible measuring range of the probe. Therefore, for a pressure probe with a measuring range of 0 to 6 m of water column (corresponding to an output current of 4 to 20 mA), set the parameter Max. value = 6 m.

The *Max. value* parameter is not set for ultrasonic probes type US1200, which send the already measured level directly in mm.

Delta This parameter can be used to scroll the zero level value. The additive coefficient A_0 of the correction equation has the same meaning.

Zero band The value of the parameter determines in set units the insensitivity band in which the signal will be artificially zeroed. In this way, various signal noises in the vicinity of the zero value are filtered out.

Correction equation Finally, the measured value can be adjusted by a 2nd order polynomial. This option is retained for all measured quantities except flow and volume, where the individual parameters A_0 to A_2 take on different meanings.

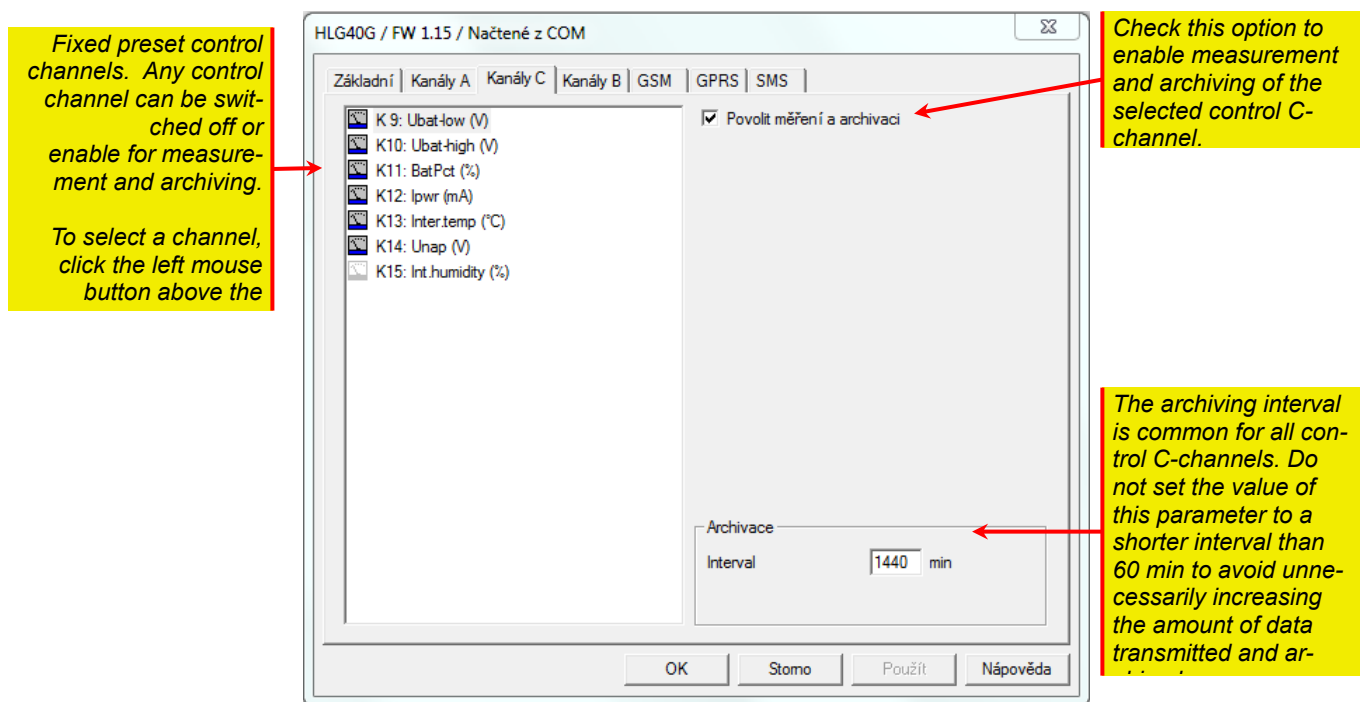
Filter parameters

Blackout on The value of this parameter determines the maximum possible change of the measured quantity in one second. A small value actually means a large dimming of the signal and vice versa. A zero parameter disables signal damping.

Error when changing o If the measured value changes by the set limit value, the measured value will not be stored in the memory, but the corresponding error code will be stored.

4.4. Control channels

The Hydro Logger H40 contains 7 control channels K9 to K15 that monitor the operating parameters of the instrument such as the capacity of the power battery, the temperature and humidity inside the instrument or the current draw of connected sensors and probes.



The user has the option to enable/disable the selected control channel and set a common archiving interval. Usually this interval is set to a value higher than 60 min (most often 1440 min - 1x per day), so that the volume of transmitted and archived data does not increase excessively.

List of control C-channels

Channel	Measured quantity
K9. Ubat-low [V]	Voltage loaded on the lithium battery supply (I = 100 mA). Measurements are taken at 24 h intervals or at the end of each data session to the server.
K10. Ubat-high [V]	Unloaded lithium battery supply voltage (I = 5 mA). Measurements are taken at 24 h intervals or after each data session to the server.
K11. BatPct [%]	Capacity of the power supply battery calculated by successive integration of the current drawn from the battery
K12. Ipwr [mA]	The amount of current drawn from the Unap power terminal. Analog sensors with 4 - 20 mA output or probes communicating via RS485 serial interface are connected to this terminal. The power supply to external sensors and probes is only momentary for the duration of the measurement of the monitored quantities.
K13. Inter.temp [°C]	Temperature inside the device
K14. Unap [V]	Unap terminal voltage size The size of this supply voltage is user adjustable from 6 to 15 V DC.
K15. Int.humidity [%]	Relative humidity inside the instrument An increase above 80% indicates a leak in the instrument and can lead to damage to the electronic circuitry in the long term. An RH sensor is not standard with the instrument.

The most important for the user is the K11 control channel, which shows the remaining capacity of the power battery. The other control channels are mainly important for servicing and self-diagnosis of the correct function and optimum setting of the instrument.

4.5. GSM parameters

This tab contains parameters related to SMS communication, including access to SMS phonebook settings.

The screenshot shows the 'GSM' tab in the HLG40G configuration interface. The window title is 'HLG40G / FW 1.15 / Načtené z COM'. The 'SMS' sub-tab is active. The interface is divided into several sections:

- Příchozí SMS (Incoming SMS):** Includes a 'Heslo' (password) field set to 'SEZAME', a checkbox for 'Přij. zprávy pouze od odesil. ze seznamu' (Receive messages only from the list), and a checkbox for 'Zasílat odpověď "Chybné heslo"' (Send response "Wrong password").
- SIM karta (SIM card):** A dropdown menu is set to 'Obecná paušální karta' (General flat rate card). Below it are fields for 'Interval kontroly kreditu:' (1440 min), 'Cena SMS zprávy:' (2 CZK), 'Limit kreditu pro varování:' (50), and 'PIN (0 pro vypnutí)' (0).
- Odchozí SMS (Outgoing SMS):** A checkbox for 'Mož. do zasílané zprávy čas události' (Possible to send message at the time of the event) is checked.
- Zasílání INFO dotazu (Sending INFO query):** Includes a 'Formát odpovědi' dropdown (set to '?'), a 'Tel. seznam' button, and an 'Automaticky poslat' checkbox. The command line field contains 'V1.V2.V3.Q'. Below it are fields for 'Poprvé poslat' (20.6.2014), a time field (0:06:50), a frequency dropdown (1x týdně), and a duration field (1440 min).
- Napájení modemu (Modem power):** Includes a field for 'Po odeslání dat na příjmu' (0 min) and a checkbox for 'trvale zapnutý při ext. napájení' (Always on when external power).

Yellow callout boxes with red arrows point to specific settings:

- Top left:** 'Password for query SMS (made from query codes)' points to the 'Heslo' field.
- Middle left:** 'Tick if you want the communicator to reply only to users listed in the phone book.' points to the 'Přij. zprávy...' checkbox.
- Bottom left:** 'A command line according to which the unit composes an SMS message and sends it to the number from which the INFO request was sent. Do not set more than 6 - 8 commands as the SMS length is limited' points to the 'Zasílání INFO dotazu' command line field.
- Bottom left (lower):** 'You can set the time and day of the week you wish to receive informative SMS.' points to the 'Poprvé poslat' date field.
- Top right:** 'Depending on the SIM card you are using, select the operator and card type from the list. This option is used to periodically check the credit amount of the prepaid SIM card' points to the 'SIM karta' dropdown.
- Middle right:** 'Advanced credit check parameters' points to the 'Interval kontroly kreditu:' field.
- Bottom right (upper):** 'After sending the data to the server, the GSM module of the device can remain logged in for a short period of time in case of a data call or in case of receiving and sending SMS messages.' points to the 'Po odeslání dat na příjmu' field.
- Bottom right (lower):** 'Access to a user-modifiable phone book' points to the 'Tel. seznam' button.

SIM card type Recently, the formerly widely used prepaid credit SIM cards have taken a back seat and the use of flat-rate SIM cards, which usually include a certain amount of free data, has become more widespread.

For this reason, and also because the information about the remaining credit on the prepaid SIM provided by the operator often changed in the form and structure of the informative SMS, the device's FW stopped supporting the automatic calculation of the remaining credit on the prepaid SIM card. Therefore, if the user selects an option other than "General flat rate card" in the device parameters for the SIM card type, the calculated remaining credit will most likely not correspond to the reality.

The other GSM communication parameters can be left in the basic settings except for the command line for setting the content of the periodic or informative SMS. This command line should be set according to the actual channel occupancy and the requirements of the station operator. The list of codes used in the command line is given in the table on page 41.

Note: The H40G will also respond to incoming SMS containing individual codes separated by a comma after the password.

The importance of other parameters will be explained in the chapter "SMS communication".

4.6. SMS communication

4.6.1. List of authorised persons

The basic settings of the GSM parameters include the creation of a list of persons to whose mobile phones warning or informative messages should be sent. The window with the phone list opens after pressing the **"Phone list"** button in the "GSM" parameters tab.

	Jméno	Telefonní číslo	Skupina	1.	2.	3.	Povol příjem SMS
1.	dispečink	+4201 23987456		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	servis	+420321654987		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	technolog	+420147258369		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Group You can direct the sending of a specific message to a group of people, who will be sent the message sequentially according to the order in the list. You can create up to 3 groups of people in the list.

4.7. SMS distribution

This chapter will describe the setting parameters and SMS types that can be divided into basic categories:

SMS sent from the station	SMS received at the station
Informative SMS	Inquiry SMS
Warning SMS	
Control SMS	Control SMS

Informative and query SMS messages have a common group of codes that determine the content of the information transmitted from the device to its operator or, conversely, the command to compose an informative SMS on the device side and send it to the interviewer.

The sent control SMS can directly control the relay in the addressed opposite station. A received control SMS, on the other hand, causes the specified command to be executed. Warning SMS messages are dealt with in a separate chapter 4.8. on p. 35.

4.7.1. Informative SMS

In this text, we will refer to informative SMS as those messages that will be automatically sent from the communicator to a group of persons or an individual on request or at regular intervals, regardless of the actual value of the measured variable (as opposed to warning SMS, which are activated by reaching a set limit, a fault, an alarm, etc.).

INFORMATIVE SMS SENT REGULARLY

To activate the regular sending of informative SMS messages, select the recipient in the parameters window called "Automatically send". This drop-down parameter will offer all preset recipients from the phonebook, including groups.

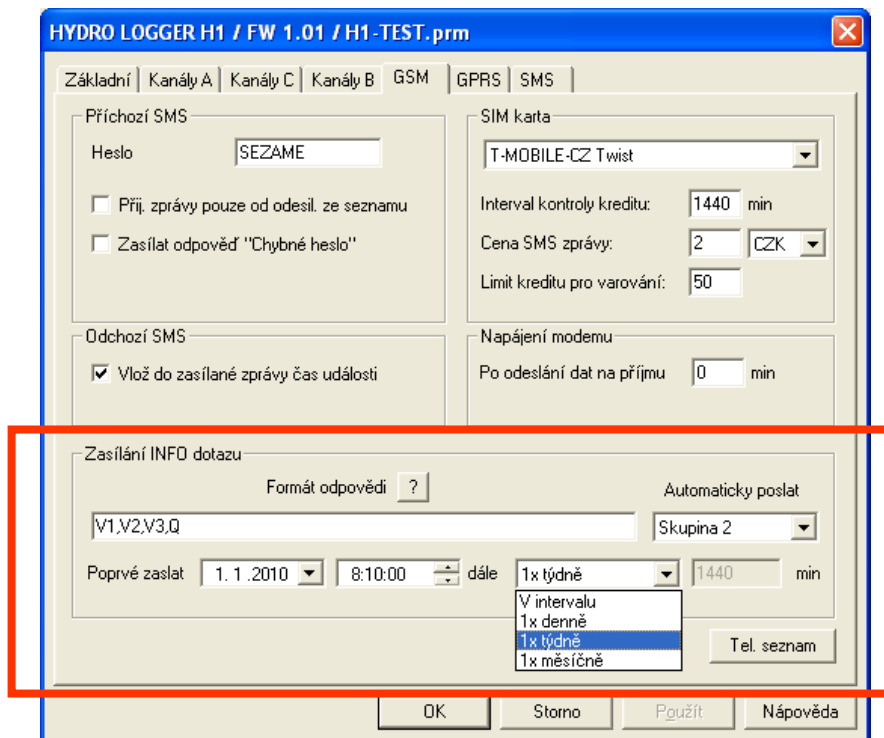
Regular sending

In the "First time send" setting window on the "GSM" tab, the time when the informative SMS message is to be sent is set. The "further" parameter determines the frequency of the message to be sent. It is possible to set monthly, weekly, daily sending or to specify any interval adjustable in minutes. In case of weekly and monthly sending, it is necessary to set the day of the week (month) when the sending should be done regularly.

From the point of view of power saving of the battery, it is advantageous to set the same time for GPRS communication and for regular sending of informative SMS, because this way only one login of the station to the GSM network takes place.

Creating an informative SMS

The content of the informative SMS is determined by the sequence of codes on the control line. The meaning of the individual codes and their overview is on the next page. The individual codes are separated by a comma, no spaces, no comma or full stop at the end:



4.7.2. Inquiry SMS

The second large group of informative messages consists of replies to incoming SMS inquiry messages. Depending on what query codes the query SMS contains (see the list on the next page), the station will compose the text of the reply and send it to the interviewer. The same rules apply for the composition of the query SMS as for the informative SMS.

Warning:

Inquiry SMS are received only after the device is logged into the GSM network, and therefore the response to the inquiry SMS may be significantly delayed. For the H40G station, it is assumed that the modem is switched on and data is sent to the server at an interval of once a day.

Password:

To prevent unauthorized persons from making queries, a password must be included at the beginning of the query SMS. This password is accessible to the user in the "GSM" tab.

INFO query

A specific query SMS consists of a short message containing only one word "INFO". This can be written in lower case and must not be preceded by a PASSWORD. The

device responds to the received INFO query with a message composed according to the codes contained in the control line.

LIST OF QUERY AND CONTROL CODES

Station H40G does not distinguish between upper and lower case

Inquiry code	Control command	COMMANDS (Query codes can be separated by comma in one SMS query)
Vk		Current channel value k (1.. 8)
LVk		Last stored channel value k (1-8)
Every		Minimum value of today's channel k (1.. 8)
Xk		Maximum value of today's channel k (1.. 8)
Ilk		Minimum value of the previous day's channel k (1.. 8)
XLk		Maximum value of the previous day's channel k (1.. 8)
PO		Total number of messages sent
PP		Total number of messages received
Q		GSM signal intensity in the range 0..31
NA		(No Answer) Do not reply to receive a control SMS

* A different password can be set for control commands from the password for obtaining information from the unit.

EXAMPLE OF QUERY SMS

Inquiry SMS

HESLO,V3,V2,U

PASSWORD ... access code

V3 ... query for the current value of the 3rd channel (temperature)

V2 ... query for the current value of the 2nd channel (level)

U ... query for battery voltage value

Answer:
(Informative SMS)

NAME, V3=8.4° C, V2=1259 mm, U=3.26 V

NAME ... station name tag (configurable parameter)

Time of dispatch The station name can be followed by the date and the current time of the unit as information about the time of transmission of the message from the unit to the operator's network. In this case it is necessary to have the option "Insert event time into the sent message" checked in the "GSM" parameters page.

4.7.3. Special characters inserted in SMS text

When setting the parameters of SMS messages from the MOST program, it is possible to place special characters in the text of the warning SMS, which the control processor either transforms into another character string or does not send the SMS and instead performs an "alarm data sending to the server".

Special characters in SMS text

#V The current value, including the units of measure, is inserted into the text of the sent SMS.

#G The station performs an "Alarm data upload to the server". Based on the emergency data sent, for example, warning or informative emails can be sent from the server. The setting of the emails is described in the manual "Web browser control".

4.7.4. Control SMS incoming

The Hydro Logger H40G does not contain any relays, therefore, unlike the H7 or M4016-G3, the number of control SMS is severely limited. In fact, it is only a command to immediately send the measured data to a server on the Internet.

This command is usually used to immediately rebuild parameters according to a new parameter file on the server.

HESLO,DIAL0

After receiving this command, the measured data is immediately transferred to the server via the GPRS network and, if necessary, a new parameter file is downloaded from the server to the device (no waiting for a regular data session).

Security The stations have built-in two-level security against misuse of control commands by an unauthorized person.

Password: The first level of protection consists in the presence of a HESLA, which must be used to start every command message. The password can be any sequence of up to 12 characters, separated from subsequent commands by a comma.

Security Another configurable condition for executing the command is that the phone number from which the control message was received is present in the list of stations with SMS reception enabled (if the option "Receive messages only from senders in the list" is set in the basic GSM parameters window). **In this case, the phone number must also be listed with the country identification, i.e. for the Czech Republic with the prefix +420.**

Response suppression The station responds to command SMS messages with a confirmation SMS message that the command has been received and is understandable. If this confirmation SMS is not to be sent, the special command NA (No Answer) must be included anywhere in the text of the control SMS.

EXAMPLE CONTROL SMS

Control SMS:

HESLO,DIAL0

PASSWORD ... access code (enter the actual password set on the device)
DIAL0 .. . the procedure for immediate sending of data to the server is activated

4.8. Warning and control SMS

Automatic sending of a preset warning or control SMS can be triggered not only by exceeding the preset limit value on the measuring channel, but also by a change in the state of the binary channel, an error in the measuring signal, activation or deactivation of an alarm on the channel, etc.

There are 14 SMS alerts.

When you select a group as the recipient, the same SMS is sent to each member of the

Trigger condition, after which the warning SMS is activated

The limit value above which the to activate the warning SMS

Phonebook for 10 recipients that can be grouped together

You can temporarily or permanently disable an SMS that you have already set up. The set parameters will be preserved.

The SMS will be sent only after the trigger condition has continued.

Prevents frequent sending of SMS when the variable moves around the li-

Text without accents. Special characters allow automatic insertion of the instantaneous value of the mea-

Starting conditions The H40G continuously evaluates the current measured values on both analogue and binary channels. If the value exceeds the set limit or if a binary input is switched on or off, it sends a pre-prepared SMS to selected mobile phones.

Activation by sum For integral variables (instantaneous or cumulative flow, rainfall, number of pulses, ...), the activation of the SMS warning can also be triggered by exceeding a pre-set limit value for a certain time.

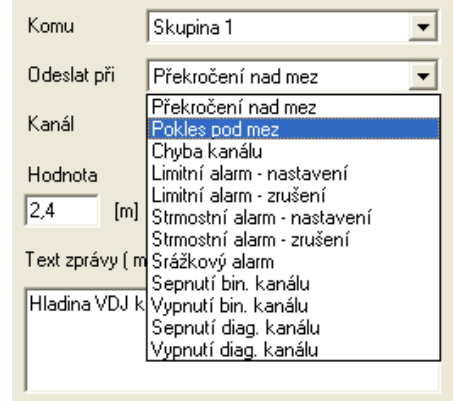
Properties of warning messages Warning messages are the basic and most frequently used type of SMS in the communicator. The features of warning SMS can be summarized in the following points:

- The user can set the text of up to fourteen different warning messages.
- At the beginning of each alert SMS it is possible to automatically insert the name of the device sending the message and the current time in the device at the time of sending the SMS. Only then is the actual text of the message followed.
Note: in special cases, such as sending a message to a special operator number that forwards incoming messages to e-mail, it is necessary to disable the automatic insertion of the name tag and time.
- For each message, you can select the recipient from a list of authorised persons. You can also create a group of persons to whom the SMS will be sent in turn.
- The sending of the message can be conditioned by the time period for which the activation condition of the message must be fulfilled (overshoot, undershoot, binary state change, measurement error, alarm).
- Resending of the next warning message is activated only after the current value returns to the allowed area by at least the *Hysteresis* value and after the *Limit value* is exceeded again for the set Delay time.
- It is possible to insert the current measured value into the text of the warning SMS using the #V character pair. Not only the current measured value, but also the channel name and the set units of measurement are transferred to the SMS text.
- The text length of one SMS must not exceed 50 characters (this limit does not include automatically inserted texts - *name tag*, time, current value).

PARAMETERS SETTINGS

The adjacent image shows an expanded menu of activation conditions that can ultimately trigger an automatic SMS alert. However, the sending of the SMS still depends on the *Delay* parameter.

Delay This parameter is set in seconds and the activation condition must last as many seconds as the value of the parameter without interruption before sending the SMS. Even a short-term return of the input to the previous state resets the time counter and the time measurement starts from the beginning.



Activation conditions *Alert SMS activation conditions table:*

Condition	Description
Exceeding the limit	The current value on the control channel has exceeded the size of the <i>Value</i> parameter. If the "Calculation functions" method is selected from the list of measurement methods, moving average, sum or difference of two adjacent channels and some other special calculations can be registered on a separate channel.
Decline below the limit	The current value on the selected channel drops below the size of the <i>Value</i> parameter. The same rules apply for the drop as for the overshoot.
Channel error	Occurrence of a communication error with the measuring probe connected to the channel or a detectable fault in the output signal of the connected sensor (current signal out of range, quantity out of the permitted range, ...)
Limit alarm - settings	The limit alarm value on the control channel has been exceeded by the set <i>hysteresis</i> - i.e. the limit alarm has been activated.
Limit alarm - cancellation	The limit alarm (return of the measured value to normal limits) has been terminated on the control channel.
Steep Alarm - Settings	A steep alarm value has been exceeded on the control channel.
Steep alarm - cancellation	The steady alarm on the control channel has been terminated.
Diagnostic channel disconnection	The set limit value on the control C-channel, i.e. the Iopto current (DG12) or the Unap current (DG11), has been exceeded. The limit value is set on the first "Basic" parameter tab in the "Power supply and diagnostics" section.
Diagnostic channel disconnection	The measured value of the diagnostic channel has fallen below the set limit value, i.e. low battery (DG4) or external supply voltage (DG6). The limit value is set on the first "Basic" parameter tab in the "Power supply and diagnostics" section.

Channel When selecting a control channel, MOST will list all occupied channels including their names. For the last two activation conditions, a list of diagnostic DG channels is offered. Multiple limit messages can be activated with one channel.

Text The text length of one SMS message is limited to 50 characters. The text may contain commas and semicolons, but these characters are converted to non-diacritical characters when creating the SMS message. The length of the text does not include the *station name* parameter, which is usually automatically inserted at the beginning of the message, or the text with the date and time of sending.

Value The value of this parameter is the threshold for activating the SMS warning message. The value is entered in the same units of measurement that the control channel works with.

Hysteresis This parameter prevents frequent sending of the same SMS when the measured value fluctuates around the limit value. The same SMS is sent only after the measured value returns to normal by at least the *Hysteresis* value and then exceeds the limit value again. Unlike alarm or relay parameters, it is not necessary to exceed the limit value by the Hysteresis to activate the SMS message, but the SMS is sent immediately after the limit value is exceeded.

4.9. Parameters for sending data under TCP/IP protocol

The "GPRS" tab contains the parameters needed to set up periodic sending of archived data via GSM/GPRS network to the designated server in the Internet.

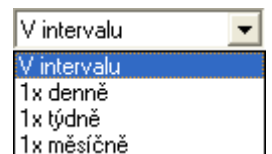
The screenshot shows the GPRS configuration window with several callout boxes explaining key features:

- Enabling GPRS data transfers:** Points to the checked 'Periodické odesílání archivovaných dat' checkbox.
- Setting the time for periodic sending of data to the server:** Points to the 'Poprvé odeslat' date and time fields.
- Set the interval in days or hours for periodic data uploads:** Points to the 'dále' frequency dropdown.
- Setting the interval in minutes for sending data for the duration of an alarm condition on a measurement channel:** Points to the 'Interval při ALARMu' field.
- Special command line for modem settings:** Points to the 'Konfigurační příkaz modemu' text area.
- List of preset APNs (Internet access points) of selected mobile operators:** Points to the APN dropdown menu.
- Box for setting your own APN for operators not listed:** Points to the APN text field.
- Name and password to access the private:** Points to the 'Jméno' and 'Heslo' fields.
- Setting the server address, port and number of retries in case of failed data transfer to the server:** Points to the 'IP adresa a port serveru', 'Počet pokusů', and 'Pokusů do resetu modemu' fields.

Checking the "Periodic sending of archived data" option in the upper left corner of the window enables setting of individual parameters of this service. Uncheck this option to temporarily or permanently disable GPRS communication.

First time send Entering the date and time is used to set up regular data sending. Setting the date to a future day will enable sending from that day onwards. On the other hand, the "old" date in the settings does not matter, the first sending will be done at the nearest set hour and minute.

Further Alarm interval Under this option are the parameters for periodic data sending. If an alarm condition occurs on any measurement channel (it does not matter whether it is a limit or a bridge condition), the communicator can send data to the server more frequently than in the normal "quiet" state. The value of the *Alarm Interval* parameter should not be less than 30 minutes. A shorter interval would put unnecessary load on the communicator battery and GSM/GPRS network, as well as on the server itself receiving data from multiple stations, and would also have a negative impact on the cost of data services.



Note *When only a few measured values are transmitted under the TCP/IP protocol, the protocol overhead itself makes up the vast majority of the information in the transmitted packet and the actual measured data occupies only a small part of the transmitted data volume. Therefore, as the sending interval shortens, the total transmitted data volume increases and thus the station's operating costs increase.*

APN (Access Point Name) The Internet access point must be set according to the type of SIM card and operator used. The "optional" option also allows you to specify special APNs of private corporate networks or foreign operators.

Server IP address and port These parameters are set at the factory and do not need to be changed. If the device will be operated in the customer's own system and the data will be transferred to the customer's own server, it is necessary to set the corresponding IP address and the port used.

5 Service and maintenance

The installed H40 telemetry station requires occasional checking of the cable connection status of the measuring probe and GSM antenna. Especially when installed in the field, the cabling is stressed by weather and sunlight. Mechanical damage to the cables by various rodents often occurs. Suitable cable protectors and a well-designed station installation can ensure trouble-free operation of the station throughout its lifetime.

5.1. Firmware updates



The screenshot shows the FIEDLER website interface. At the top, there is a navigation bar with the FIEDLER logo and the tagline 'ELEKTRONIKA PRO EKOLOGII'. To the right of the logo are links for 'Partnerská zóna', 'Mapa stránek', and 'English'. Below the navigation bar is a menu with items: 'Aplikace', 'Produkty', 'Ke stažení', 'Podpora', 'Společnost', 'Kontakt', 'Reference', 'Monitoring', and 'Datahosting'. On the left side, there is a sidebar under the heading 'PODPORA' (Support) with links for 'Často kladené otázky (FAQ)', 'Odstraňování problémů', 'Informace pro projektanty', and 'Firmware a utility'. The main content area is titled 'FIRMWARE A UTILITY' and features a small image of a microchip. Below the image, the text reads: 'Zde najdete poslední verze programového vybavení (firmware) k našim přístrojům. Stahování firmwaru je umožněno pouze přihlášeným uživatelům. Přihlášení pro naše partnery naleznete zde.' (Here you can find the latest versions of the software equipment (firmware) for our devices. Firmware download is only possible for logged-in users. Registration for our partners can be found here.) It also includes a note: 'Pokud ještě nejste našimi registrovanými partnery, vyplňte prosím krátkou registraci zde. Po potvrzení administrátorem vám bude doručen email s přihlašovacími informacemi.' (If you are not yet our registered partners, please fill out a short registration form here. After confirmation by the administrator, you will receive an email with login information.)

The manufacturer of the Hydro Logger H40 maintains updated firmware versions for most of its products in the "Firmware and Utilities" partner zone on its **www.fiedler. company** server. The partner zone is accessible to authorized users by logging in to the "Support" menu.

Firmware updates are performed from the menu of the MOST program, which must be licensed for service companies. A detailed description of how to update the firmware can be found on this website along with the individual firmware packages.

Follow these steps to update the firmware:

- Connect to the unit whose software you want to update with MOST.
- Read the current parameters from the connected telemetry station and save them as a parameter file as a backup of the current instrument settings. Similarly, back up archived measurement data.
- In MOST, select the "Firmware" option in the "Manufacturing" menu.
- Select the desired data file containing the firmware (*.hex) and load it into the PC by pressing the "Open" button.
- After the new firmware transfer is complete, the unit will automatically restart and MOST will display the message "Firmware update complete".

5.2. Replacing the battery power pack

Control channel K11 displays the remaining capacity of the battery pack, expressed as a percentage. If this value falls below 15%, it is advisable to replace the power pack with a new one. The power pack can be replaced by the user or ordered from the station manufacturer. The power supply unit is equipped with a short cable ending with a connector for easy connection to the electronic board of the instrument.

H40G The Hydro-Logger H40G is powered by a lithium battery pack with a voltage of 3.6 V and a capacity of 26 Ah.

H40D The Hydro-Logger H40D without GSM communication module is powered by a smaller 3.6V / 19Ah block.

When replacing the battery pack, proceed as follows:

- Unscrew the locking screw that secures the front panel in position in the Hydro Logger H40's stainless steel cylindrical housing.
- Slide the electronic part of the instrument connected to the front panel out of the stainless steel housing of the instrument.
- Disconnect the power connector from the electronics, remove the old battery pack from the instrument case and replace it with a new one, connect the power connector to the electronics part and insert it back into the instrument case.
- Apply silicone petroleum jelly to the O-ring in the front panel to prevent moisture from entering the station and slide the front panel with the connected electronics back into the stainless steel housing, securing it with the locking screw.
- Using the connected PC and the MOST program, RESET the capacity counter.

Setting the initial capacity after battery replacement

Button for zeroing counters of the energy consumed so far from the power batteries. Press the button to set the control channel K11 to 100% after inserting new batteries.

After replacing the power supply battery with a new one, you need to reset the power draw counter using the MOST program and set the initial capacity to 100%.

To reset the counter, press the *Reset* button in the "Main Information" window. This window is called up by selecting *Info* -> *Current values* from the main menu and selecting the *Instrument status* tab.

Notice

The used power battery blocks can be returned to the manufacturer of the device (FIEDLER AMS s.r.o. , Lipová 1789/9, 370 05 České Budějovice), who has a contract for the take-back of used batteries. Improper disposal of used batteries could damage the environment.

Technical parameters

Parameters of recording channels

Number and distribution of channels	1 - 8 recording measurement channels with 16-bit resolution 7 control channels for recording voltage, currents, battery capacity consumption, temperature and humidity inside the instrument 1 text channel for storing events (1 record max. 220 B)
Storing data in memory	0 to 3 decimal places (0.000 to 65535; ± 32767)
Data memory capacity	2048 kB Flash type, 250,000 - 450,000 values including time
Archiving interval	From 0 min to 1440 min, 1 min increments, each channel separately
Alarms	Limit and gradient alarm for each recording channel
Other calculations over recording channels	Difference of two channels, sum of two channels Value correction by a general second order polynomial

Inputs

Analog Input AV1	Max. vs. range 0(4) - 20 mA, load res. 100 Ω , surge protection 18 V/ 600 W, ADC resolution 16 bits.
RS485 serial communication interface	Communication protocol FINET (HART, Modbus RTU), adjustable baud rate 1200 - 19600 Bd (default 19600)

Other parameters

Microprocessor	RISC type; 8 bits; supply voltage 3.3 V
Power	Lithium battery pack 3.6 V / 19 Ah (28 Ah)
Current consumption	Type. 6 mA, 30 μ A at rest
Dimensions	Diameter 40 mm, length 340 mm H40 (480 mm - H40G)
Weight	1100 g including batteries (1330 g - H40G)
Degree of coverage	IP67
Connectors	K1: Type M12, 4 poles, IP67;
Working temperature	-25° C ... +55° C (storage temperature -30° C ... +70° C)

GSM module

GSM	Frequency band: 900/1800 MHz (EGSM/DCS) Transmitting power: CLASS 4 (2W @ 900 MHz) CLASS 1 (1W @ 1800 MHz)
GPRS	Slots: Class 12 (4Rx / 4Tx, 5MAX)
SMS	Text SMS, 160 characters Number of configurable SMS: 14 alert, 8 fixed, 1 info Number of query codes for SMS: 19 Number of control codes: 1 Max. number of recipients in the list: 10

SIM card	Access after removing the device from the case, flip-out holder
Antenna	SMA connector, magnetic dual 6 dB, 3 m cable



CE version

The instruments listed in this user manual comply with both the EMC directives 89/336/EU including their supplements and EN 61326-1:98 including its supplements.



Notice

The used lithium batteries can be returned by the manufacturer of the device - FIEDLER AMS s.r.o., Lipová 1789/9, 370 05 České Budějovice, which has a contract with the importer of batteries for the take-back of used batteries. Improper disposal of used batteries could damage the environment.

Disposal of equipment

The manufacturer has a contract for the take-back of this device with RETELA s. r. o. You can find an overview of collection points in your area at www.retela.cz.

Installation according to this user manual may only be carried out by personnel at least competent according to § 5 of Decree 50/1978 Coll. or 51/1978 Coll.

Warranty Card

Type : H40 _____ Date of delivery to customer : _____

Serial number : _____ Date of commissioning : _____

.....
Manufacturer / Supplier - signature

The product was tested and set up correctly before being shipped from the company. Nevertheless, it may happen that during operation, defects may appear on the device that are undetectable when the product is tested by the manufacturer.

If any defect is caused by faulty material, workmanship or software, the product will be repaired or replaced free of charge if the claim is made within the warranty period, which is :

two years from the date of entry into service, but no longer than two and a half years from the date of sale.

If the manufacturer is unable to repair or replace the product within the warranty period, it may provide a refund of the purchase price upon return of the product.

The manufacturer is not liable for defects caused by interference with the design of the device, damage to the device or improper connection. When installing and operating the device, it is necessary to observe all the instructions in the Technical Specifications, the related ČSN and safety rules.

All repairs during the warranty period are the sole responsibility of the manufacturer. For hygiene reasons, only clean and properly packaged products should be sent for repair.

Assurance of conformity

within the meaning of Act No.22/1997 Coll., on technical requirements for products

Manufacturer : FIEDLER AMS s. r. o.
represented by Ing. Jindřich Fiedler
Lipová 1789/9, 370 05 České Budějovice, Czech Republic
ID 03155501, Tel/Fax: +420 386 358 274, E-mail: prodej@fiedler.company

Pursuant to § 13 paragraph (5) of Act No.22/1997 Coll., on Technical Requirements for Products, we assure the distributor/customer that we have issued a "Declaration of Conformity" for the products manufactured/imported by us, which are covered by the aforementioned Act and the relevant government regulations.

In České Budějovice on 17. 01. 2015

Ing. Jindřich Fiedler
Managing Director

TXP0150914.001
H40-V101

Producer:

FIEDLER AMS s.r.o.
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