RTU Touchscreen Controller for HiQDT Smart Digital RS-485 MODBUS RTU pH, ORP, Dissolved Oxygen, Ion Selective & Conductivity Sensors

Six (6) Channel Configuration shown on left and Dual (2) Channel Configuration shown on right.

Measurements

- pH
- ORP
- Dissolved Oxygen (D.O.)
- Ion Selective (ISE)
- Conductivity (EC)
- **Special Computed Total ISE Configuration for pH Compensated Total Ammonium, Total Fluoride and Total Cyanide**
  - *Total ISE special configurations require free ammonium, free fluoride and free cyanide ion selective sensor and pH sensor in addition to special 3TX-TOT-DT module to compute and output total pH compensated total ammonium, total fluoride and total cyanide*
  - *Computed total ISE sent as 4-20mA analog output and MODBUS TCP digital output*

Features

- **Expandable universal controller software allows for anywhere from one (1) to six (6) fully independent measurement channels**
- **Isolated, Reversible & Scalable 4-20mA analog output for each measurement channel from universal 3TX-RTU-D transmitter module**
- **MODBUS TCP (a.k.a. Modbus over ethernet)**
- **Seamless plug & play hot-swap of sensors for smart workflow where maintenance such as cleaning and recalibration does not have to be done at site installation location**
- **Secure Encrypted Remote capabilities include:**
  - In-Situ Offset Calibrations
  - View all smart analytics such as serial number, time in use & current calibrations
  - Change analog output scaling

Comparison Chart of RTU Style Touchscreen Controller Configurations

Feature or Functionality	Dual (2) Channel Smart Controller Package	Six (6) Channel Smart Controller Package	Total Ammonium, Total Fluoride or Total Cyanide Special Controller
Interface (HMI)	4.3 Inch Color Touchscreen 3.70" X 2.10" 480 X 272 pixels	7.0 Inch Color Touchscreen 6.11" X 3.42" with 800 X 480 pixels	
Installation Styles	NEMA 4X Assembly with Clear Hinged Latched Protective Door for Touchscreen HMI Package is Ready for Wall or Pipe Mounting in the Field as supplied with support for securing with padlock		
Approvals	CSA & UL for HMI CE for Transmitters	CSA & UL for HMI (Class I, Divison II rated HMI as special order option) CE for Transmitters	
Calibration Methods	Windows Software / Handheld Battery Powered Communicator / PLC Touchscreen Interface Auto-buffer calibration mode on PLC Touchscreen with 1.68, 4.00, 6.86, 7.00, 9.18, 10.00, 12.45 pH buffers supported Separate slope for acid conditions (pH <7) and alkaline conditions (pH>7) supported for all calibration methods		
Power Options	PS1 85-264 VAC | PS4 9-36 VDC	PS1 85-264 VAC | PS4 9-36 VDC	
Max Number of HiQDT Sensors	Up to 2 each (Min is 1 each)	Up to 6 each (Min is 1 each)	Up to 4 each Min 1 each Free ISE & 1 each pH Optional 2 each additional sensors
Max Power	460mA @ 24VDC	930mA @ 24VDC	790mA @ 24VDC
Analog Outputs	Selectable Standard Non-Inverted 0-20mA, 4-20mA or Inverted 20-0mA, 20-4mA current loop output configurations Max 500 Ω load per current loop One (1) each analog current loop output exits for each measurement channel requested at time of order. Dual channel controller can have 1 or 2 each outputs. Six channel controller can have from 1 to 6 e ach outputs. Special total ISE controller will have 1 each output for free ISE, 1 each output for pH and 1 each output for total ISE. If addition channels are added to special total ISE controller then up to 2 each more analog outputs will be present.		
Digital Output	MODBUS TCP Slave (a.k.a. MODBUS over ethernet) with registers to access all information that is shown on HMI		
Trend Graphs	Process & temp values for last 8 hours of each channel. For conductivity sensors computed units of PSU (salinity) & TDS or resistivity MegaOhm (MΩ) units can be shown. Dissolved oxygen can show ppm & percent (%) saturation units. For TOT total pH compensated total ISE channels the extent of ionization is also shown for each data point.		
Datalogging	Process Values, Temp & raw mV logged every 30 seconds (with onscreen trending graph); Analytic & Calibration Info logged every 30 minutes. **Remote access to logged data over FTP.** Capacity is 32GB for logging on all configurations.		
Email Notifications	Email sent to user defined list when trigger event such as communication lost with sensor occurs.		
Remote Access Capabilities	**ALL** functionality is available remotely over ethernet with VNC & FTP using secure **Maple Systems EasyAccess 2.0** Supported Remote Platforms Include: Microsoft Windows PC as well as Android & iOS Smartphones & Tablets		
Special Feature 1	**Hot-swap sensors between channels configured for same sensor type without changing node address. This means seamless exchange of sensors between any controller with channel configured for that same measurement type.**		
Special Feature 2	**Fully customizable default settings for 3TX-RTU-D and 3TX-TOT-DT transmitter modules with preconfigured touchscreen controller HMI assembly if requested at time of order for zero configuration plug and play startup.**		

1. Analog output has 4mA trim offset and 20mA trim span calibration capabilities from each 3TX-RTU-D transmitter module.
2. Controllers are expandable up to the maximum number of channels supported for that given configuration. Additional channels can be added in the field after time of commissioning of original controller. One (1) each 3TX-RTU-D transmitter module is required for each additional channel to be added in the field. Inquire to factory if you believe that expansion may be required.
3. HiQ4FP panel mount connectors installed into controller enclosure are NEMA 6P rated (IP68) serve as fully waterproof sensor input ports for smart digital HiQDT MODBUS RTU sensors. Sufficient input ports are preinstalled up to the maximum number of supported channel for the given touchscreen controller configuration to allow for expansion in the field if desired.
4. Galvanic and serial optocoupler isolation between all sensor inputs for fully independent measurements channels

Advanced Sensor Technologies, Inc. U.S.A. Website: www.astisensor.com IOTRON™ Trademark of ASTI

Selected Photos of Six (6) Channel Touchscreen Controller Assy for HiQDT Smart Digital RS-485 MODBUS RTU Sensors
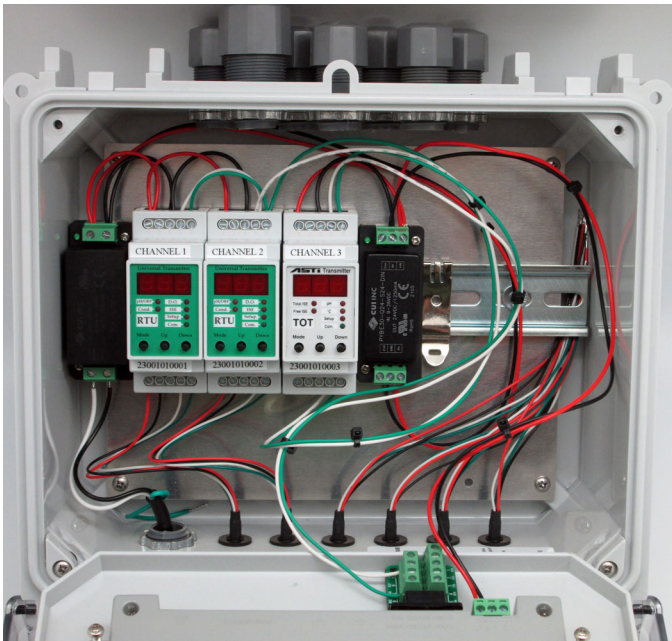

Photo above for fully populated six channel touchscreen controller assy. Large seven (7) inch touchscreen for configuration of channels, output scaling, calibration & display for all sensors. The isolated analog output provided from each 3TX-RTU-D transmitter. The digital MODBUS TCP output is provided from the ethernet port on the HMI.

TOP TWO LEFT PHOTOS:
*Clear hinged latched door provides outstanding protection for advanced touchscreen HMI from environment as part of NEMA 4X rated assembly. To access internal components of controller simply remove two top screws & open with pull handle. **After initial wiring of outputs, enclosure does not need to be opened to swap sensors but rather just plugged into waterproof panel connector sensor input ports.** Seven (7) cable glands on top output side and one (1) cable gland on bottom input side of enclosure along with the six (6) each waterproof HiQ4FP NEMA 6P rated female snap panel mount connectors for easy plug & play use of smart digital hot-swappable sensors.*

BOTTOM LEFT:
Inside detail view of special pH compensated total fluoride, total ammonium and total cyanide controller configuration (special wiring required for this setup). Up to two (2) additional measurement channels can be added after commissioning in this special setup.

Screenshots of Six (6) Channel Touchscreen Controller (1 of 2)

Main Menu
2023/03/30 10:09

Sensor 1: 2.21 pION+
S1 Temp: 25.0 C   111.75 ppm
S1 Raw : 143.5 F.W. 18.04

Sensor 2: 9.18   pH
S2 Temp: 26.2 C
S2 Raw : -126.3

Sensor 3: 290.30   ORP
S3 Temp: 30.4 C
S3 Raw: 277.5

Sensor 4: 10.64   D.O.
S4 Temp: 25.8 C   129.2 % Sat
S4 Raw : 18.1

Sensor 5: 85.36   COND mS
S5 Temp: 27.7 C   40.23 PSU
S5 Raw : 113.3   61500 TDS

Sensor 6: 0.07   COND us
S6 Temp: 23.1 C   13.912 M Ohms
S6 Raw : 0.1   12.768 M UPW

(5) (41) (82) (124) (166) (206)

Controller for MODBUS RTU Sensors

Main display for the six channel controller. Other screens are obtained through the main menu. Status updates, alarms & alerts are scrolled across top of screen.

Analog Output Status   Back

Configure Analog Output Channel
Scale Analog Outputs

	Value	Sensor	Type			Output Value	Output Type
Ch1:	2.21	pION+	112.00	ppm		5.79	4-20mA
Ch2:	9.18	pH				14.49	4-20mA
Ch3:	290.20	ORP				14.99	4-20mA
Ch4:	10.65	D.O.		ppm		12.52	4-20mA
Ch5:	85.36	COND mS				16.88	4-20mA
Ch6:	12.80	COND		M UPW		8.18	4-20mA

There is one isolated analog output for each smart sensor input. Selectable as standard 0-20mA or 4-20mA or inverted 20-0mA or 20-4mA output instead.

Main Menu   Exit

Select Channel   **Hold Channel Output**

Sensor Type   **Analog Outputs**

Calibrate Sensor   **Alarm Event Status**

Sensor Diagnostics   **Remote Access 2.0**

E-Mail Notifications

Controller Info

Trend Display

Main menu highlights major tasks & functionality. Additional submenus will load as appropriate to further navigate each of the available features & options.

Scale Analog Outputs   Back
Select Working Channel: [0]

Update Scaling

	Channel 1 pION+		Channel 2 pH		Channel 3 ORP
H	0.00	H	88.89	H	100.00
	2.21		9.18		290.30
L	0.00	L	11.11	L	0.00

Current High 51.42 / Current Low 18.09 / Current High 88.89 / Current Low 11.11 / Current High 88.89 / Current Low 11.11

	Channel 4 D.O.		Channel 5 COND mS		Channel 6 COND
H	13.33	H	100.00	H	100.00
	10.65		85.36		13.05
L	0.00	L	0.00	L	0.00

Current High 13.33 / Current Low 0.00 / Current High 100.00 / Current Low 0.00 / Current High 100.00 / Current Low 0.00

Universal controller supports setting any measurement type for any channel. Analog output scaling setpoints are entered in percent units for all sensor types.

Select Sensor Type   Back
Currrent Working Channel: [1]
Currrent Working Node: [0]

Update Sensor

Select Sensor Type   **Sensor Address Range**

pH
ORP
Wide ORP
D.O.
pION
Conductivity

pH (Node 1/41/81/121/161/201)
ORP (Node 2/42/82/122/162/202)
Wide ORP(Node 3/43/83/123/163/203)
D.O. (Node 4/44/84/124/164/204)
pION (Node 5/45/85/125/165/205)
Conductivity (Node 6/46/86/126/166/206)
TOT(Node 8/48/88/128/168/208)

Universal touchscreen controller supports any measurement on any channel and is fully programmable in the field as well as being available preconfigured.

Sensor Diagnostics   Back
Currrent Working Channel: [2]

Get Sensor Info

Year Manufactured: 21	Sensor Type: COND
Month Manufactured: 7	Software Rev#: 0
Date Manufactured: 23	Item Number: 23998
Serial Number Year: 21	Min Temperature: 21.7
Serial Number Month: 7	Max Temperature: 24.8
Serial Number Letter: CC	Days In Service: 5.1
Serial Number: 126	Dampener Delay: 1
Cell Constant: 10.00	Cond. Range Mode: 2000

Analytic info for each sensor shown for each channel & datalogged to give details about not only process values but the sensor used for the measurements.

Display pH Sensor Calibrations   Back
Currrent Working Channel: [1]
Currrent Node: [1]

Temperature Offset: -0.7 Celcius
Time Since Temp Offset Cal: 3.2 Days

Process Asymmetric Potential: -54.6 mV
Time Since Temp Asymmetric Potential (A.P) Cal: 3.2 Days

pH Slope For Acid Use: 56.1 mV per pH
Time Since Acid Slope Cal: 3.17 Days

pH Slope For Alkaline Use: 56.6   mV per pH
Time Since Alkaline Slope Cal: 3.17 Days

Sensor calibrations for each channel are displayed & datalogged including time since each calibration was last performed to facilitate best practice maintenance.

Auto pH Buffer A.P. Cal   Back
Currrent Working Channel: [1]
Currrent Node: [1]

pH Buffer for Asymmetric Potential (A.P.) Calibration

Choices: 7.00 Or 6.86   **Selection: 7.00**   Calibrated Value

Perform Auto-Calibration: Calibrate   **7.00607**

Current Reading: 6.97 pH   Current Temp: 22.6 C
Current Asymmetric Potential (A.P.): -48.2 mV
Time Since Calibration: 0.00 Days

Note: Exact pH of Buffer is computed from the temerature of sensor which is calibrated to ensure results are independent of temperature.

Auto buffer pH sensor calibrations with support for 7.00/6.86 buffers for A.P. (Offset); 4.00/1.68 buffers for acid slope & 10.00/9.18/12.45 for alkaline slope

Screenshots of Six (6) Channel Touchscreen Controller (2 of 2)

Main display for the special total ISE controller. Up to two more measurement channels can be added if desired in addition to these three.

Example of typical setup for Special total fluoride controller: Channel 1 - free fluoride, Channel 2 - pH & channel 3 - Total pH compensated fluoride.

Typical default configuration for Special total ISE controller with ISE & TOT channels setup for 0-1000ppm scaling and pH setup for 0-14 scaling.


Analog outputs configurations are selectable as the standard non-inverted type 0-20mA or 4-20mA as well as the inverted 20-0mA or 20-4mA type outputs.
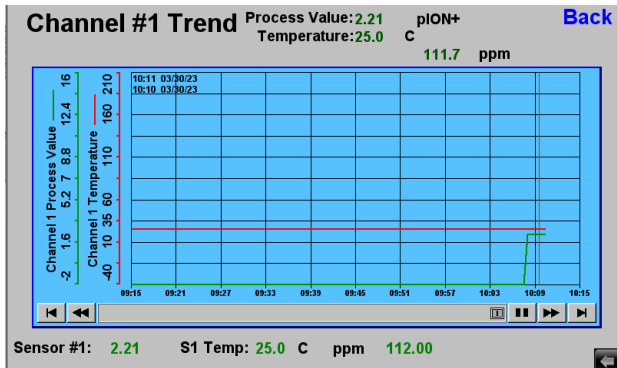
Trend graph free for free ISE channel 1 in special total ISE controller. Both the scientific pION value and common ppm units are shown along with temp.
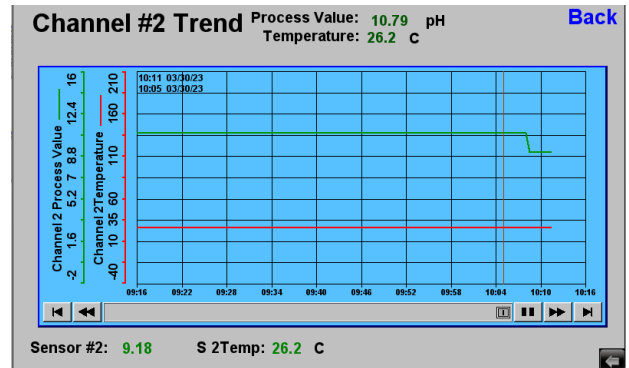
Trend graph shows last 8 hours of process & temp values for each channel. Unlimited datalogging capacity w/ 32GB storage, remotely accessible via FTP.
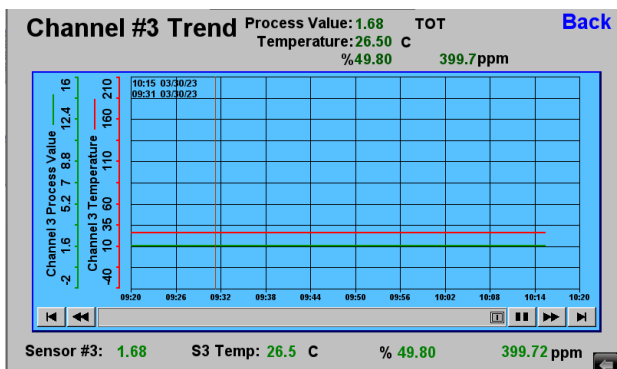
Trending graph for pH compensated total ISE value in pION and ppm units along with percent of ionization at each data points along with temperature.

Along with full secure graphical remote access capabilities, email notifications are sent for each trigger event. There exists secure FTP access for logged data.

Selected Photos of Dual (2) Channel Touchscreen Controller for HiQDT RS-485 MODBUS RTU Smart Digital Sensors

Dual (2) channel RTU touchscreen controller shown above on right with 2 each waterproof HiQ4FP panel mount ports on right input side for the HiQDT smart digital RS485 MODBUS RTU pH sensors. On left above four (4) cable glands on left output side for power, output & ethernet cable. Controller is NEMA 4X when the door is latched. Hot swappable smart plug & play sensors come with NEMA 6P rated HiQ4M snap connectors.
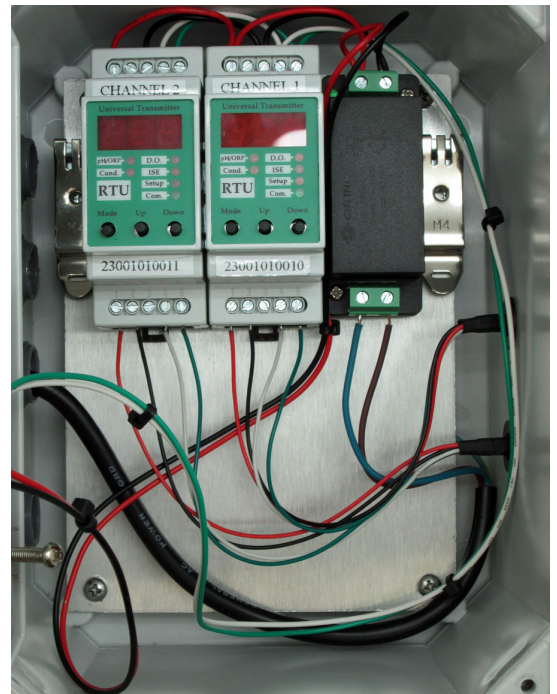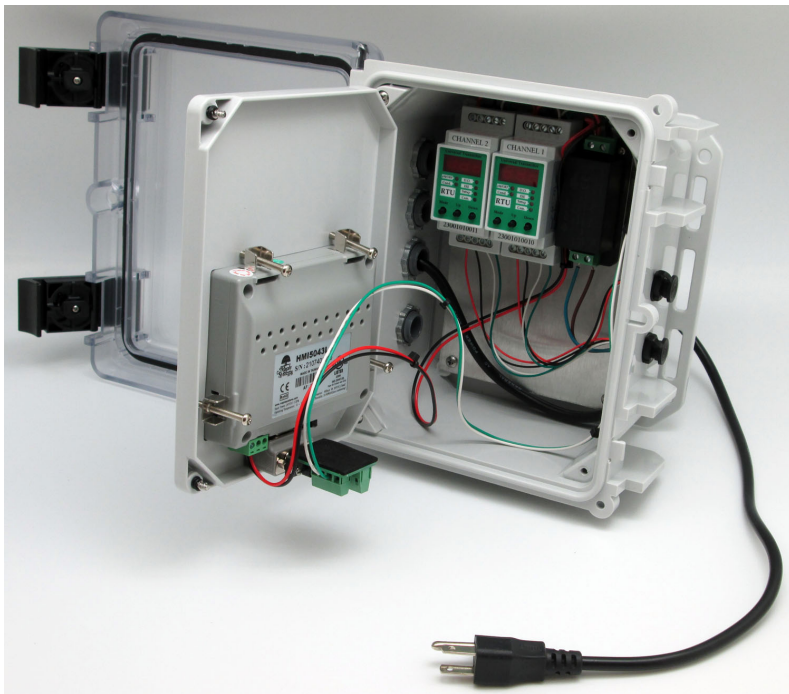
Clear hinged latched protective door provides outstanding NEMA 4X protection for touchscreen HMI from environment. In order to access the internal components of controller simply remove two far right screws and open. Analog 4-20mA current loop output(s) provided by 3TX-RTU-D transmitter modules while MODBUS TCP digital output is provided via the ethernet port on the HMI. This controller can be purchase as a single channel unit and expanded to a dual channel configuration by adding and wiring up 3TX-RTU-D transmitter after time of original commissioning.

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