

**HANNA**  
instruments 1978



*World  
presentation  
Achema  
2003*

**HI 504**  
**pH / ORP REGULATOR with TELE-CONTROL**

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

Precise measurement  
Intelligent transmission  
Versatile installation  
"State of the art process control"



**HI 504** introduces an innovation in the concept of pH and ORP control, strengthening even more the family of industrial analysers supplied by Hanna Instruments. Our 25 years of experience in the production of regulators for industrial processes have enabled us to develop the **HI 504** series, which offer elevated performance capabilities, rugged design and exploit an intelligent and advantageous use of tele-control technology.

This technology supplies the means to control from whatever distance and in real time, one or more installations, creating the possibility to optimise operations such as maintenance cycles and reducing unscheduled and costly plant shutdowns. Thanks to the two-way communication supplied by an RS485 output and Windows® compatible software, operators can control the complete regulation process, from the comfort of their own personal computer.

Measurement reliability is guaranteed by many self-diagnostic and troubleshooting functions, for example the innovative "**sensor check system**", which is the result of an advanced research and development program, our application know-how and many years of experience in the field of industrial and water treatment processes.

The many different models present in the **HI 504** family offer analysers designed to fit your individual needs, able to satisfy whatever application of monitoring and regulation you might require. Analysers from the **HI 504** family together with the wide range of industrial pH and ORP probes supplied by Hanna Instruments, permit successful "problem solving" even in the most challenging situations, such as:

- **Civil and industrial wastewater** – pH and ORP control both at entry and in discharge.
- **Chemical production** - pH and ORP control during production.
- **Textile industry** – pH control at high temperatures during dyeing procedures
- **Tanning industry** – pH control in discharge and for odour filtration plants.
- **Paper production** - pH and ORP control during production.
- **Electroplating** – Chromate and Cyanide reduction in discharge.
- **Energy production** – pH control for ultra pure water.
- **Food processing** – pH control using sterilized probes in production.



## Sensor check pH/ORP

Incorporated in the self-diagnostic functions of the instrument, the “**sensor check system**” provides a continuous inspection of the probe’s condition. With this troubleshooting system, a precise reading is guaranteed. The test is not limited to a simple signal that indicates that an error is in progress, in fact, it reports the very nature of the breakdown, communicating directly on the instrument’s display a code that corresponds to an individual error. With the accessory **HI 504900** (cellular module) eventual errors or alarms can be sent directly to the operator’s mobile phone under the form of an SMS message.

The types of breakdowns shown by the “**sensor check system**” are:

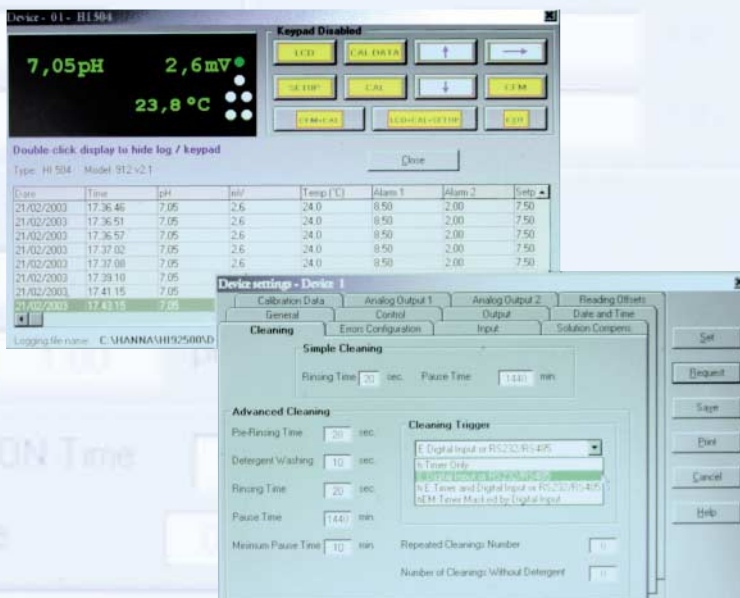
- pH probe damaged
- Reference probe contaminated
- Reference or matching pin not immersed in liquid
- Dirty or blocked junction
- Short circuit between the cable and the probe
- Loss of signal from the cable or the connector caused by humidity or dirt.

The instrument’s internal circuit executes two independent tests, one for the probe and one for the reference chamber, measuring the respective impedance values every 30 seconds. The test lasts for a very brief period in order to avoid undesired effects such as electrolysis and polarization, which can be caused by a prolonged exposure to an electric current.

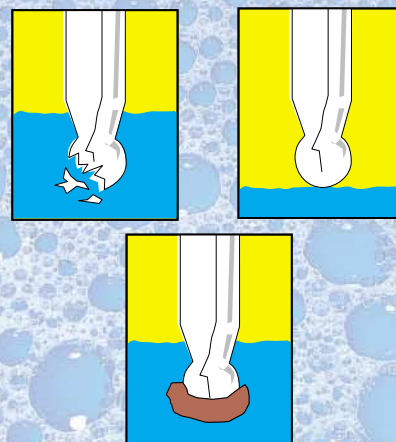
## RS485

The RS485 output is a versatile interface that can be used for connecting the instrument with many other devices. Other than the simplest configuration represented by a direct wire connection to a personal computer, with distances of up to 1 km, it is also possible to create more advanced solutions such as tele-control, using either a traditional or GSM modem. By means of the data management software **HI 92500**, which is supplied by Hanna Instruments and compatible with Windows® operated systems, once connected, the operator can interact with the system, visualize parameters in real time, download process data relative to the last 100 events that have occurred, and if necessary alter or reconfigure program settings; for example - set points, alarms, cleaning cycles, stand-by times, etc.

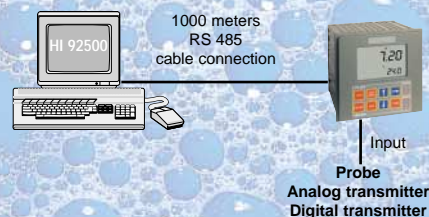
When a connection is kept continuously active it is possible to create a “logbook” which automatically stores process data in an Excel® format. This data, once saved, can be easily organized into tables and graphs, used for creating records and supervising the progression of the process.



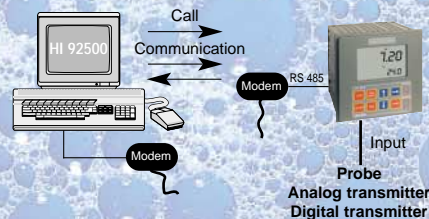
## Some types of revealed breakdowns



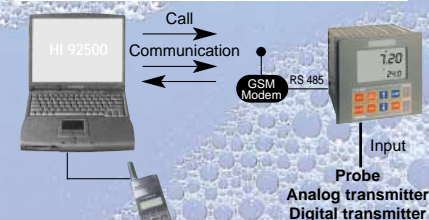
## PC connection



## Traditional Modem Connection

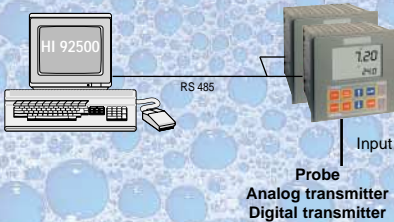


## Wireless Modem Connection

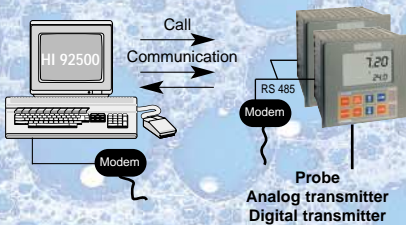




## RS485 Network: Connection to PC



## RS485 Network: Modem Connection



## RS485 Network

The RS485 output permits the realization of a network composed of a maximum of 32 instruments using a simple double-wire cable. The communication speed, composed between 1,200 and 19,200 BPS, allows the possibility to create an RS485 network covering an area of up to 1 km between the two instruments situated at both extremities of the network. One or more units of the **HI 504** family can establish a network, or alternately any industrial analyser Hanna Instruments that is supplied with an RS485 output can be used (mV602, pH502, HI700).

The entire network can be managed by the **HI 92500** software, using a simple wire connection, or with the help of a traditional modem. In both situations, the program permits the operator to select any instrument from the network, and therefore visualize and record data.

## Digital transmitter input

Many industrial applications call for distances from the regulating system to the probe superior to the 20 meters that are guaranteed by traditional industrial probes. For these situations, the use of a transmitter results indispensable. The many different models in the **HI 504** family are supplied with an input that can be connected to either an analogical or a digital transmitter.

Compared to a traditional analog transmitter, which has a maximum transmission length of 300 meters, the new digital transmitter **HI 504910** permits a connection with the regulator even at distances of up to 1,000 meters. The data transmitted can be either pH and temperature or mV and temperature, but the real advantage in using the digital transmitter **HI 504910** results in the opportunity to keep the “**sensor check**” function, and therefore guaranteeing an excellent precision with a continuous inspection of the probe.

## Programmable auto-cleaning cycle

Heavy-duty applications often require an almost continuous maintenance of the probe. In a brief period elements such as suspended solids, fat, oils, pigments and micro-organisms can deposit and soil the glass bulb of a pH probe, the sensor of an ORP probe or the reference junction of both. The *cleaning* function permits the control of these inconveniences by programming one or more wash cycles of the probe, a fundamental characteristic, especially in “batch production”.

The instrument provides two possible cleaning cycles, “**Simple Cleaning**” and “**Advanced Cleaning**”. The first option is a “simple” wash with a single element which can be water or detergent, programmed by setting the rinse time and the pause length. The “Advanced” version uses both elements and permits three distinct stages, with the possibility to vary the sequence, the time and the number of cycles.

The “**Advanced Cleaning**” can also be put into action in any moment from a personal computer by using the two-way tele-control system, or by exploiting an isolated digital input, situated at the rear of the instrument, which can be connected to an external switch and used to trigger the cleaning cycle manually.

Even though the “simple” and “advanced” cleaning systems have different working methods, the analyser can trigger both automatically whenever the “**sensor check**” reveals a soiled probe.

It is possible to impost a delay time before restarting the reading after a cleaning cycle has taken place; this permits the probe to adjust completely to the operating conditions after being exposed to detergents and different pH values

## ADVANCED CLEANING

Cleaning phases	Liquid
PRE-RINSE	WATER
WASH	DETERGENT
FINAL RINSE	WATER

## Versatile Analyser: pH or ORP in one instrument

The instrument can be used either as a pH regulator or as an ORP regulator. The universal BNC connector permits the use of whatever type of industrial probe chosen for a specific application, but at the same time allows simple and time saving probe replacement.

## Two analog outputs: Data registration or PID dosage control

The range of instruments available in the **HI 504** family offer the possibility to choose from one or two insulated analog outputs. These outputs can be either connected to a recorder for the registration of process data, for example pH/ORP and temperature or otherwise used for controlling dosing systems, such as proportional pumps or valves using a **Proportional Integrative Derivative** action.

## ON/OFF – PID

The **HI 504** family offers the choice of instruments with two different types of control: either ON/OFF or PID for an efficient and precise dosing control.

## Logging of the last 100 events

With the industrial analysers **HI 504** it is possible to view in whatever moment a sequence of the last 100 events that have occurred; errors, calibrations, variations of the system's set up, cleaning cycles.

Every code visualised on the display corresponds to a certain event, an error or a precise operation. Errors that are still in course are visualised by a flashing code, while operations and alarms recorded, or that have already concluded appear with a fixed code on the display.

## Automatic temperature compensation

Connecting a Pt100 or Pt1000 probe activates the automatic temperature compensation. The self-diagnostic system automatically recognises which type of temperature probe has been connected and verifies continuously that a correct connection has been applied and that the probe is intact.

## 5 VDC output for amplified probes

Thanks to the  $\pm 5$  VDC, output the instrument permits the use of amplified industrial probes that require an outside power supply, for example HI 1004/5.

## Fail safe alarm system

Hanna's exclusive "**fail safe**" alarm system represents an efficient protection both on a hardware and a software level against problems caused by interruption of the power supply or by human error, which are typical risks in an industrial ambient.

The alarm functions in a "normally closed" condition, and goes into action when there is a loss of tension due to power failures or human error, for example if power cables are accidentally pulled out of their sockets. This alarm function is considered very important in industrial plants because usually alarms are not activated if there is an interruption of the electrical current, this situation can cause serious damage due to a loss of control of the process plant.

On a software level, the "**fail safe**" function activates an alarm in the case of abnormal circumstances, for example, if the dosing contacts remain closed for an excessive period. During a "**fail safe**" alarm a red LED directly on the keyboard of the instrument starts to blink and can easily be seen from a distance.

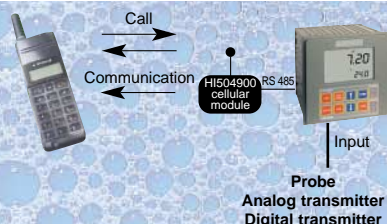
## Programmable Hold System

The "Hold" function permits the user to deactivate the regulating action of the analyser for periods of time that can be pre-programmed. It is possible to impose the hold periods in correspondence to programmed operations such as plant maintenance, probe cleaning and instrument calibration.



## ACCESSORIES FOR HI 504

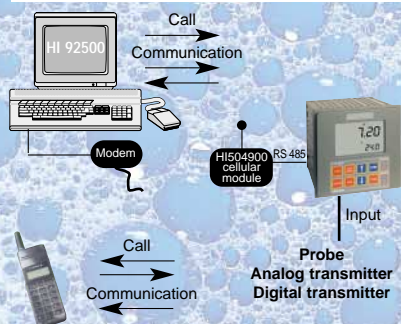
### SMS Service



### Message received!



### Tele-control and SMS Service



### Digital Transmitter



### HI 504900: GSM CELLULAR MODULE HI 504910: DIGITAL TRANSMITTER

#### HI 504900: GSM Cellular Module

The ability to optimise the running of an industrial process plant, means, more than anything else the reduction of costly unscheduled shutdown time. With this in mind, Hanna Instruments have developed a GSM cellular module, **HI 504900**, used for sending SMS alarm messages, and on request from authorized plant personnel live updates on actual process conditions.

The GSM cellular module permits the user to memorise one or two mobile phone numbers, to which alarm messages can be sent whenever a malfunction is revealed. The SMS message reports a clearly and immediately understandable phrase that expresses the nature of the alarm in course, for example:

- *pH probe damaged*
- *High set point exceeded*
- *Temperature probe damaged*
- *Broken pH probe*

The user can impost the number of SMS messages for the module to send in case of errors (from 1 to 5 messages) and the interval between two consecutive SMS messages (from 5 to 60 minutes).

It is possible to "call" the analyser in whatever moment from any mobile phone whose number is memorised by the instrument and receive an immediate response by way of an SMS message which reports the actual process data (pH/ORP, temperature and registered errors) and information about the module's cell card (the number of remaining messages etc.). If the caller is using a mobile phone whose number is not memorized by the GSM module, it is still possible to contact the analyser at any moment by sending an SMS message indicating the instrument's ID code. Once this code is recognised, **HI 504900** automatically responds by sending an SMS message with the updated data required.

Using the GSM cellular module together with a remote connection guarantees an excellent control window thanks to a two-way communication and calling system. Once an SMS alarm message has been received, the user can connect to the analyser by way of a personal computer, enter into the controlling system of the instrument to verify eventual errors and if necessary modify the set-up.

#### HI 504910: Digital transmitter

The digital transmitter **HI 504910** is designed to cover two distinct functions:

- 1) To transmit process data to the regulator **HI 504**, covering distances of up to 1.000 meters, therefore satisfying many industrial applications.
- 2) To establish a versatile industrial indicator for monitoring and recording process data.

The digital transmitter presents a series of innovative features when compared to a traditional analog transmitter. Below some of the most interesting characteristics are represented.

- pH or ORP measurement.
- Matching Pin
- Sensor Check
- Manual or Automatic temperature compensation with Pt100 or Pt1000 probes.
- Automatic temperature probe recognition and self-diagnostic functions.
- Automatic two point calibration.
- Manual one point calibration with the possibility to select any single point on the pH range.
- Rapid one point calibration with the Hanna Instruments calibrator **HI 504920**
- Last calibration data memory: date and hour, pH offset and slope, number of calibration points and corresponding values.
- RS485. This output permits a wire connection to the regulator **HI 504** or directly to a personal computer. Alternatively, it is possible to create a transmission from **HI 504910** with a personal computer using a traditional external modem or the GSM module **HI504900**. The output also permits the user to install the transmitter in a two-wire RS485 network.

### HI 504920: Digital Calibrator

The digital calibrator represents an absolute novelty in the concept of calibrating field transmitters, simplifying and quickening an operation that is often complicated by distances from the probe to the transmitter, and by the type of probe installation used.

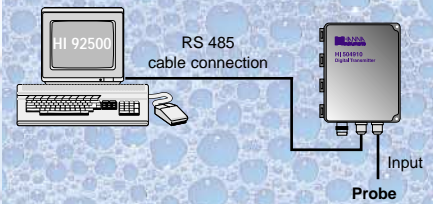
**HI 504920** is a portable instrument with the possibility to measure pH/ORP and temperature, used with the Hanna Instruments digital transmitter **HI 504920** as a reference instrument for calibration. The innovation of the "single quick point calibration" consists in the possibility to calibrate the transmitter without the need to interrupt the measurement in order to gain access to the probe, which is often found in difficult to reach positions. In the case of long distances from the transmitter to the probe, it eliminates the need to utilize more than one person for the calibration.

The **single quick point calibration** consists in three simple steps:

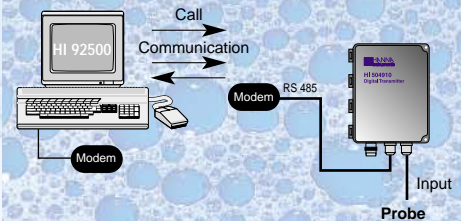
1. After calibrating **HI 504920** with fresh buffer solutions, connect the instrument to the transmitter by means of the dedicated cable HI7290.
2. Immerge the calibrator's probe in the liquid being monitored by the transmitter, as near as possible to the industrial probe, and wait a few seconds for a stable reading.
3. Press the **TXCAL** button to transfer the data to the transmitter and wait for the conformation of a successful calibration to appear on the display.

Whenever utilizing probes that are installed at a distance of many meters from the transmitter, the operator can automatically store the pH value read on the portable meter **HI 504920**, and then connect to the transmitter **HI 504910** in order to trigger the calibration.

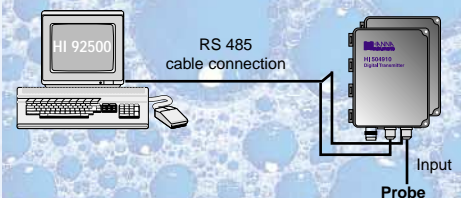
### PC Connection



### Modem Connection



### RS 485 Network



### Field Calibration



## HI 504 TECHNICAL DATA

<b>RANGE</b>	-2.00 to 16.00 pH -2000 to 2000 mV -30 to 130.0°C
<b>RESOLUTION</b>	0.01 pH 1 mV 0.1 °C above -10°C; 1°C below -10°C
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH ± 2 mV ± 0.5 °C (-9.9 to 130.0°C); ±1°C (-30 to -10°C)
<b>ANALOG INPUT</b>	4 to 20 mA
<b>DIGITAL INPUT FOR pH/ORP/°C TRANSMITTER</b>	RS 485
<b>OTHER INSULATED INPUTS</b>	1 Hold and 1 Advanced Cleaning; activated from 5 to 24 VDC
<b>OUTPUT ALIMENTATION</b>	- 5V ; + 5V (for amplified probes with external power sources)
<b>DIGITAL INSULATED OUTPUT</b>	Contact Closed with instrument in hold mode
<b>ANALOG OUTPUT</b>	1 or 2 Independent Outputs (0-20 mA or 4-20mA)
<b>ANALOG OUTPUT RESOLUTION</b>	0.1‰ f.s.
<b>ANALOG OUTPUT ACCURACY</b>	± 2‰ f.s.
<b>RELAYS : 1 / 2 / 3 / 4</b>	Electromechanical with SPDT contacts; 5A-250VAC, 5A-30VDC (resistive load) Protection fuse: 5A, 250V <i>Quick Blow Fuse</i>
<b>ALARM RELAY</b>	Electromechanical with SPDT contacts; 5A-250VAC, 5A-30VDC (resistive load) Fuse protected: 5A, 250V <i>Quick Blow Fuse</i>
<b>TEMPERATURE COMPENSATION</b>	Automatic or Manual from -30°C to 130°C
<b>TEMPERATURE PROBE</b>	Pt100 / Pt1000 (with sensor check and automatic recognition)
<b>POWER SUPPLY</b>	230 ± 10% VAC, 115 ± 10% VAC or 100 ± 10% VAC; 50/60 Hz (depending on the model)
<b>POWER CONSUMPTION</b>	10 VA
<b>OVER CURRENT PROTECTION</b>	400 mA 250 V <i>Quick Blow Fuse</i>
<b>MAXIMUM OSCILLATION FREQUENCY</b>	8 MHz
<b>ENVIRONMENT</b>	From 0 to 50°C; max 85% RH non-condensing
<b>CASING</b>	IP20 (housing); IP54 (Front panel)
<b>WEIGHT</b>	1.6 Kg

## HOW TO ORDER

The models of the HI 504 series are identifiable by the last three digits of the code. Each code reveals a particular characteristic of the instrument as the following diagram illustrates.

X=1, single setpoint  
X=2, double setpoint  
X=8, double setpoint and digital transmitter  
X=9, double setpoint and digital transmitter and Advanced Cleaning

Y=1, ON/OFF control  
Y=2, ON/OFF and PID control

Z=2, single analogic output and RS485 input with SMS (Short Message Service)  
Z=4, double analog output

**HI 504XYZ**

**ACCESSORI**

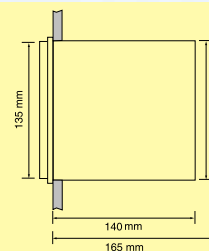
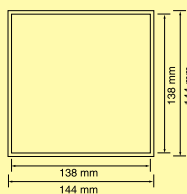
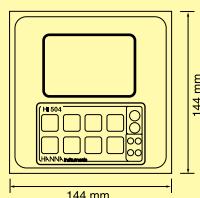
CELLULAR MODULE HI 504900

DIGITAL TRANSMITTER HI 504910

CALIBRATOR HI 504920

SOFTWARE HI 92500

### DIMENSIONS



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