Hanna Instruments HI510 Universal Process Controllers Instruction Manual

Hanna Instruments HI510 Universal Process Controllers

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Single and DualChannel Universal Process Controllers

- Waterproof IP65 (NEMA 4X) enclosure
- Large backlit LCD
- Multi-color LED status indicators
- Audible alarm
- Tactile rubberized keypad
- Universal mounting
- Universal Hanna digital probe

HI510 and HI520 are advanced process controllers that can be configured for applications requiring monitoring and/ or control of four main water-analysis parameters: pH, ORP, Conductivity, and Dissolved Oxygen.

These controllers feature a digital probe input(s) that automatically detects and updates the controller with the parameter that it measures.

HI520 is Hanna's first dual-input process controller that accepts virtually any combination of compatible probes.

Designed to adapt to unique process control requirements, users have the option to enable or disable each channel independently.

Additionally, HI520 introduces enhanced industrial control by operating a control-loop system whereby users have the option to run channel control either independently or configure to be triggered sequentially upon reaching the other channel's set point(s) (1, 2, or both). The device operates a logical channel with built-in mathematical functions.

This function is intended for when the controller works as an analyzer for monitoring high/low parameter levels between two identical inputs with identical measuring configurations.

These Universal Process Controllers offer wall, pipe, and panel mounting options and feature a large backlit dot matrix display for easy viewing and provide an intuitive interface for setup options.

The controllers utilize multi-color LEDs for easy viewing of the instrument's status including relay activation, in alarm mode, or in hold status. All programming operations are done through the low profile vulcanized rubber keypad or with an RS485 connection to a Modbus-compliant supervisory computer

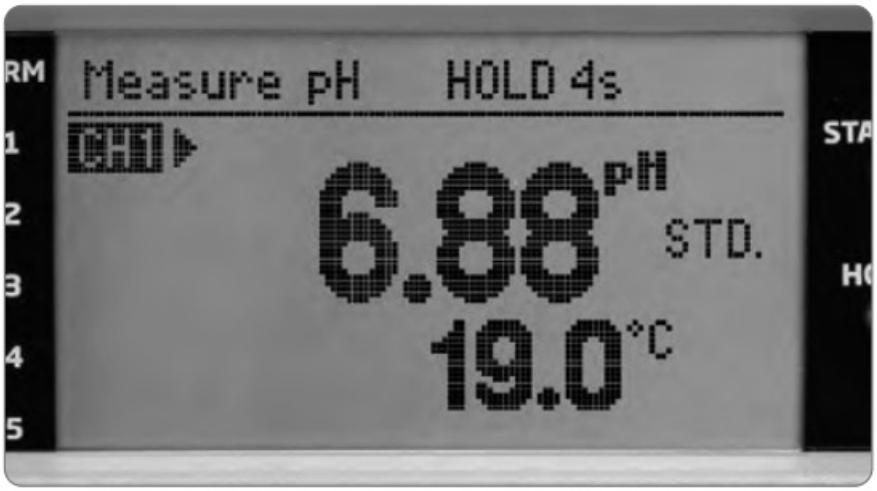
Features Displayed on Screen (HI520 display shown)

Control Modes

The control mode can be configured to be On/Off, Proportional, or PID.
The mode can be set high or low. High control mode is required if the process value is too high and needs to be decreased. Low control mode is required if the process value is too low and needs to be increased.
For On/Off control, the hysteresis band is adjustable, while in Proportional and PID modes, deviation, control period, and other tuning parameters can be set to optimize control around a set point.
For HI520, each channel can run control independently or sequentially.

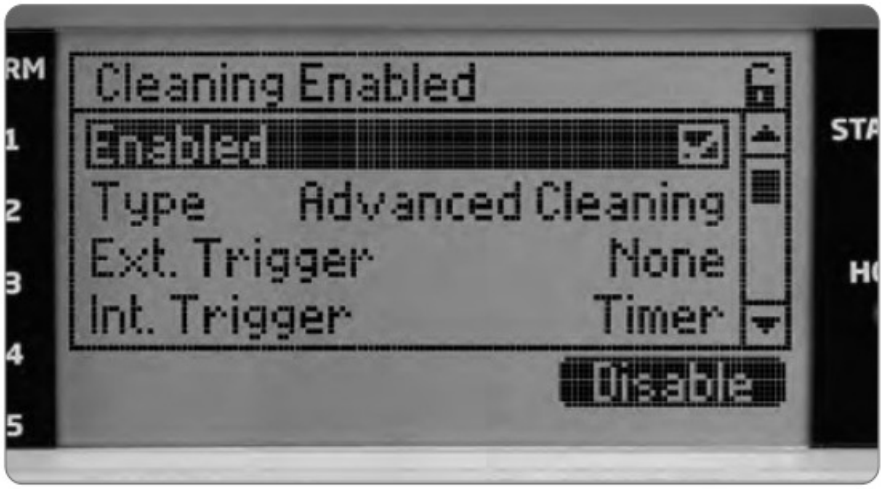
Hold Function

During calibration, cleaning, and configuration the controller automatically goes into Hold mode. During Hold mode all control loops related are disabled. The analog outputs may be configured to go to a fixed value or remain at the last value.
The Hold function can also be triggered manually, using an external digital input or by entering in Manual mode. This is useful for disabling control when performing maintenance.



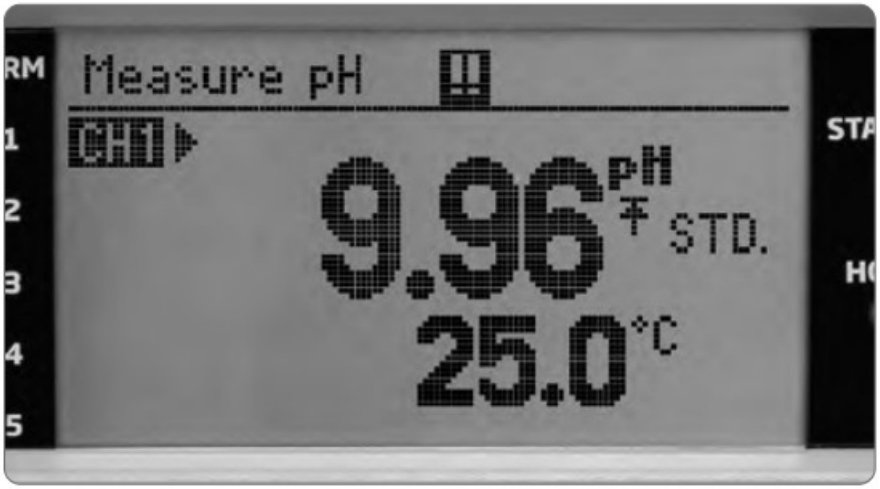
Auto-Cleaning Cycle

Difficult applications often require an almost continuous maintenance of the probe. Processes with high-suspended solids, fats, oils, pigments, and microorganisms will coat the pH sensing glass, ORP sensors, and the reference junction. The cleaning function allows programming of one or more wash cycles and uses the relays to activate valves, pumps or compressed air based on the type of washing that is required to maintain probes for reliable results.



Configurable Alarm System
The alarm system is configurable for measured parameters. The alarm can also be activated by event triggers or abnormal operation. For example, if a dosing relay remains closed for an excessive period of time or if temperature exceeds an upper limit during an exothermic neutralization reaction. A blinking red LED signals an alarm state.
All relays configured for control are inactivated until the alarm state is resolved.
On HI520 use channel configuration to setup and trigger an alarm.

LCD Information
Local visual indicators of measurement details as well as errors are displayed. The ? DIAG key provides details of the issue.



? DIAG – Help and Diagnostic Key

The help and diagnostic key (? DIAG) provides information related to errors; or in setup mode, information about settings.

Inputs and Outputs

Digital Inputs

- Two digital inputs for remotely triggering, cleaning and hold functions

Analog Outputs

- Up to 4 analog outputs and 5 relays used for control and for sending a signal to data loggers, PLC, SCADA and other remote monitoring systems
- 0-20 mA or 4-20 mA
- Scalable in selecting values for the range
- Can be used for control of pumps and valves
- On alarm state can output a 22 mA signal to the monitoring system

Digital Communication

- The Modbus-compliant unit can be integrated within a Modbus-based network and connected to other industrial electronic devices. The following tasks may be accomplished remotely:
  · Monitoring, using the virtual LCD (limited to a single remote control in the entire network)
  · Setup
  · Loading the Setup configuration file to a controller
- RS485 Digital output for PC and other device connectivity

Relays

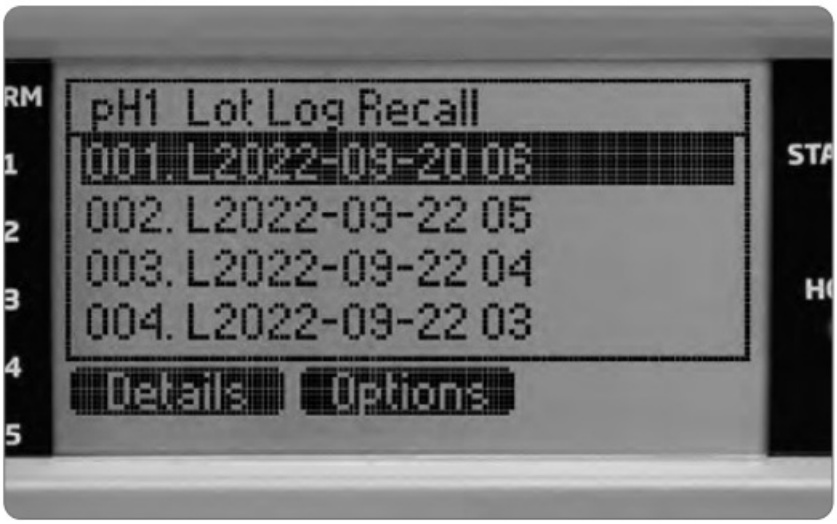
- Up to 5 control and 1 alarm electromechanical relays
- Replaceable 5A fuses to protect all relays
- Extractable terminal blocks for easy wiring
- Relay options include single pole double throw (SPDT) and single pole single throw (SPST)
- Control relays can be programmed for On/Off, Proportional, or PID control as well as Cleaning and Hold functions
- Configurable alarm relay
- Relays terminal blocks and their wires paths are separated from the low voltage section for additional safety

Data and Event Logging

Automatic Data-logging
HI510 and HI520 have built-in data logging that stores data at selectable intervals along with relay control settings and calibration data.

- Data stored in up to 100 lots with each holding 8600 records
- Selectable log interval: from 10 seconds to 3 hours
- Logged Data includes:
  - Measured values and alarms for all supported parameters
  - Calibration information including solutions used. For pH, the offset and slope is recorded.

Event Log
The Event Log file can hold a maximum of 100 events. It includes errors, alarms, warnings, calibration events, configuration changes, and cleaning events.



Password protection
The controllers feature password protected calibration and setup.

Enclosure Features

NEMA 4X Enclosure
The controllers are suitable for indoor or outdoor environments. The NEMA 4X enclosure ensures the electronics are protected against splashing and hose-directed water or windblown dirt, dust, rain or sleet. It also provides corrosion protection for use near salt water.

Cable Glands
To maintain the NEMA 4X enclosure rating during use, the conduit openings and connection cables are sealed against the environment using the provided cable glands, seals, and plugs.

Spring Loaded Screws
The front panel is hinged at the front of the enclosure for easy access to wiring locations.
It features spring loaded screws that won't fall out when accessed.

USB Type-C Port
Logged data can be transferred to a flash drive as a .csv file using the USB Type-C port.
A rubberized plug helps protect the port against the ingress of water.

Panel-Mount

HI510-01 Panel-Mount Kit

The controllers can be securely panel mounted through a ½ DIN opening using the HI510-01 Panel-Mount Kit. The kit includes a sealing gasket, dual zinc coated brackets, and associated hardware.

Wall-Mount

The controllers can be surface mounted using the HI510-02 WallMount Kit. The kit includes a zinc coated mounting plate and associated hardware. The plate may be oriented vertically or horizontally.

HI510-02 Wall-Mount Kit

Pipe-Mount

The controller can be mounted to a vertical or horizontal pipe using the HI510-03 Pipe-Mount Kit. The kit includes a zinc coated mounting plate, associated hardware, and U-bolts to accommodate a 1”, 1 ½”, or 2” pipe.

Specifications

HI510-0540

HI510-0320

HI520-0540

HI520-0320

Specifications	HI510	H1520
Digital Probes	See the following pages	
Channels	1	2
Display	Graphic LCD, 128 x 64 pixel B/W with backlight	
Digital Inputs	2 independent galvanically isolated inputs (conf igurable for Hold **ET** Cleaning functions) On state: 5 to 24 Vdc, low or high level active	
Analog Outputs	2 or 4 independent, galvanically isolated outputs 0- 22 mA configurable as: 0 – 20 mA; 4 – 20 mA 22 mA as alarm signal, configurable option	
Analog Output A ccuracy	±0.2%f.s.	
Digital Communi cation	R5485 serial port -Remote monitoring and control USB-C port- Retrieve log files and firmwa re upgrading	

Relays	Up to 5 relays (independently configurable for process variables, Hold & Cleaning functions) Electromechanical relay SPOT and PST contact outputs SA – 250 Vac; SA – 30 Vdc (resistive load) Fuse protected:5A, 250V slow blow fuse	
Alarm Relay for All Measurement Alarms	Electromechanical relay SPOT contact output SA – 250 Vac; SA – 30 Vdc (resistive load) Fuse protected:5A, 250V slow blow fuse	
Data Logging	Interval log, up to 100 files, maximum 8600 records on each stored file. When the maximum limit of 100 stored files is reached, the most recent file will automatically erase the oldest one. Event log, maximum 100 records. When the maximum limit is reached, the last record over writes the oldest one.	
Power Supply	100 – 240 Vac ±10%; 50/60 Hz;15VA; fuse protected (2A, 250V slow blow fuse)	
Power Consumption	15VA	
Installation Category	II	
Environment	-20 to 50 °C (-4 to 122 °F); maximum 100% RH non-condensing	
Enclosure”	Single case **V2** DIN, type 4X, IP65 ingress protection	
Weight	Approximately **1.6 kg (3.5** lb.)	
Dimensions	Width:144.0 mm (5.7″) Height:144.0 mm (5.7″) Depth:151.3mm **(6.0“)**	
Ordering Information	**HI510-0540** universal process controller with 5 relays and 4 analog outputs is supplied with 3m power cable, cable gland set, instrument certificate, and quick reference guide with instructions for manual download. **H1510-0320** universal process controller with 3 relays and 2 analog outputs is supplied with 3m power cable, cable gland set, instrument certificate, and quick reference guide with instructions for manual download. **HI520-0540** universal process controller with 5 relays and 4 analog outputs is supplied with 3m power cable, cable gland set, instrument certificate, and quick reference guide with instructions for manual download. **H1520-0320** universal process controller with 3 relays and 2 analog outputs is supplied with 3m power cable, cable gland set, instrument certificate, and quick reference guide with instructions for manual download.	
Accessories	**HI510-01** panel-mount kit	**HI76510-10** patch cable, 10 m (32’91
	HI510-02 wall-mount kit	**HI76510-15** patch cable,15 m **(49’2“)**
	HI510-03 pipe-mount kit	**H176510-25** patch cable, 25 m (82′)
	HI76510-05 patch cable, 5 m (16’51	**HI76510-50 patch** cable, 50 m (164′)

* For a water tight seal: Gland seals need to be used over cables and the four screws on the front casing need to be tightened to 13.3 lbf·in (1.5 N·m, maximum 2.0 N·m), of torque.

Specifications	example HI2004-18zz	
ORP	Range	–2000 to +2000 mV
	Resolution	1 mV
	Accuracy	±2 mV
	Calibration	Single point, value can be adjusted ±60 mV around measured mV
Temperature	Range	–5.0 to 100.0 °C (23.0 to 212.0 °F)
	Resolution	0.1 °C; 0.1 °F
	Accuracy	±0.5 °C; ±1.0 °F
	Calibration	Single point offset (controller setting)
Temperature Source	Automatic (from Probe) Manual	
Body	PVDF	
Junction	PTFE	
Sensor	Material	platinum
	Body	glass
	Tip shape	flat

	Diameter	22 mm (0.9”)
	Insertion length	21 mm (0.8”)
Maximum Pressure	6 bar	
Threaded Connection	3/4” NPT external thread for mounting	
Wetted Parts	Probe body	PVDF
	Sensor body O-ring	glass NBR
	Junction	PTFE
	Matching pin	titanium
Protection Rating	IP68	
Cable Length	zz, see Ordering Information	

PTFE junction: Minimizing the potential for clogging and chemically resistant, PTFE is ideal for samples with high content of suspended solids or for high-pressure installations.
Ceramic junction: Porous chemically resistant plug that connects the reference electrode to the process electrically.

Ordering Information

Each probe is supplied with quick reference guide with probe quality certificate

HI20 x x - y 8 z z

Choose your configuration:

xx	04 14	PTFE junction Ceramic junction
y	1	Platinum sensor; –5.0 to 100.0 °C (23.0 to 212.0 °F); ±2000 mV
	2	Gold sensor; –5.0 to 100.0 °C (23.0 to 212.0 °F);± 2000 mV
8	Smart probe, with RS485 connection	
zz	00 supplied with DIN connector (without cable). See page 15.56 (HI510 and HI520 accessories section) for patch cable ordering codes. 05, 10, 15, 25, 50 fixed cable length (in meters)	

See compatible probe extension cables on page page 15.56, see additional mounting accessories on page 15.25, see probe holders on page 15.134 and 15.130.

ORP and Temperature Industrial Smart Probes

HI2004-18 • HI2014-18
HI2004-28 • HI2014-28

HI510 and HI520 Universal Process Controller compatibleHI20X4-18 and HI20X4-28 are ORP and temperature probes designed for use with the Hanna Instruments® HI510 or HI520. The system is designed to monitor and control disinfection chemicals or follow and control a critical oxidation (or reduction) reaction. mV measurements are auto-compensated for barometric pressure and temperature.

- HI2004-18 and HI2014-18 platinum-sensor series are designed to provide the best response over a wide range of applications. Used in reducing processes such as chlorine dosing in pools and spas or chromate reduction.
- HI2004-28 and HI2014-28 gold-sensor series are designed for oxidative processes such as cyanide oxidation in the mining industry.

The probe features a flat tip (ideal for solutions containing aggressive chemicals) which virtually eliminates dirt deposits and significantly reduces maintenance.

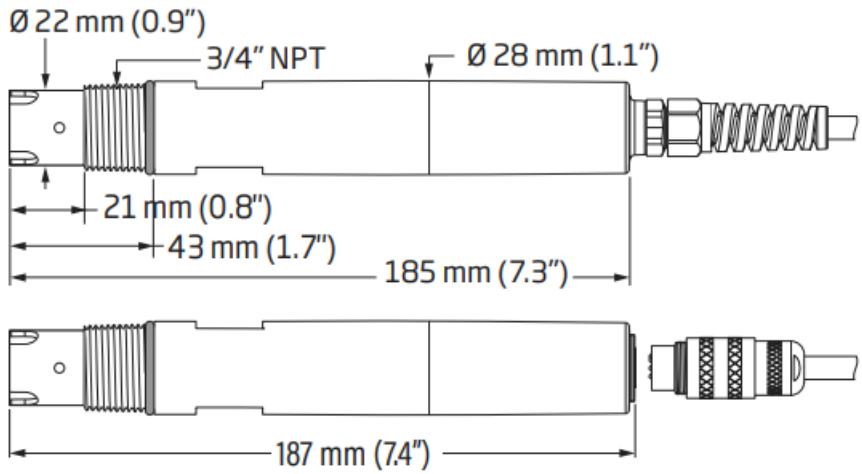
Suitable for continuous measurement of ORP required for monitoring and/or controlling oxidizers and reducing agents in water treatment monitoring, industrial effluent treatment, and swimming pools, the probe can be submersed/immersed using the 3/4” NPT threads, or installed directly in-line or in a flow cell installation, using the lower sensor threads.

The probe is also available with an integral connector that permits cable connections after installation.

Patch cables may be purchased separately to connect between the probe and controller up to 50 meters (164 ft).

- Rugged, chemically-resistant PVDF body
- 3/4” NPT external thread
- 6 bar (87 psi) maximum pressure at 25 °C (77 °F)
- Built-in temperature sensor for measurement
- Digital probe stores model, firmware, serial number, and calibration information
- Minimum maintenance

Dimensions



pH and Temperature Industrial Smart Probes

HI1006-18 • HI1006-38 • HI1006-48
HI1016-18 • HI1016-38 • HI1016-48


HI1006-1805
pH: 0-12
T: -5 to 80 °C

HI510 and HI520 Universal Process Controller compatible
These industrial pH probes are intended for industrial process control when paired with the HI510 or HI520 Universal Process Controller.

- HI1006-18 and HI1016-18 series, designed for low conductivity or low-temperature process environments
- HI1006-38 and HI1016-38 series, designed for extended pH range or high-temperature process environments
- HI1006-48 and HI1016-48 series, designed for process environments where hydrofluoric acid is present

An integral temperature sensor measures water temperature and adjusts the probe signal over the specified temperature range.
The flat tip eliminates deposits that can foul the sensor and significantly reduces necessary maintenance.
The PVDF body material is easy to clean and disinfect, and resistant to most chemicals (e.g. solvents, sodium hypochlorite), ultraviolet light, and fungal growth.
Suitable for continuous measurement of pH required in applications such as urban wastewater treatment, industrial effluent treatment, and surface water monitoring, the probe (and accessories) can be installed directly in-line, immersed in a tank, or in a flow cell.
The probe is available with an integral connector that permits connections after installation.
Patch cables may be purchased separately to connect between the probe and controller up to 50 meters (164 ft).

- Rugged, chemically-resistant PVDF body
- Specialized glass sensor for fast stabilization and accurate results
- 3/4” NPT external thread for mounting
- Built-in temperature sensor for measurement and compensation
- Matching pin helps avoid typical problems caused by grounding loop current
- Digital probe stores model, firmware, serial number, and calibration information

Specifications	HI1006-18zz – example	
	Range	0.00 to 12.00 pH

pH	Resolution	0.1 pH or 0.01 pH
	Accuracy	±0.02 pH
	Calibration	Up to three-points (option to select from five standard buffers)
Temperature	Range	–5.0 to 80.0 °C (23.0 to 176.0 °F)
	Resolution	0.1 °C; 0.1 °F
	Accuracy	±0.5 °C; ±1.0 °F
	Calibration	Single point offset (controller setting)
Temperature Compensation	Automatic	0.0 to 80.0 °C (32.0 to 176.0 °F)
Temperature Source	Automatic (from Probe) Manual	
Body	PVDF	
Junction	PTFE	
Sensor	Body	LT glass
	Tip shape	flat, self-cleaning
	Diameter	22 mm (0.9”)

	Insertion length	17 mm (0.7”)
Maximum Pressure	6 bar (87 psi) at 25 °C (77 °F)	
Threaded Connection	3/4” NPT external thread for mounting	
Wetted Parts	Probe body	PVDF
	Sensor body	Glass
	O-ring	NBR
	Junction	PTFE
	Matching pin	Titanium
Protection Rating	IP68	
Cable Length	zz, see Ordering Information	

PTFE junction: Minimizing the potential for clogging and chemically resistant, PTFE is ideal for samples with high content of suspended solids or for high-pressure installations.
Ceramic junction: Porous chemically resistant plug that connects the reference electrode to the process electrically.
LT glass: Fast stabilization and accurate results at lower temperatures or lower ion content.
HT glass: Fast stabilization and accurate results at higher temperatures and over a larger pH range.
HF glass: Fast stabilization and accurate results for aggressive applications that have fluoride ions (F^-<2 g/L, temperature<60 °C, pH>2).

Ordering Information
Each probe is supplied with quick reference guide with probe quality certificate.

HI10 x x - y 8 z z

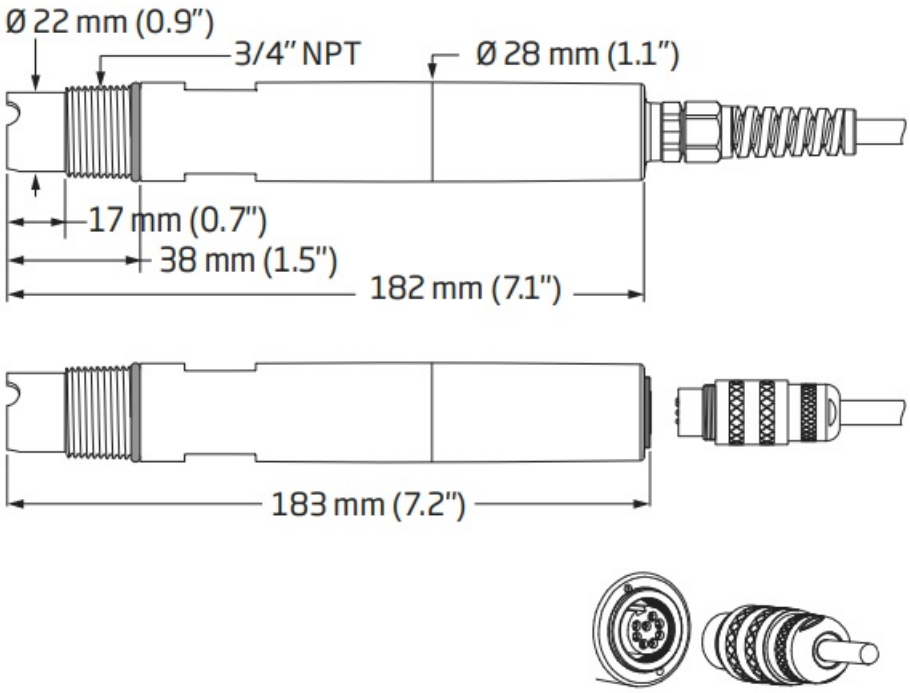
Choose your configuration:

xx	06	PTFE junction
	16	Ceramic junction
y	1	Low Temperature (LT) glass sensor, titanium matching pin –5.0 to 80.0 °C (23.0 to 176.0 °F) 0.00 to 12.00 pH
	3	High Temperature (HT) glass sensor, titanium matching pin 0.0 to 100.0 °C (32.0 to 212.0 °F) 0.00 to 14.00 pH
	4	Fluoride-resistant (HF) glass sensor, titanium matching pin –5.0 to 60.0 °C (23.0 to 140.0 °F) 0.00 to 10.00 pH
8	Smart probe, with RS485 connection	
zz	00 supplied with DIN connector (without cable). See Accessories section for patch cable ordering codes. 05, 10, 15, 25, 50 fixed cable length (in meters)	

HI76510-05	Patch cable, 5 m (16’5”)
HI76510-10	Patch cable, 10 m (32’9”)

Accessories	HI76510-15	Patch cable, 15 m (49’2”)
	HI76510-25	Patch cable, 25 m (82’)
	HI76510-50	Patch cable, 50 m (164’)

Dimensions



Documents / Resources

	Hanna Instruments HI510 Universal Process Controllers [pdf] Instruction Manual HI510 Universal Process Controllers, HI510, Universal Process Controllers, Process Controllers, Controllers

References

- pH Meters, Photometers, Titrators, Controllers - Hanna Instruments