

HI720

Conductivity Process Digital Controller

with Inductive Probe

- Automatic temperature compensation
- Logging of up to 100 system events

HI720 is an on/off and PID EC/TDS controller with one or two set points and includes an inductive conductivity probe.

The measurement configuration settings and EC and TDS control are saved separately and permits users to switch between EC and TDS without losing settings. TDS or a specific user defined curve can be used for concentration.

Temperature is continuously monitored using a temperature sensor (Pt100 or Pt1000 type) with ATC of conductivity. Conductivity temperature compensation parameters are fully customizable: linear or non-linear temperature compensation, reference temperature and temperature coefficient. Users can define the specific curve of temperature compensation.

The working conductivity range is user selectable and the conductivity calibration in one point is performed in a value that corresponds to the measurement range.

The logging feature can save the last 100 error, configuration, calibration and cleaning events. This information can be accessible from a PC through RS485 and HI92500 software. The controller also has a full auto diagnostic procedure. A cleaning procedure of the EC inductive probe is also available.

In-Line Cleaning

The cleaning feature allows an automatic cleaning action of the probe. To perform cleaning, the controller activates an external device (pump). Cleaning actions never take place if no relay is configured for cleaning. Cleaning can be of two types:

- 1. Simple cleaning:** with water only, it can be triggered only by a timer (periodical cleaning) or by an error for which a cleaning action can be configured.
- 2. Advanced cleaning (optional):** with water and detergent, it can be triggered by the following events:

Timer: Digital input or RS485 command (external trigger); Timer and digital input or RS485 command (external trigger); Timer masked by the digital input (i.e. disabled when the digital input is on); Error for which a cleaning action can be configured



| Specifications | HI720 |
|-----------------------------------|--|
| Range | 0 to 2000 mS/cm (autoranging); -30 to 130°C / -22 to 266°F |
| Resolution | 1 µS/cm (0 to 1999 µS/cm); 0.01 mS/cm (2.00 to 19.99 mS/cm); 0.1 mS/cm (20.0 to 199.9 mS/cm); 1 mS/cm (200 to 2000 mS/cm); 0.1°C / 0.2°F |
| Accuracy (@25°C/77°F) | ±2% f.s. (conductivity) / ±0.5°C / ±1°F |
| Temperature Compensation | automatic or manual, -30 to 130°C |
| Temperature Probe | three-wire or two-wire Pt100 or Pt1000 sensor with automatic recognition and damage test |
| Digital Input | digital transmitter, hold and advanced cleaning inputs |
| Digital Output | one digital insulated contact closed upon hold mode |
| Analog Output | one or two independent outputs; 0-22 mA (configuring as 0-20 mA or 4-20 mA) |
| Digital Serial Output | RS485 |
| Dosing Relay | 1, 2, 3 or 4 electromechanical relays SPDT; 5A-250 VAC, 5A-30 VDC (resistive load); fuse protected: 5A, 250 V fuse |
| Alarm Relay | 1 electromechanical relay SPDT; 5A-250 VAC, 5A-30 VDC (resistive load); fuse protected: 5A, 250 V fuse |
| Installation Category | II |
| Power supply (depending on model) | 24 VDC/ac, or 115 VAC or 230 VAC or 100 VAC ±10%, 50/60 Hz; fuse protected: 400 mA, 250 V fast fuse |
| Power Consumption | 10 VA |
| Max Oscillation Frequency | 8 MHz |
| Environment | 0 to 50°C (32 to 122°F); RH max 85% non-condensing |
| Enclosure | single case 1/2 DIN |
| Weight | approximately 1.6 kg (3.5 lb) |
| Ordering Information | <p>Each HI720 model is supplied complete with mounting brackets and instructions.</p> <p>Choose your configuration:</p> <p>HI720122-1 single setpoint, on/off and PID control, single analog output, 115V</p> <p>HI720122-2 single setpoint, on/off and PID control, single analog output, 230V</p> <p>HI720224-1 dual setpoint, on/off and PID control, dual analog output, 115V</p> <p>HI720224-2 dual setpoint, on/off and PID control, dual analog output, 230V</p> |
| Probes | <p>HI7610 Stainless steel Pt100 probe with front and back 1/2" NPT thread and 5 m (16.4') cable</p> <p>HI7611 Glass Pt100 probe with front and back 1/2" NPT thread and 5 m (16.4') cable</p> <p>HI7620 Stainless steel Pt1000 probe with PG 13.5 thread and 5 m (16.4') cable</p> <p>HI7621 Glass Pt1000 probe with PG 13.5</p> |

Inductive Conductivity Probe

for HI720

EC Inductive Probe Theory of Operation

This instrument allows conductivity measurements without any electrical contact between electrodes and process fluid. The measurement is based on inductive coupling of two toroidal transformers by the liquid.

The instrument supplies a high frequency, reference voltage to the "Drive Coil", and a strong magnetic field is generated in the toroid.

The liquid passes through the hole in the toroid and can be considered as one turn secondary winding. The magnetic field induces a voltage in this liquid winding, the current induced in the flow is proportional to this voltage, and the conductance of the liquid one-turn winding is in accordance to Ohm's law.

The conductance is proportional to the specific conductivity and a constant factor determined by the sensor geometry and installation.

The liquid also passes through the second toroid and therefore the liquid turn can be considered as a primary winding of the second toroidal transformer. The current in the liquid will create a magnetic field in the second toroid, and the induced current can be measured as an output.

The output current of this "receive coil" is therefore proportional to the specific conductivity of process liquid.

For an inductive cell, the cell constant is defined as the measured conductivity, obtained by making a loop through the sensor with a resistor R, multiplied by that R value.

The cell constant depends only on the sensor geometry. However, when the probe is immersed in a liquid, the induced current in the solution is affected by the piping or any other container where the probe is inserted. This effect is negligible when there is an area of at least 3 cm of liquid around the cell.

Otherwise, it is necessary to multiply measurements by the installation factor: $\text{Conductivity} = (\text{cell constant})(\text{installation factor})/(\text{measured resistance})$.

The installation factor is < 1 for conductive piping/containers, and > 1 for nonconductive piping/containers.

Since this type of sensor has no electrodes, common problems such as polarization and contamination are eliminated and will not affect the performance of the electrodeless sensor.

| Specifications | HI7650 Inductive Conductivity Probe | |
|-------------------------|--|-----------------------------|
| Measuring Range | 0 to 2000 mS/cm | |
| Accuracy | ±2% f.s. | |
| Pressure | 3 bar | |
| Max. Temp. | 50°C | |
| Cell Constant | approx. 2.4 cm-1 | |
| Protection Class | IP67 | |
| Temperature Sensor | Pt100 to Pt1000 (depending on model) | |
| Temperature Response | 90% of the final value, approximately 10 minutes | |
| Required Pipe Diameter | >80 mm (consider installation factor for pipe with diameter < 125 mm) | |
| Dimensions (probe only) | 40 x 190 x 55 mm (1.57 x 7.48 x 2.16"); head: 32 x OD 55 mm (1.25" x OD 2.16") | |
| Weight (probe only) | approximately 330 g (11.64 oz.) | |
| Ordering Information | Choose your configuration | |
| | HI7650-1105 | PVC body, Pt100, 5 m cable |
| | HI7650-1110 | PVC body, Pt100, 10 m cable |
| | HI7650-1115 | PVC body, Pt100, 15 m cable |
| | HI7650-1125 | PVC body, Pt100, 25 m cable |

