



**HI 504903**

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GSM Supervisor

Instruction Manual

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IMEI number.  
Stick here the IMEI number label or write it down for your future reference.

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Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

Dear Customer,

Thank you for choosing a Hanna Product.

Please read this instruction manual carefully before using the instrument. It will provide you with the necessary information for correct use of the instrument, as well as a precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at **tech@hannainst.com**.

This instrument is in compliance with the **CE** directives.

## WARRANTY

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The **HI504903 interface** is warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. This warranty is limited to repair or replacement free of charge.

Damage due to accidents, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Customer Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

## PRELIMINARY EXAMINATION

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Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify your Dealer or the nearest Hanna Customer Service Center immediately.

**Note** Save all packing materials until you are sure that the instrument functions correctly. Any damaged or defective items must be returned in their original packing materials together with the supplied accessories.

## GENERAL DESCRIPTION

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**HI504903** instrument is an intelligent interface between **HI142** temperature dataloggers connected through RS485 port and an industrial GSM cellular phone for sending SMS messages or connecting through a local or a remote computer with **HI92140** Hanna application software.

**HI504903** can acquire from **HI142** information about active alarms, errors, current status and real time temperature values on datalogger.

**HI504903** device is also provided with one digital input (typically an alarm relay) from “non-intelligent” instruments, with only an alarm relay contact or another digital output signal. **HI504903** can be configured for all its parameters and features through the **HI504903SW** Windows® compatible application software provided with the instrument.

Two models are available:

- **HI504903-1:** Dual-band 900/1900 MHz GSM  
Power supply: 12VDC to 115VAC  
power adapter (**HI710005**)
- **HI504903-2:** Dual-band 900/1800 MHz GSM  
Power supply: 12VDC to 230VAC  
power adapter (**HI710006**)

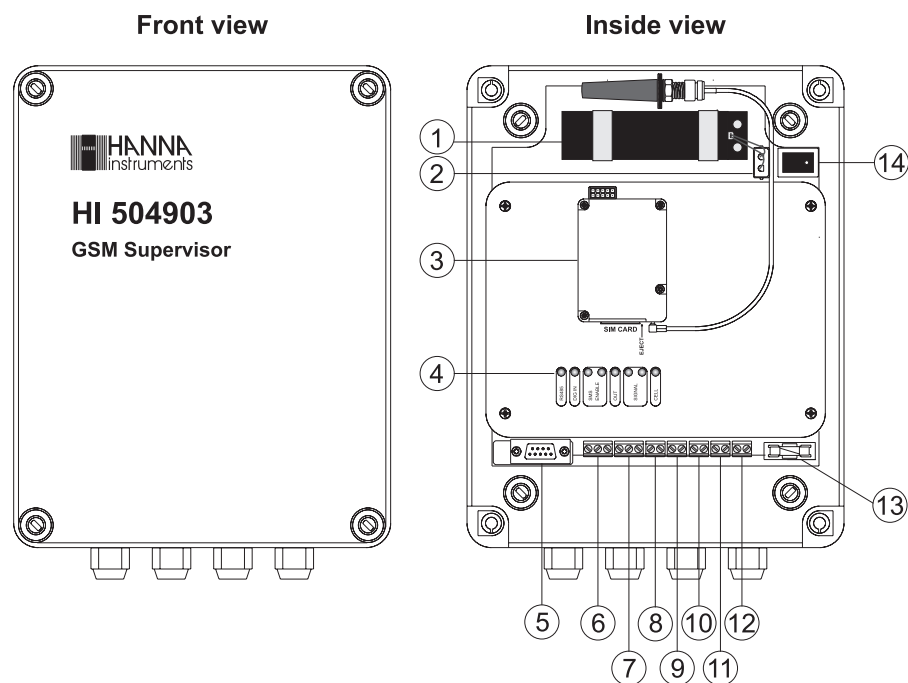
## MAIN FEATURES

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Here below are listed the main features of the **HI504903** interface:

- GSM phone inside for Short Messaging Service (SMS) sending.
- Possibility of a wireless remote interface configuration or connection to a computer workstation (equipped with a modem) through the cellular phone inside.
- RS232 auxiliary port (PC config) for configuration or connection purpose with a local computer connected through **HI920010** cable.
- RS485 port, allowing connection of up to 31 **HI142** temperature dataloggers on the same wire.
- Digital input port (typically connected to an alarm relay) to acquire information from “non-intelligent” instruments.
- Digital output port, for which it is possible to change the status (open/closed) through an appropriate SMS sent to the interface.
- SMS enabling/disabling option through a dedicated port.
- LED indicators: two red LED’s are provided for signaling error conditions or active alarms in the devices connected to the interface through RS485 port or digital input, depending on interface configuration; one green LED and one red LED are provided to give indication about SMS sending enable current status; two green LED’s indicate the cellular phone signal quality; one yellow LED is dedicated to the current status of digital output contact, and another yellow LED to the operating status of the cellular phone terminal.
- Real time clock.
- Diagnostic features.
- Internal backup battery which provides power supply in case of mains power failure.

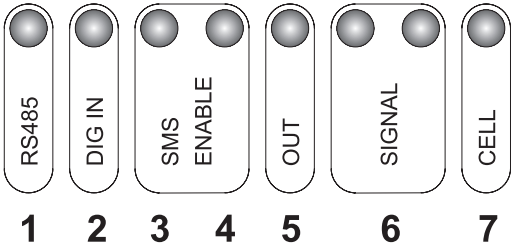
# **FUNCTIONAL DESCRIPTION**



1. Backup battery (rechargeable, sealed lead-acid, 12V / 0.8Ah).
2. On board battery connector.
3. GSM module.
4. LED indicators (see figure on next page).
5. RS232 auxiliary communication port (for local PC communication only).
6. Terminals not used for this model.
7. Terminals not used for this model.
8. Digital input terminal to acquire external information.
9. Digital input terminal to disable SMS sending.
10. Digital output terminal.
11. RS485 serial communications terminal.
12. Power supply input (12 VDC).
13. Fuse (1 A).
14. Power ON/OFF switch.

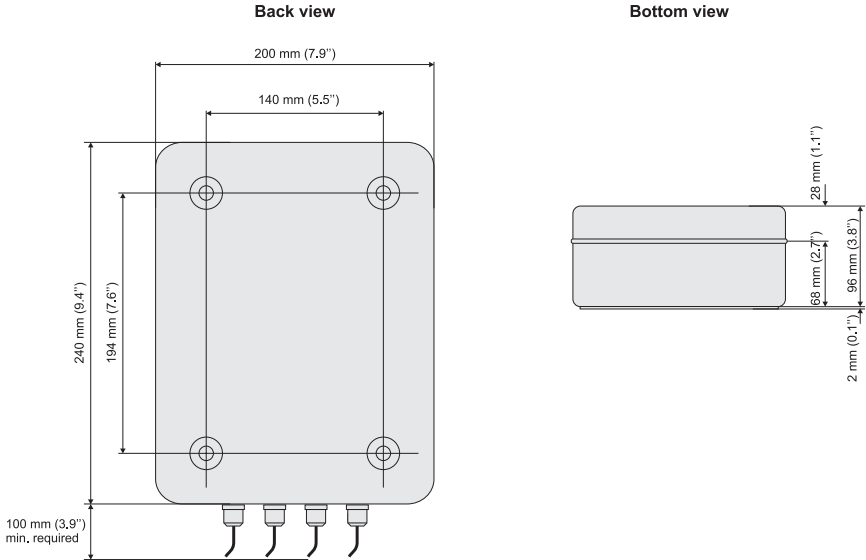
 Unplug the meter before any electrical connection.

## **LED Indicators**



1. RS485 serial port red LED.
2. Digital input port red LED.
3. SMS enable green LED.
4. SMS disable red LED.
5. Digital output yellow LED.
6. Cellular signal strength green LED's.
7. Cellular operating status yellow LED.

# **MECHANICAL DIMENSIONS**



## TECHNICAL DATA

Max output power	2 W for EGSM900; 1 W for GSM1800/1900
SIM interface	3V type SIM card
Antenna	Dual-band antenna (900/1800/1900 MHz)
RS485 channel towards instruments	For connection of up to 31 HI142 temperature dataloggers on the same wire; baud rate fixed to 1200 bps (limited by the HI142 dataloggers)
Digital input channel	Supporting mechanical relays or open-collector outputs
Digital output channel	Open collector output, 5 mA / 30V max.
RS232 auxiliary port towards PC	D-Sub female connector, baud rate up to 9600
Installation Category	I
Power Supply	12 VDC adapter & internal rechargeable battery (12V / 0.8 Ah) for backing up
Power Consumption	6 VA max.
Environment	0 to 50 °C; max. 85% RH non-condensing
Enclosure	ABS case, IP54
Dimensions	240 x 200 x 98 mm (9.4 x 7.9 x 3.9")

## SAFETY INFORMATION

Radio devices have limitations in the vicinity of electronic devices.



- Unplug and turn off the unit in hospitals or near medical devices like pacemakers or hearing aids. The module may interfere with the operation of these devices.



- Unplug and turn off the unit when flying. Secure is so that it can not be powered inadvertently.



- Unplug and turn off the unit near petrol stations, fuel depots, chemical plants or blasting operations. The module can disturb the operation of technical equipment.



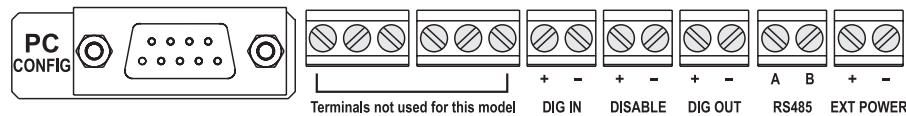
- Interference can occur if the device is used near televisions, radios or PCs.

In order to avoid possible damage, it is recommended to use only the Hanna Instruments accessories. They have been tested and shown to work well with this device. However, accessories are not covered by the warranty.

## MAINTENANCE & SAFETY TIPS

- SIM card: do not bend or scratch the SIM card or expose it to static electricity.
- Wipe the module housing with a moist or antistatic cloth. Do not use a chemical cleaning agent.
- Do not expose the GSM module to any extreme environment where the temperature or humidity is high.
- Do not attempt to disassemble the unit. There are no user serviceable parts inside.

# INSTALLATION



## RS232 AUXILIARY PORT

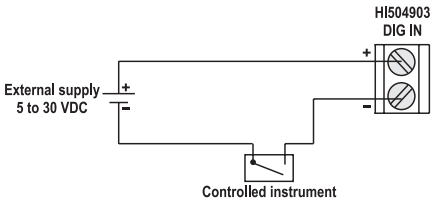
**HI504903** is provided with an auxiliary RS232 port (D-Sub 9-pole female plug) for connection to a local PC using an **HI920010** Hanna cable.

**Note** Use this RS232 auxiliary port **only** for local configuration of the interface with **HI504903SW** software or local communication session with an instrument connected to the **HI504903** interface (see "Interface Configuration" and "PC Communication" sections for details).

**Note** If the **HI920010** Hanna cable is too short for your application, please refer to "Appendix, section 3" for details about making a longer communication cable.

## DIGITAL INPUT (DIG IN)

**HI504903** is provided with a digital input, which can be configured with **HI504903SW** software (see "Interface Configuration" section) to send an alarm SMS when a DC voltage from 5 to 30 V is applied or when it is disconnected. This input can come from a relay contact or from an open collector output (for example from a PLC). Connect the positive pole of an external power supply to the positive DIG-IN terminal; connect a command relay between the negative pole of the external power supply and the negative DIG-IN (see also below diagram).



**Note** Never connect mains or AC voltage supply directly to the DIG-IN terminal.

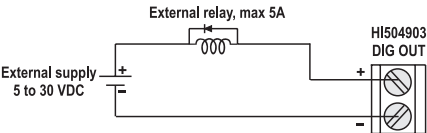
**Note** The digital input is optoisolated.

## DISABLE SMS (DISABLE)

This input works as a digital input (see previous subsection) and allows to ignore active errors and suspend SMS sending during operations as start-up, maintenance, etc.

## DIGITAL OUTPUT (DIG OUT)

This optoisolated terminal is an open collector output, which can be used for external signaling through LED indicators or small relays (see below diagram).



## RS485 SERIAL PORT

**HI504903** is also provided with a 2-pin RS485 terminal for communication with Hanna **HI142** temperature dataloggers. The RS485 standard is a digital transmission method that allows long line connections. Its current loop system makes this standard suitable for data transmission in noisy environments.

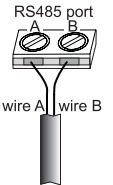
### Specifications:

The RS485 standard is implemented in **HI504903** interface with the following characteristic:

Data rate: fixed to 1200 bps for communication with **HI142** temperature dataloggers  
 Communication: bidirectional Half-Duplex  
 Line length: up to 1.2 Km typical, with 24 AWG cable  
 Loads: up to 32 typical  
 Internal termination: none

### Connections:

The RS485 port of **HI504903** can connect up to 31 **HI142** dataloggers on the same physical network, with a total line length up to 1.2 Km using a 24 AWG cable. For connecting the first **HI142** to the supervisor, use a cable made as shown in the "Appendix, section 1" and connect the A and B wires to the A and B pins of the **HI504903** RS485 terminal.



To connect the subsequent dataloggers one to the other, use a cable with RJ11 plugs, made as explained in the "Appendix, section 2".

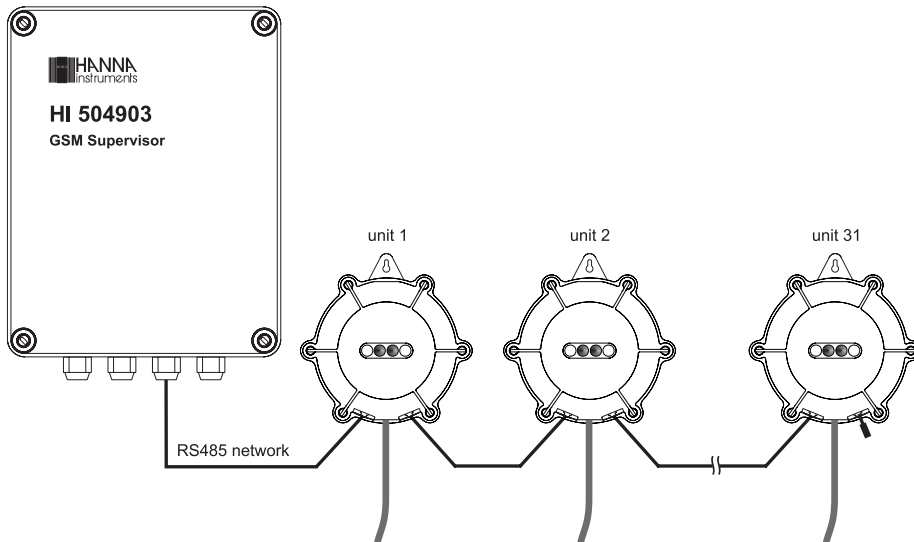
To terminate the line, plug on the last **HI142** the termination key supplied with the **HI504903** supervisor.

All the instruments connected to the RS485 port are "slave" devices that are queried by the **HI504903** supervisor. In other words, the interface can work only as a "master" component, whereas the connected instruments work as remote terminal equipments answering to the commands only.

Each **HI142** instrument is identified by a unique address number, included in the 000001 to 999999 interval, which corresponds to the Serial Number of the temperature datalogger.

As additional feature, the **HI504903** interface is also provided with internal Fail Safe Open Line protection method.

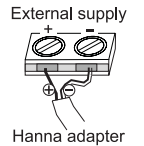
To minimize electromagnetic interferences, it is recommended to use shielded and twisted pair cable to connect the units.



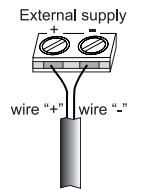
## POWER SUPPLY INPUT

The power supply input terminal can be used for powering both the **HI504903** supervisor (directly from the mains with a 12VDC adapter) and the **HI142** network (through the supervisor).

For **HI504903**, use a 12VDC adapter (**HI710005** or **HI710006**) and connect the black wire to the positive input terminal (marked "+") and the black & white wire to the negative one (marked "-").



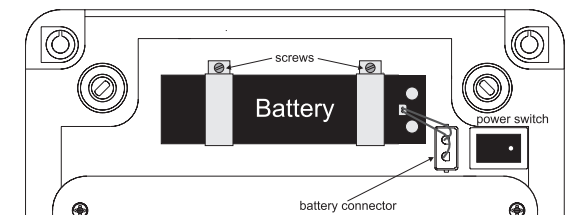
For **HI142** network, connect the first **HI142** using a cable made as shown in the "Appendix, section 1" and connect the "+" and "-" wires to the "+" and "-" pins of the **HI504903** power supply connector.



All hard wiring can be accomplished through four cable glands on the bottom side of the case, by passing wires through the rubber grommets and tightening the nuts.

**Note** All connected cables should end with cable lugs.

## BATTERY



**FOR SAVING BATTERY, THE HI504903 IS SUPPLIED WITH BATTERY NOT CONNECTED. PLUG THE BATTERY CONNECTOR BEFORE STARTING OPERATION.**



Use only rechargeable sealed lead-acid battery with 12 V and 0.8 Ah capability.



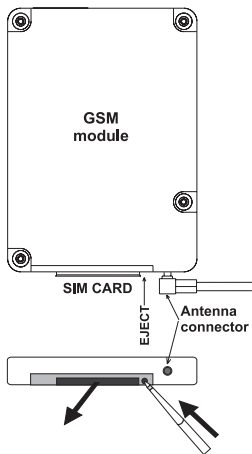
To substitute battery, please follow below instructions:

1. turn off the **HI504903**: turn OFF the power switch and disconnect the interface from the mains;
2. remove the screws on the bottom of the two battery clips;
3. disconnect the battery cable from its connector;
4. substitute the old battery with a new one;
5. fix back the two girdles by tightening the screws;
6. connect the battery cable to the connector;
7. connect the interface to the mains;
8. turn ON the power switch.

**Note** Pay attention that the battery cable is correctly connected to the battery connector, otherwise an alarm SMS will be sent immediately after the start-up procedure (see "Fault Condition" section for details).

**Note** If the interface is powered on immediately after a battery substitution, it is possible that an alarm SMS of "Battery failure" is sent. Ignore that message and check if the error is still active the day after. For avoiding this problem, connect the unit to the mains and wait for at least 10 hours before turning ON the power switch. In this manner the new battery can be charged.

## SIM CARD INSERTION



Before using the **HI504903**, insert a SIM card.

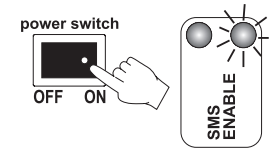
- Press the SIM card holder ejector on the cellular module by using a sharp item (for example, a pen);
- Insert the SIM card in the holder and push it back in the housing.

**Note** If the **HI504903** has to be used for sending alarm SMS, be sure that the SIM card can support voice calls. If the **HI504903** will be used for remote connection session, be sure that the SIM card supports data calls. Please contact the cellular network operator for information about SIM active services.

**Note** Do not remove the SIM card while voltage is applied to cellular phone. Before removing the card, turn off the interface. Failure to do so may seriously affect the serviceability of the **HI504903**.

## START-UP

Turn ON the power switch (#14 on page 8): the red SMS disable LED lights up and will stay in this state until the start-up procedure ended and the idle mode is entered.



During start-up procedure the Real Time Clock (RTC) is checked to control if a reset occurred since last software initialization. In this case, the RTC is initialized with the default date and time 01/01/2000 - 00:00. An EEPROM reset does not affect the RTC settings.

The EEPROM is also checked to control if it is new. In this case, the default values are copied from ROM and the device enters normal mode. Otherwise an EEPROM checksum test is performed (the same is performed periodically during EEPROM selftest procedure, see "Fault Condition and Selftest Procedure" section for more details).

If checksum is not correct, the proper EEPROM error LED indication will be given as soon as the Idle state is entered.

During start-up, the internal cellular phone is turned ON and an initialization procedure is performed to insert PIN code and make network registration for enabling incoming and outgoing calls. Moreover, the telephone answering service is disabled to avoid automatic network call forwarding if interface is busy and can not serve immediately incoming call.

Initialization procedure can last up to 30 seconds if no problem occurs, otherwise some more time could be needed and proper cellular LED indication will be given in idle state.

When the start-up procedure is complete, the interface enters the idle state.

**Note** When the **HI504903** is turned ON for the first time, it is possible to get a cellular error indication. This can happen if the SIM card requests a PIN code to be registered in the network and the interface was not yet configured (see "Local configuration" section for details).

# IDLE STATE

The idle state is the normal operation state for the **HI504903** supervisor. While in idle state, the following main tasks are fulfilled:

- Management of incoming remote connection and configuration requests (see “Interface configuration” and “PC communication” sections for details);
- Management of incoming local connection and configuration requests;
- Polling procedure of connected devices;
- Diagnostic selftest procedures: battery test, cellular phone test, EEPROM corruption data test (see “Fault condition” and “SMS delivery” sections);
- Processing of incoming SMS’s for digital output control (if enabled) and information SMS’s request (see “SMS delivery” section);
- Sending of alarm SMS’s or information SMS’s upon user request (see “SMS delivery” section).

When in idle state, the **HI504903** can perform periodically some diagnostic selftest procedures as: internal backup battery test, cellular phone test, EEPROM corruption data test. If one of these tests does not pass, the interface advises the user with a visual indication about the problem using the red and green SMS enable/disable LED’s. Please refer to “Fault conditions and Selftest Procedures” section for more complete indications about interface related fault conditions.

Moreover, every 30 seconds the two green LED’s for cellular phone signal are updated with the current signal strength, and the indication meanings are listed in the table below:

LED	Status	Meaning
Cell Signal 1 (green)	OFF	No signal or cellular error found
Cell Signal 2 (green)	OFF	
Cell Signal 1 (green)	ON	Medium signal
Cell Signal 2 (green)	OFF	
Cell Signal 1 (green)	ON	Strong signal
Cell Signal 2 (green)	ON	

Also the digital output status LED is updated with the current status of the digital output contact. The digital output contact status can be changed by the user only by sending the proper SMS to the interface. The below table shows the digital output LED indication depending on the digital output status:

LED	Status	Meaning
Digital Output (yellow)	OFF	Dig.output contact open
	ON	Dig.output contact closed

**Note** The status of the digital output contact is saved in **HI504903** internal memory, so that the digital output is set to the correct value in case of a reset or after a start-up of the interface.

During polling procedure all devices connected to the interface through RS485 serial ports and digital input port (if correctly configured, see “Interface Configuration” section) are periodically queried to acquire their current status, measurement values and active alarms. The delay between a query operation and the following one is user selectable, and can vary from 1 to 10 minutes (see “Query Delay” field and “Interface Configuration” section).

If many devices are connected to the RS485 link and the cellular phone interface can not interrogate all the devices within the selected delay time, then the actual interval becomes longer than the set value.

When polling devices procedure is completed, the RS485 serial port LED (#1 on page 9) lights up if an alarm is active at least in one of the instruments connected to the RS485 port (up to 31 devices can be connected on the same RS485 port); the digital input port LED turns on or off depending on the user-selected logic for closed contact (if control of digital input port was user-enabled during last interface configuration).

Moreover, if an active alarm found in a device connected to the **HI504903** matches with one of those selected by the user during last interface configuration, or if the digital input status matches with the condition selected for triggering an alarm message, then one (or more) SMS(s) are immediately submitted by the **HI504903** to the set cellular phone number(s) (see “SMS delivery” section).

**Note** The “Query Delay” time value fixes the maximum delay between an alarm occurrence in a device and the related alarm

SMS sending by the interface.

SMS can be submitted by the **HI504903** supervisor only if the SMS sending feature is enabled through an external switch (see further on for details); if the SMS sending is disabled, then no message will be sent upon alarm or fault condition on connected devices.

**Note** To make the **HI504903** queries the connected devices and sends SMS's, it is necessary to configure the interface, otherwise no polling procedure can take place and no alarm notification will be given by the interface. **HI504903** can not automatically detect which instruments are connected to the interface; moreover, the user must select for which type of alarms the warning SMSs have to be sent.

While in idle state, the SMS sending feature can be disabled or enabled by the user at any time, by simply closing (or opening) the proper external switch. If no error indication is already active, then the red and green LED's (#3 and #4 on page 9) keep indication about the SMS sending enable/disable status:

External Switch	LED	Status	Meaning
Open	SMS enable (green)	ON	SMS sending enabled
	SMS disable (red)	OFF	
Close	SMS enable (green)	OFF	SMS sending disabled
	SMS disable (red)	ON	

**Note** Sometimes the updating of LED indication about SMS sending status can take a few seconds after changing the external switch status by the user. This happens if the interface is busy while performing procedures as polling devices, SMS sending, incoming call processing, etc.

While in idle state, **HI504903** can serve also incoming request for configuration or PC communication session activation (both local and remote), but remote sessions (both configuration and PC communication) can take place only if no cellular errors are active on the interface.

## INTERFACE CONFIGURATION

The **HI504903** supervisor is not provided with keyboard or display for user interfacing purpose. For first installation and for successive changes of the system configuration, it is necessary to use the **HI504903SW** Windows® compatible application software provided with the instrument.

### APPLICATION SOFTWARE INSTALLATION

To install the **HI504903** configuration software on the computer, it is necessary a 3.5" drive. Insert the disk in the floppy disk driver, execute *setup.exe* and then follow on-line instructions.

After installation, run the configuration software by simply double-clicking on **HI504903SW** icon and starting the configuration procedure.

### STARTING CONFIGURATION

Before starting the configuration procedure, turn the **HI504903** on and make sure it ended the initialization procedure (see "Start-up" section).

The **HI504903** supervisor can be configured in two different ways: "Local configuration" and "Remote configuration", which can be selected on "Connection setting" window while running the application software.

Find here below a complete list of LED's status during configuration procedure:

LED	Status	Meaning
RS485 channel (red)	OFF	---
Digital input (red)	OFF	---
SMS enable (green)	OFF	---
SMS enable (red)	ON	---
Digital output (yellow)	ON or OFF	indication about digital output previous status (ON: contact closed, OFF: open)
Cell Signal Quality (2, green)	OFF & OFF	updated only when "Phone Status" button is pressed on application software while running on PC connected with <b>HI504903</b> device
	ON & OFF	
	ON & ON	
Cell Status	ON or OFF or blinking	cellular phone real time operating status (fast blinking if a remote connection/configuration is taking place)

## LOCAL CONFIGURATION

The “Local” configuration is the only one allowed for the first configuration of **HI504903** supervisor. This type of configuration takes place between the **HI504903** device and a PC (placed near) with **HI504903SW** installed, through a serial cable connection.

To connect the **HI504903** supervisor to the PC, use an **HI920010** cable. Plug one connector to the **HI504903** device RS232 auxiliary connector (PC config port) and the other one to a serial port of the PC. Before connecting the supervisor to the PC, read the computer manual. To proceed with local configuration, select the “Local” connection type on **HI504903SW** “Configuration Settings” window, and on “Serial communication port” section the PC COM port to which the serial cable is connected. Then press “OK” to proceed (see “General Settings” section).

**Note** The first configuration of **HI504903** must be done through a local configuration because it is necessary to set up the SIM card PIN code and at least one cellular phone number for the alarm SMS sending.

**Note** If no answer is received from **HI504903**, an alarm window will be displayed by the application software. Check if the serial cable is correctly connected or if the **HI504903** is busy (a remote configuration or a remote connection or a polling procedure are taking place). Try later for a new local configuration attempt.

## REMOTE CONFIGURATION

The “Remote” configuration takes place between the **HI504903** device and a PC with **HI504903SW** software installed, through a data call made by a modem connected to the PC. In this way all **HI504903** parameters can be re-configured (excluding the SIM card PIN number), even if the supervisor is located far from the PC, without requiring to move the PC where the **HI504903** is physically installed to make a local configuration through serial cable (see “Local Configuration” section).

To proceed with the remote configuration, select the “Remote” connection type on **HI504903SW**, by checking the proper box. On “HI 504903 phone number” field enter the phone number of the SIM card inserted in the **HI504903** and the password (only if it was set in a previous configuration).

In the “Advanced Settings” section it is possible to give to the modem connected to the PC a particular configuration for the initialization string and the dial string. Note that in the most common cases the default setting can be used. On “Serial Communication Port” section select the COM port to which the modem is connected.

When “OK” is pressed, the software will try to establish a data call between the PC and the **HI504903** device, and then it is possible to proceed with the configuration (see “Configuration Settings” section).

**Note** If no answer is received from **HI504903**, an alarm window will be displayed by application software. Check if the modem line is busy, or **HI504903** is busy (a remote configuration or a remote connection or a polling procedure are taking place), or **HI504903** cellular phone is over coverage. Try later for a new remote configuration attempt.

## CONFIGURATION SETTINGS

The setup procedure is divided into three different sections, displayed on three different folders inside the main window:

- General Options Setting (see “General Options Setting”)
- RS485 Options Setting (see “RS485 Options Settings”)
- Digital I/O Options Setting (see “Digital I/O Options Settings”)

Five buttons are available on the bottom of the window, which can be pressed for performing the following actions:

### “Update All” button:

Press this button to send the complete configuration to the **HI504903** device. It is possible to test all RS485 devices for connection or not. In this way the **HI504903** interface can be configured even if devices will be connected only on a second time to RS485 and digital input port.

If the PIN code is changed during configuration, it will be checked and this operation lasts about 30 seconds. If no error occurs, the message “HI504903 device correctly updated!” will be displayed. Otherwise the occurred errors list will be shown and the previous configuration will be kept in **HI504903** memory.

**Note** If no error occurs during configuration, the previous **HI504903** setup will be lost. At start-up, 3 attempts for entering the cellular PIN code are available (see “General options setting” section) and at each update with a wrong PIN value, an attempt will be lost. The SMS’s stored in the SIM card will be erased.

**Note** If an error occurs on cellular phone before pressing the “Update All” button, the cellular phone will be turned off and on again for trying solving the error condition. This procedure lasts about 30 seconds.

### “Load” button:

Press this button to load on the PC the last configuration stored in the **HI504903** memory.

**Note** By loading the **HI504903** configuration, all parameters modifications made till that moment will be lost. At program start-up, an automatic loading is performed.

**Note** At the start-up of **HI504903SW** program, the application software advises the user with warning messages if some error occurs on the interface.

The following fault conditions can be detected by **HI504903SW**:

- “Error on cellular phone found”: warning for generic error on cellular phone, e.g. cellular phone not network registered, SIM card missing, no network coverage, cellular phone not answering, etc.
- “Wrong cellular PIN code”: PIN code on **HI504903** is not correct.
- “PIN code missing”: PIN code needed for SIM card and not available on current **HI504903** configuration.
- “Last SMS reached”: no more SMS’s are available on the SIM card (SIM card credit reached zero).
- “Expiration date reached”: SIM card expired.
- “Error in current device configuration. Check data before proceeding with the new configuration”: some corrupt data found on **HI504903** internal memory (EEPROM).

### “Phone status” button:

Press this button to open a secondary window for seeing the cellular phone network registration status (“REGISTERED” or “NOT REGISTERED”) and the signal quality.

**Note** The cellular status check during a remote configuration via modem may require a few seconds more than during a local configuration, and information may arrive with a small delay.

**Note** When the “Phone status” button is pressed, also the **HI504903** green LED’s for cellular signal indication are updated with the new real value provided by cellular phone.

### “Help” button:

Press this button to display the help file.

### “Exit” button:

Press this button to exit the setup program during a local configuration.

### “Disconnect” button (for remote configuration only):

Press this button to end the remote connection with the **HI504903**. The data call will be immediately stopped.

## GENERAL OPTIONS SETTING

The following features are selectable in the general options setting folder:

### Telephone numbers:

It is possible to set two telephone numbers for automatic sending of alarm messages and sending of information messages

upon a call from one of these phones. Valid values are numbers of a maximum of 20 digits, with the country code in front and without spaces or “+” symbol (e.g. for Italy 39335.....)

**Note** At least a value for telephone number #1 must be inserted to proceed with configuration.

**Note** The country code is necessary, otherwise **HI504903** will not be able to send any SMS.

**Note** The set phone number are not saved on the phonebook area of the SIM card. If there are some phone numbers previously stored on any SIM card location, they will be not overwritten.

#### **HI 504903 date and time:**

Date and time present in the **HI504903** device can be read. These fields can not be modified manually. To align the **HI504903** to the PC date and time, simply click on “Update **HI504903** Date and Time” check-box: the new values will be displayed on the PC and the updating will take place when the “Update All” button is pressed.

#### **SIM Card options:**

- On “Remaining SMSs” field it is possible to set the number of remaining messages in the SIM card: this number gives indication about the charge level of the SIM card. To know the value to be inserted, divide the SIM card credit by the cost of one SMS. This number will be decreased at every sent message and when zero level is approaching, one or more messages will be sent by the **HI504903** device to warn the user about the need of SIM card recharging.

**Note** It is useful to enable this feature in case of a rechargeable SIM card, and disable it if an unlimited credit card is used. If the feature is enabled, it is necessary to insert a value to proceed with the configuration.

- On “Expiration Date” field it is possible to set the SIM card expiration date (dd/mm/yy): this is the date after which the SIM card expires if not recharged (usually after one year). 15 days, 7 days and 1 day before the expiration date, warning SMS messages will be sent to the programmed number(s).

**Note** It is useful to enable this feature in case of a rechargeable SIM card, and disable it if an unlimited credit card or a special rechargeable SIM card is used. If the feature is enabled, it is necessary to insert a date to proceed with the configuration.

#### **SMS options:**

- On “Repeated SMSs” field it is possible to set the number of repeated SMSs to be sent. Each alarm or warning SMS sent by the **HI504903** device requires an explicit confirmation by a back call from (one of) the cellular phone(s) that received the message: this call is not answered by the **HI504903**, but works as a confirmation about having read and understood the alarm/warning message (see “SMS delivery” section). If **HI504903** does not receive this confirmation within a fixed time interval (see the “SMS delay” section below), it will send the alarm message again. With the “Repeated SMSs” option, it is possible to set the maximum number of alarm messages that will be sent in these conditions.

**Note** Default value is 2 repeated SMS’s.

**Note** Valid values are numbers from 0 (i.e. no repeated messages) to 5. If an out-of-range value is inserted, a warning message will be displayed and the maximum allowed value (i.e. 5) is automatically set.

- On “SMS Delay” field it is possible to set the delay between two subsequent alarm/warning SMS’s (see “SMS’s delivery” section). This delay is related to the number of “Repeated SMSs” (see above).

**Note** Default value is 10 minutes.

**Note** Valid values are from 5 to 60 minutes. If an out-of-range value is inserted, a warning message will be displayed and the default value is automatically set.

**Note** If a zero value is set in the “Repeated SMSs” section, this feature is disabled.

- On “Query Delay” field it is possible to set the delay between a query operation and the following one of the alarm situation for all the connected devices made by **HI504903**. With this option the maximum time for an alarm detection and the relating SMS sending is set (see “Idle state” section).

**Note** Default value is 1 minute.

**Note** Valid values are from 1 to 10 minutes. If an out-of-range value is inserted, a warning message will be displayed and the default value is automatically set.

**Note** The actual interval for the query operation can be bigger than the set value if many devices are connected to the RS485 link and the **HI504903** interface has not enough time to interrogate all the devices within the set time value.



### Security options:

- On “HI504903 Password” field it is possible to set the password for the **HI504903** device. This password protects from unauthorized remote modem connection to one of the instruments connected to the cellular phone interface and from unauthorized remote configuration. This password does not block the local configuration of the instrument, i.e. no password is required to configure the **HI504903** device with its application software through the serial cable. The password can be disabled. Valid values are string of 6 to 20 characters (letters and numbers are allowed).

**Note** Letters typed in lower case will be automatically changed in upper case by the software. If the field is enabled, a value must be inserted.

- On “PIN number” field the SIM card PIN number has to be inserted (maximum 4 digits). When inserting this code the characters are masked. Valid values are numbers from 0000 to 9999. The PIN code must be inserted only in the first **HI504903** configuration and every time the SIM card PIN code is changed.

**Note** The SIM card PIN number must be inserted in any case and is required by the application software even if the PIN lock has been disabled through a normal cellular phone.

**Note** If an update with a wrong PIN code is made, an attempt for cellular PIN insertion is lost. At start-up, 3 attempts for entering the cellular PIN code are available, and at each update with a wrong PIN value, an attempt will be lost. After 3 wrong attempts, to unlock the SIM card, extract it and manually enter the PUK by using a cellular phone.

**Note** If the PIN code is changed during configuration it will be checked and this operation lasts about 30 seconds (the cellular phone will be turned off and on again to verify the PIN code correctness).

**Note** If the SIM card PIN number is longer than 4 digits, it has to be changed before using it in the **HI504903** interface. To do this, insert the SIM card in a cellular phone and change the old PIN number with a new one with value from 0000 to 9999, while paying attention to remember the new code (please refer to the cellular phone instruction manual for the correct procedure). After that, it is possible to insert the SIM card in the **HI504903** (see “Installation” section) and use the new PIN number in the next interface local configuration.

## RS485 OPTIONS SETTING

In this section it is possible to set all options related to the RS485 communication channel towards the connected **HI142** temperature dataloggers. All the loggers must be connected to the same RS485 bus; the maximum number of instruments that can be connected to the same **HI504903** interface is 31. To set the **HI142** options, click on one of the 31 available buttons and then set the following features:

- Instrument name: enable the communication between **HI504903** interface and **HI142** temperature datalogger connected to the RS485 channel by selecting “HI142” in the window. To disable an instrument previously inserted, select “NO INSTRUMENT”.
- Baud rate: once the instrument has been selected, the default baud rate value is automatically proposed. The only baud rate available for **HI142** loggers is 1200 bps.
- Serial number: it is the serial number of the **HI142** logger to be connected to **HI504903** (allowed values are within 0 to 999999 range). This serial number will be used by **HI504903** as logger address to identify the instruments connected to the RS485 channel. Each logger must have a different value for this field.

**Note** To enable one **HI142** logger, all the three previous options (instrument name, baud rate and serial number) must be set.

- Messages options: to choose in which alarm conditions an SMS will be sent to the selected phone number(s), click on the “Message Options” button. This window will be displayed only if “HI142” was selected on “Instrument name” field. Available alarm conditions for **HI142** are:
  - Temperature out of range: to receive an alarm SMS when temperature on **HI142** logger exceed low or high temperature limits.
  - Low battery: to receive an alarm SMS when the level of the logger internal battery is low; **contact the nearest Hanna Service Center.**

## DIGITAL I/O OPTIONS SETTING

### Digital input section

This section includes all the specific options that apply to the digital input channel. This channel is intended for connection to a simple instrument provided with a digital output port. For such instruments, an alarm output like an electro-

mechanical relay or an open collector digital output can be connected to the **HI504903** interface to trigger the sending of an alarm SMS message. The complete options list is:

- Instrument enable: it is possible to enable this feature if an instrument is connected to the digital input simply by checking on the check-box.
- Instrument name: in this field a description related to the instrument has to be inserted: for example "Freezer East Side" to indicate an electromechanical relay (connected to the digital input) of a freezer placed on the east side of a room. The maximum length of this description is 20 characters.
- Information options: set the options related to the information SMSs to be received upon phone call:
  - Red LED status when the contact is closed (ON/OFF).
  - Description of the digital input status when the contact is closed (e.g. "ALARM!"). The maximum length of this description is 30 characters.
  - Description of the digital input status when the contact is open (e.g. "OK"). The maximum length of this description is 30 characters.
- Alarm options: set the options related to the alarm SMSs:
  - Enable alarm: the alarm SMSs sending can be enabled or disabled.
  - The alarm can be triggered upon the closing or opening of a contact on digital output (default trigger event is closed contact).
  - Alarm description string (e.g. "ALARM #1!"). The maximum length of this description is 30 characters.

#### Digital output section

It is possible to enable (or disable) the control of the digital output status connected to the **HI504903** by checking the proper check-box. Once enabled, it is possible to control the digital output simply sending the SMS "CLOSEP<cellular phone interface password>" to close the digital output contact, and "OPENP<cellular phone interface password>" to open the digital output contact. If the digital output control is enabled, when an information will be requested to **HI504903**, an SMS with the digital output status will be sent.

**Note** By disabling this option, it will not be possible to set the digital output status and no information SMS about the digital output will be sent.

**Note** If the digital output management is disabled, the digital output will be automatically opened, even if it was previously closed.

**Note** If the password is not set, only "CLOSEP" or "OPENP" SMS must be sent.

#### Default values

The following table lists the default value for previous items, i.e. the factory values copy from ROM if **HI504903** was never configured.

Item	Default value
Telephone #1	empty field
Telephone #2	empty field
Date	from internal RTC
Time	from internal RTC
Remaining SMSs	disabled
Expiration date	disabled
Repeated SMSs	2
SMS delay	10 minutes
Query delay	1 minute
Password	disabled
PIN	empty field
RS485 options	no instrument configured
Digital input	disabled
Digital output	disabled



## SMS DELIVERY

**HI504903** is able to send SMSs to one (or two) cellular phone number(s). **HI504903** can send two types of message: alarm SMSs (upon an alarm condition at least in one of the instruments connected to the interface) and information SMS (upon specific request from the user).

**Note** To use the SMS feature, a SIM card able to make a voice call must be used.

### ALARM SMSs

Alarm messages are submitted by **HI504903** to the cellular phone number(s) when an error occurred on one of the instruments connected to the interface. A message about an alarm condition in one instrument will be sent by the interface only if the alarm is active and the specific alarm notification was enabled during last configuration, by checking the proper box on the "message option" window of the selected device (see "Interface configuration" section). If an alarm is active in one instrument connected to the interface but its notification was not enabled during last configuration, then no SMS will be sent (however **HI504903** gives indication to the user about the error condition by turning on the red LED for the RS485 port or digital input port where the instrument is connected).

**Note** An alarm SMS can be sent only if SMS sending is user enabled through digital input terminal (#9 on page 8), otherwise no SMS will be issued.

#### Alarm SMSs for HI142 dataloggers

The format of alarm messages for **HI142** dataloggers connected to the RS485 port will be:

"HI142-SN<DEVICE SERIAL NUMBER>; LotID<USER LOT ID>; Alarms: <ALARM SPECIFIC TO THE INSTRUMENT>; Rem msg: <NUMBER OF REMAINING MESSAGES>"

During alarm condition, the field <ALARM SPECIFIC TO THE INSTRUMENT> on the alarm message contains the list of **only active alarms** (see further on for the complete list of selectable alarms).

The <DEVICE SERIAL NUMBER> label is a 6-character text string with the serial number of the **HI142** generating the alarm SMS.

The <USER LOT ID> label is a label (up to 16 characters) with the user-defined lot identification: this is the identification lot

string that user can specify in **HI92140** software before starting logging with **HI142** (see "LotID" field in **HI92140** software).

The <NUMBER OF REMAINING MESSAGES> is a value (max. 4 digits) indicating the number of remaining messages in the SIM card (see "Interface configuration" section).

The complete list of all available alarm indications (and their coded notations) for **HI142** temperature datalogger is:

- "Temperature": the temperature on **HI142** logger exceeds low or high temperature limits.
- "Low battery": the charge level of the logger battery is low and should be replaced soon; **contact the nearest Hanna Service Center.**

When all alarms are active, the message will report the entire list as follows: "Temperature,Low battery".

**Note** If during last polling procedure **HI504903** was not able to communicate with one of the **HI142** dataloggers connected to the interface, then a specific alarm SMS will be sent. This happens if the cable between **HI504903** and the instrument is not correctly connected, the power supply on **HI142** fails, or the serial number used in **HI504903** to address the logger is not correct (see "Interface configuration" section).

The format of this kind of alarm message will be:

"HI142-SN<DEVICE SERIAL NUMBER>; LotID<USER LOT ID>; Alarms: Device not responding; Rem msg: <NUMBER OF REMAINING MESSAGES>"

#### Alarm SMSs for instrument connected to the digital input port

If the digital input was configured to send alarm SMSs and the present status of port matches with the condition selected for triggering an alarm message in the last **HI504903** configuration (see "Interface configuration" section), then the following SMS will be sent:

"<INSTRUMENT DESCRIPTION>; Digital input; <ALARM DESCRIPTION>; Rem msg: <NUMBER OF REMAINING MESSAGES>"

Previous fields represent strings inserted by the user with the **HI504903SW** software as following:

- <INSTRUMENT DESCRIPTION>: instrument description string, maximum length is 20 characters;
- <ALARM DESCRIPTION>: alarm description string, maximum length is 30 characters.

### Alarm SMSs specific to the interface

Two alarm SMSs are provided to inform the user about troubles specific to the **HI504903** interface, the first one concerning the internal backup battery status, the second one about mains power supply status.

If a problem was found during last battery test (see “Fault conditions and selftest procedures” section), **HI504903** issues the following alarm SMS: “Alarm! Battery test failure; Rem msg: <NUMBER OF REMAINING MESSAGES>”. After user confirmation of message reception (see further on), **HI504903** will send back the SMS: “Battery test failure; Rem msg: <NUMBER OF REMAINING MESSAGES>”.

Instead, in case of mains power failure (see “Power failure” section), **HI504903** issues the following alarm SMS: “Alarm! Power failure; Rem msg: <NUMBER OF REMAINING MESSAGES>”. After user confirmation of message reception (see further on), **HI504903** will send back the SMS: “Power failure; Rem msg: <NUMBER OF REMAINING MESSAGES>”. After a power failure event, when the mains power supply comes back, the following message will be sent to the set phone number(s) without any request: “Power is ok now; Rem msg: <NUMBER OF REMAINING MESSAGES>” (this message does **not need** confirmation by the user; see further on).

**Note** After submission of an alarm message, a phone call is made by the instrument to the programmed number(s). This is done because the SMS can be received with a considerable delay due to network overload, while the phone call takes place immediately and has a long ring, which is more likely to be heard. The phone call advises the user that something happened on the **HI504903** (or on one of the connected instruments) and an SMS is going to be received. It is not necessary to answer this phone call and it is suggested to simply close it. When an error occurs (and an alarm SMS is sent), the interface wait for a confirmation of the message reception. The confirmation can be done calling the **HI504903** phone number (number for voice call of the GSM module). The interface will answer hanging up the incoming call and send one or more SMSs about the status of all instruments connected to the **HI504903** interface (this confirmation is managed as an information request; see further on for details). It is also possible to configure the instrument to send repeated messages if confirmation is not received

immediately (see “Repeated SMS” and “SMS delay” items in “Interface configuration” section). This feature has been introduced to prevent losing of warning messages due for example to overload of telephone lines; “Repeated SMS” item represents the number of repeated SMSs to send, while “SMS delay” item sets the delay time between two subsequent alarm messages.

### INFORMATION SMSs

In addition to the alarm messages already described, the cellular phone interface can send information messages upon request. These messages include all relevant information that can be got from the controlled instruments, and could be requested, for example, after an alarm message regarding an error which should close without any intervention. The user could also want to be informed about the values of the measured magnitudes or current devices status.

The information messages can be requested:

1. by making a call from one of the phone numbers programmed for alarm messages sending: in this case the cellular phone interface recognizes the calling phone number, hangs up without answering and then sends to the calling number one information message for each controlled instrument;
2. by sending an SMS from whatever cellular phone to the device. The message must have the following format: “P<CELLULAR PHONE INTERFACE PASSWORD>”, i.e. the uppercase P letter followed by the cellular phone interface password in uppercase letters; if the password is disabled, just “P” is enough. Upon this requesting message, the interface will send one information message for each controlled instrument to the cellular phone which issued the requesting SMS.

#### Information SMSs for HI142 dataloggers

The format of the information messages for **HI142** dataloggers is very similar to the one for alarm messages. The only difference is the “Info: <INFORMATION SPECIFIC TO THE INSTRUMENT>” string instead of “Alarms: <ALARM SPECIFIC TO THE INSTRUMENT>” (see previous subsection for details).

The format of information messages for **HI142** will be: “HI142-SN<DEVICE SERIAL NUMBER>; LotID<USER LOT ID>; Info: <INFORMATION SPECIFIC TO THE INSTRUMENT>; Rem msg: <NUMBER OF REMAINING MESSAGES>”.

For <DEVICE SERIAL NUMBER>, <USER LOT ID> and <NUMBER OF REMAINING MESSAGES> fields, please refer to the previous subsection.

Find here below a complete list of available information (and coded notations) in the <INFORMATION SPECIFIC TO THE INSTRUMENT> field for all **HI142** devices connected to the **HI504903** interface:

- “Temp: ###.##C or F”: temperature reading in Celsius (“C”) or Fahrenheit (“F”) unit, depending on last datalogger configuration. If the meter is currently logging, then the displayed temperature value is the last logged sample, otherwise (logger is in delayed start or log ended status) it is the real time temperature reading during last polling procedure. If the reading is over-range the indication will be “>>>>”, while for under-range value the displayed indication will be “<<<<”.
- <LOGGER STATUS>: current logger status. There are four operating status for **HI142** loggers:
  - “Log wait... (<DATE AND TIME OF LOGGING BEGINNING>)”: the logger is currently waiting to start the logging procedure; <DATE AND TIME OF LOGGING BEGINNING> field keeps information about date and time when the **HI142** device will start to log the first sample of the lot.
  - “Logging... (<DATE AND TIME OF LOGGING END>)”: **HI142** is currently logging; <DATE AND TIME OF LOGGING END> field keeps information about date and time when the **HI142** device will record the last sample of the current lot.
  - “Logging... (cyclic memory)”: **HI142** is currently logging in cyclic memory mode; once the memory is full, the logger can continue to log by overwriting the older samples with the new ones.
  - “Log ended”: **HI142** is not currently logging; logging ended or it was interrupted by the user.
- “Low al.: ###.##C or F”: alarm low limit value in Celsius (“C”) or Fahrenheit (“F”) unit, depending on last datalogger configuration (refer to **HI92140** on-line-help for details). If no low alarm limit was set by the user, then the indication will be “Low al.: -----C or F”.

- “High al.: ###.##C or F”: alarm high limit value in Celsius (“C”) or Fahrenheit (“F”) unit, depending on last datalogger configuration (refer to **HI92140** on-line-help for details). If no high alarm limit was set by the user, then the indication will be “High al.: -----C or F”.
- “ALARMS: <ACTIVE ALARMS>”: list of all active alarms, as previously described (see “Alarm SMSs for HI142 dataloggers” subsection). If no alarm is active, then the indication will be “No alarms”.

#### **Information SMSs for meter connected to the digital input port**

If the digital input was configured to send information SMSs upon a user request message (see “Interface configuration” section), then the following SMS will be sent:

“<INSTRUMENT DESCRIPTION>; Digital input; <DESCRIPTION FOR THE DIGITAL INPUT STATUS>; Rem msg: <NUMBER OF REMAINING MESSAGES>”.

<INSTRUMENT DESCRIPTION> field is the same as for the alarm SMS; <DESCRIPTION FOR THE DIGITAL INPUT STATUS> is one of the two description strings defined by the user with **HI504903SW** software on last interface configuration related to present digital input status (close or open).

Here is a message example: “Freezer East Side; Digital Input; Port is open; Rem msg:32”.

**Note** If no information is available regarding an instrument because it did not answer to **HI504903** during last polling procedure, then the following “Device not responding” string will appear for <INFORMATION SPECIFIC TO THE INSTRUMENT> field.

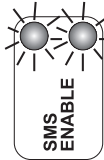
**Note** If SMS sending is disabled through the external switch, then **HI504903** sends only the message: “SMS disabled; Rem msg: <NUMBER OF REMAINING MESSAGES>”.

**Note** The information about SIM charge and expiration date are not saved in the SIM card, but are managed by the network operator; the instrument can not get directly the information. To prevent the discharge of the SIM card, the user has to configure manually (according with the credit stored on the SIM card) the maximum number of SMSs that can be sent (see “Interface configuration” section).

**Note** Every time an SMS is submitted, the <NUMBER OF REMAINING MESSAGES> is updated and it will always indicate the remaining number of messages that can be sent by the instrument. When this number is going to reach zero, the mes-

sage "Maximum number of SMSs reached. Please check the HI504903 SIM charge level; Rem msg: <NUMBER OF REMAINING MESSAGES>" will be sent by the instrument to the programmed cellular phone number(s). This particular situation is managed as an error occurrence and a confirmation is waited. When this happens, no more messages will be sent by the interface until the error is deactivated.

Also a cellular error indication is given by interface: green and red LEDs disable/enable blink together. To deactivate this error and restore the SMS service, it is necessary to recharge the SIM card credit.



**Note** Every time a recharge of the cellular module SIM card is performed, the corresponding expiration date has to be manually updated with the application software **HI504903SW** (see "Interface configuration" section). A check is performed daily between the current (Real Time Clock) and the expiration date. Two weeks before the expiration date, the message "The HI504903 SIM card will expire on DD-MM-YYYY. Please recharge or substitute it" is sent to the programmed phone number(s). The same message will be sent again also one week before and the day before the expiration date. This particular warning message does not need confirmation. In this case the user has to recharge or substitute the SIM card. The sending of the repeated warning messages will be reset when the expiration date is changed. If the expiration date is reached without any updating of the "Expiration Date" item (see "Interface configuration" section), then no more messages will be sent by the interface until error is deactivated and a cellular error indication will be given. To deactivate this error it is necessary to update the SIM expiration date.

**Note** If the user has unlimited credit on the SIM card (i.e. option was disabled during last interface configuration), the value of remaining messages will not be decrement and no check will be performed on the SIM expiration date. Moreover, at the end of each SMS there will not be the remaining-messages information ("Rem msg: <NUMBER OF REMAINING MESSAGES>").

## DIGITAL OUTPUT CONTROL

The user can control the digital output status simply sending an SMS to **HI504903** (one to close and one to open the port). Following messages can be sent from whatever cellular phone to change the status:

- "CLOSEP<cellular phone interface password>" to close the contact (if password is enabled)
- "CLOSEP" to close the contact (if password is disabled)
- "OPENP<cellular phone interface password>" to open the contact (if password is enabled)
- "OPENP" to open the contact (if password is disabled)

**Note** All the letters for <cellular phone interface password> in the message must be in uppercase format.

After one of these messages is received by the interface and the correspondent action performed, a message confirming the new status of the digital output port is sent back by the interface:

- "Digital Output: Contact Closed", if digital output contact is closed;
- "Digital Output: Contact Open", if digital output contact is open.

Previous messages are sent also by the interface upon an user information request, if digital output control was enabled.

**Note** If a communication problem with internal cellular phone occurs during the normal functioning of the interface, the cellular error indication will be switched on and no SMS can be submitted until the error will be deactivated (when this error occurs, the instrument will try repeatedly to initialize the cellular engine and the error will be deactivated only after a successful initialization).

## PC COMMUNICATION

**HI504903** interface can act as a gateway for a connection through a remote computer. With this feature a seamless data connection will be established between a computer and whatever instrument connected and previously correctly configured on the **HI504903** interface through **HI504903SW** application software (see “Interface configuration” section).

Through a PC communication session it is possible to download on the PC all information, alarms and fault conditions regarding all instruments connected to **HI504903** through only one data communication link towards **HI504903** interface (no need to perform as many data links as many instruments have to be queried). Actually, once data call is in progress, the user can select with which instrument (connected to the interface) he wants to communicate and switch among the various instruments at any time.

There are two ways for establishing a PC communication session: the “local” one with a serial cable, and the “remote” one through a modem connected to the PC (see below).

Data transmission to the PC from dataloggers connected to the interface (both local and remote) is possible with the **HI92140** Windows® compatible application software offered by Hanna Instruments.

The user-friendly **HI92140** offers a variety of features such as logging selected variables or plotting the recorded data. It is also provided with an on-line help feature to support the user through the operation.

**HI92140** makes it possible to use the powerful means of the most diffuses spreadsheet programs (Excel®, Lotus 1-2-3®, etc.). Simply run the favorite spread sheet and open the file downloaded by **HI92140**. It is then possible to elaborate the data with the selected software (e.g. graphics, statistical analysis).

To install **HI92140** are required only a 3.5” drive and a few minutes to follow the instructions printed on the disk label.

Contact your Hanna Dealer to request a copy.

### LOCAL COMMUNICATION

This type of communication session takes place between the **HI504903** device and one (placed near) PC with **HI92140** application software installed, towards a serial cable con-

nection. To connect the **HI504903** supervisor to PC use an **HI920010** cable. Plug the connectors, one to the supervisor RS232 auxiliary connector (PC config port), and the other one to a serial port of the PC.

### REMOTE COMMUNICATION

This type of communication session takes place between the **HI504903** device and one remote PC with the **HI92140** application software installed, through a data call made by a modem connected to the PC. The incoming call is answered by the interface and then a seamless data connection will be established between any connected instrument and remote computer. In this way it is possible to monitor a meter even if it is placed long far from the operator position.

**Note** During remote communication, yellow LED for cellular status (when available) blinks fast to indicate data call in progress.

**Note** **HI504903** will be able to establish a remote communication only if the used SIM card is enabled for data call. Please contact the cellular phone network operator for active services on the used SIM card.

No connection can be established towards an instrument not configured on **HI504903** interface, even if electric wiring is correctly performed between **HI504903** and the instrument itself. Please refer to the **HI92140** on-line help for more details.

**Note** If mains power supply failure occurs on **HI504903** side while a PC communication session is taking place, **HI504903** enters in power failure status (see “Power failure status” section) and communication session is immediately aborted. Moreover, in remote communication case cellular phone hangs up and telephone line is released.

**Note** While a PC communication session towards a remote computer is taking place, devices connected to **HI504903** are not polled. So if some new alarms occur meanwhile, no SMS is sent by the phone interface. Configured alarm messages are sent when the connection ends, if the correspondent alarm is still active. Also information messages are temporarily suspended.



## PC COMMUNICATION PROTOCOL

Even if it is strongly recommended to use **HI92140** software to establish local or remote connections between **HI504903** and a PC, it is possible to try also without **HI92140** by building the application software for communication session management (i.e. session establishment, serial port channel selection and session termination). It is necessary to issue to the interface towards PC some simple commands accomplishing with the protocol implemented on **HI504903**.

Commands are composed of three parts: command identifier, parameter (when needed), end of command. The end of the commands corresponds to the CR char (0x0d).

Following is the complete list of available commands:

Command	Parameter	Remarks
PWD	<interface password>	Send the general password (*)
COA	not available	Request to RS485 channel selection

(\*) 6 to 20 characters long ASCII string representing interface password (letters in uppercase format)

### Local PC connection session establishment

To start a local PC connection the application software has to perform the following operations on PC side:

- Set baud rate at 9600 bps on the selected PC serial port.
- Pull up the DTR line of the serial port and wait for phone interface "RDY<CR>" answer. The DTR line must remain high while application software is running; if the DTR goes down while communication is taking place, then **HI504903** aborts immediately the current PC communication session.
- If the password was enabled in the phone interface during last configuration (see "Interface configuration" section), the application software must send the password through the command "PWD<interface password><CR>" and the interface will answer <ACK> (char 0x06) if the password is correct, or <CAN> (char 0x18) if password is wrong or <NAK> (char 0x15) if command syntax is wrong.

### Remote PC connection session establishment

To open a remote PC connection the application software has to perform the following operations on PC side:

- Set the baud rate at 9600 bps for the serial port where modem is connected and continue to use this value for **all the time** the communication is in place;

- Make a data call to cellular phone number with the modem;
- After the reception of the "CONNECT" notification string (i.e. the data connection establishment), wait for the string "RDY<CR>" issued by the interface: this means that the interface is ready to receive a command from the remote PC;
- If the password was enabled in the phone interface during last configuration (see "Interface configuration"), the application software must send the password within 3 minutes through the command "PWD<interface password><CR>" and the interface will answer <ACK> (char 0x06) if the password is correct, or <CAN> (char 0x18) if password is not correct, or <NAK> (char 0x15) if command syntax is wrong, and hangs up the call when 3 minutes have elapsed.

### Local channel selection

Before communicating with one of the loggers attached to **HI504903**, the application software on remote PC needs to specify to the interface to use the RS485 channel with 1200 bps (this is baud rate used by interface to communicate with **HI142** during polling procedure). To do this, the COA<CR> command has to be sent to **HI504903**. The cellular phone interface will send back <ACK> if the command is correctly recognized, otherwise <NAK>. <CAN> is sent back if the required channel is not configured in the instrument. When command is correctly recognized, baud rate in the local PC must be set to 1200 bps. In this way the local PC and the selected instrument are connected directly and everything works like a direct point-to-point connection (if we exclude the delay issues).

### Remote channel selection

Also in remote communication session the application software needs to select a channel, but the procedure is a bit different from the local one. Before communicating with one of the instruments attached to **HI504903**, the application software on remote PC needs to specify to the interface to use the RS485 channel with 1200 bps. To do this, the COA<CR> command has to be sent to cellular interface. The phone interface will send back "+++" (the "+++" is needed to return temporarily to command mode in the cell phone to change baud rate) and then, after several seconds, <ACK> if the command is correctly recognized, otherwise <NAK>. <CAN> answer is sent back if the required channel is not configured in the instrument. When command is correctly recognized, the local PC and the selected remote instrument are connected directly and

everything is works like a direct point-to-point connection (if the delay issues are excluded). No need to change baud rate value on PC side as modem buffers handle automatically the baud rate difference (remember that the baud rate must be kept at 9600 bps in remote communication on PC).

#### Local PC connection closure

The application software can close a local PC connection pulling down the DTR line of the serial port at any moment.

#### Remote PC connection closure

The application software can close a remote PC connection hanging up the data call sending to the modem “+++” and then, after “OK” reception, “ATH<CR>” commands at any moment.

An automatic disconnection on **HI504903** side takes place if no character is received in 8 minutes.

### LEDs STATUS DURING PC COMMUNICATION SESSION

Following is a table with all possible status of **HI504903** LEDs during a PC communication session:

LED	Status	Meaning
RS485 channel (red)	OFF	Not yet channel selection made by remote PC
	Blinking	Communication session in progress between remote PC and one or more <b>HI142</b> dataloggers on RS485 channel
Digital input (red)	OFF	--- (no meaning)
SMS enable (green)	OFF	--- (no meaning)
SMS enable (red)	ON	--- (no meaning)
Digital output (yellow)	ON / OFF	Indication about digital output previous status (ON if contact closed, OFF if contact open)
Cell signal quality (2 green LEDs)	both OFF, or ON + OFF, or both ON	Indication about last cellular signal strength before PC communication session beginning
Cell status (yellow)	ON / OFF / blinking	Cellular phone real time operating status (fast blinking if remote communication is taking place)

## POWER FAILURE

The power failure status is the working mode of **HI504903** when the mains power supply fails and the interface works using the internal backup battery.

In this situation the green “SMS enable” and red “SMS disable” LEDs are in the following conditions:

LED	Status	Meaning
SMS enable (green)	blinking	SMS sending enabled
SMS disable (red)	OFF	
SMS enable (green)	OFF	SMS sending disabled
SMS disable (red)	blinking	

All other LEDs (excluding the digital output LED when the digital output contact is closed) are turned off.

If the SMS sending is user enabled, then alarm SMS related to power failure event will be sent by **HI504903** to the programmed number(s) (see “SMS delivery” section).

After that, if

1. sending of maximum number of repeated messages is reached without user confirmation, or
2. **HI504903** receives a phone call from one of the programmed number(s) to confirm alarm SMS reception, or
3. SMS sending is disabled through external switch, then **HI504903** turns off the cellular phone engine to prevent internal backup battery consumption.

#### Note

If SMS sending was disabled before power supply failure event, then cellular phone is immediately turned off and no alarm will be issued by interface.

While in power failure status **HI504903** does not perform device polling procedure, so that new alarms on instruments connected to the interface can not be notified.

Also interface configuration and PC communications (both local & remote) are not allowed until mains supply comes back. When the mains power supply comes back, the cellular phone turns on and cellular initialization procedure takes place (it keeps about 30 seconds). As in start-up procedure, during cellular phone initialization the red LED for SMS disable turns on while the green LED (SMS enable) turns off. When cellular phone is ready, **HI504903** sends the SMS “Power is OK now!” to the programmed number(s), if SMS sending is enabled.

# FAULT CONDITIONS & SELFTEST PROCEDURES

**HI504903** is provided with some selftest procedures to prevent interface problems. The below fault conditions may be detected by the software:

- EEPROM data error
- Cellular phone error
- Battery test failure

If a problem is found, **HI504903** gives to the user a “visual” indication through green and red LEDs for SMS sending enable/disable (also for battery test failure an alarm SMS is submitted to the programmed number(s)).

## EEPROM DATA ERROR

EEPROM data error can be detected through automatic EEPROM test procedure. **HI504903** performs this test at start-up and once every hour.

When an EEPROM data error is detected (i.e. if a checksum control fails), **HI504903** tries to repair the corrupted data. If it does not succeed, a fault alarm is generated for EEPROM corruption error. To close this error a new local interface configuration is required.

As soon as an EEPROM error is detected, the following “visual” LED indication is provided by the interface:

LED	Status	Meaning
SMS enable (green)	ON	EEPROM data
SMS disable (red)	ON	corrupted

**Note** While EEPROM data error is active no polling operation is performed. Remote PC communication and remote interface configuration can not take place. Only a local PC configuration is allowed in order to let the user to verify EEPROM stored data and to correct the corrupted ones.

## CELLULAR PHONE ERROR

During the normal functioning of the interface if a problem occurs in communication with the cellular engine, a cellular error will be switched on. **HI504903** performs periodically (every 10 minutes) a cellular test to be sure that the cellular phone engine is ready and network registered. Moreover, a cellular error can be generated if the SIM card expiration date is reached or when the number of remaining messages reached zero.

If cellular error is active, the following “visual” LED indication will be given by the interface:

LED	Status	Meaning
SMS enable (green)	blinking	Cellular phone
SMS disable (red)	blinking	error

When this error occurs, the instrument will try repeatedly to initialize the cellular phone engine and the error will be disactivated only after a successful initialization.

**Note** If SIM card expired or maximum number of remaining messages reached zero, the only way to disactivate cellular error is to recharge or substitute the SIM card.

While cellular error is active no remote configuration and PC communication session can take place until error will be disactivated. Also SMS service is not available.

## BATTERY TEST FAILURE

**HI504903** can test the internal backup battery in order to check if it is good and correctly connected on the main board. Interface performs the battery test at device start-up and once a day at 15:00 (3:00 pm).

If battery test is not successful, then an alarm SMS is submitted by **HI504903** supervisor to the programmed number(s) as described on the “SMS delivery” section. Also repeated SMSs are sent if no user confirmation is received.

**Note** Every day, after this test procedure, related alarm SMS for battery test failure will be submitted by the interface even if an user confirmation was received the day before (if there is still problem with internal battery). The only way to prevent alarm SMS sending is to solve the problem related to the internal battery. While battery problem persists green “SMS enable” and red “SMS disable” LEDs are in the following conditions:

LED	Status	Meaning
SMS enable (green)	blinking	Battery test failed and
SMS disable (red)	ON	SMS sending enabled
SMS enable (green)	ON	Battery test failed and
SMS disable (red)	blinking	SMS sending disabled

**Note** Before removing battery or checking its capability, make sure that the **HI504903** is turned off.

**Note** Even if a battery problem persists, all **HI504903** functions are still available.



## LED INDICATORS

Find here below a brief explanation of all possible LEDs indications of **HI504903** interface.

### RS485 PORT LED

This red LED keeps indication about devices connected to the RS485 port.

- **LED off**
  - in idle state: no instrument is configured or no alarm is on
  - during PC communication session: not yet channel selection made by remote PC
- **LED on**, in idle state: at least one instrument is configured and at least one alarm is on
- **LED blinking**, during PC communication session: a communication is in progress between remote PC and one (or more) of RS485 instruments

### DIGITAL INPUT PORT LED

This red LED keeps indication about digital input status (if software enabled) depending on last interface configuration setting.

- **LED off**
  - in idle state: digital input not configured or digital contact close (if configured to be on when contact is open) or contact open (if configured to be on when contact is close)
  - during PC communication session: when a call is in progress with any instrument
- **LED on**, in idle state: digital input configured and close (if configured to be on when contact is close) or contact open (if configured to be on when contact is open)

### SMS ENABLE/DISABLE LEDs

These two LEDs keep indication about SMS sending enable/disable status and are used on fault interface related condition to provide to the user a “visual” indication of actual problem.

- **green LED on & red LED off**, in idle state: SMS sending enabled
- **green LED off & red LED on** during interface start-up procedure or in idle state if SMS sending is disabled
- **green LED blinking & red LED off**, in power failure status: SMS sending enabled
- **green LED off & red LED blinking**, in power failure status: SMS sending disabled

- **green LED blinking & red LED on**, battery test failed and SMS sending enabled
- **green LED on & red LED blinking**, battery test failed and SMS sending disabled
- **green & red LEDs blinking**, cellular error is active
- **green & red LEDs on**, EEPROM data corruption

### DIGITAL OUTPUT STATUS LED

This yellow LED keeps indication about digital output contact status (if software enabled).

- **LED off**, digital output contact open
- **LED on**, digital output contact close

### CELLULAR SIGNAL LEDs

These green LEDs keep indication about signal strength for cellular phone module.

- **Cell signal #1 & Cell signal #2 LEDs off**, no signal or cellular error found or power failure status
- **Cell signal #1 LED on & Cell signal #2 LED off**, medium signal condition
- **Cell signal #1 & Cell signal #2 LEDs on**, strong signal condition

### CELLULAR STATUS LED

When available, this yellow LED displays the operating status of the cellular phone terminal.

- **LED off**, cellular engine off
- **LED on**, cellular engine on but not registered to the network
- **LED blinking (slow)**, cellular engine on and registered to the network
- **LED blinking (fast)**, cellular engine registered to the network and a call is in progress

# ERRORS PRIORITY

**HI504903** is provided with some selftest procedures and related “visual” LED indications when some of these tests failed, in order to make the user understand the interface related problem (see “Fault conditions and selftest procedures” section).

Only two LEDs (green and red LEDs for SMS sending enable/disable) are available to give information to the user about active errors, and no more than one can be shown at the same time. For this reason every error type has an associated priority level, as described in the following table:

Error type	Priority level
Power failure	4
EEPROM data corruption	3
Cellular error	2
Battery test failure	1

If more than one fault condition occurs simultaneously, then errors with lower priority level are masked by error with high one: only error indication with higher priority will be visible by the user.

# TROUBLESHOOTING GUIDE

If troubles occur with the **HI504903** device, follow the below guidelines.

## INTERFACE CONFIGURATION

- One (or more) **HI142** datalogger(s) is (are) not recognized by **HI504903** interface during interface configuration with provided application software **HI504903SW** on “test device” procedure.

Possible causes	Solutions
Configuration parameters for serial communication between <b>HI504903</b> and <b>HI142</b> datalogger are not correct.	Check if the <b>HI142</b> serial number parameter for serial communication set with <b>HI504903SW</b> application software matches with the one of the datalogger.
Mains power supply missing on <b>HI142</b> datalogger.	Provide the mains power supply to <b>HI142</b> datalogger.
Wiring not correctly performed.	Check if <b>HI142</b> datalogger is correctly connected to the <b>HI504903</b> supervisor.

- During local interface configuration attempt the **HI504903SW** software can not connect to the **HI504903** interface.

Possible causes	Solutions
Wiring not correctly performed.	Check if the <b>HI920010</b> cable is correctly connected to the RS232 serial port on the PC and to the auxiliary serial port on the <b>HI504903</b> interface.
<b>HI504903</b> interface is busy (a remote PC communication or remote interface configuration is already in place, interface is performing the polling procedure for a not responding device, etc.).	Try to connect later.
<b>HI504903</b> is in power failure status.	Restore mains power supply or wait for power supply comes back.
<b>HI504903</b> interface is turned off.	Turn on the <b>HI504903</b> interface.

- During remote interface configuration attempt the **HI504903SW** software can not connect to the **HI504903** interface.

Possible causes	Solutions
Modem on PC is turned off.	Turn on the modem and try again.
SIM card on <b>HI504903</b> is not able to make data calls.	Change the SIM card with one enabled for data calls. <b>Note:</b> Some SIM cards can be used both for data and voice calls. Please check the network operator for further details.
<b>HI504903</b> interface is out of coverage.	Install <b>HI504903</b> interface in a place with good network coverage.
<b>HI504903</b> interface is busy (PC communications or interface configurations, both remote and local, are already in place, interface is performing the polling procedure for a not responding device, etc.).	Try to connect later.
<b>HI504903</b> is in power failure status.	Restore mains power supply or wait for power supply comes back.
<b>HI504903</b> interface is turned off.	Turn on the <b>HI504903</b> interface.

## PC COMMUNICATION

- No local "PC communication session" can take place with **HI504903** interface : see case "During local interface configuration attempt the **HI504903SW** software can not connect to the **HI504903** interface" on the "Interface configuration troubleshooting" section.
- No remote "PC communication session" can take place with **HI504903** interface : see case "During remote interface configuration attempt the **HI504903SW** software can not connect to the **HI504903** interface" on the "Interface configuration troubleshooting" section.
- Can not communicate with one of the dataloggers connected to **HI504903** interface.

Possible causes	Solutions
Wiring not correctly performed.	Check if the remote <b>HI142</b> datalogger is correctly connected to <b>HI504903</b> interface.

Possible causes	Solutions
<b>HI504903</b> not configured for communication with remote <b>HI142</b> datalogger.	Run <b>HI504903SW</b> application software and configure <b>HI504903</b> for communication with remote datalogger. <b>Note:</b> No PC communication session can take place if a device is not configured in <b>HI504903</b> , even if electric wiring is correctly performed between interface and device.
Mains power supply missing on <b>HI142</b> datalogger.	Provide the mains power supply to <b>HI142</b> datalogger.

## SMS DELIVERY

- Can not receive alarm SMS even if an alarm is active on one **HI142** datalogger connected to **HI504903** interface.

Possible causes	Solutions
<b>HI504903</b> not configured for communication with datalogger.	Run <b>HI504903SW</b> application software and configure <b>HI504903</b> for communication with datalogger.
<b>HI504903</b> not configured for sending SMS upon an alarm active on device.	Run <b>HI504903SW</b> application software and enable the specific alarm notification checking the proper box on "message option" window of selected device.
Destination telephone number stored on interface is not correct or country code missing.	Run <b>HI504903SW</b> application software and check if destination telephone number is correct and if includes country code.
SMS sending disabled through external switch.	Enable SMS sending through external switch.
SIM card on <b>HI504903</b> expired or credit reached zero.	Recharge or substitute the SIM card.
SIM card on <b>HI504903</b> is not able to make voice calls.	Change the SIM card with one enabled for voice calls. <b>Note:</b> Some SIM cards can be used both for data and voice calls. Please check the network operator for further details.

- *Can not receive alarm SMSs regarding digital input port.*

Possible causes	Solutions
Wiring not correctly performed.	Check if wires on digital input port are correctly connected to <b>HI504903</b> supervisor.
<b>HI504903</b> not configured to send alarm SMSs for digital input port status.	Run <b>HI504903SW</b> application software and enable digital input on <b>HI504903</b> .
Current status of digital input port does not match with the one set on <b>HI504903</b> interface.	Run <b>HI504903SW</b> application software and change the options for SMS sending logic on “digital input” window.
SMS sending disabled through external switch.	Enable SMS sending through external switch.

- *Can not control digital output contact through SMS messages.*

Possible causes	Solutions
Wiring not correctly performed.	Check if wires on digital output port are correctly connected to <b>HI504903</b> supervisor.
<b>HI504903</b> not configured to control and send information SMSs for digital output port status.	Run <b>HI504903SW</b> application software and configure <b>HI504903</b> for controlling and sending information SMSs related to digital output contact on “digital output” window.
Interface password on SMS message not correct or not inserted, but needed.	Insert or check the interface password on the SMS sent.

- *Can not receive the **HI504903** phone call after the reception of an alarm SMS.*

Possible causes	Solutions
SIM card on <b>HI504903</b> is not able to make voice calls.	Change the SIM card with one enabled for voice calls. <b>Note:</b> Some SIM cards can be used both for data and voice calls. Please check the network operator for further details.

## ACCESSORIES

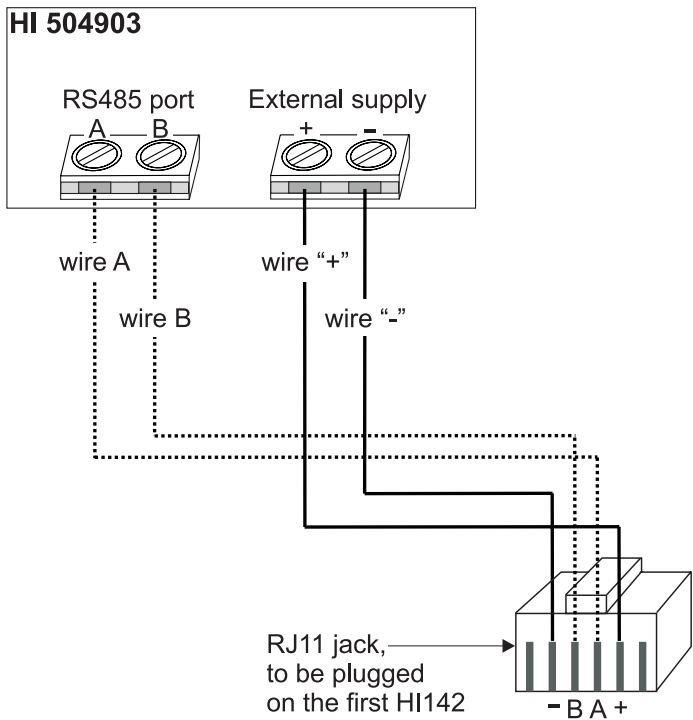
HI 710005	12 VDC to 115 VAC power adapter, USA plug
HI 710006	12 VDC to 230 VAC power adapter, European plug
HI 710012	12 VDC to 230 VAC power adapter, UK plug
HI 710013	12 VDC to 230 VAC power adapter, South African plug
HI 710014	12 VDC to 230 VAC power adapter, Australian plug
HI 920010	9 to 9-pin RS232 connection cable
HI 92140	Windows® Compatible Application Software

# APPENDIX

## SECTION 1: CONNECTING THE HI142 NETWORK TO HI504903

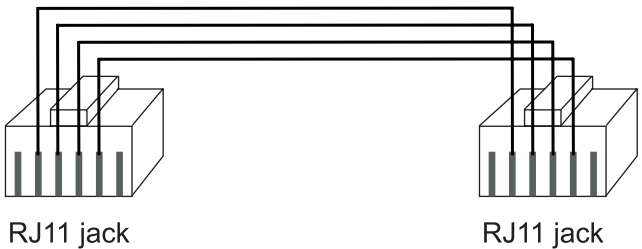
For connecting the first **HI142** datalogger to the **HI504903** interface, make a cable for both RS485 and power supply connections.

A 4-wire cable and an RJ11 jack (male connector) are necessary, then follow the below diagram:



## SECTION 2: CONNECTING HI142 TO HI142

For connecting one **HI142** datalogger to the next one, make a cable as explained on the below diagram, by using a 4-wire cable and two RJ11 jacks (male connectors):



## SECTION 3: RS232 AUXILIARY PORT

**HI504903** is provided with an auxiliary RS232 port (D-Sub 9-pole female plug) for connection to a local PC using an **HI920010** Hanna cable.

If the provided **HI920010** Hanna cable is too short for your application, it is possible to make a longer communication cable (up to 15 m long) by following the below table for pin connections.

PC side female connector pin	HI504903 side male connector pin
2	3
3	2
4	6
5	5
6	4

## CE DECLARATION OF CONFORMITY



### DECLARATION OF CONFORMITY

We

Hanna Instruments Italia Srl  
via E.Fermi, 10  
35030 Sarmeola di Rubano - PD  
ITALY

herewith certify that the GSM Supervisor:

**HI 504903**

has been tested and found to be in compliance with EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC according to the following applicable normatives:

**EN 50082-1:** Electromagnetic Compatibility - Generic Immunity Standard

**IEC 61000-4-2** Electrostatic Discharge

**IEC 61000-4-3** RF Radiated

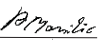
**IEC 61000-4-4** Fast Transient

**EN 50081-1:** Electromagnetic Compatibility - Generic Emission Standard

**EN 55022** Radiated, Class B

**EN61010-1:** Safety requirements for electrical equipment for measurement, control and laboratory use

Date of Issue: May 2004

  
A. Marsilio - Technical Director  
On behalf of  
Hanna Instruments S.r.l.

### Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used.

Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment.

To maintain the EMC performance of equipment, the recommended cables noted in the user's manual must be used.

Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance.

To avoid electrical shock, do not use this instrument when voltage at the measurement surface exceeds 24VAC or 60VDC.

To avoid damage or burns, do not perform any measurement in microwave ovens.

External cables to be connected to the instrument should be terminated with cable lugs.

## TECHNICAL SERVICE CONTACTS

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**Australia:** Tel. (03) 9769.0666 • Fax (03) 9769.0699

**China:** Tel. (10) 88570068 • Fax (10) 88570060

**Egypt:** Tel. & Fax (02) 2758.683

**Germany:** Tel. (07851) 9129-0 • Fax (07851) 9129-99

**Greece:** Tel. (210) 823.5192 • Fax (210) 884.0210

**Indonesia:** Tel. (21) 4584.2941 • Fax (21) 4584.2942

**Japan:** Tel. (03) 3258.9565 • Fax (03) 3258.9567

**Korea:** Tel. (02) 2278.5147 • Fax (02) 2264.1729

**Malaysia:** Tel. (603) 5638.9940 • Fax (603) 5638.9829

**Singapore:** Tel. 6296.7118 • Fax 6291.6906

**South Africa:** Tel. (011) 615.6076 • Fax (011) 615.8582

**Taiwan:** Tel. 886.2.2739.3014 • Fax 886.2.2739.2983

**Thailand:** Tel. 66.2619.0708 • Fax 66.2619.0061

**United Kingdom:** Tel. (01525) 850.855 • Fax (01525) 853.668

**USA:** Tel. (401) 765.7500 • Fax (401) 765.7575

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see **[www.hannainst.com](http://www.hannainst.com)***