

Guide for ScanView Windows Software to Configure HiQDT-NEMA4X-LEDTX Single & Dual Controllers in Master Configuration for Smart Digital RS-485 MODBUS RTU HiQDT pH, ORP & D.O. Sensors



Single Channel HiQDT-NEMA4X-LEDTX Controller in Master Configuration shown with Fully Submersible Extreme Dehydration Resistant Smart Digital MODBUS RTU pH Sensor

Controllers are CE, CSA & UL listed for non-hazarduous safe areas UL & c-UL Listed. For hazardous locations use Explosion-Proof (EX) rated version of controller instead.



Dual Channel HiQDT-NEMA4X-LEDTX Controller in Master Configuration shown without sensors. Waterproof caps should be affixed when sensors are not connected. Cable glands are factory installed on top of enclosure for sealing analog output and contact relays connections (not visible from bottom view angle in photos shown above).

# SCANVIEW WINDOWS CONFIGURATION GUIDE - Revised September 12, 2019

Welcome to the configuration guide for the ScanView Windows software for the master configuration for use with the smart digital RS-485 MODBUS RTU HiQDT pH, ORP & D.O. sensors. This controller package offers a ready made plug and play solution to perform pH, ORP & dissolved oxygen measurements right out of the box with zero configuration required if default settings are used. System includes ability to hot-swap sensors between different controllers as well as predictive maintenance notifications for when it is time to recalibrate or reorder spare sensors. This guide covers all aspects that are specific to the ScanView Windows software. For general documentation including configuration from the LED interface rather than with the ScanView Windows software please refer to the separate main HiQDT-NEMA4X-PANEL-LEDTX controller manual. Commissioning & maintenance are also detailed in this guide in addition to use of the ScanView software.

#### **Dimensional Details:**

ASSEMBLY SIZE:	7.8 inches (198mm) Width X 8.0 inches (203mm) Height X 7.0 Inches (178mm) Depth
NET WEIGHT:	2.9 Pounds (1.3 kilograms) for Single/Snooper; 3.2 pounds (1.5 kilograms) for Dual
SHIPPING BOX:	9 inches X 9 inches X 9 inches (229mm X 229mm X 299mm)
SHIP WEIGHT:	3.9 pounds (1.8 kilograms) for Single/Snooper; 4.2 pounds (1.9 kilograms) for Dual



## SINGLE CHANNEL NEMA 4X LEDTX CONTROLLER CONFIGURATIONS

#### Model: HiQDT-NEMA4X-LEDTX-H-1CH-PSAC12

or

#### Model: HiQDT-NEMA4X-LEDTX-H-1CH-PSDC12

#### Short Description:

**Single Channel Controller for HiQDT MODBUS RTU Sensors in NEMA 4X Field Assembly**; 1 ea HiQ4FP Panel Connector; 85-265 VAC to 12VDC Supply (PSAC12) or 12-24 VDC to 12VDC Supply (PSDC12) used to power both Smart Sensor & Controller; 1 each Isolated Scalable 4-20mA; 4 ea Programmable Contact Relays, 5 ea <sup>1</sup>/<sub>4</sub>" NPT glands for outputs

#### Long Description:

- **SINGLE CHANNEL MODBUS RTU MASTER CONFIGURATION** for smart digital HiQDT MODBUS RTU sensor slave. Controller is preconfigured for sensor type interfaced ready for immediate plug and play operation. Configuration can be downloaded, saved and modified with free Windows software connected via USB port. Software is automatically loaded if not already installed on connecting machine.
- The following registers are polled and displayed for each sensor type in scan mode. A single register can be displayed continuously instead of scanning all registers, typically the pH, ORP or DO process value.
  - o pH Sensors
    - Process Values: pH, Temperature, Absolute raw mV
    - All pH values are always calibrated & temperature compensated
    - Calibrations: (Performed by Handheld Communicator or Windows Software) \*
      - Offset (Asymmetric Potential, a.k.a. A.P.) & Time in use since Offset (A.P.) Cal
        - Acid Slope & Time in use since Acid Slope Calibration
      - Base (a.k.a. Alkaline) Slope & Time in use since Alkaline Slope Calibration
  - ORP Sensors
    - Process Values: ORP (calibrated), Temperature, Absolute raw mV
    - Calibration: (Performed by Handheld Communicator or Windows Software) \*
    - Offset & Time in use since Offset Calibration

#### • Dissolved Oxygen (D.O.) Sensors

- Process Values: DO ppm, DO Percent (%) Saturation with and without salinity correction User enter Salinity value (PSU) Temperature, Absolute raw mV
  - All DO ppm & percent (%) saturation values always calibrated & temp compensated
- Calibration: (Performed by Handheld Communicator or Windows Software) \*
  - Slope & Time in use since Slope Calibration
- Shared Analytic Data for <u>ALL</u> Sensor Types:
  - Month & year of manufacture
  - Sensor Item Number (unique identifier for all aspects of sensor configuration)
  - Total time in field use (recorded in hours)
  - Minimum & Maximum temperature during field use
- HOLD: Single push button operation to place analog output and relays on hold as well as to release holds
- ANALAG OUTPUT: 1 each isolated, scalable & reversible 4-20mA with trim calibrations, Max 700  $\Omega$  load
- CONTACT RELAYS: 4 each SPDT (Form C) / SPST (Form A); 3A @ 30VDC & 125/250 VAC resistive load; Programmable with USB Windows software; latching or non-latching; fail-safe operation, adjustable time on & off delay, high & low setpoints, deadband, pump alternation & sampling operation with communications break handling
  - Relays 3 & 4 provide predictive maintenance notification using time since last calibration and total time in field use registers from sensors as the user adjustable basis for recalibration & reordering of spare sensors
- ISOLATION: 4 kV input/output-to-power line; 500 V input-to-output or output-to-P+ supply
- POWER: 85-264 VAC line powered operation with -PSAC12 power configuration & 12-24 VDC power operation with -PSDC12 power configuration. NEMA 4X field controller configuration always includes isolated 12VDC power to energize smart digital HiQDT MODBUS RTU sensor slaves.
- CERTIFICATIONS: UL & c-UL LISTED (USA & Canada) UL 508 Industrial Control Equipment. For use in nonhazardous locations only. For hazardous locations please use HiQDT-EX-LEDTX controller instead.
- \* See APPENDIX "G" for details of tasks that are performed by handheld communicator or Windows Software.

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



## **DUAL CHANNEL NEMA 4X LEDTX CONTROLLER CONFIGURATIONS**

#### Model: HiQDT-NEMA4X-LEDTX-2H-2CH-PSAC12

or

#### Model: HiQDT-NEMA4X-LEDTX-2H-2CH-PSDC12

#### Short Description:

**Dual Channel Controller for HiQDT MODBUS RTU Sensors in NEMA 4X Field Assembly**; 2 each HiQ4FP Panel Connector; 85-265 VAC to 12VDC Supply (PSAC12) or 12-24 VDC to 12VDC Supply (PSDC12) powers both Smart Sensors & Controllers; 2 each Isolated Scalable 4-20mA; 8 ea Programmable Contact Relays, 6 ea <sup>1</sup>/<sub>4</sub>" MNPT glands for outputs

#### Long Description:

- **DUAL CHANNEL MODBUS RTU MASTER CONFIGURATION** for smart digital HiQDT MODBUS RTU sensor slaves. Controller is preconfigured for sensor type interfaced ready for immediate plug and play operation. Configuration can be downloaded, saved and modified with free Windows software connected via USB port. Software is automatically loaded if not already installed on connecting machine.
- The following registers are polled and displayed for each sensor type in scan mode. A single register can be displayed continuously instead of scanning all registers, typically the pH, ORP or DO process value.
  - o pH Sensors
    - Process Values: pH, Temperature, Absolute raw mV
      - All pH values are always calibrated & temperature compensated
    - Calibrations: (Performed by Handheld Communicator or Windows Software)
      - Offset (Asymmetric Potential, a.k.a. A.P.) & Time in use since Offset (A.P.) Cal
        - Acid Slope & Time in use since Acid Slope Calibration
      - Base (a.k.a. Alkaline) Slope & Time in use since Alkaline Slope Calibration
  - ORP Sensors
    - Process Values: ORP (calibrated), Temperature, Absolute raw mV
    - Calibration: (Performed by Handheld Communicator or Windows Software)
    - Offset & Time in use since Offset Calibration

#### • Dissolved Oxygen (D.O.) Sensors

- Process Values: DO ppm, DO Percent (%) Saturation with and without salinity correction User enter Salinity value (PSU) Temperature, Absolute raw mV
  - All DO ppm & percent (%) saturation values always calibrated & temp compensated
- Calibration: (Performed by Handheld Communicator or Windows Software)
  - Slope & Time in use since Slope Calibration
- Shared Analytic Data for <u>ALL</u> Sensor Types:
  - Month & year of manufacture
  - Sensor Item Number (unique identifier for all aspects of sensor configuration)
  - Total time in field use (recorded in hours)
  - Minimum & Maximum temperature during field use
- HOLD: Single push button operation to place analog output and relays on hold as well as to release holds
- ANALAG OUTPUTS: 2 each isolated, scalable & reversible 4-20mA with trim calibrations, Max 700  $\Omega$  load
- CONTACT RELAYS: 4 each SPDT (Form C) / SPST (Form A); 3A @ 30VDC & 125/250 VAC resistive load; Programmable with USB Windows software; latching or non-latching; fail-safe operation, adjustable time on & off delay, high & low setpoints, deadband, pump alternation & sampling operation with communications break handling
  - Relays 3 & 4 provide predictive maintenance notification using time since last calibration and total time in field use registers from sensors as the user adjustable basis for recalibration & reordering of spare sensors
- ISOLATION: 4 kV input/output-to-power line; 500 V input-to-output or output-to-P+ supply
- POWER: 85-264 VAC line powered operation with -PSAC12 power configuration & 12-24 VDC power operation with -PSDC12 power configuration. NEMA 4X field controller configuration always includes isolated 12VDC power to energize smart digital HiQDT MODBUS RTU sensor slaves.
- CERTIFICATIONS: UL & c-UL LISTED (USA & Canada) UL 508 Industrial Control Equipment. For use in nonhazardous locations only. For hazardous locations please use HiQDT-EX-LEDTX controller instead.
- \* See APPENDIX "G" for details of tasks that are performed by handheld communicator or Windows Software.

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



#### DEFAULT 16 MODBUS REGISTERS DISPLAYED FOR MASTER CONFIGURATION FOR SMART DIGITAL HIQDT MODBUS RTU pH & DISSOLVED OXYGEN (D.O.) SENSORS

HiQDT-pH Master Con	figuration		
орн 3.91 рн	Sensor Item Number	Time since Acid Slope Cal - 4.0 dAYS	Month of Manufacture
- Temperature Celsius	Asymmetric Potential (A.P.)	Slope for Alkaline Range —	Software Revision
21.7 dEgC	<b>-54.6</b> mV	59.2 mV/PH	8 SoFtw
Raw mV Input	Time since Offset Cal ———	Time since Base Slope Cal	Min Temp in Use (Celsius)
117 AbSmV	4.0 days	159.8 days	18.1 min-C
Total Days in Use ———	Slope for Acid Range	-Year of Manufacture	┌ Max Temp in Use (Celsius) ๅ
159.8 days	56.2 mV/PH	2018 YEAr	31.4 max-c



#### NOTES:

- Please indicate desired scaling for analog output at time of order. If no special requests are indicated, then scaling will be set to full measurement range of the given sensor type. For dissolved oxygen controllers please indicate whether DO ppm or DO percent (%) saturation units will be the basis of the output.
- Contact relays are configured as follows as the default configuration with default setpoint values for each shown in parantheses. Relay configuration and setpoints can be readily changed with ScanView software.
  - Relay 1 Low Set for pH (0.00), Std ORP (-1,000mV), Wide ORP (-2,000) or DO (0.00 ppm / 0.0 %)
  - Relay 2 Hi Set for pH (14.00), Std ORP (+1,000mV), Wide ORP (+2,000) or DO (150 ppm / 1,500 %)
  - Relay 3 Predictive Maintenance for Recalibration Default set as 30 days since last calibration
  - Relay 4 Predictive Maintenance for Reordering Default 365 for pH/ORP & 1,095 days for DO
- Datalogging for all 16 registers with free ScanView software when connected to USB port on controller
- Alternate registers can be polled from HiQDT sensors other than the 16 which are displayed above in the screenshots. Contact factory if custom configurations are desired. These can be programmed prior to dispatch if factory is advised at time of shipment. This guide details the 16 registers shown above.



#### **INITIAL COMMISSIONING STEPS:**

- 1. Provide power to controller. Depending upon configuration this can be 85-265 VAC (PSAC) or 12-24 VDC (PSDC)
  - a. If unsure about correct location & power type to be provided to unit consult factory to avoid damage!!
- 2. Your HiQDT-NEMA4X-LEDTX controller when when ordered in the master configuration has been preconfigured by the factory for the type of sensor that is to be used for your measurement. This measurement to be performed can be change by loading an alternate \*.mvp configuration onto the controller.
  - a. It is strongly recommended to save a copy of the configuration with which your HiQDT-NEMA4X-LEDTX controller was shipped to allow for restoration back to this factory default configuration if there should be any mistakes made in modifying the controller setup as well as for archival backup purposes.
- 3. Your smart digital HiQDT MODBUS RTU sensors have been precalibrated at the factory at time of dispatch. Simply plug in HiQDT sensors terminated with HiQ4M male snap connector (or extension cable termianting in the same) into the HiQ4FP female panel mount connector integrated into your HiQDT-NEMA4X-LEDTX controller assembly. The preconfigured 16 parameters will be continuously scanned by default. Use Scan/Stop button (F3) to display a just one parameter rather than scrolling. Typically the first pH, ORP or Dissolved Oxygen value is continuous shown.
- 4. When the sensors require to be recalibrated simply place the outputs on hold by pressing F1 before removing the sensor from service. The HiQDT MODBUS RTU sensors can be recalibrated with the handheld communicator (see below) or Windows software. Please refer back to the separate manuals for use of the HHC and Windows software for calibration of the sensors. Before reconnecting sensor to controller release all outputs from hold by pressing F2.



The handheld communicator (HHC) can both search for the node of the connected sensor as well as to modify the node if desired. Using this battery powered handheld communicator (HHC) to control the node assignments of the MODBUS RTU sensors allows for a very convenient field installation and maintenance scheme especially for snooper type configurations.

For ongoing maintenance the HHC can modify the sensor node to the desired value for the channel to which it is to be hot-swap exchanged in a plug and play manner for ease of field workflow.





## **MASTER CONFIGURATION & INSTALLATION GUIDE**

The configurations in the HiQDT-NEMA4X-LEDTX controllers is specifically designed to be used with IOTRON<sup>™</sup> & ZEUS<sup>™</sup> series smart digital RS-485 MODBUS RTU HiQDT pH, ORP & dissolved oxygen (D.O.) sensors. The ASTI supplied HiQDT-NEMA4X-LEDTX controller package in the master configuration re turn-key systems available for purchase ready for plug and play commissioning right out of the box. Alternatively when the HiQDT-NEMA4X-LEDTX controllers are used in the snooper configuration then any suitable PLC, DCS, SCADA or datalogger of your choice can be used to directly interface the smart digital RS-485 MODBUS RTU HiQDT pH, ORP & dissolved oxygen (D.O.) sensors. The snooper configuration can display any values that are continuous polled by the device acting as the MODUS RTU master as well as providing power to energize the sensors as well as an isolated RS-485 serial port in the field. Please see the separate installation guide and modbus implementation guide for the HiQDT pH, ORP & D.O. sensors for use with customer supplied PLC if you plan to use the snooper configuration where you will program the software on the PLC to used. Contact factory for assistance with all snooper configurations as well as customer supplied MODBUS RTU masters.

<u>PROCESS PARAMETERS</u> (Function Code 04 Read Input Registers):	Page(s)	ANALYTIC & CALIBRATION PARAMETERS (Function Code 03 Read Holding Registers):	Page(s)
<ul> <li>General Controller Setup</li> <li>Baudrate, Parity, Delay &amp; Timeout</li> <li>Configure and Monitor Menus</li> <li>Sensor Baudrate, Node &amp; Calibration</li> </ul>	7 7	<ul> <li>CalibrationValues for pH Sensors</li> <li>Offset Cal &amp; Time Since Cal – PV 6 &amp; 7</li> <li>Acid Slope Cal &amp; Time Since Cal – PV 8 &amp; 9</li> <li>Base Slope Cal &amp; Time Since Cal – PV 10 &amp; 11</li> </ul>	21-22 22-23 23-24
<ul> <li>Default baudrate and Node Addresses</li> <li>How to change Baudrate &amp; Node</li> <li>How to perform sensor calibrations</li> </ul>	8 8 8	<ul> <li>Analytic+Calibration Values for ORP Sensors</li> <li>Offset Cal &amp; Time Since Cal – PV 6 &amp; 7</li> <li>Analytic+Calibration Values for Wide ORP</li> </ul>	25-26
<ul> <li>Process Values for pH Sensors</li> <li>pH - PV1</li> <li>Temperature - PV2</li> <li>Raw Absolute mV - PV3</li> </ul>	9 9-10 10	<ul> <li>Offset Cal &amp; Time Since Cal – PV 6 &amp; 7</li> <li>Analytic+Calibration Values for D.O. Sensors</li> <li>Slope Cal &amp; Time Since Cal – PV 10 &amp; 11</li> </ul>	27-28 29-30
<ul> <li>Process Values for Standard ORP Sensors</li> <li>ORP - PV1</li> <li>Temperature - PV2</li> <li>Raw Absolute mV - PV3</li> <li>Process Values for Wide Style ORP Sensors</li> <li>Wide ORP - PV1</li> <li>Temperature - PV2</li> <li>Raw Absolute mV - PV3</li> <li>Process Values for D.O. Sensors</li> </ul>	11 11-12 12 13 13-14 14	<ul> <li>Analytic Info Shared for ALL Sensor Types</li> <li>Total Days in Use – PV4</li> <li>Sensor Item Number – PV5</li> <li>Year &amp; Month of Manufacture – PV 12 &amp; 13</li> <li>Software Revision – PV14</li> <li>Min &amp; Max Temp in Use – PV 15 &amp; 16</li> <li>Snooper Configurations</li> <li>Summary of NEMA 4X &amp; 1/8-DIN Config</li> <li>Monitoring Screenshots &amp; Notes</li> </ul>	31 31-32 32-33 33-34 34-35 36-37 38
<ul> <li>Dissolved Oxygen ppm - PV1</li> <li>Temperature - PV2</li> <li>Dissolved Oxygen Percent (%) Saturation WITH Salinity Correction - PV3</li> <li>Raw Absolute mV - PV6</li> <li>Dissolved Oxygen Cal Percent Saturation WITHOUT Salinity Correction - PV7</li> <li>Salinity &amp; Air Pressure - PV8 &amp; PV9</li> </ul>	15 15-16 16 17 17-18 18-19	<ul> <li>Appendix</li> <li>"A &amp; B" - Temperature &amp; pH Buffers</li> <li>"C" - pH Buffer choice for Windows Autocal</li> <li>"D" - Best practice pH Calibration Tips</li> <li>"E" - DO Autocalibration background info</li> <li>"F" - DO Salinity correction summary</li> <li>"G" - Handheld Communicator Functions</li> </ul>	39-40 41 42 43 44 45
<ul> <li>Analog 4-20mA Output &amp; 4 each Relays</li> <li>4-20mA Analog Output Configuration</li> <li>Configuration of Relays for Alarm, Control &amp; Predictive Maintenance Notification</li> </ul>	20 20	<ul> <li>Miscellaneous &amp; Datalogging</li> <li>Core LED Display Configuration Setup</li> <li>Datalogging with ScanView Software</li> <li>Sample of logged data with ScanView</li> </ul>	46 46 47-52



### "General Controller Setup"

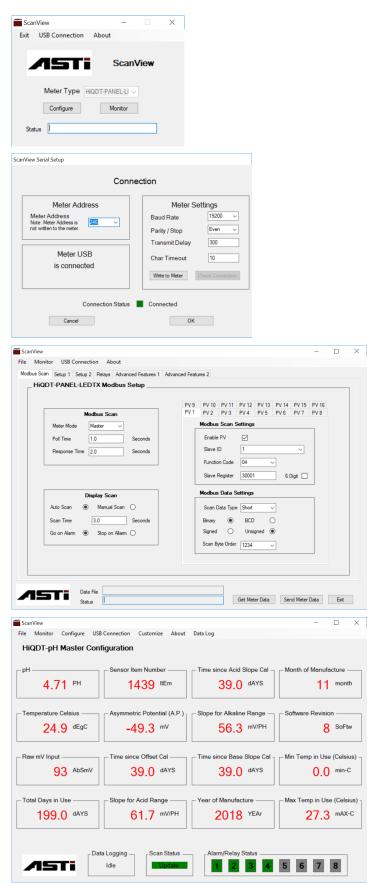
When the USB cable from the HiQDT-NEMA4X-LEDTX controller is connected to your PC it will automatically install the ScanView software if it is not detected. Thereafter it will auto-detect the type of controller which is connected. The main default screen after the ScanView software is loaded is shown to the right.

Clicking on the "USB" connection will load the screen shown to the right. The baudrate, parity, transmit delay and char timeout must be as shown to ensure proper communications between the smart digital HiQDT MODBUS RTU sensors and your HiQDT-NEMA4X-LEDTX controller. The meter address is of no consequence but should generally be set to 246 to 247 for best practice. Once your "USB Connection" screen is identical to what is shown to the right you can proceed further.

Clicking on the "Configure" button from the main default screen will load the screen shown to the right. The remainder of this guide will walk through proper configuration for each tab for the various sensor types.

It is VERY strongly recommended to first click on the "Get Meter Data" and then to save the downloaded configuration of the HiQDT-NEMA4X-LEDTX controller BEFORE commissioning in order to have a backup of the factory default settings for future use and reference purposes. If any changes are made to the default configuration it is strongly recommended to save those modified settings with a unique descriptive filename including the installation location and date.

Clicking on the "Monitor" button from the main default screen will load all programmed registers. The screenshot shown to the right has been slightly optimized to omit any unused settings. This type of customization is possible for each controller type. In the case to the right the custom configuration monitor display file used is "HiQDT-pH-Master.svc". The custom configuration monitor display file for your measurement type will be emailed at time of dispatch. In addition to showing the 16 programmed registers from the connected sensor the monitor screen also displays the status for the 4 contact relays based upon the current configuration that is loaded. For other types of sensors the monitoring different types of registers will be displayed as appropriate. See monitoring section for details and appropriate page for each particular PV.



7



### "Sensor Baudrate, Node Address & Calibration"

#### **IMPORTANT NOTE ABOUT BAUDRATE:**

The default baudrate for all HiQDT sensors to be used with the six channel controller is 19,200 kbps. Default baudrate for the HiQDT sensors is 19,200 unless otherwise requested at time of purchase. If the baudrate is changed to 9,600 kbps on your HiQDT sensor it must then also be changed accordingly on your HiQDT-NEMA4X-LEDTX controller as well. **ONLY the ASTI HiQDT Windows software can change the baudrate of the HiQDT smart digital RS-485 MODBUS RTU sensors (see manual for details).** 

#### **IMPORTANT NOTE ABOUT NODE ADDRESS:**

The default node address for HiQDT-NEMA4X-LEDTX controller in the master configuration assumes that all connected sensors are using the default node address. The default node address will be exactly the same as the sensor type. So for pH the sensor type is 1 and the default node address is 1. Likewise for the standard range ORP the sensor type is 2 and so the default node address is 2. Similarly for the wide range ORP the sensor type is 3 and the default node address is 3. Lastly for dissolved oxygen (D.O.) the sensor type is 4 and so the default node address is then also 4. **IMPORTANT NOTE:** <u>ONLY</u> the ASTI HiQDT Windows software or the ASTI handheld communicator (HHC) can change the node address of HiQDT smart digital RS-485 MODBUS RTU sensors (see respective manuals for details).

#### **ORDERING NOTES:**

HiQDT sensors can be ordered with node addresses pre-assigned other than the default values shown above. This is done by adding "-NX" to the end of the part number where X is the node address to be factory assigned. If not special indication is made then the sensor will come with the standard default node address scheme as detailed above. For cases where the sensors are purchased together with the controller a logical preset node scheme will be provided so that all sensors will automatically show up in the home display screen allowing for plug and play operation right out of the box.

#### COMMISSIONING AND SETUP:

ONLY the ASTI HiQDT Windows software or ASTI Handheld Communicator (HHC) can change the node address of the HiQDT smart digital RS-485 MODBUS RTU sensors (see respective manuals for details).

#### **CALIBRATION NOTES:**

HiQDT sensors can be calibrated with either the free of charge Windows software (separate from the ScanView software used to configure the controller) or the battery powered handheld communicator (HHC). Please refer to the separate manuals for the Windows software and HHC when calibration needs to be performed. The Appendix A, B, C, D, E, F & G located at the end of this document provide useful information when calibrating your smart digital HiQDT MODBUS RTU sensors. Inquire to factroy if additional assistance should be required.



# "Process Values for pH Sensors" – Page 1 of 2

PV1 is configured to display the temperature compensated and calibrated pH value from the connected HiQDT pH sensor. This is read as register 30001 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV1 is performed under the Setup 1 tab. The calibrated and temperature compensated pH value is sent as 0 to 16,000 corresponding to engineered values of -2.000 to +16.000 pH. In reality the third position of the pH value sent is quite uncertain and so the display should be set to show only the two significant figures past the decimal of the pH value which how the configuration is set from the factory and as can be visualized in the screenshot to the right.

PV2 is configured to display calibrated temperature from the connected HiQDT pH sensor. This is read as register 30002 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

ScanView		- 0
	Connection About	humanad Easterna 2
	EL-LEDTX Modbus Setup	
	Modbus Scan	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8
Meter M	ode Master V	Modbus Scan Settings
Poll Time	e 1.0 Seconds	Enable PV
Respons	e Time 2.0 Seconds	Slave ID 1 ~
		Function Code 04 ~
		Slave Register 30001 6 Digit
	Display Scan	Modbus Data Settings
Auto Sca		Scan Data Type Short 🗸
Scan Tim		Binary  BCD  Signed  Unsigned
Go on Ala	arm	Scan Byte Order 1234
		12.34
<b>1</b> STi	Data File	Get Meter Data Send Meter Data Exit
	Status	
ScanView		- 0
	Connection About	have a Destrume 2
	Setup 2 Relays Advanced Features 1 Ad EL-LEDTX Setup 1	Ivanced Features 2
		V 15 PV 16 Math 1 Math 2 Math 3 Math 4
	PV1 PV2 PV3 PV4 PV	
	Modbus Scan Settings	Modbus Scan Settings
	Tag PH	Scale Points 2
	Unit PH	Input Display
	Display Format Decimal	✓ 1 0 -2.00 2 18000 16.00
	Display Decimal Point dddd.dd	V 1 2 1000 1000
	Float Decimal Point ddd.ddd	✓
		Excel Import Excel Export
лст:	Data File	
1511	Status	Get Meter Data Send Meter Data Exit
ScanView		- 0
	Connection About	
Iodbus Scan Setup 1	Setup 2 Relays Advanced Features 1 Ad	Ivanced Features 2
Hiqdt-Pan	EL-LEDTX Modbus Setup	
		PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16
	Modbus Scan	PV 1 PV2 PV 3 PV 4 PV 5 PV 6 PV 7 PV 8
Meter M		Modbus Scan Settings
Poll Time		Enable PV 🔽 Slave ID 1
	e Time 2.0 Seconds	Slave ID 1 V
		Slave Register 30002 6 Digit
		50002 5 Digit
	Display Scan	Modbus Data Settings
	n   Manual Scan	Scan Data Type Short ~
Respons Auto Sca Scan Tim	n  Manual Scan	Scan Data Type Short  V Binary  Binary BCD
Respons Auto Sca Scan Tim	n   Manual Scan	Scan Data Type Short Binary  BCD  Signed  Unsigned
Respons Auto Sca Scan Tim	n  Manual Scan	Scan Data Type Short  V Binary  Binary BCD



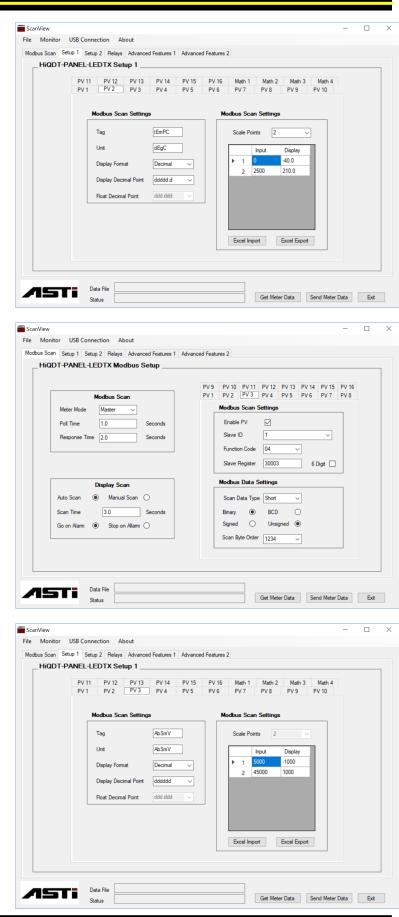
## "Process Values for pH Sensors" Page 2 of 2

The scaling for PV2 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.

PV3 is configured to display the raw absolute mV input from connected HiQDT pH sensor. This is read as register 30003 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV3 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 5,000 to 45,000 corresponding to engineered values of -1,000 to +1,000 mV. Although this raw mV input is sent in a very high resolution format (0.05mV) for the diagnostic purposes that this information is used showing just the signed whole number is quite sufficient, which is how the display of this register is configured from the factory and as can be visualized in the screenshot to the right.



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



## "Process Values for Standard ORP Sensors" – Page 1 of 2

PV1 is configured to display the calibrated ORP value from connected HiQDT ORP sensor. This is read as register 30001 as an unsigned 16 bit integer.

The default node address for the Standard ORP sensor is 2 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

Scaling for PV1 is performed under the Setup 1 tab. Calibrated ORP sent as 0 to 20,000 corresponding to engineered values of -1,000 to +1,000 mV.

	nitor USB Connection About	- 0
JUDUS 30	an Setup 1 Setup 2 Relays Advanced Features 1	Advanced Features 2
HiC	DT-PANEL-LEDTX Modbus Setup	
	Modbus Scan Meter Mode Master V	PV9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV1         PV2         PV3         PV4         PV5         PV6         PV7         PV8           Modbus Scan Settings
	Poll Time 1.0 Seconds	Enable PV
	Response Time 2.0 Seconds	Slave ID 2
		Function Code 04 ~
		Slave Register 30001 6 Digit
	Display Scan	Modbus Data Settings
	Auto Scan 🔘 Manual Scan 🔾	Scan Data Type Short ~
	Scan Time 3.0 Seconds	Binary   BCD
	Go on Alarm 💿 Stop on Allarm 🔾	Signed O Unsigned O
		Scan Byte Order 1234
79	Deta File HQDT-PANEL-NEMA4X-LED Status Send Complete	TX-MASTER-ORP_STAND Get Meter Data Send Meter Data Exit
canView		- 0
e Mor	nitor USB Connection About	
	an Setup 1 Setup 2 Relays Advanced Features 1	Advanced Features 2
HiC	DT-PANEL-LEDTX Setup 1	
		PV 15         PV 16         Math 1         Math 2         Math 3         Math 4           PV 5         PV 6         PV 7         PV 8         PV 9         PV 10
	Modbus Scan Settings	Modbus Scan Settings
	Tag ORP	Scale Points 2 ~
	Unit mV	
		Input Display ▶ 1 0 -1000
	Display Format Decimal	
	Display Decimal Point dddddd	
	Float Decimal Point ddd.ddd	✓
		Excel Import Excel Export
	Data File Data from file - HIQDT-PANEL	NEMANU EDTY.MASTER
	Data File Data from file - HiQDT-PANEL Status	Get Meter Data Send Meter Data Exit
ScanView		- 0
	nitor USB Connection About	
	an Setup 1 Setup 2 Relays Advanced Features 1	Advanced Features 2
	DT-PANEL-LEDTX Modbus Setup	
		PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16
	Modbus Scan	PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8
	Meter Mode Master V	Modbus Scan Settings
		Enable PV 🔽
	Poll Time 1.0 Seconds	
	Poll Time 1.0 Seconds Response Time 2.0 Seconds	Slave ID 2
		Slave ID 2 ~ ~ Function Code 04 ~ ~
		Slave ID 2
		Slave ID 2 ~ ~ Function Code 04 ~ ~
	Response Time 20 Seconds	Siave ID 2 ~ Function Code 04 ~ Siave Register 30002 6 Digit Modbus Data Settings
	Response Time 20 Seconds Display Scan	Slave ID 2 ~ Function Code 04 ~ Slave Register 30002 6 Digit
	Display Scan           Auto Scan         Manual Scan         O           Scan Time         3.0         Seconds	Siave ID 2 ~ Function Code 04 ~ Siave Register 30002 6 Digit Modbus Data Settings Scan Data Type Short ~
	Response Time 20 Seconds  Display Scan  Auto Scan  Manual Scan	Slave ID 2 ~ Function Code 04 ~ Slave Register 30002 6 Digit Modbus Data Settings Scan Data Type Short ~ Binary  BCD 0
	Display Scan           Auto Scan         Manual Scan         O           Scan Time         3.0         Seconds	Siave ID 2 ~ Function Code 04 ~ Slave Register 30002 6 Digit Modbus Data Settings Scan Data Type Short ~ Binary  BCD O Signed O Unsigned
	Display Scan           Auto Scan         Manual Scan         O           Scan Time         3.0         Seconds	Siave ID 2 ~ Function Code 04 ~ Slave Register 30002 6 Digit Modbus Data Settings Scan Data Type Short ~ Binary  BCD O Signed O Unsigned
	Response Time     Z0     Seconds       Display Scan       Auto Scan <ul> <li>Manual Scan</li> <li>Scan Time</li> <li>3.0</li> <li>Seconds</li> </ul>	Siave ID 2 ~ Function Code 04 ~ Slave Register 30002 6 Digit Modbus Data Settings Scan Data Type Short ~ Binary  BCD O Signed O Unsigned

11

PV2 is configured to display calibrated temperature value from connected HiQDT ORP sensor. This is read as register 30002 as an unsigned 16 bit integer.

The default node address for the Standard ORP sensor is 2 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



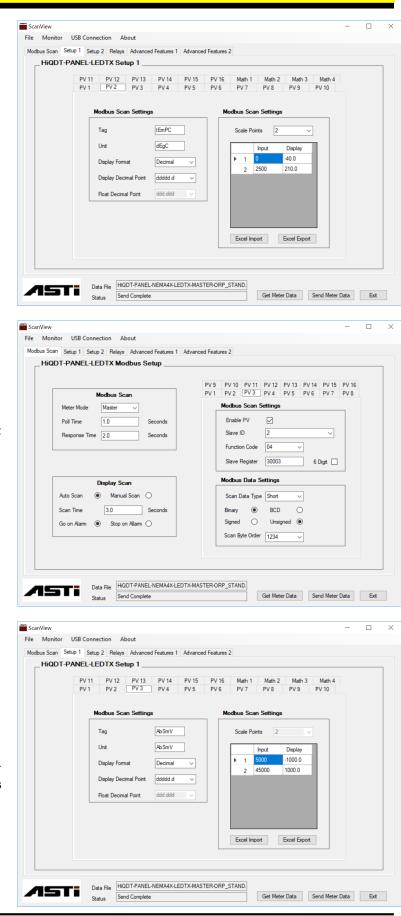
## "Process Values for Standard ORP Sensors" - Page 2 of 2

The scaling for PV2 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.

PV3 is configured to display the raw absolute mV input from connected HiQDT ORP sensor. This is read as register 30003 as an unsigned 16 bit integer.

The default node address for the Standard ORP sensor is 2 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV3 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 5,000 to 45,000 corresponding to engineered values of -1,000 to +1,000 mV. Although this raw mV input is sent in a very high resolution format (0.05mV) for the diagnostic purposes that this information is used showing just the signed whole number is quite sufficient, which is how the display of this register is configured from the factory and as can be visualized in the screenshot to the right.





# "Process Values for <u>Wide Range</u> ORP Sensors" - Page 1 of 2

PV1 is configured to display the calibrated ORP value from connected HiQDT ORP sensor. This is read as register 30001 as an unsigned 16 bit integer.

The default node address for the Wide Range ORP sensor is 3 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

Scaling for PV1 is performed under the Setup 1 tab. Calibrated ORP sent as 0 to 20,000 corresponding to engineered values of -2,000 to +2,000 mV.

Modbus S	onitor USB Connection About
	Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2
_ Hi	QDT-PANEL-LEDTX Modbus Setup
	PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16
	Modbus Scan PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8
	Meter Mode Master  Modbus Scan Settings
	Poll Time 1.0 Seconds Enable PV
	Response Time 2.0 Seconds Slave ID 3 ~
	Function Code 04 V
	Slave Register 30001 6 Digit
	Display Scan Modbus Data Settings
	Auto Scan  Manual Scan  Scan Scan Scan Scan
	Scan Time 3.0 Seconds Binary  BCD O
	Go on Alarm    Stop on Alarm    Stop on Alarm     Stop on Alarm
	Scan Byte Order
	Data File HQDT-PANEL-NEMA4X-LEDTX-MASTER-ORP_STAND
	Status Get Meter Data Send Meter Data Exit
_	
ScanViev	w — 🗆
	Can Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2
	QDT-PANEL-LEDTX Setup 1
	PV 11         PV 12         PV 13         PV 14         PV 15         PV 16         Math 1         Math 2         Math 3         Math 4           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8         PV 9         PV 10
	PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8 PV9 PV10
	Modbus Scan Settings Modbus Scan Settings
	Tag ORP Scale Points 2 V
	Unit mV Input Display
	Display Format Decimal V 1 0 -2000
	Display Decimal Point dddddd v
	Float Decimal Point ddd.ddd 🗸
	Excel Import Excel Export
<b>/</b> !	Data File HQDT-PANEL-NEMA4X-LEDTX-MASTER-ORP_STAND. Status Get Meter Data Send Meter Data Ext
	Status Get Meter Data Exit
ScanViev	N – D
	onitor USB Connection About
Modbus S	ican Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2
_Hi	QDT-PANEL-LEDTX Modbus Setup
	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           Modifiue Scan         PV 1         PV2         PV3         PV4         PV5         PV6         PV7         PV8
	Meter Mode Master  Modbus Scan Settings
	Pol Time 1.0 Seconds Enable PV
	Pol Time 1.0 Seconds Enable PV S Response Time 2.0 Seconds Slave ID 3
	Pol Time 1.0 Seconds Enable PV
	Pol Time 1.0 Seconds Enable PV S Response Time 2.0 Seconds Slave ID 3
	Pol Time     1.0     Seconds       Pesponse Time     2.0     Seconds       Slave ID     3     ~       Function Code     0.4     ~       Slave Register     30002     6 Digit
	Pol Time     1.0     Seconds       Response Time     2.0     Seconds       Function Code     04     ✓       Slave Register     30002     6 Digt         Display Scan     Modbus Data Settings
	Display Scan     Modbus Data Settings       Auto Scan     Manual Scan
	Display Scan     Modbus Data Settings       Auto Scan (in 3.0)     Seconds
	Pol Time       1.0       Seconds         Pesponse Time       2.0       Seconds         Slave ID       3       ~         Function Code       04       ~         Slave Register       30002       6 Digit         Modbus Data Settings       Scan Time       3.0         Scan Time       3.0       Seconds         Go on Alarm       Stop on Allarm O       Signed       Unsigned
	Display Scan     Modbus Data Settings       Auto Scan     Manual Scan       Scan Time     3.0       Seconds     Binary
	Display Scan     Modbus Data Settings       Auto Scan @ Manual Scan O     Scan Data Type Short ~       Scan Time     3.0       Go on Alam @ Stop on Allam O     Signed O
	Display Scan     Modbus Data Settings       Auto Scan @ Manual Scan O     Scan Data Type Short ~       Scan Time     3.0       Go on Alam @ Stop on Allam O     Signed O
	Display Scan     Modbus Data Settings       Auto Scan @ Manual Scan O     Scan Data Type Short ~       Scan Time     3.0       Go on Alam @ Stop on Allam O     Signed O

13

PV2 is configured to display calibrated temperature value from connected HiQDT ORP sensor. This is read as register 30002 as an unsigned 16 bit integer.

The default node address for the Wide Range ORP sensor is 3 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



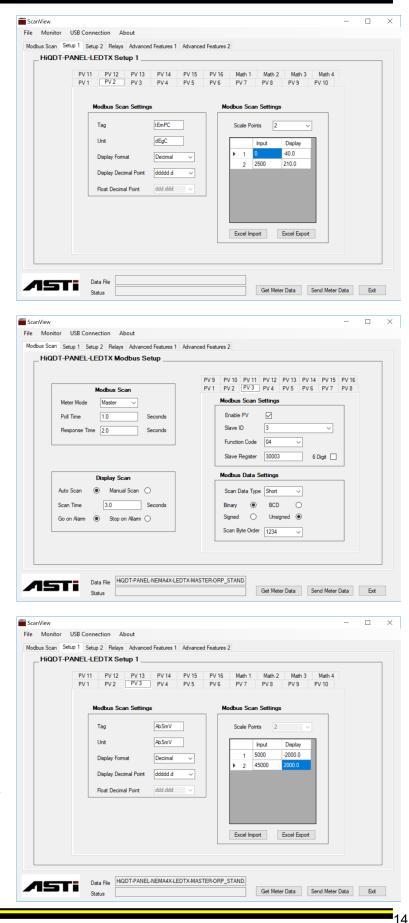
### "Process Values for <u>Wide Range</u> ORP Sensors" - Page 2 of 2

The scaling for PV2 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.

PV3 is configured to display the raw absolute mV input from connected HiQDT ORP sensor. This is read as register 30003 as an unsigned 16 bit integer.

The default node address for the Wide Range ORP sensor is 3 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV3 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 5,000 to 45,000 corresponding to engineered values of -2,000 to +2,000 mV. Although this raw mV input is sent in a very high resolution format (0.1mV) for the diagnostic purposes that this information is used showing just the signed whole number is quite sufficient, which is how the display of this register is configured from the factory and as can be visualized in the screenshot to the right.





## "Process Values for Dissolved Oxygen (D.O.) Sensors" – Page 1 of 5

PV1 is configured to display the temperature compensated and calibrated dissolved oxygen ppm from the connected HiQDT DO sensor. This is read as register 30001 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV1 is performed under the Setup 1 tab. The calibrated and temperature compensated DO ppm value is sent as 0 to 15,000 corresponding to engineered values of 0.00 to 150.00 dissolved oxygen ppm units.

View -  View -  Monitor USB Connection About us Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2 HiQDT-PANEL-LEDTX Setup 1  PV11 PV12 PV13 PV14 PV15 PV16 Math 1 Math 2 Math 3 Math 4  PV1 PV2 PV3 PV4 PV5 PV5 PV7 PV8 PV9 PV10  Modbus Scan Settings Unit dOPPm Unit dod dd v Roat Decimal Point ddd dd v Roat Decimal Point ddd dd v Excel Import Excel Export  Data File Data from Meter Status  Data File Data from Meter Excel Import Status  Cet Meter Data Send Meter Data End Meter Data End Meter Data End	HIQDT-PANE	Setup 2 Relays Advanced Features	Advanced Features 2
Weet Node       Events         Meter Node       Events         Meter Node       Events         Meter Node       Events         Meter Node       Events         Marka Scin       Seconds         Marka Scin       Seconds         Marka Scin       Seconds         Sen Time       20         Monter       1000 formation         Sen Time       20         Sen Time       20         Sen Time       20         Sen Time       20		L-LEDTX Modbus Setup	
Meer Meer       Bota Sconds         Pat Tae       Bota Sconds         Pat Tae       Bota Sconds         Ada Scan       Meanad Scan         Scan Tae       Bota Sconds         Scan Statu 1       Scan Scands         Scan Statu 1       Scan Statu 2         HODT PANEL LED IX Scand Features 1       Meanad Scands         More US Connection Abod       Scan Statu 1         a Scan Statu 1       Scan Scan Scatting         Vite       PV15       PV16         PV11       PV12       PV3         PV12       PV3       PV14       PV5         PV16       PV17       PV12       PV3         Dask file       Beta Meer       Beta         Scan Statu 2       Mean Abance Scan Scattings       East East East East East East East East			
Note Image: Seconds   Net Time Image: Seconds   Net Soc Seconds   Seconds Seconds <t< td=""><td></td><td></td><td></td></t<>			
Report The 0       Second         Report The 0       Second         Add Son ()       Second         Son The 30       Second The 30         Son The 30       Second Texture 1         Monter       USI Connection About         Son The 20       PV11         PV11       PV12       PV13         PV11       PV12       PV14         PV			
Imperter Mit Imperior Mit   Deptory Scan   And Sian   San Time   San			
Diskey Son Ato Son @ Manual Son O Son Ota Type From © 0 Son Dia Type © 0 OSON © 0 Son Dia Type © 0 OSON © 0 Son Dia Type © 0 OSON © 0 Son Dia Type © 0 Son	Response	Time 1.0 Seconds	
Display Scin         And Scin         Scin Time			
Acto Som       Markad Som         Som Time       33         Som Time       34         Som Time       35         Som Time       50         Som Time       50         Monitor       USB Connection         Monitor       USB Connection         Monitor       USB Connection         Modular       Som Time         Som Time       Som Time         Display format       Decimal         Som       Decimal       Decimal         Net       Decimal       Decimal         Nota       Som			
Son Time       30       Seconds         Go n Aam       Stop on Alam       Stop on Alam         Stop on Alam       Stop on Alam       Stop on Alam         Stop on Alam       Stop on Alam       Stop on Alam         Stop on Alam       Stop on Alam       Stop on Alam         Stop on Alam       Stop on Alam       Stop on Alam         Stop on Alam       Stop on Alam       Stop on Alam         Stop on Alam       Stop on Alam       Get Meer Dala       Eed Meer Dala         Stop on Alam       Stop on Alam       Get Meer Dala       Eed Meer Dala         Nonhor       USE Connection       About       Stop on Alam       Stop on Alam         View       -       -       Mach 1       Mach 2       Mech 3       Mach 4         PV11       PV12       PV13       PV14       PV15       PV16       PV18       PV19       PV10         Motion       USE Sconection       About       Stop on Stop 0       Eed Meer Dala       Eed Meer D			
Go n Alem @ Stop on Alem O       Signed O Unsigned @         Son Bate Order (224)         ISSNE Dates File       Sate State         Sate State       Get Meter Dates         Sate State       Get Meter Dates         Normier       USS Connection About         as Son State 1 Setup 2 Relays Markened Features 1 Advanced Features 2         HODT-PANEL-LEDTX Solup 1         Image: State 2 Relays Markened Features 1 Advanced Features 2         HODT-PANEL-LEDTX Solup 1         Image: State 2 Relays Markened Features 1 Advanced Features 2         HODT-PANEL-LEDTX Solup 1         Image: State 2 Relays Markened Features 1 Advanced Features 2         HODT-PANEL-LEDTX Solup 1         Image: State 2 Relays Markened Features 1 Advanced Features 2         Morkener USS Connection About         State 1 Setup 2 Relays Markened Features 1 Advanced Features 2         HODT-PANEL-LEDTX Modebus Solup         Vev         Morier       USC Connection About         State 1 Setup 2 Relays Markened Features 1 Advanced Features 2         HODT-PANEL-LEDTX Modebus Solup         Image: Solution       PY 19 19 19 19 19 19 19 19 19 19 19 19 19			
Scan Byte Oder       [234]         Image: State of the s			
Das Re       Das Re       Send Meer Das       Send Meer Das       E         Vew	Cit off Addi	Stop on Aliann	
Sature       Get Meere Date       Send Meere Date       E         View       -			
Sature       Get Meere Date       Send Meere Date       E         View       -			
Sature       Get Meere Date       Send Meere Date       E         View       -		Data File Data from Meter	
Monitor USB Connection About as San Sribp 1 Satup 2 Relays Advanced Features 1 Advanced Features 2 HIDDT-PANEL-LEDTX Setup 1 PV11 PV12 PV13 PV14 PV15 PV15 Math 1 Math 2 Math 3 Math 4 PV11 PV2 PV3 PV4 PV5 PV5 Source Setups Tag @OPPm Unit	، ا کا		Get Meter Data Send Meter Data Ex
Monitor USB Connection About as San Sribp 1 Satup 2 Relays Advanced Features 1 Advanced Features 2 HIDDT-PANEL-LEDTX Setup 1 PV11 PV12 PV13 PV14 PV15 PV15 Math 1 Math 2 Math 3 Math 4 PV11 PV2 PV3 PV4 PV5 PV5 Source Setups Tag @OPPm Unit	View		- 0
HODT-PANEL-LEDTX Setup 1 Image: Setup 1       Image: Se		onnection About	
PV11       PV12       PV3       PV4       PV5       PV5       PV7       PV8       PV8       PV10         Moduus Scan Settings       Image: Construction of the second of the seco			1 Advanced Features 2
PV1       PV2       PV3       PV4       PV5       PV6       PV7       PV8       PV5       PV10         Modbus Scan Settings       Scale Points       Scale		-	
Tag       @OPPm         Unit       @OPPm         Daplay Format       @eemal         Daplay Decimal Point       @ddd.dd         Boat Decimal Point       @ddd.dd         Boat Decimal Point       @dd.dd         Boat Decimal Point       @dd.dd         Eccel Import       Eccel Export			
Unit       OPPm         Display Format       Decimal ¬ Display         Boat Decimal Porx       ddd.ddd         Roat Decimal Porx       ddd.ddd         Eccel Import       Eccel Import         Eccel Import       Eccel Import         Bata File       Data file         Satus       Get Meter Data         Send Meter Data       Send Meter Data         View       -         View       -         Monitor       USB Connection         About       Advanced Features 1         Monitor       USB Connection         Modus       Seconds         Poil Time       10         Seconds       Save ID         Modus       Seconds         Save ID       4         Modus       Seconds         Save ID       4         Save ID       4         Save ID       4         Save ID       4         Save Register       30022         Soon Data Type       BCD         Sare ID       Binary         Sare ID       Unsigned @		Modbus Scan Settings	Modbus Scan Settings
Unit       OPPPin         Display Format       Decimal Port         Display Decimal Port       ddd.ddd         Roat Decimal Port       ddd.ddd         Roat Decimal Port       ddd.ddd         Eccel Import       Eccel Export		Tag dOPPm	Scale Points 2
Display Format       Decimal Poirt       ddd.dd         Display Decimal Poirt       ddd.ddd       Image: Status       Image: Status         Roat Decimal Poirt       ddd.ddd       Image: Status       Excel Export         Data File       Data File       Data file       Image: Status       Excel Export         View       -       -       Contention       About       Excel Export       Excel Export         View       -       -       Contention       Advanced Features 1       Advanced Features 2         HiGDT-PANEL-LEDTX       Modbus Setup       Modbus Setup       File       File       File         Image: The Info       Seconds       Sare ID       File		Unit dOPPm	
Display Decimal Poirt       idddddi       i         Boat Decimal Poirt       idddddi       i         Boat Decimal Poirt       idddddi       i         Excel Import       Excel Export     Excel Import Excel Export  Excel Export  Excel Export  Excel Export  Excel Export  Excel Export  Excel Export Excel Export  Excel Export Excel Export  Excel Export Excel Expo			
Roat Decimal Porit       ddd ddd         Excel Import       Excel Export         View       -         Monitor       USB Connection         About       us Scan Setup 1         Scan Setup 1       Seconds         Poil Time       10         Seconds       Finction Code         Modus Scan       Modus Seconds         Exail Availanced Features 1       Save Bout         Modus Scan Manual Scan       Save Register         Scan Time       3.0         Scan Time       Stop on Alamn			2 15000 150.00
Image: Scale Seconds       Data File       Data			
Data File       Data from Meter         Satus       Get Meter Data         Seconda       Get Meter Data         View       —         Montor       USB Connection         About       —         us Scan       Setup 1         Setup 2       Relaya         Advanced Features 1       Advanced Features 2         HiODT-PANEL-LEDTX Modbus Setup			
Data File       Data from Meter         Satus       Get Meter Data         Seconda       Get Meter Data         View       —         Montor       USB Connection         About       —         us Scan       Setup 1         Setup 2       Relaya         Advanced Features 1       Advanced Features 2         HiODT-PANEL-LEDTX Modbus Setup			
Data File       Data from Meter         Satus       Get Meter Data         Seconda       Get Meter Data         View       —         Montor       USB Connection         About       —         us Scan       Setup 1         Setup 2       Relaya         Advanced Features 1       Advanced Features 2         HiODT-PANEL-LEDTX Modbus Setup			Excel Import Excel Export
Josa Ine       Get Meter Data       Send Meter Data       E         Status       Get Meter Data       Get Meter Data       E         View       —			
Josa Ine       Get Meter Data       Send Meter Data       E         Status       Get Meter Data       Get Meter Data       E         View       —			
Status     Uset Meter Data     Send Meter Data     Send Meter Data	STI	Data File Data from Meter	
Monitor       USB Connection       About         us Scon       Setup 1       Setup 2       Relay       Advanced Features 1         HiQDT-PANEL-LEDTX Modbus Setup		Status	Get Meter Data Send Meter Data Ex
HIGOT - PANEL-LEDTX Modbus Setup HIGOT - PANEL-LEDTX Modbus Setup Modbus Scan Meter Mode Master ↓ Pol Time 1.0 Seconds Response Time 1.0 Seconds Display Scan Auto Scan @ Manual Scan ↓ Scan Time 3.0 Seconds Go on Alam @ Stop on Alam ↓	View		- 0
HIQDT-PANEL-LEDTX Modbus Setup		onnection About	
Modbus Scan         Meter Mode         Meter Mode         Master         Pol Time         10         Seconds         Response Time         10         Seconds         Biaplay Scan         Auto Scan @ Manual Scan ○         Scan Time         3.0       Seconds         Go on Alam @ Stop on Allam ○	Monitor USB C		1 Advanced Features 2
Modbus Scan         Meter Mode       Master          Pol Time       1.0         Seconds       Enable PV         Pol Time       1.0         Seconds       Save ID         Function Code       04         Slave Register       30002         Scan Time       3.0         Seconds       Scan Data Settings         Modbus Data Settings       Modbus Data Settings         Binary       BCD         Signed       Unsigned @	us Scan Setup 1	L-LED IX MOUDUS Setup	
Meter Mode       Master         Pol Time       1.0       Seconds         Pol Time       1.0       Seconds         Response Time       1.0       Seconds         Slave ID       4       ✓         Function Code       04       ✓         Slave Register       30002       6 Digt         Modbus Data Settings         Modbus Data Settings         Scan Time       3.0       Seconds         Scan Time       3.0       Seconds       Binary       BCD       Binary       BCD       Signed       Unsigned @       Insigned       Insigned <td< td=""><td>us Scan Setup 1</td><td></td><td></td></td<>	us Scan Setup 1		
Poll Time       1.0       Seconds         Poll Time       1.0       Seconds         Response Time       1.0       Seconds         Slave ID       4       ✓         Function Code       04       ✓         Slave Register       30002       6 Digit         Modbus Data Settings       Scan Data Type       Shot         Scan Time       3.0       Seconds       Signed O         Go on Alam       Stop on Allam       Signed O       Unsigned @	us Scan Setup 1	Nadua Saar	
Normalized and the seconds       Slave ID       4       ✓         Response Time       1.0       Seconds       Slave ID       4       ✓         Function Code       04       ✓       Slave Register       30002       6 Digit         Display Scan       Modbus Data Settings       Scan Data Type       Short ✓       Binary       BCD       Signed       Unsigned @	us Scan Setup 1 HiQDT-PANE		PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8
Function Code     04       Slave Register     30002     6 Digit       Display Scan     Modbus Data Settings       Auto Scan     Manual Scan     Scan Data Type       Scan Time     3.0     Seconds       Go on Alarm     Stop on Allarm     Signed	us Scan Setup 1 .HiQDT-PANE	e Master ~	PV 1 PV 2 PV 3 PV 4 PV 5 PV 6 PV 7 PV 8 Modbus Scan Settings
Display Scan         Modbus Data Settings           Auto Scan (e)         Manual Scan (c)           Scan Time         3.0           Seconds         Binary (e)           Go on Alarm (e)         Stop on Allarm (c)	us Scan Setup 1 HIQDT-PANE Meter Mod Poll Time	Master V 1.0 Seconds	PV 1 PV 2 PV 3 PV 4 PV 5 PV 6 PV 7 PV 8  Modbus Scan Settings  Enable PV
Auto Scan        Manual Scan         Scan Time        3.0         Scan Time        3.0         Scan Time        Scan Data Type         Scan Time        3.0         Scan Time        Scan Data Type         Scan Data Type        Binary         Binary        Bccn         Signed        Unsigned @	us Scan Setup 1 HIQDT-PANE Meter Mod Poll Time	Master V 1.0 Seconds	PV 1 PV 2 PV 3 PV 4 PV 5 PV 6 PV 7 PV 8  Modbus Scan Settings  Enable PV  Slave ID
Auto Scan <ul> <li>Manual Scan</li> <li>Scan Data Type</li> <li>Short</li> <li>Scan Time</li> <li>3.0</li> <li>Seconds</li> <li>Binary</li> <li>BCD</li> <li>Go on Alarm</li> <li>Stop on Allarm</li> <li>Signed</li> <li>Unsigned</li> </ul>	us Scan Setup 1 HIQDT-PANE Meter Mod Poll Time	Master V 1.0 Seconds	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus Scan Settings         Enable PV         Image: Comparison of the set of the
Scan Time     30     Seconds     Binary     BCD       Go on Alarm     Image: Stop on Allarm     Signed     Unsigned	us Scan Setup 1 HIQDT-PANE Meter Mod Poll Time	e Master 10 Seconds Time 10 Seconds	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus Scan Settings         Enable PV         Image: State Stat
Go on Alam   Stop on Allam  Signed  Unsigned	us Scan Setup 1 HIQDT-PANE Meter Mod Poll Time Response	e Master 10 Seconds Time 10 Seconds Display Scan	PV 1 PV2 PV3 PV4 PV5 PV6 PV7 PV8 Modbus Scan Settings Enable PV  Slave ID 4   Function Code 04  Slave Register 30002 6 Digt Modbus Data Settings
Scan Byte Order 1234 V	us Scan Setup 1 HIQDT-PANE Meter Mod Poll Time Response	e Master  10 Seconds Time 10 Seconds Display Scan  (Manual Scan O	PV 1     PV 2     PV 3     PV 4     PV 5     PV 6     PV 7     PV 8       Modbus Scan Settings     Enable PV
	us Scan Setup 1 HIODT-PANE Meter Mod Poll Time Response Auto Scan Scan Time	e Master	PV 1     PV 2     PV 3     PV 4     PV 5     PV 6     PV 7     PV 8       Modbus Scan Settings     Enable PV
	us Scan Setup 1 HIODT-PANE Meter Mod Poll Time Response Auto Scan Scan Time	e Master	PV 1     PV 2     PV 3     PV 4     PV 5     PV 6     PV 7     PV 8       Modbus Scan Settings     Enable PV
	us Scan Setup 1 HIODT-PANE Meter Mod Poll Time Response Auto Scan Scan Time	e Master	PV1     PV2     PV3     PV4     PV5     PV6     PV7     PV8       Modbus Scan Settings     Enable PV

15

PV2 is configured to display calibrated temperature from the connected HiQDT DO sensor. This is read as register 30002 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



### "Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 2 of 5

The scaling for PV2 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.

PV3 is configured to display the computed percent (%) saturation value including salinity correction from the connected HiQDT DO sensor. This is read as register 30005 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

Scaling for PV3 is performed under the Setup 1 tab. The computed percent (%) saturation including salinity correction value is sent as 0 to 15,000 corresponding to engineered values of 0.0 to 1,500.0 % saturation.

	etup 1 Setup 2 Relays Advanced Features 1 Advan	ced Features 2
HiQDT-	PANEL-LEDTX Setup 1	
	PV 11         PV 12         PV 13         PV 14         PV 15           PV 1         PV 2         PV 3         PV 4         PV 5	
	Modbus Scan Settings	Modbus Scan Settings
	Tag tEmPC	Scale Points 2 ~
	Unit dEgC	Input Display
	Display Format Decimal ~	▶ 1 0 -40.0 2 2500 210.0
	Display Decimal Point ddddd.d 🗸	
	Float Decimal Point ddd.ddd 🗸	
		Excel Import Excel Export
<b>/</b> 51	Data File Data from Meter	
	Status	Get Meter Data Send Meter Data Exi
ScanView		- 0
	USB Connection About etup 1 Setup 2 Relays Advanced Features 1 Advan	ced Faatures 2
	PANEL-LEDTX Modbus Setup	
		PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16
M	Modbus Scan ster Mode Master V	PV 1 PV 2 PV 3 PV 4 PV 5 PV 6 PV 7 PV 8 Modbus Scan Settings
	II Time 1.0 Seconds	Enable PV
Re	esponse Time 1.0 Seconds	Slave ID 4
		Function Code 04 V Slave Register 30005 6 Digit
		Modbus Data Settings
Aut	Display Scan o Scan   Manual Scan	Scan Data Type Short
Sca	in Time 3.0 Seconds	Binary   BCD
Go	on Alarm	Signed O Unsigned  Scan Byte Order 1234
		Scan Byte Order 1234
٨ST	Data File Data from Meter	Get Meter Data Send Meter Data Exi
	Status	Get Meter Data Send Meter Data Bo
ScanView		- 0
	USB Connection About	
	etup 1 Setup 2 Relays Advanced Features 1 Advanced Features 1 Advanced Features 1 Advanced Features 1	ced Features 2
	PV 11         PV 12         PV 13         PV 14         PV 15           PV 1         PV 2         PV 3         PV 4         PV 5	
	Modbus Scan Settings	Modbus Scan Settings
	Tag PErCnt	Scale Points 2
	Unit PErCnt	Input Display ▶ 1 0 0.0
	Display Format Decimal ~	2 15000 1500.0
	Dieplay Decimal Point	
	Display Decimal Point dddddd.	
		Excel Import Excel Export



## "Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 3 of 5

PV6 is configured to display raw absolute mV input from the connected HiQDT DO sensor. This is read as register 30003 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV6 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 0 to 25,000 corresponding to engineered values of 0.00 to 250.00 mV.

PV7 is configured to display the computed percent (%) saturation value WITHOUT salinity correction from the connected HiQDT DO sensor. This is read as register 30006 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

	itor USB Connection About	
	n Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2 DT-PANEL-LEDTX Modbus Setup	
	Modbus Scan         PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           Modbus Scan         PV 1         PV 2         PV 3         PV 4         PV 5         PV 7         PV 8           Meter Mode         Master         Modbus Scan Settings         Modbus Scan Settings         Modbus Scan Settings	
	Poll Time 1.0 Seconds Enable PV ✓ Response Time 1.0 Seconds Slave ID 4 ✓ Function Code 04 ✓ Slave Register 30003 6 Digit □	
[	Display Scan Modbus Data Settings	
	Auto Scan        Manual Scan         Scan Time       3.0         Scan Time       3.0         Scan Time       Binary         Go on Alarm       Stop on Allarm         Scan Byte Order       1234	
75	Data Fie Data from Meter Status Get Meter Data Send Meter Data	Exit
anView		
	itor USB Connection About	
	in Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2 DT-PANEL-LEDTX Setup 1	
	PV 11         PV 12         PV 13         PV 14         PV 15         PV 16         Meth 1         Meth 2         Meth 3         Meth 4           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8         PV 9         PV 10           Modbus Scan Settings         Modbus Scan Settings         Modbus Scan Settings         Modbus Scan Settings	
	Tag         AbSmV         Scale Points         2           Unit         AbSmV         input         Display           Display Format         Decimal         Imput         Display	
	Display Decimal Point     dddd dd       Roat Decimal Point     ddd ddd   Excel Import Excel Export	
	Data Fie Usta inform meeer Status Get Meter Data Send Meter Data	Exit
	DT-PANEL-LEDTX Modbus Setup	
	Modbus Scan         PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           Modbus Scan         PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Meter Mode         Master         Modbus Scan Settings         Enable PV         P	
	Poll Time 1.0 Seconds Enable PV Response Time 1.0 Seconds Slave ID 4 · · · · · · · · · · · · · · · · · ·	
	Display Scan         Modbus Data Settings           Auto Scan (e)         Scan Data Type Short (red)	
	Scan Time     3.0     Seconds     Binary     BCD       Go on Alarm     Stop on Allarm     Signed     Unsigned       Scan Byte Order     1234     V	



## "Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 4 of 5

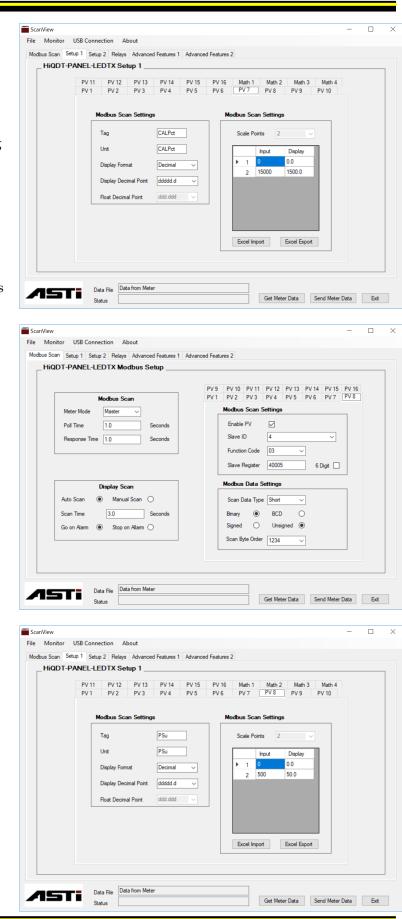
Scaling for PV7 is performed under the Setup 1 tab. Computed percent (%) saturation WITHOUT salinity correction sent as 0 to 15,000 corresponding to engineered values of 0.0 to 1,500.0 % saturation.

This PV7 value is what should be expected to be near 100% after a successful calibration is performed dry in air. If the salinaity value programmed into the sensor (PV8) is not 0.0, there will be difference between the computed percent saturation with and without salinity correction. The precent saturation without salinity correction is also called the calibration % saturation value.

PV8 is configured to display the programmed salinity of the measured solution used in the percent saturation computed for PV3 from the connected HiQDT DO sensor. This is read as register 40005 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV8 is performed under the Setup 1 tab again. The user defined salinity value programmed into the HiQDT DO Sensor input value is sent 0 to 500 corresponding to engineered values of 0.0 to 50.0 PSU. The salinity can be obtained with any suitable conductivity measurement equipment that can display PSU salinity units.



18



## "Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 5 of 5

PV9 is configured to display the programmed air pressure at the measurement location. This value is used to in the autocalibration routine as well as for all precent saturation value (PV3 & PV7). This is read as register 40006 as an unsigned 16 bit integer.

The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV9 is performed under the Setup 1 tab again. The user defined ambient air pressure programmed into the HiQDT DO Sensor input value is sent 0 to 760 corresponding to engineered values of 0 to 760 mmHg. The air pressure can be obtained with any suitable commn instrument.

The ScanView Windows software can be used to simultaneously display all 16 PV registers from the connected HiQDT DO sensor in the master configuration. In addition to the process values detailed in this section of the manual the PV10 and PV11 calibration values are also displayed. Please see the calibration section for further details on these two parameters.

ndhus Scan Setup 1 Setup 2 Rei	About ays Advanced Features 1 Advanced	d Eastruma 2	
HIQDT-PANEL-LEDTX		3 reatures 2	
		PV1 PV2 PV3 PV4 PV5 F	V 6 PV 7 PV 8
Modbus		PV 9 PV 10 PV 11 PV 12 PV 13 P	V 14 PV 15 PV 16
Meter Mode Maste		Modbus Scan Settings	
Poll Time 1.0 Response Time 1.0	Seconds	Slave ID 4	~
		Function Code 03 ~	
		Slave Register 40006	6 Digit
Display	Scan	Modbus Data Settings	
	nual Scan	Scan Data Type Short ~	
Scan Time 3.0 Go on Alarm   Sto	Seconds	Binary   BCD   Signed  Unsigned	
		Scan Byte Order 1234	
	Data from Meter		
Status		Get Meter Data	Send Meter Data Exit
canView			- 0
Monitor USB Connection	About		
dbus Scan Setup 1 Setup 2 Re HIQDT-PANEL-LEDTX	ays Advanced Features 1 Advanced	J Features 2	
PV 11 PV 1		PV 16 Math 1 Math 2 Math	3 Math 4
PV 1 PV 2			PV 10
Modbus	Scan Settings	Modbus Scan Settings	
Tag	mmHg	Scale Points 2	
Unit	mmHg		
Display		Input Display ▶ 1 0 0	
	Decimal Point ddddddd ~	2 760 760	
Float De	cimal Point ddd.ddd 🗸		
		Excel Import Excel Exp	ort
	Data from Meter		
Data File		Get Meter Data	Send Meter Data Exit
Data File Status			
Status			
CanView	Connection Customize About	t Data Log	- 0
canView e Monitor Configure USB		: Data Log	- 0
Status Status CarView Monitor Configure USB GQDT-DO Master Configure	figuration		
CanView CanView CanView Configure USB Configure USB Configure USB Configure USB Configure USB Configure USB Configure Configur	<b>Figuration</b>	Air Pressure	Month of Manufacture
Status Status CarView Monitor Configure USB GQDT-DO Master Configure	figuration		- D
carView a Monitor Configure USB diQDT-DO Master Cont Dissolved Oxygen PPM 8.39 dOPPm	<b>Figuration</b>	Air Pressure	Month of Manufacture
carView a Monitor Configure USB diQDT-DO Master Cont Dissolved Oxygen PPM 8.39 dOPPm	Sensor Item Number	Air Pressure 760 mmHg	Month of Manufacture
carView a Monitor Configure USB diQDT-DO Master Conti Dissolved Oxygen PPM 8.39 dOPPm remperature Celsius	Sensor Item Number 18017 ItEm	Air Pressure 760 mmHg	Month of Manufacture
carView a Monitor Configure USB <b>HiQDT-DO Master Conf</b> bissolved Oxygen PPM 8,39 dOPPm remperature Celsius 25.6 dEgC	Sensor Item Number 18017 ItEm	Air Pressure 760 mmHg	Month of Manufacture
carView a Monitor Configure USB <b>HiQDT-DO Master Conf</b> bissolved Oxygen PPM 8,39 dOPPm remperature Celsius 25.6 dEgC	Sensor Item Number 18017 ItEm Raw mV Input 15.10 AbSmV	Air Pressure 760 mmHg Slope in mV per DO PPM 1.80 mV/PP	Month of Manufacture 6 mor Software Revision — 5 Sof
carView a: Monitor Configure USB <b>HiQDT-DO Master Conf</b> Dissolved Oxygen PPM 8.39 dOPPm Femperature Celsius 25.6 dEgC	Sensor Item Number         18017         Raw mV Input         15.10         AbSmV	Air Pressure 760 mmHg Slope in mV per DO PPM 1.80 mV/PP	Month of Manufacture 6 mor Software Revision — 5 Sof
Status CarlView a Monitor Configure USB diQDT-DO Master Confi pissolved Oxygen PPM 8.39 dOPPm and the status configure Celsius 25.6 dEgC Percent Saturation 109.1 PErCnt cotal Days in Use	iguration Sensor Item Number	Air Pressure 760 mmHg Slope in mV per DO PPM 1.80 mV/PP Time since Slope Calibration 26.0 dAYS	Month of Manufacture 6 mor Software Revision — 5 Sof Min Temp in Use (Celt 18.5 min Max Temp in Use (Cel
CanView e Monitor Configure USB HIQDT-DO Master Conf Dissolved Oxygen PPM 8.39 dOPPm Femperature Celsius 25.6 dEgC Percent Saturation	Sensor Item Number 18017 ItEm Raw mV Input 15.10 AbSmV % Saturation w/o Salinity 101.9 CALPct	Air Pressure 760 mmHg Slope in mV per DO PPM 1.80 mV/PP Time since Slope Calibration 26.0 dAYS	Month of Manufacture 6 mor Software Revision — 5 Sof

19



## "4-20mA Analog Output Configuration & 4 each Programmable Contact Relays"

4-20mA analog output is configured from process value provided by the connected sensor. For pH, Standard & Wide Range ORP sensors this is always PV1. For dissolved oxygen (D.O.) sensors this is either PV1 for DO ppm or PV3 for DO percent (%) saturation with salinity correction. The scaling limits provided for the 4-20mA analog output should always lie within the permissible limits for each measurement type. These are as follows:

pH.	-2.00 to +16.00 (Default 0.00 to 14.00)
ORP.	-1,000 to +1,000
Wide ORP.	-2,000 to +2,000
DO ppm.	0.00 to 150.00
DO % Sat.	0.0 to 1,500.0

When break box is unchecked the analog output will hold last value before break occurs effectively acting as a retentive register if sensor is accidentally disconnected or loses communications.

When disconnecting sensor always first press F1 key to hold all ouputs. Before reconnecting sensor always press F2 to release all outputs from hold.

Relays can be programmed in any configuration as desired. Typical configuration shown to the right:

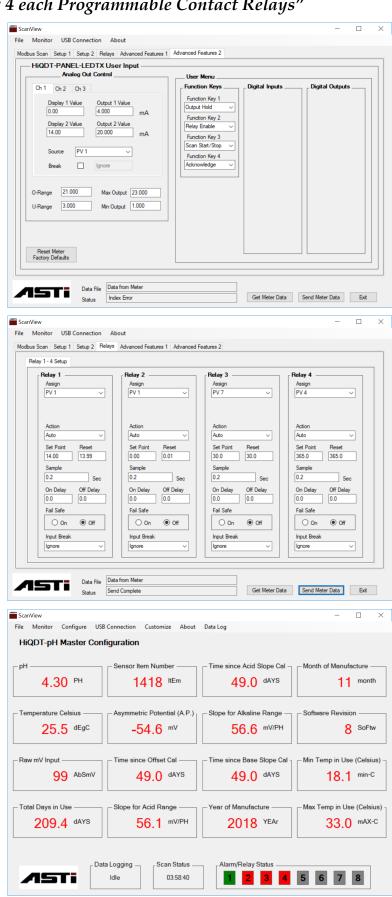
Relay 1 is setup as a high setpoint at pH14 and Relay 2 is setup as a low setpoint at pH0. *Alternate setpoints can be used. Reset value defines the deadband; On & Off delay can be adjusted as desired.* 

Relay 3 is setup for predictive maintenance for when it is time to perform a new calibration. In the example to the right this value is set to 30 days. In this case PV7 is used which is the days since offset calibration was last performed. This is suitable if the sensor type is pH, ORP or Wide ORP. If the sensor type was the dissolved oxygen then PV11 should be used (days since slope calibration).

Relay 4 is setup as predictive maintenance for when a spare sensor should be ordered. For all sensor types this would be PV4 which is the total days in field use. In the example to the right 365 days is set as the threshold value for when a spare sensor is to be ordered. Obviously this is just an example for illustration purposes and other values can be set.

Refer to main HiQDT-NEMA4X-PANEL-LEDTX controller manual for detailed instructions of the relay wiring and relay action modes and options.

In screenshot to right relays # 2, 3 & 4 are active (in this example the total time in use setting is lower).



20



# "Calibration Values for pH Sensors"- Page 1 of 4

PV6 is configured to display the asymmetric potential from an offset calibration performed on the connected HiQDT pH sensor. This is read as register 40001 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV6 is performed under the Setup 1 tab. The offset calibration value is sent as 0 to 5000 corresponding to engineered values of -250.0 to +250.0 mV. The asymmetric potential is the mV value at pH7 isopotential point. The pH sensor is expected to have this offset value when it is at pH7 at any temperature.

PV7 is configured to display the total days in use since the offset calibration was performed. This is read as register 40014 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

dbus Sca	itor USB Connection About an Setup 1 Setup 2 Relays Advanced Features 1	Advanced Features 2
	DT-PANEL-LEDTX Modbus Setup	
	Modbus Scan       Meter Mode     Master       Poll Time     1.0       Seconds       Response Time     2.0	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 15         PV 15         PV 15         PV 15         PV 16         PV 7         PV 8           Modbus         Scan         Settings         Stave ID         1         ~         ~         Function Code         03         ~         ~         Image: Color of the start of the star
	Display Scan       Auto Scan <ul> <li>Manual Scan</li> <li>Seconds</li> <li>Go on Alam</li> <li>Stop on Alam</li></ul>	Slave Register 40001 6 Digt Modbus Data Settings Scan Data Type Shot Binary Signed Scan Byte Order Unsigned Scan Byte Order Scan Byte Order
75	Data File	Get Meter Data Send Meter Data Ext
anView		- 0
	itor USB Connection About	
	an Setup 1 Setup 2 Relays Advanced Features 1 DT-PANEL-LEDTX Setup 1	Advanced Features 2
	Unit         OFFSEt           Display Format         Decimal           Display Decimal Point         dddddd           Roat Decimal Point         ddd ddd	Imput     Daplay       Imput     Daplay       Imput     250.0       2     5000       2     5000       Escel Imput     Escel Espot
anView	Data File	Get Meter Data Send Meter Data Ext
	an Setup 1 Setup 2 Relays Advanced Features 1	Advanced Features 2
	DT-PANEL-LEDTX Modbus Setup Modbus Scan Meter Mode Master ~ Poll Time 1.0 Seconds Response Time 2.0 Seconds	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus         Scan Settings         Enable PV         Image: Constraint of the set of the s
	Display Scan       Auto Scan <ul> <li>Manual Scan</li> <li>Manual Scan</li> <li>Scan Time</li> <li>3.0</li> <li>Seconds</li> <li>Go on Alarm</li> <li>Stop on Alarm</li> <l< td=""><td>Modbus Data Settings       Scan Data Type     Short       Binary          <ul> <li>BCD</li> <li>Signed</li> <li>Unsigned</li> <li>Scan Byte Order</li> <li>1234</li> </ul></td></l<></ul>	Modbus Data Settings       Scan Data Type     Short       Binary <ul> <li>BCD</li> <li>Signed</li> <li>Unsigned</li> <li>Scan Byte Order</li> <li>1234</li> </ul>



# "Calibration Values for pH Sensors" Page 2 of 4

The scaling for PV7 is performed under the Setup 1 tab. The total hours in use since offset calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim 7.5$  years) and displayed with one decimal point.

PV8 is configured to display the result of the slope calibration in mV per pH units performed on the connected HiQDT pH sensor for measurements that are performed in the acidic region (below pH7). This is read as register 40002 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV8 is performed under the Setup 1 tab. The acid slope calibration value is sent as 600 to 1800 corresponding to engineered values of 30.0 to 60.0 mV per pH unit.

dbus Scan Setup	SB Connection About	Advanced Features 2
	NEL-LEDTX Setup 1	
		PV 15         PV 16         Math 1         Math 2         Math 3         Math 4           PV 5         PV 6         PV 7         PV 8         PV 9         PV 10
	PV 1 PV 2 PV 3 PV 4	PV 5 PV 6 PV 7 PV 8 PV 9 PV 10
	Modbus Scan Settings	Modbus Scan Settings
	Tag dAYS	Scale Points 2
	Unit dAYS	Input Display
	Display Format Decimal	✓ 1 0 0.0 2 65535 2730.6
	Display Decimal Point ddddd.d	✓
	Float Decimal Point ddd.ddd	
		Excel Import Excel Export
15Ti	Data File	
	Status	Get Meter Data Send Meter Data E
anView		
	SB Connection About	
	1 Setup 2 Relays Advanced Features 1	Advanced Features 2
	NEL-LEDTX Modbus Setup	
	Modbus Scan	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8
Meter		Modbus Scan Settings
Poll Tir	me 1.0 Seconds	Enable PV
Respo	nse Time 2.0 Seconds	Slave ID 1
		Function Code 03  Slave Register 40002 6 Digit
Auto Sc	Display Scan	Modbus Data Settings Scan Data Type Short
Scan Ti		Scan Data Type Short ~ Binary  BCD
	Narm   Stop on Allarm	Signed O Unsigned O
		Scan Byte Order 1234
1STi	Data File	Get Meter Data Send Meter Data E
1STi	Data FileStatus	Get Meter Data E
		Get Meter Data Send Meter Data E
	Status	
anView Monitor US dbus Scan Setup	Status SB Connection About 1 Setup 2 Relays Advanced Features 1	
anView Monitor US dbus Scan Setup	Status SB Connection About SB Connection About SB Connection About NEL-LEDTX Setup 1	-  Advanced Features 2
anView Monitor US dbus Scan Setup	Status         Status           58 Connection         About           11         Setup 2         Relays         Advanced Features 1           NEL-LEDTX         Setup 1	
anView Monitor US dbus Scan Setup	Status         Status           58 Connection         About           11         Setup 2         Relays         Advanced Features 1           NEL-LEDTX Setup 1	-      -      Advanced Features 2  PV 15 PV 16 Math 1 Math 2 Math 3 Math 4
anView Monitor US dbus Scan Setup	Status St	-  Advanced Features 2  PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  Modbus Scan Settings
anView Monitor US dbus Scan Setup	Status           S8 Connection         About           S8 Connection         About           S8 Connection         Advanced Features 1           NEL-LEDTX         Setup 1           PV11         PV12         PV13           PV1         PV2         PV3           Modbus         Scan Settings           Tag         AddSL	Advanced Features 2
anView Monitor US dbus Scan Setup	Status         Status           SB Connection         About           SI Setup 2         Relays           Advanced Features 1         NEL-LEDTX Setup 1           PV 11         PV 12         PV 13           PV 11         PV 12         PV 3           PV 12         PV 3         PV 4           Modbus Scan Settings         Tag         AcidSL           Unit         m/V/PH         PH	-  Advanced Features 2  PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  Modbus Scan Settings
anView Monitor US dbus Scan Setup	Status           SB Connection         About           SB Connection         About           Status         Status           SB Connection         Advanced Features 1           NEL-LEDTX Setup 1	-  Advanced Features 2 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10 Modbus Scan Settings Scale Points 2 hput Display t 00 200
anView Monitor US dbus Scan Setup	Status SB Connection About To setup 2 Relays Advanced Features 1 NEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 NU1 PV 2 PV 3 PV 4	-  Advanced Features 2 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  Modbus Scan Settings  Scale Points 2  pt 1 600 0.0 2 1800 90.0
anView Monitor US dbus Scan Setup	Status           SB Connection         About           SB Connection         About           Status         Status           SB Connection         Advanced Features 1           NEL-LEDTX Setup 1	-  Advanced Features 2 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  Modbus Scan Settings  Modbus Scale Points 2  Input Display I 600 30.0 2 1800 90.0
anView Monitor US dbus Scan Setup	Status SB Connection About To setup 2 Relays Advanced Features 1 NEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 NU1 PV 2 PV 3 PV 4	-  Advanced Features 2 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  Modbus Scan Settings  Scale Points 2  pt 1 600 0.0 2 1800 90.0
anView Monitor US dbus Scan Setup	Status SB Connection About To setup 2 Relays Advanced Features 1 NEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 NU1 PV 2 PV 3 PV 4	-  Advanced Features 2 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  Modbus Scan Settings  Scale Points 2  pt 1 600 0.0 2 1800 90.0
anView Monitor US dbus Scan Setup	Status SB Connection About To setup 2 Relays Advanced Features 1 NEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 NU1 PV 2 PV 3 PV 4	Advanced Features 2 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10 Modbus Scan Settings Scale Points 2 1 000 30.0 2 1800 90.0

22



# "Calibration Values for pH Sensors" Page 3 of 4

PV9 is configured to display the total days in use since the acid slope calibration was performed. This is read as register 40015 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV9 is performed under the Setup 1 tab. The total hours in use since acid slope calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim 7.5$  years) and displayed with one decimal point.

PV10 is configured to display the result of the slope calibration in mV per pH units performed on the connected HiQDT pH sensor for measurements that are performed in the alkaline region (above pH7). This is read as register 40003 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

	r USB Connection About Setup 1 Setup 2 Relays Advanced F	-
		Modbus         Scan Settings           Enable PV         V           Steve ID         1           Function Code         03           Slave Register         40015
s	Display Scan Pato Scan (e) Manual Scan () Scan Time (3.0) Sec Scon Nam (e) Stop on Alam ()	State Register     6 Uigit       Modbus Data Settings       Scan Data Type       Binary <ul> <li>BCD</li> <li>Signed</li> <li>Unsigned</li> <li>Scan Byte Order</li> <li>1234</li> <li>V</li> </ul> <li>Scan Byte Order</li>
<b>^</b> 5	Data File	Get Meter Data Send Meter Data Ext
ScanView	r USB Connection About	- 0
Modbus Scan	Setup 1 Setup 2 Relays Advanced F	Features 1 Advanced Features 2
	Unit [ Display Format [ Display Decimal Point [	dAYS dAYS Decimal ✓ ddddd d ✓ dddddd ✓ Excel Impot Excel Export
<b>Л</b> 5	Data FileStatus	Get Meter Data Send Meter Data Ext
	r USB Connection About Setup 1 Setup 2 Relays Advanced F	
		JP         PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           Modbus Scan Settings         Enable PV         ✓         ✓         ✓         ✓           sonds         Slave ID         1         ✓         ✓         ✓         ✓
	Display Scan	
	Scan Time 3.0 Sec Go on Alarm () Stop on Allarm ()	Signed Unsigned  Scan Byte Order 1234

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



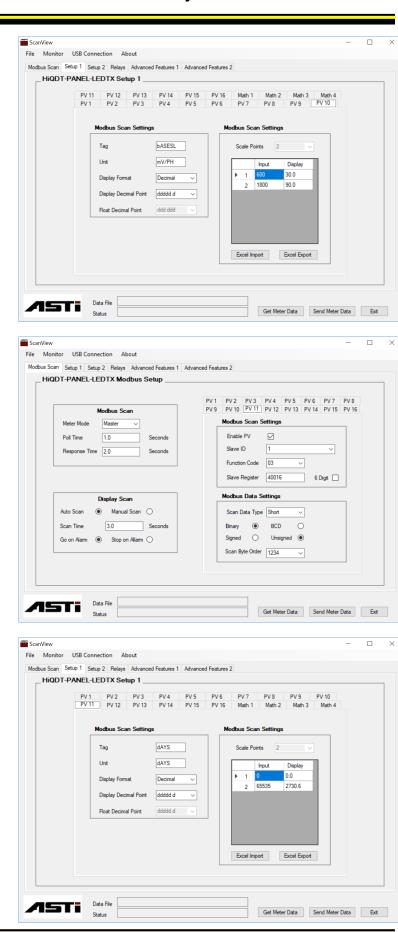
"Calibration Values for pH Sensors" Page 4 of 4

The scaling for PV10 is performed under the Setup 1 tab. The alkaline slope calibration value is sent as 600 to 1800 corresponding to engineered values of 30.0 to 60.0 mV per pH unit.

PV11 is configured to display the total days in use since the alkaline slope calibration was performed. This is read as register 40016 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV11 is performed under the Setup 1 tab. The total hours in use since alkaline slope calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim$ 7.5 years) and displayed with one decimal point.





# "Calibration Values for Standard Range ORP Sensors" - Page 1 of 2

PV6 is configured to display the results from an offset calibration performed on the connected HiQDT ORP sensor. This is read as register 40001 as an unsigned 16 bit integer.

The default node address for the Standard ORP sensor is 2 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV6 is performed under the Setup 1 tab. The offset calibration value is sent as 0 to 5000 corresponding to engineered values of -250.0 to +250.0 mV.

lodbus Scan Setup 1	Connection About		
	Setup 2 Relays Advanced Features 1 Advanced Fe	dvanced Features 2	
Meter Mode Poll Time	Modbus Scan	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 7         PV 8           Modbus Scan Settings         Enable PV         Image: Comparison of the text of text o	
Auto Scan Scan Time Go on Alam	Display Scan Manual Scan O 3.0 Seconds the Stop on Allarm O	Save Register 40001 6 Digt Modbus Data Settings Scan Data Type Short Binary  BCD Signed Unsigned Scan Byte Order 1234	
/ISTi	Data File HIGDT-PANEL-NEMA4X-LEDT Status Send Complete	X-MASTER-ORP_STAND Get Meter Data Send Meter Data	Exit
canView e Monitor USB C	Connection About	-	
	Tag     OFFSE       Unit     OFFSE       Display Format     Decimal       Display Decimal Point     dddd dd       Float Decimal Point     ddd ddd	Scale Points 2 input Display ▶ 1 0 -250.00 2 5000 250.00 	
		Excel Import Excel Export	
ASTi	Data File HQDT-PANEL-NEMA4X-LEDT Status Send Complete		Exit
ScanView le Monitor USB C	Status Send Complete	X-MASTER-ORP_STAND. Get Meter Data Send Meter Data	Ext

PV7 is configured to display the total days in use since the offset calibration was performed. This is read as register 40014 as an unsigned 16 bit integer.

The default node address for the Standard ORP sensor is 2 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



# "Calibration Values for Standard Range ORP Sensors"– Page 2 of 2

The scaling for PV7 is performed under the Setup 1 tab. The total hours in use since offset calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim 7.5$  years) and displayed with one decimal point.

The ScanView Windows software can be used to simultaneously display all 12 PV registers from the connected HiQDT ORP sensor in the master configuration. In addition to the process and analytic values P6 and P7 calibration type values are also displayed. Please see the display process values section for further details on those registers.

	Connection About			
		ed Features 1 Advanced Fea	tures 2	
HIQDT-PANE	L-LEDTX Setup 1			
PV PV	(11 PV 12 PV 13 (1 PV 2 PV 3		/16 Math 1 Math 1 Math 1 Math 1 Math 1 Math 2010	th 2 Math 3 Math 4 8 PV 9 PV 10
PV	PV2 PV3	PV4 PV5 P	V6 IV/ PV	8 PV9 PV10
	Modbus Scan Setting	15	Modbus Scan Sett	inas
	Tag	dAYS	Scale Points	2 ~
	Unit	dAYS	Input	Display
	Display Format	Decimal ~	▶ 1 0	0.0
	Display Decimal Point	ddddd.d 🗸	2 65535	2730.6
	Float Decimal Point	ddd.ddd 🗸		
	rioat Decimai Point	uuu.uuu		
			Excel Import	Excel Export
	Data File HIQDT-PANEI	L-NEMA4X-LEDTX-MASTER4	ORP STAND	
<b>15</b> Ti	Data nie		_	
	Status Send Complete	e	Get	Meter Data Send Meter Data Exi
	Status Send Complete	e	Get	Meter Data Send Meter Data Exi
	Status Send Complete	e	Get	
			Get	Meter Data Send Meter Data Exi
Monitor Confi	gure USB Connection	Customize About		
HiQDT-ORP Ma		Customize About I	Data Log	
Monitor Confi HiQDT-ORP Ma	gure USB Connection	Customize About I on Sensor Item Num	Data Log	
Monitor Confi HiQDT-ORP Ma	gure USB Connection	Customize About I on Sensor Item Num	Data Log	
Monitor Confi HiQDT-ORP Ma	gure USB Connection	Customize About I on Sensor Item Num	Data Log	- OMonth of Manufacture
• Monitor Confi <b>IiQDT-ORP Ma</b> ORP	gure USB Connection aster Configuration	Customize About I on Sensor Item Num	Data Log ber	- OMonth of Manufacture
Monitor Confi <b>IiQDT-ORP Ma</b> ORP	gure USB Connection aster Configuration 39 mV Msius	Customize About of Sensor Item Num	Data Log 2 ItEm ntial (A.P.)	- OMonth of Manufacture
Monitor Confi <b>IiQDT-ORP Ma</b> ORP	gure USB Connection aster Configuration	Customize About of Sensor Item Num	Data Log ber	- Month of Manufacture
Monitor Confi <b>IiQDT-ORP Ma</b> ORP	gure USB Connection aster Configuration 39 mV Msius	Customize About of Sensor Item Num	Data Log 2 ItEm ntial (A.P.)	- OMonth of Manufacture
Monitor Confi HiQDT-ORP Ma ORP	gure USB Connection aster Configuration 39 mV Msius	Customize About of Sensor Item Num	Data Log 2 ItEm ntial (A.P.) 0 OFFSEt	- OMonth of Manufacture
Monitor Confi HiQDT-ORP M: ORP -18 Temperature Ce 25. Raw mV Input -	gure USB Connection aster Configuration 9 mV Isius 6 dEgC	Customize About 1 Sensor Item Num 1442; Asymmetric Poter 0.00 Time since Offset	Data Log ber	Month of Manufacture — 11 month Software Revision — 4 SoFtw Min Temp in Use (Celsius) –
Monitor Confi HiQDT-ORP M: ORP -18 Temperature Ce 25. Raw mV Input -	gure USB Connection aster Configuration 39 mV Msius	Customize About 1 Sensor Item Num 1442 Asymmetric Poter 0.00	Data Log ber	- O Month of Manufacture
Monitor Confi HiQDT-ORP Ma ORP -18 Temperature Ce 25. Raw mV Input - -188.	gure USB Connection aster Configuration 9 mV Isius 6 dEgC 8 AbSmV	Customize About	Data Log 2 ItEm ntial (A.P.)	Month of Manufacture — 11 month Software Revision — 4 SoFtw Min Temp in Use (Celsius) – 25.0 min-C
Monitor Confi HiQDT-ORP M ORP -18 Temperature Ce 25. Raw mV Input -	gure USB Connection aster Configuration 9 mV Isius 6 dEgC 8 AbSmV	Customize About 1 Sensor Item Num 1442; Asymmetric Poter 0.00 Time since Offset	Data Log 2 ItEm ntial (A.P.)	Month of Manufacture — 11 month Software Revision — 4 SoFtw Min Temp in Use (Celsius) –
Monitor Confi HiQDT-ORP Ma ORP	gure USB Connection aster Configuration 39 mV delsius 6 dEgC 8 AbSmV	Customize About Tom Sensor Item Num 1442 Asymmetric Poter 0.00 Time since Offset 183.0	Data Log 2 ItEm htial (A.P.) 0 OFFSEt Cal 0 dAYS UIRE	- In Month of Manufacture In Month of Manufacture In Month of Manufacture In Month In Month In Month In Month In Month In Month In Manufacture In Max Temp in Use (Celsius) - Max Temp in Use (Celsius
Monitor Confi HiQDT-ORP Ma ORP	gure USB Connection aster Configuration 9 mV Isius 6 dEgC 8 AbSmV	Customize About Tom Sensor Item Num 1442 Asymmetric Poter 0.00 Time since Offset 183.0	Data Log 2 ItEm ntial (A.P.)	Month of Manufacture — 11 month Software Revision — 4 SoFtw Min Temp in Use (Celsius) – 25.0 min-C
Monitor Confi HiQDT-ORP Ma ORP	gure USB Connection aster Configuration 39 mV delsius 6 dEgC 8 AbSmV	Customize About Tom Sensor Item Num 1442 Asymmetric Poter 0.00 Time since Offset 183.0	Data Log 2 ItEm htial (A.P.) 0 OFFSEt Cal 0 dAYS UIRE	- In Month of Manufacture In Month of Manufacture In Month of Manufacture In Month In Month In Month In Month In Month In Month In Manufacture In Max Temp in Use (Celsius) - Max Temp in Use (Celsius



## "Calibration Values for <u>Wide Range</u> ORP Sensors" - Page 1 of 2

PV6 is configured to display the results from an offset calibration performed on the connected HiQDT Wide Range ORP sensor. This is read as register 40001 as an unsigned 16 bit integer.

The default node address for the Wide Range ORP sensor is 3 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV6 is performed under the Setup 1 tab. The offset calibration value is sent as 0 to 1,000 corresponding to engineered values of -500.0 to +500.0 mV. Please inquire to factory in the unlikely case that a wider calibration offset limit is needed.

	itor USB Connection About	
	In Setup 1 Setup 2 Relays Advanced Features 1 A DT-PANEL-LEDTX Modbus Setup	dvanced Features 2
	<b>-</b>	
		PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8
	Modbus Scan	Modbus Scan Settings
	Meter Mode Master ~	
	Poll Time 1.0 Seconds	Enable PV 🔽 Slave ID 3 🗸
	Response Time 2.0 Seconds	Function Code 03
'		
		Slave Register 40001 6 Digit
	Display Scan	Modbus Data Settings
	Auto Scan 💿 Manual Scan 🔾	Scan Data Type Short ~
	Scan Time 3.0 Seconds	Binary   BCD
	Go on Alam    Stop on Allam	Signed O Unsigned
		Scan Byte Order 1234 V
	Data File HIQDT-PANEL-NEMA4X-LEDT	X-MASTER-ORP STAND
	Status	Get Meter Data Send Meter Data Exit
ScanView		- 0
	itor USB Connection About	
	an Setup 1 Setup 2 Relays Advanced Features 1 A DT-PANEL-LEDTX Setup 1	dvanced Features 2
		PV 15 PV 16 Math 1 Math 2 Math 3 Math 4 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10
	Modbus Scan Settings	Modbus Scan Settings
	Tag OFFSEt	Scale Points 2
	Unit OFFSEt	Input Display
	Display Format Decimal	✓ 1 0 -500.00 ▶ 2 10000 500.00
	Display Decimal Point dddd.dd	✓
	Float Decimal Point ddd.ddd	
		Excel Import Excel Export
<b>/</b> 19	Data File HIQDT-PANEL-NEMA4X-LEDT Status	X-MASTER-ORP_STAND. Get Meter Data Send Meter Data Exit
	Status	
ScanView		- 0
e Mon	itor USB Connection About	
	Setup 1 Setup 2 Relays Advanced Features 1 A	dvanced Features 2
HiQ	DT-PANEL-LEDTX Modbus Setup	
		PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16
	Modbus Scan	PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8
	Meter Mode Master V	Modbus Scan Settings
	Poll Time 1.0 Seconds	Enable PV
	Response Time 2.0 Seconds	Slave ID 3
		Function Code 03 ~
		Slave Register 40014 6 Digit
		Modbus Data Settings
	Display Scan	
	Auto Scan 💿 Manual Scan 🔿	Scan Data Type Short ~
	Scan Time 3.0 Seconds	Binary   BCD
	Go on Alarm	Signed Unsigned
		Scan Byte Order 1234 V

27

PV7 is configured to display the total days in use since the offset calibration was performed. This is read as register 40014 as an unsigned 16 bit integer.

The default node address for the Wide Range ORP sensor is 3 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



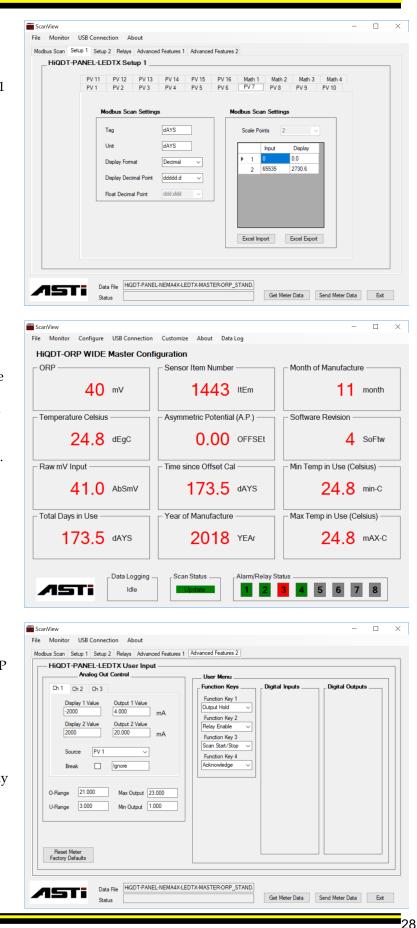
# "Calibration Values for <u>Wide Range</u> ORP Sensors"– Page 2 of 2

The scaling for PV7 is performed under the Setup 1 tab. The total hours in use since offset calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim 7.5$  years) and displayed with one decimal point.

The ScanView Windows software can be used to simultaneously display all 12 PV registers from the connected HiQDT Wide Range ORP sensor in the master configuration. In addition, the process and analytic values P6 and P7 calibration type values are also displayed. Please see the display process values section for further details on those registers.

The analog output is by default always scaled for the full range for the standard and wide range ORP sensors. In the case the scaling for the wide range ORP is shown as -2,000mV at 4mA and +2,000mV at 20mA with the source being PV1.

When break box is unchecked the analog output will hold last value before break occurs effectively acting as a retentive register if sensor is accidentally disconnected or loses communications.





# "Calibration Values for Dissolved Oxygen (D.O.) Sensors" Page 1 of 2

PV10 is configured to display the results from an autocalibration that yields the sensor slope in mV per DO ppm performed dry in air on the connected HiQDT Wide Range DO sensor. This is read as register 40002 as an unsigned 16 bit integer.

The default node address for the Dissolved Oxygen sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV10 is performed under the Setup 1 tab. The slope calibration value is sent as 70 to 600 corresponding to engineered values of 0.70 to 6.00 mV per DO ppm.

	USB Connection About	
	tup 1 Setup 2 Relays Advanced Features 1 ANEL-LEDTX Modbus Setup	Advanced Features 2
Met	Modbus Scan ter Mode Master ~	PV1         PV2         PV3         PV4         PV5         PV6         PV7         PV8           PV5         [PV10]         PV11         PV12         PV13         PV14         PV15         PV16           Modbus Scan Settings
	Time 1.0 Seconds sponse Time 1.0 Seconds	Enable PV  Slave ID  Function Code  Slave Register  40002  6 Digit
Scar	Display Scan           Scan         Manual Scan           n Time         3.0           Seconds           in Harm         Stop on Allarm	Modbus Data Settings Scan Data Type Short Binary  Binary  Binary  Binary  Binary  Signed  Unsigned  Scan Byte Order 1224
/51	Data File Data from Meter	Scan Byte Order 1234
ScanView		- 0
	USB Connection About tup 1 Setup 2 Relays Advanced Features 1	Advanced Features 2
	ANEL-LEDTX Setup 1	
	PV 11         PV 12         PV 13         PV 14           PV 1         PV 2         PV 3         PV 4	PV 15         PV 16         Math 1         Math 2         Math 3         Math 4           PV 5         PV 6         PV 7         PV 8         PV 9         PV 10
	Modbus Scan Settings	Modbus Scan Settings
	Tag SLOPE	Scale Points 2
	Unit mV/PP	input Display
	Display Format Decimal Display Decimal Point dddd.dd	▶         1         70         0.70           2         600         6.00
	Roat Decimal Point ddd.ddd	
		Excel Import Excel Export
<b>/</b> 51	Data File Data from Meter Status	Get Meter Data Send Meter Data Ext
ScanView		- 0
	USB Connection About	
	tup 1 Setup 2 Relays Advanced Features 1 PANEL-LEDTX Modbus Setup	Advanced Features 2
		PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8
Met	Modbus Scan ter Mode Master ~	PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16 Modbus Scan Settings
	Time 1.0 Seconds	Enable PV
Re	sponse Time 1.0 Seconds	Slave ID 4 ~
		Slave Register 40015 6 Digit
	Display Scan	Modbus Data Settings
	Scan  Manual Scan	Scan Data Type Short  Binary  Binary BCD
		Signed O Unsigned
Scar	in Alarm	Scan Byte Order 1234
Scar	in Alarm	

PV11 is configured to display the total days in use since the offset calibration was performed. This is read as register 40015 as an unsigned 16 bit integer.

The default node address for the Dissolved Oxygen sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

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



# "Calibration Values for Dissolved Oxygen (D.O.) Sensors" Page 2 of 2

The scaling for PV11 is performed under the Setup 1 tab. The total hours in use since offset calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim 7.5$  years) and displayed with one decimal point.

Relays can be programmed in any configuration as desired. Typical configuration shown to the right:

Relay 1 is setup as a high setpoint at pH14 and Relay 2 is setup as a low setpoint at pH0. *Alternate setpoints can be used. Reset value defines the deadband; On & Off delay can be adjusted as desired.* 

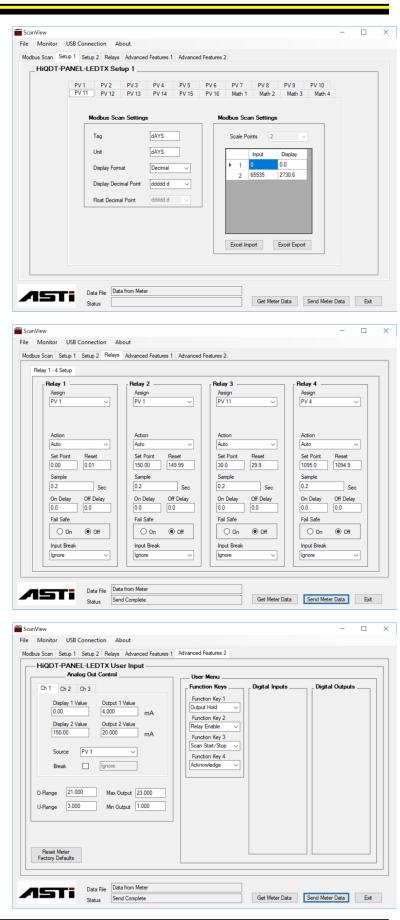
Relay 3 is setup for predictive maintenance for when it is time to perform a new calibration. In the example to the right this value is set to 30 days. In this case PV11 is used as the basis because this the days since slope autocalibration dry in air was last performed for the dissolved oxygen type sensors.

Relay 4 is setup as predictive maintenance for when a spare sensor should be ordered. For all sensor types this would be PV4 which is the total days in field use. In the example to the right 1,095 days is set as the threshold value for when a spare sensor is to be ordered. Obviously this is just an example for illustration purposes and other values can be set.

The analog output is by default always scaled for the full range for the dissolved oxygen (D.O.) type sensors. In the case the scaling for the DO sensor is shown as 0.00 ppm at 4mA and 150.00 ppm at 20mA with the source being PV1.

Alternatively the source could also be PV3 which is the percent (%) saturation including salinity correction. If the full range was used this would be 0.0% at 4mA and 1,500.0 % at 20mA instead.

When break box is unchecked the analog output will hold last value before break occurs effectively acting as a retentive register if sensor is accidentally disconnected or loses communications.





# "Analytic Info Shared for ALL Sensor Types" - Page 1 of 3

PV4 is configured to display the total days in use from the connected HiQDT pH, ORP or DO sensor. This is read as register 40031 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV4 is performed under the Setup 1 tab. The total hours in use is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to  $\sim 7.5$  years) and displayed with one decimal point.

PV5 is configured to display the sensor item number of the connected HiQDT pH sensor. This is read as register 40028 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

ScanView ile Monitor USB (	Connection About	- [	
	Setup 2 Relays Advanced Fea	atures 1 Advanced Features 2	
	L-LEDTX Modbus Setup		
	Modbus Scan	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8	
Meter Moo	de Master 🗸	Modbus Scan Settings	
Poll Time	1.0 Secon		
Response	Time 2.0 Secon		
		Function Code 03 ~	
		Slave Register 40031 6 Digit	
	Display Scan	Modbus Data Settings	
Auto Scan	Manual Scan O	Scan Data Type Short ~	
Scan Time	3.0 Secon		
Go on Alam	m 🖲 Stop on Allarm 🔾	Signed Unsigned	
		Scan Byte Order 1234 V	
/ISTi	Data File	Get Meter Data Send Meter Data	Exit
	Status	Get Neter Data Seria Meter Data	EXIL
ScanView		- [	
ile Monitor USB (			
	Setup 2 Relays Advanced Fea	atures 1 Advanced Features 2	
	L-LEDTX Setup 1		
	V 11 PV 12 PV 13 P V 1 PV 2 PV 3 P		
	Modbus Scan Settings	Modbus Scan Settings	
	Tag tim	nE Scale Points 2 ~	
	Unit	AYS Input Display	
	Display Format De	ecimal ~	
	Display Decimal Point dd	2 65535 2730.6	
		bbb.bb	
		Excel Import Excel Export	
	Data File		
<b>/</b> STi	Status	Get Meter Data Send Meter Data	Exit
	Connection About	- [	
ScanView	connection About	atures 1 Advanced Features 2	
ile Monitor USB (	Setup 2 Relays Advanced Fea		
le Monitor USB ( Modbus Scan Setup 1	Setup 2 Relays Advanced Fea		
le Monitor USB ( Modbus Scan Setup 1		PV.9 PV.10 PV.11 PV.12 PV.12 PV.14 PV.15 PV.16	
le Monitor USB ( Modbus Scan Setup 1		PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8	
le Monitor USB ( Modbus Scan Setup 1	L-LEDTX Modbus Setup	PV 9         PV 10         PV 11         PV 12         PV 13         PV 14         PV 15         PV 16           PV 1         PV 2         PV 3         PV 4         [PV 5]         PV 6         PV 7         PV 8           Modbus Scan Settings         Modbus Modbus Methods         Modbus Methods         Modbus Methods         Modbus Methods	
le Monitor USB ( Modbus Scan Setup 1 HIQDT-PANE	L-LEDTX Modbus Setup	PV 1 PV 2 PV 3 PV 4 PV 5 PV 6 PV 7 PV 8  Modbus Scan Settings  Enable PV	
le Monitor USB ( Modbus Scan Setup 1 HiQDT-PANE Meter Moo Poll Time	EL-LEDTX Modbus Setup Modbus Scan	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus Scan Settings         Enable PV	
le Monitor USB ( Modbus Scan Setup 1 HiQDT-PANE Meter Moo Poll Time	Modbus Scan de Master V 1.0 Secon	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus Scan Settings         Enable PV         Image: Compare the set of	
le Monitor USB ( Modbus Scan Setup 1 HiQDT-PANE Meter Moo Poll Time	Modbus Scan de Master V 1.0 Secon	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus Scan Settings         Enable PV	
le Monitor USB ( Modbus Scan Setup 1 HiQDT-PANE Meter Moo Poll Time	Modbus Scan de Master V 1.0 Secon	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8           Modbus Scan Settings         Enable PV         Image: Compare the set of	
le Monitor USB ( Modbus Scan Setup 1 HiQDT-PANE Meter Moo Poll Time	Modbus Scan de Master ✓ 1.0 Secon Time 2.0 Secon	nds Modbus Scan Settings  Modbus Scan Settings  Inds Slave ID I V Slave Register 40028 6 Digt	
le Monitor USB ( Modeus Scan Setup 1 HIQDT-PANE HIQDT-PANE Meter Moc Pol Time Response	A-LEDTX Modbus Setup Modbus Scan de Matter ✓ 1.0 Secon Time 2.0 Secon Display Scan	PV 1     PV 2     PV 3     PV 4     PV 5     PV 6     PV 7     PV 8       Modbus Scan Settings     Enable PV     Image: Start Setting 5     Image: Start Setting 5       Slave ID     1     Image: Start Setting 5     Image: Start Setting 5       Modbus Data Settings     Start Setting 5       Scan Data Type     Short Image: Short Image: Start Setting 5	
le Monitor USB ( Modeus Scan Setup 1 HIQDT-PANE HIQDT-PANE Response Auto Scan Time	A-LEDTX Modbus Setup Modbus Scan de Master ✓ 1.0 Secon Time 2.0 Secon Display Scan (e Manual Scan O	PV 1     PV 2     PV 3     PV 4     PV 5     PV 6     PV 7     PV 8       Modbus Scan Settings     Enable PV     Image: Start Setting 5     Image: Start Setting 5       Slave ID     1     Image: Start Setting 5     Image: Start Setting 5       Modbus Data Settings     Start Setting 5       Scan Data Type     Short Image: Short Image: Start Setting 5	
le Monitor USB ( Modeus Scan Setup 1 HIQDT-PANE HIQDT-PANE Response Auto Scan Time	A-LEDTX Modbus Setup Modbus Scan de Master ✓ 1.0 Secon Time 2.0 Secon Display Scan (e) Manual Scan O 3.0 Secon	nds N	
le Monitor USB ( Modeus Scan Setup 1 HIQDT-PANE HIQDT-PANE Response Auto Scan Time	A-LEDTX Modbus Setup Modbus Scan de Master ✓ 1.0 Secon Time 2.0 Secon Display Scan (e) Manual Scan O 3.0 Secon	nds	



"Analytic Info Shared for ALL Sensor Types" – Page 2 of 5

The scaling for PV5 is performed under the Setup 1 tab again. The scaling for PV5 is very simple. The value sent corresponds exactly to the sensor item number of the connected sensor.

PV12 is configured to display the year of manufacture of the connected HiQDT pH sensor. This is read as register 40024 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV12 is performed under the Setup 1 tab again. The scaling is quite simple for this register. The value of 00 corresponds to the year 2000 and the value of 99 corresponds to the year 2099.

File Monitor USB Connection About	
Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2	
HiQDT-PANEL-LEDTX Setup 1	
PV 11         PV 12         PV 13         PV 14         PV 15         PV 16         Math 1         Math 2         Math 3         N           PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8         PV 9         PV	
Modbus Scan Settings Modbus Scan Settings	
Tag ItEm Scale Points 2	
Unit ItEm Input Display Display Format Decimal V 1 0 0	
Display Format Decimal V 2 65535 65535	
Roat Decimal Point ddd ddd v	
Excel Import Excel Export	
ASTI Data File Get Meter Data Sence	d Meter Data Exit
ScanView	- 0
File Monitor USB Connection About	
Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2	
	01/7 01/0
PV 1         PV 2         PV 3         PV 4         PV 5         PV 6           Modbus Scan         PV 9         PV 10         PV 11         PV 12         PV 13         PV 14	
Meter Mode Master V Modbus Scan Settings	
Pol Time 1.0 Seconds Enable PV 2	
Response Time 2.0 Seconds Slave ID I Function Code 03 V	
	gt 🗌
Display Scan Modbus Data Settings	
Auto Scan  Manual Scan  Scan Data Type Short	
Scan Time 3.0 Seconds Binary   BCD	
Go on Alarm  Stop on Allarm  Signed  Unsigned	
Scan Byte Order 1234 ~	
ASTI Data Fie Get Meter Data Seno	d Meter Data Exit
ScanView	- 0
ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2	
HigDT-PANEL-LEDTX Setup 1	
PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8 PV9 PV	
PV 11 PV 12 PV 13 PV 14 PV 15 PV 16 Math 1 Math 2 Math 3 N	lath 4
Modbus Scan Settings Modbus Scan Settings	_
Tag YEAr Scale Points 2	
Unit YEAr Input Display	
Display Format   Decimal	
Display Decimal Point dddddd v	
Roat Decimal Point ddd.ddd v	
Excel Import Excel Export	
Excel Import Excel Export	



# "Analytic Info Shared for ALL Sensor Types" – Page 3 of 5

PV13 is configured to display the month of manufacture of the connected HiQDT pH sensor. This is read as register 40025 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV13 is performed under the Setup 1 tab again. The scaling is quite simple for this register. The value of 0 corresponds to the January while a value of 12 corresponds to December.

Meter Poll Tir		PV1         PV2         PV3         PV4         PV5         PV6         PV7         PV8           PV9         PV10         PV11         PV12         PV13         PV14         PV15         PV16           Modbus         Scan Settings         Enable PV         Image: Compared to the state of the sta
Auto Sc		Function Code 03 ~
Scan Ti Go on A		Slave Register 40025 6 Digit Modbus Data Settings Scan Data Type Short Binary  BCD Signed  Unsigned Scan Byte Order 1234
IST	Data File	Get Meter Data Send Meter Data Ex
View Monitor U	B Connection About	- 0
	Modbus Scan Settings	Modbus Scan Settings
ST	Data FileStatus	Get Meter Data Send Meter Data Ex
	B Connection About	- 0
HIQDT-PA	ne 1.0 Seconds nse Time 2.0 Seconds Display Scan an  Manual Scan O ne 3.0 Seconds	PV1       PV2       PV3       PV4       PV5       PV6       PV7       PV8         PV9       PV10       PV11       PV12       PV13       PV14       PV15       PV16         Modbus Scan Settings       Image: Constraint of the set of the

PV14 is configured to display the software revision of the connected HiQDT pH sensor. This is read as register 40037 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

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



# "Analytic Info Shared for ALL Sensor Types" – Page 4 of 5

The scaling for PV14 is performed under the Setup 1 tab again. The scaling for PV14 is very simple. The value sent corresponds exactly to the software revision of the connected sensor. Please contact the factory to confirm that you are using the most current version of the sensor board software.

PV15 is configured to display the minimum temperature during field use of the connected HiQDT pH sensor. This is read as register 40029 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV15 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.

Modbue Se	onitor USB Connection About Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2		
	iQDT-PANEL-LEDTX Setup 1		
	PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8 PV9	PV 10	
	PV 11 PV 12 PV 13 PV 14 PV 15 PV 16 Math 1 Math 2 Math 3	Math 4	
	Modbus Scan Settings Modbus Scan Settings		
	Tag SoPtw Scale Points 2		
	Unit Softw Input Display		
	Display Format Decimal V 1 0 0		
	Display Decimal Point dddddd v		
	Float Decimal Point ddd.ddd 🗸		
	Excel Import Excel Expo		
	Excer import Excer Expo	n	
<b>Л</b> 9			
	Status Get Meter Data	Send Meter Data	Exit
ScanView	w		
File Mo	onitor USB Connection About		-
	Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2 QDT-PANEL-LEDTX Modbus Setup		
	PV 1         PV 2         PV 3         PV 4         PV 5         PV           Modbus Scan         PV 9         PV 10         PV 11         PV 12         PV 13         PV		
	Meter Mode Master  V Modbus Scan Settings		
	Poll Time 1.0 Seconds Enable PV 🗹		
	Response Time 20 Seconds Slave ID 1 Function Code 03 V	~	
	Slave Register 40029	6 Digit 🔲	
	Auto Scan  Motobus Lota Settings  Scan Data Type Short		
	Scan Time 3.0 Seconds Binary   BCD O		
	Go on Alarm   Stop on Allarm   Signed   Unsigned		
	Scan Byte Order 1234 V		
	Data File		
<b>/</b> 9	STTE Data File Get Meter Data	Send Meter Data	Exit
ScanView	w onitor USB Connection About	_	
	Scan Setup 1 Setup 2 Relays Advanced Features 1 Advanced Features 2		
HiC	QDT-PANEL-LEDTX Setup 1		
	PV 1         PV 2         PV 3         PV 4         PV 5         PV 6         PV 7         PV 8         PV 9           PV 11         PV 12         PV 13         PV 14         PV 15         PV 16         Math 1         Math 2         Math 3	PV 10 Math 4	
	Nothing Comp Calif.		
	Modbus Scan Settings Modbus Scan Settings		
	Tag min-C Scale Points 2		
	Unit min-C Input Display		
	Display Format         Decimal         1         0         40.0         2         2500         210.0		
	Display Format Decimal V Display Decimal Point ddddd V Display Decimal Point ddddd V		
	Display Format         Decimal         1         0         40.0         2         2500         210.0		
	Display Format Decimal V Display Decimal Point ddddd V Display Decimal Point ddddd V		
	Display Format Decimal V Display Decimal Point ddddd V Display Decimal Point ddddd V	đ	
	Display Format Decimal V Display Decimal Point ddddddd V Roat Decimal Point ddddddd V	đ	

34



# "Analytic Info Shared for ALL Sensor Types" – Page 5 of 5

PV16 is configured to display the maximum temperature during field use of the connected HiQDT pH sensor. This is read as register 40030 as an unsigned 16 bit integer.

The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

The scaling for PV16 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.

ScanView	- 🗆 X
File Monitor USB Connection About	
Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ad	dvanced Features 2
HiQDT-PANEL-LEDTX Modbus Setup	
	PV1 PV2 PV3 PV4 PV5 PV6 PV7 PV8
Modbus Scan	PV 9 PV 10 PV 11 PV 12 PV 13 PV 14 PV 15 PV 16
Meter Mode Master ~	Modbus Scan Settings
Poll Time 1.0 Seconds	Enable PV
Response Time 2.0 Seconds	Slave ID 1
	Function Code 03 ~
	Slave Register 40030 6 Digit
	Modbus Data Settings
Display Scan	
Auto Scan   Manual Scan	Scan Data Type Short ~
Scan Time 3.0 Seconds	Binary   BCD  Signed  Unsigned
Go on Alarm     Stop on Allarm	
	Scan Byte Order 1234 V
Data File	
Status	Get Meter Data Send Meter Data Exit
Status	Get Meter Data Send Meter Data Ext
	Get Meter Data Send Meter Data Ext
ScanView	
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac	x
ScanView ile Monitor USB Connection About	x
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HIQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P	
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HIQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P	dvanced Features 2
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P	- C × dvanced Features 2 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings	×
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P	- C × dvanced Features 2 PV 5 PV 6 PV 7 PV 8 PV 9 PV 10 PV 15 PV 16 Math 1 Math 2 Math 3 Math 4
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings	×  dvanced Features 2  PV 5 PV 6 PV 7 PV 8 PV 9 PV 10  PV 15 PV 16 Math 1 Math 2 Math 3 Math 4  Modbus Scan Settings  Scale Points 2  Input Display
ScanView iile Monitor US8 Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC	×
ScanView File Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unt mAXC	× dvanced Features 2  V 5 PV 6 PV 7 PV 8 PV 9 PV 10  V 15 PV 16 Math 1 Math 2 Math 3 Math 4  Modbus Scale Points 2  Input. Display  Input.
ScanView iile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiODT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format Oddid d	×
ScanView Tile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC	×
ScanView iile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format ddddd d	×  dvanced Features 2  V5 PV 6 PV 7 PV 8 PV 9 PV 10  V 15 PV 16 Math 1 Math 2 Math 3 Math 4  Modbus Scan Settings  Scale Points 2  I 0 40.0 2 2500 210.0  V 15 2 2500 210.0 V 15 2 2500
ScanView iile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format ddddd d	×
ScanView iile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format ddddd d	×  dvanced Features 2  V5 PV 6 PV 7 PV 8 PV 9 PV 10  V 15 PV 16 Math 1 Math 2 Math 3 Math 4  Modbus Scan Settings  Scale Points 2  I 0 40.0 2 2500 210.0  V 15 2 2500 210.0 V 15 2 2500
ScanView ile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format Oddid d	×
ScanView iile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiQDT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format ddddd d	×
ScanView iile Monitor USB Connection About Modbus Scan Setup 1 Setup 2 Relays Advanced Features 1 Ac HiODT-PANEL-LEDTX Setup 1 PV 1 PV 2 PV 3 PV 4 P PV 11 PV 12 PV 13 PV 14 P Modbus Scan Settings Tag mAXC Unit mAXC Display Format Decimal Display Format Oddid d	×



Model: HiQDT-NEMA4X-LEDTX-4H-SNOOPER-PSAC

or

Model: HiQDT-NEMA4X-LEDTX-4H-SNOOPER-PSDC

#### Short Description:

**Quad Channel Snooper for HiQDT MODBUS RTU Sensors in NEMA 4X Field Assembly**; 4 each HiQ4FP Panel Connector; 85-265 VAC (PSAC) or 12-24 VDC (PSDC) Power Operation; 12VDC power supply used to drive 4-20mA output can be used to power up to 4 each Smart HiQDT MODBUS RTU Sensors; 16 modbus registers can be scanned & displayed; 4 each Contact Relays Programmable from Windows Software, 5 each <sup>1</sup>/<sub>4</sub>" NPT glands for outputs

#### Long Description:

- **QUAD CHANNEL MODBUS RTU SNOOPER CONFIGURATION** for smart digital HiQDT MODBUS RTU sensor slaves. Snooper configured by end-users for the sensor type(s) to be interfaced. The MODBUS RTU master must poll registers to be displayed (16 max). Configuration assistance available upon request. Configuration can be downloaded and saved as well as modified with free of charge Windows software connected via USB port. Software is automatically loaded if not already installed on connecting machine.
- Contact factory for suitable extension cables and/or bridge box to interface HiQDT sensors
- The following registers are polled and displayed for each sensor type in scan mode. A single register can be displayed continuously instead of scanning all registers, typically the pH, ORP or DO process value.
  - o pH Sensors
    - Process Values: pH, Temperature, Absolute raw mV
      - All pH values are always calibrated & temperature compensated
  - ORP Sensors
    - Process Values: **ORP** (calibrated), Temperature, Absolute raw mV
  - Dissolved Oxygen (D.O.) Sensors
    - Process Values: DO ppm, DO Percent (%) Saturation with and without salinity correction Temperature, Absolute raw mV
      - All DO ppm & percent (%) saturation values always calibrated & temp compensated
- HOLD: Single push button operation to place analog output and relays on hold as well as to release holds
- ANALAG OUTPUT:
  - NOT AVAILABLE IN SNOOPER CONFIGURATION IF 12VDC DRIVE VOLTAGE IS USED TO ENERGIZE HiQDT SENSORS. IF 4-20mA IS USED A SEPARATE ISOLATED & REGULATED 12VDC POWER SUPPLY IS REQUIRED TO ENERGIZE HIQDT SENSORS.
- CONTACT RELAYS: 4 each SPDT (Form C) / SPST (Form A); 3A @ 30VDC & 125/250 VAC resistive load; Programmable with USB Windows software; latching or non-latching; fail-safe operation, adjustable time on & off delay, high & low setpoints, deadband, pump alternation & sampling operation with communications break handling
  - Relays 3 & 4 provide predictive maintenance notification using time since last calibration and total time in field use registers from sensors as the user adjustable basis for recalibration & reordering of spare sensors
- ISOLATION: 4 kV input/output-to-power line; 500 V input-to-output or output-to-P+ supply
- POWER: 85-264 VAC line powered operation with -PSAC power configuration & 12-24 VDC power operation with -PSDC power configuration. NEMA 4X field snooper configuration uses isolated 12VDC power used to drive 4-20mA to instead energize smart digital HiQDT MODBUS RTU sensor slaves.
- CERTIFICATIONS: UL & c-UL LISTED (USA & Canada) UL 508 Industrial Control Equipment. For use in nonhazardous locations only. For hazardous locations please use HiQDT-EX-LEDTX snooper instead.

\* See APPENDIX "G" for details of tasks that are performed by handheld communicator or Windows Software.



Model: HiQDT-PANEL-LEDTX-SNOOPER-PSAC or

Model: HiQDT-PANEL-LEDTX-SNOOPER-PSDC

#### Short Description:

**Quad Channel Snooper for HiQDT MODBUS RTU Sensors in 1/8-DIN Panel Configuration**; 85-265 VAC (PSAC) or 12-24 VDC (PSDC) Power Operation; 12VDC power supply used to drive 4-20mA output can be used to power up to 4 each Smart HiQDT MODBUS RTU Sensors; 16 modbus registers can be scanned & displayed; 4 each Contact Relays Programmable from Windows Software

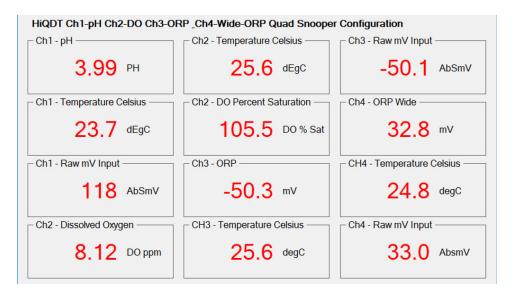
#### Long Description:

- **QUAD CHANNEL MODBUS RTU SNOOPER CONFIGURATION** for smart digital HiQDT MODBUS RTU sensor slaves. Snooper configured by end-users for the sensor type(s) to be interfaced. The MODBUS RTU master must poll registers to be displayed (16 max). Configuration assistance available upon request. Configuration can be downloaded and saved as well as modified with free of charge Windows software connected via USB port. Software is automatically loaded if not already installed on connecting machine.
- Contact factory for suitable extension cables and/or bridge box to interface HiQDT sensors
- The following registers are polled and displayed for each sensor type in scan mode. A single register can be displayed continuously instead of scanning all registers, typically the pH, ORP or DO process value.
  - o pH Sensors
    - Process Values: pH, Temperature, Absolute raw mV
      - All pH values are always calibrated & temperature compensated
  - ORP Sensors
    - Process Values: **ORP** (calibrated), Temperature, Absolute raw mV
  - Dissolved Oxygen (D.O.) Sensors
    - Process Values: DO ppm, DO Percent (%) Saturation with and without salinity correction Temperature, Absolute raw mV
      - All DO ppm & percent (%) saturation values always calibrated & temp compensated
- HOLD: Single push button operation to place analog output and relays on hold as well as to release holds
- ANALAG OUTPUT:
  - NOT AVAILABLE IN SNOOPER CONFIGURATION IF 12VDC DRIVE VOLTAGE IS USED TO ENERGIZE HiQDT SENSORS. IF 4-20mA IS USED A SEPARATE ISOLATED & REGULATED 12VDC POWER SUPPLY IS REQUIRED TO ENERGIZE HIQDT SENSORS.
- CONTACT RELAYS: 4 each SPDT (Form C) / SPST (Form A); 3A @ 30VDC & 125/250 VAC resistive load; Programmable with USB Windows software; latching or non-latching; fail-safe operation, adjustable time on & off delay, high & low setpoints, deadband, pump alternation & sampling operation with communications break handling
  - Relays 3 & 4 provide predictive maintenance notification using time since last calibration and total time in field use registers from sensors as the user adjustable basis for recalibration & reordering of spare sensors
- ISOLATION: 4 kV input/output-to-power line; 500 V input-to-output or output-to-P+ supply
- POWER: 85-264 VAC line powered operation with -PSAC power configuration & 12-24 VDC power operation with -PSDC power configuration. NEMA 4X field snooper configuration uses isolated 12VDC power used to drive 4-20mA to instead energize smart digital HiQDT MODBUS RTU sensor slaves.
- CERTIFICATIONS: UL & c-UL LISTED (USA & Canada) UL 508 Industrial Control Equipment. For use in nonhazardous locations only. For hazardous locations please use HiQDT-EX-LEDTX snooper instead.

\* See APPENDIX "G" for details of tasks that are performed by handheld communicator or Windows Software.



#### EXAMPLE OF TYPICAL REGISTERS DISPLAYED FOR SNOOPER CONFIGURATION FOR SMART DIGITAL HiQDT MODBUS RTU pH, ORP & DISSOLVED OXYGEN (D.O.) SENSORS



HiQDT-pH Single Snooper Configuration	
рн 3.98 <sup>рн</sup>	
Temperature Celsius dEgC	
Raw mV Input AbSmV	

NOTES:

- Datalogging is available when free ScanView Windows software is connected to USB port
- It is recommended to use the free MODBUS Datalogging software to test snooper configuration prior to interfacing with PLC or SCADA at installation location. The registers shown above are polled by the free MODBUS Datalogging software and were used to make these screenshots.
- Alternate registers can be polled from HiQDT sensors other than those which are displayed above in the screenshots. Contact factory for assistance with configuration of your snooper installation.
- Contact factory for desired relay configurations. Any registers that are to be displayed and/or used as the basis of relays must be polled by customer programmed MODBUS RTU master.



## APPENDIX "A"

#### Temperature Considerations for Calibrating pH Sensors with pH Buffers - Part 1 of 2

1	Nonman pri banci Designation @ 25 C 5nown in Gray at 10p of Column									
Temp °C	1.68	4.00	6.86	7.00	9.18	10.01	12.45			
0	1.67	4.01	6.98	7.11	9.46	10.32	13.42			
5	1.67	4.00	6.95	7.08	9.39	10.25	13.21			
10	1.67	4.00	6.92	7.06	9.33	10.18	13.00			
15	1.67	4.00	6.90	7.03	9.28	10.12	12.81			
20	1.68	4.00	6.88	7.01	9.23	10.06	12.63			
25	1.68	4.00	6.86	7.00	9.18	10.01	12.45			
30	1.68	4.01	6.85	6.98	9.14	9.97	12.29			
35	1.69	4.02	6.84	6.98	9.10	9.93	12.13			
40	1.69	4.03	6.84	6.97	9.07	9.89	11.98			
45	1.70	4.04	6.83	6.97	9.04	9.86	11.84			
50	1.71	4.06	6.83	6.97	9.02	9.83	11.71			
55	1.72	4.07	6.83	6.97	8.99	9.80	11.57			
60	1.72	4.09	6.84	6.98	8.97	9.78	11.45			

Exact pH Values of the NIST Traceable pH buffers at Various Temperatures Nominal pH Buffer Designation @ 25°C Shown in Gray at Top of Column

NIST traceable pH buffers are the most commonly used methods for calibration of pH sensors. On each pH buffer bottle is written the exact pH value of the buffer at variety of temperature conditions. Listed above are exact pH values for the most commonly used buffers between 0 and 60 °C. When using the ASTI HiQDT Touchscreen Controller for calibration of your IOTRON<sup>™</sup> series Smart Digital HiQDT type RS-485 MODBUS RTU pH sensors use the autobuffer calibration mode if using the pH buffers detailed above. For any other pH buffers you will need to obtained the exact pH value for the current temperature condition. This information is typically provided on the label of the pH buffer.

#### NOTE: ASTI HiQDT touchscreen controller software automatically corrects for temperature induced change to buffer to compute the exact pH value of buffer automatically when calibrations are performed with autobuffer calibration mode. Exact pH value of the buffer at the current temperature obtained from the connected HiQDT pH sensor is used for calibration. This may differ from the nominal value of the buffer at the reference 25 degree Celsius condition.

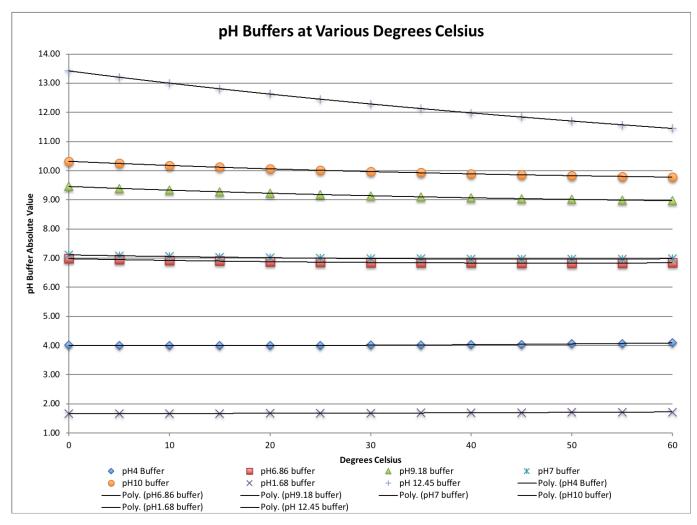
To use any pH buffer besides 1.68, 4.00, 6.86, 7.00, 9.18, 10.01 or 12.45 you will need to account for the temperature induced shift of the pH value for the buffer in both the Windows software as well as any other devices used to perform calibrations of the HiQDT pH sensors. There are no reliable pH buffers below 1.69 and above 12.45 and so specialized and custom calibration schemes needed to be used for these situations. Contact factory for assistance in such cases.

Inquire to the factory if you plan to measure consistently below pH=1.0 or above pH=13.0 for special assistance. As can be seen from mere inspection the temperature dependence of high pH buffers is much more significant than for low pH buffers. Similarly for process solutions with high pH the temperature induced pH dependence may be quite significant and should be considered when trying to control such systems with fluctuating temperature. Process solutions with relatively weak ionic strength (low conductivity) are also rather prone to higher temperature induced pH shifts whereas process solution with relatively high ionic strength (high conductivity) are less prone to temperature induced pH shifts.



## APPENDIX "B"

*Temperature Considerations for Calibrating pH Sensors with pH Buffers – Part 2 of 2* 



The HiQDT touchscreen controller automatic calibration mode computes the exact values of the pH 1.68, 4.00, 6.86, 7.00, 9.18, 10.01 and 12.45 buffers in the automatic calibration mode for anywhere between 0 to 60 °C. If calibrating with pH buffers in the temperature condition below 0°C or above 60 °C automatic calibration mode cannot be used (manual mode must be used instead). The HiQDT touchscreen controller software can also perform manual calibration to any pH value for Offset, Slope Low (Acidic) or Slope High (Alkaline). In this way this controller is not limited to pH 1.68, 4.00, 6.86, 7.00, 9.18, 10.00 and 12.45 buffers for calibration but rather can perform offset and slope calibrations to any value desired.

Temperature compensation only accounts for the change in the mV response of the pH sensor itself with temperature. The type of temperature induced shifts such as those demonstrated in the table above for the pH buffers are NOT corrected in default Nernstian temperature compensation scheme. For process solutions the change in the pH value with temperature can be significantly more pronounced than for pH buffers which are inherently designed to shift in only the most minimal way due to changes in temperature, dilution, evaporation and other typical conditions in field use. Thankfully the HiQDT-pH sensors allow for a user defined temperature compensation coefficient to account for the NET temperature effects. The temperature impact on the pH sensor and the temperature impact on the measured solution cannot be cleanly separated (deconvoluted). It is, however, possible to determine the effective net mV per °C change and enter this as a custom temperature compensation schemes. The default temperature compensation setting is the classical Nernstian 198µV (0.198mV) per °C with the allowable range of 000-999 µV to any custom value for your given process. The temperature compensation coefficient can be changed by the Windows software or handheld communicator.



#### APPENDIX "C"

## HiQDT-pH " Buffer Choices for Autocalibration

#### AVAILABLE pH BUFFERS FOR AUTOCALIBRATION MODE:

Asymmetric Potential (A.P):	7.00 or 6.86
Acid Slope:	4.00 of 1.68
Alkaline Slope:	10.00 or 9.18 or 12.45

CALIBRATION SCHEME # 1 – Typical for most installations in the USA

Asymmetric Potential (A.P):	7.00
Acid Slope:	4.00
Alkaline Slope:	10.00

This scheme is the most common pH buffer scheme for most customers in the USA. The 10.01 pH buffer must be used carefully since it is more prone to shifting substantially more than the very stable 4.00 or even the 7.00 pH buffer. Intrusion of carbon dioxide into the 10.01 pH buffer from the atmosphere is the main culprit creating an erroneous non-temperature induced shift in pH by exceeding the buffer capacity. Care should be taken that the pH10 buffer is fresh to ensure relaible alkaline slope calibration results.

CALIBRATION SCHEME # 2 – Typical for most installations in Europe

Asymmetric Potential (A.P):	6.86
Acid Slope:	4.00
Alkaline Slope:	9.18

Typical values for most European pH installations are 4.00, 6.86 and 9.18 pH buffers. This is the best practice pH buffer scheme for most pH measurements that do not commonly go much below pH 4.00 and or else much above pH 9.20. The 6.86 & 9.18 pH buffers are most stable than the 7.00 & 10.01 pH buffer counterparts but are still more prone to shifting then the very stable 4.00 pH buffer. Care should be taken that the pH 9.18 buffer is fresh to ensure best alkaline slope calibration results

CALIBRATION SCHEME # 3 - For batch style installations where pH can vary quite considerably

Asymmetric Potential (A.P):	1.68
Acid Slope:	6.86
Alkaline Slope:	12.45

This pH buffer calibration scheme is typical for batch type process applications that often go below pH2 and above pH12. The 1.69 and 6.86 pH buffers are quite stable but the 12.45 pH buffer shifts in value quite easily. Great care should be taken when using the 12.45 buffer to ensure accurate results. In particular this buffer should always be in code, well stored in a cool dry place and not exposed to light or air. Make sure that the 12.45 pH buffer is always fresh to ensure reliable alkaline slope calibrations results.

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



### <u>APPENDIX "D"</u>

## HiQDT-pH "Best Practice Tips for Calibration with pH Buffers

#### TEMPERATURE OFFSET CALIBRATION SETUP FOR AUTOREAD:

It is best practice to wait until the temperature reading on the sensor is no longer moving before selecting the setup temperature and starting calibration(s) with pH buffers. The temperature of the sensor may take some time to reach the ambient conditions of the pH buffer solution(s) if it was previously installed into field service at conditions that are significantly below or above the ambient temperature.

#### GENERAL BEST PRACTICE COMMENTS FOR CALIBRATION WITH pH BUFFERS

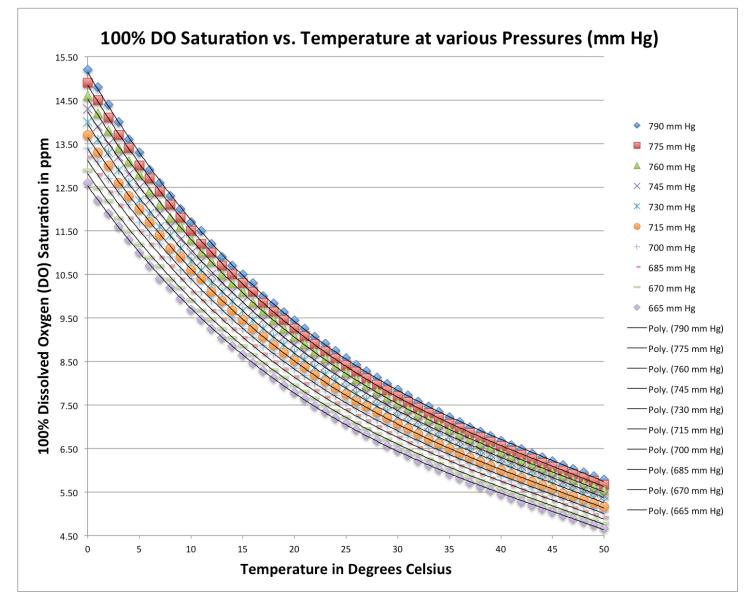
Only the amount of buffer required for the given calibration should be dispensed. Buffers should not be reused to avoid dilution & cross-contamination. Buffers should not be left exposed to air or direct light for prolonged periods of time to avoid the impact of dissolved carbon dioxide from the atmosphere and other potential decomposition pathways. Special care should be taken the pH buffers above 7.00 are always fresh when used for calibrations as these tend to loose the integrity of their values much faster than pH buffers below 7.00. Buffers should be stored in a cool, dry location away from light and chemicals. The pH sensor should at a stable ambient temperature before performing any calibration.



APPENDIX "E"

# Automatic Calculation of Theoretical 100% Dissolved Oxygen Saturation at any Temperature & Pressure for Accurate Calibration & Measurement

The HiQDT-DO sensor has preprogrammed the correct 100% dissolved oxygen saturation levels valid at any temperature and pressure. This is important for two main purposes: 1) to ensure accurate calibration of the sensor which is performed dry in air and 2) when the percent (%) saturation is displayed and output for purposes of monitoring and control. The graph below demonstrate the impact of both temperature and pressure on the dissolved oxygen (DO) ppm levels that constitute 100% saturation condition.



For the calibration function, either the field condition should be 100% relative humidity for best accuracy or else the sensor should be suspended dry in air but over a water source to simulate locally the 100% relative humidity condition. The water molecule in air (humidity) is then saturated with oxygen in manner that can be fully described by the ambient temperature and pressure as shown above. When placed into service, the galvanic DO sensor will measure the ppm levels at the installation depth. To convert this measured ppm value into percent (%) saturation the HiQDT-DO sensor uses the internally stored curve visualization above.

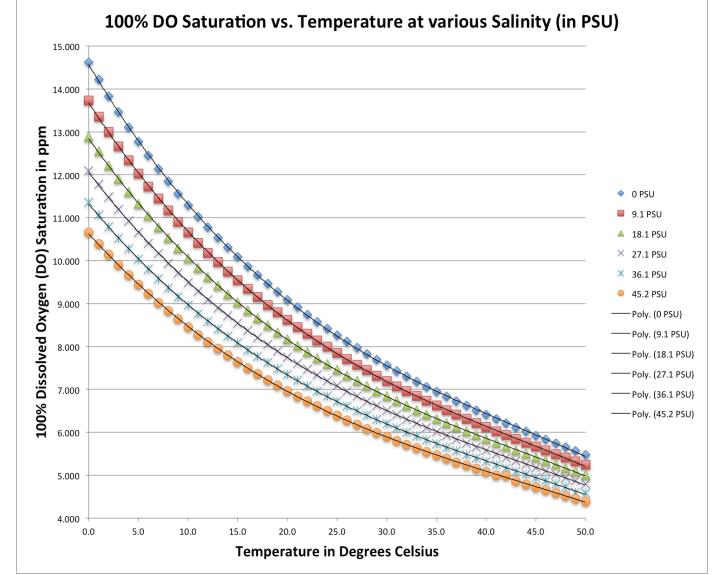
Advanced Sensor Technologies, Inc. U.S.A. Website: www.astisensor.com IOTRON<sup>™</sup> Trademark of ASTI



APPENDIX "F"

# Automatic Calculation of Theoretical 100% Dissolved Oxygen Saturation at any Temperature & Pressure for Accurate Calibration & Measurement

The HiQDT-DO has preprogrammed the correct 100% dissolved oxygen saturation levels valid at not only any temperature and pressure but also corrected for salinity. This is important for applications where not only fresh water will be present but also for brackish and salt water sources in variable amounts. The graph below demonstrates the impact of salinity on the dissolved oxygen (DO) ppm levels that constitute 100% saturation condition at the nominal 760mm pressure condition. For simplicity of visualization just one set of curves is shown although the analyzer can perform this compensation any temperature, pressure or salinity.



This salinity correction is only required as a correction to the computation of the % saturation from the measured DO ppm levels for the inline measurement. Since the calibration is done dry in air, salinity correction is not required for this part of operation. Since the impact of salinity is considerable as shown in the graph above, it must be corrected carefully at any level of salinity and temperature. The salinity value in standard PSU (PPT) units can be entered into the HiQDT-DO sensor to perform this correction. The value of the salinity can be determined by a handheld meter or else monitoring continuously using a conductivity transmitter from which one can readily convert into common salinity units.

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



## APPENDIX "G"

#### DETAILS OF TASKS DONE WITH HANDHELD COMMUNICATOR / WINDOWS SOFTWARE

#### Calibrations

#### pH Sensors

- Offset (Asymmetric Potential, a.k.a. A.P.) & Time in use since Offset (A.P.) Calibration
- Acid Slope & Time in use since Acid Slope Calibration
- Base (a.k.a. Alkaline) Slope & Time in use since Alkaline Slope Calibration
- Temperature offset & Time in use since Temperature Offset Calibration
- Reset all calibration back to factory default

#### **ORP Sensors**

- Offset & Time in use since Offset Calibration
- Temperature offset & Time in use since Temperature Offset Calibration
- Reset all calibration back to factory default

#### Dissolved Oxygen (D.O.) Sensors

- Slope (mv per DO ppm) & Time in use since Slope Calibration
- Temperature offset & Time in use since Temperature Offset Calibration
- Reset all calibration back to factory default

#### Analytic Data Displayed (for all sensor types)

- Absolute Raw mV value
- Month & year of manufacture for sensor
- Sensor Serial Number (unique traceability for each sensor)
- Sensor Item Number (unique identifier for all aspects of sensor configuration)
- Total time in field use (recorded in hours)
- Minimum & Maximum temperature in field use

#### **Configuration & Setup**

- View and Change smoothing dampener (time averaging) setting for process values
- Find node of connected sensor
- Change node of connected sensor
- Configure temperature compensation coefficient for pH sensors
- Configure salinity and ambient air pressure for dissolved oxygen sensors



## "Core LED Display Configuration Setup"

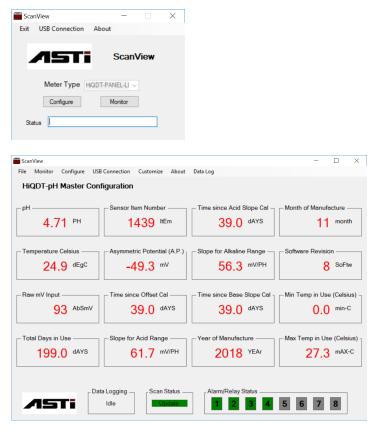
The Setup 2 Tab allows for configuration of the core LED display settings. Unless there exists a very special reason it should be left as the default settings as shown in the screenshot to the right.

HiQDT-PANEL-LEDTX Setup 2	
Display	Manual Control Menu Output Test Analog Output [4.000] mA
	Relay and Digital Out Test
Line 2 Display Tag 🗸	Relay Dig Out Force ON Force ON
Display Intensity 8	R2 O R3 O R4 O
Information	
Firmware Revision 2.040	
	Auto

### "Datalogging with ScanView Software"

Clicking on the "Monitor" button from the main default screen will load all programmed registers as well as gaining access to the Data Log functions.

To configure datalogging options as well as to start and stop datalogging click on the "Data Log" drop down menu on top right of the Monitor Window.





## "Sample of logged data with ScanView" - Page 1 of 6

The value for each of the 16 registers that is defined by the ScanView software can be datalogged as well as the corresponing tag and units for each register. A sample for datalogging of the HiQDT MODBUS RTU pH sensor in the master configuration is provided in the following pages to illustrate the datalogging software. The logged file contains the date by default and is saved as a \*.csv file which can readily be imported into Excel for further workup.

Name: C:\Advanced Sensor Technologies\ScanView\Log Files\ScanView Log 090619.csv Created 9/6/2019 4:00:17 PM

Meter ID: 246 Serial Port: Logging Rate: 1 update every 10 Seconds

Date & Time	Tag	Value	Units	Tag	Value	Units	Tag	Value	Units
9/6/19 4:00	pН	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	98	AbSmV
9/6/19 4:00	pН	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	97	AbSmV
9/6/19 4:00	pН	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	98	AbSmV
9/6/19 4:00	pН	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pН	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pН	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pН	4.3	PH	<b>Temperature</b> Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pН	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	97	AbSmV
9/6/19 4:01	pН	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	95	AbSmV
9/6/19 4:01	pН	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:03	pН	4.68	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:04	pН	4.67	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	93	AbSmV
9/6/19 4:04	pН	4.66	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:04	pН	4.66	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	93	AbSmV
9/6/19 4:04	pН	4.66	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:04	pН	4.67	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	93	AbSmV
9/6/19 4:04	pН	4.69	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	95	AbSmV
9/6/19 4:05	pН	4.65	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:05	pН	4.68	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:05	pН	4.65	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	95	AbSmV
9/6/19 4:05	pН	4.68	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	93	AbSmV



# "Sample of logged data with ScanView" - Page 2 of 6

Date & Time	Tag	Value	Units	Tag	Value	Units	Tag	Value	Units
	Total Days in			Sensor Item			Asymmetric		
9/6/194:00	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/194:00	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:00	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:00	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:01	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:01	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:01	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:01	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:01	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:01	Use	209.4	dAYS	Number	1418	ItEm	Potential (A.P.)	-54.6	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:03	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:04	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:04	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:04	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:04	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:04	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:04	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:05	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
	Total Days in			Sensor Item			Asymmetric		
9/6/19 4:05	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
0 / / / 10 0 0 0-	Total Days in		1.1.1.10	Sensor Item		T. 17	Asymmetric	10.5	
9/6/19 4:05	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV
0////0//07	Total Days in	100	1.4.3/6	Sensor Item	1 100	T.T.	Asymmetric	40.0	
9/6/19 4:05	Use	199	dAYS	Number	1439	ItEm	Potential (A.P.)	-49.3	mV



# "Sample of logged data with ScanView" - Page 3 of 6

Date & Time	Tag	Value	Units	Tag	Value	Units	Tag	Value	Units
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:00	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
.,.,	Time since			Slope for		mV/	Time since Acid	_,	
9/6/194:00	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:00	Offset Cal	49	dAYS	Acid Range	56.1	ΡĤ	Slope Cal	49	dAYS
, ,	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:00	Offset Cal	49	dAYS	Acid Range	56.1	ΡĤ	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:01	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:01	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:01	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:01	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:01	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:01	Offset Cal	49	dAYS	Acid Range	56.1	PH	Slope Cal	49	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:03	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:04	Offset Cal	39	dAYS	Acid Range	61.7	$\mathbf{PH}$	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:04	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:04	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:04	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:04	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:04	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:05	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:05	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:05	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS
	Time since			Slope for		mV/	Time since Acid		
9/6/19 4:05	Offset Cal	39	dAYS	Acid Range	61.7	PH	Slope Cal	39	dAYS



# "Sample of logged data with ScanView" – Page 4 of 6

Date & Time	Tag	Value	Units	Tag	Value	Units	Tag	Value	Units
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:00	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
,, ,, ,, ,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,	Slope for	0010	mV/	Time since Base			Year of	_010	
9/6/19 4:00	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:00	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
, ,	Slope for		mV/	Time since Base			Year of		
9/6/194:00	Alkaline Range	56.6	ΡĤ	Slope Cal	49	dAYS	Manufacture	2018	YEAr
, ,	Slope for		mV/	Time since Base			Year of		
9/6/19 4:01	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:01	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:01	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:01	Alkaline Range	56.6	$\mathbf{PH}$	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:01	Alkaline Range	56.6	$\mathbf{PH}$	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:01	Alkaline Range	56.6	PH	Slope Cal	49	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:03	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:04	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:04	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:04	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
	Slope for		mV/	Time since Base			Year of		
9/6/19 4:04	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
	Slope for	-	mV/	Time since Base	•	1.1.1/0	Year of		
9/6/19 4:04	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
0////0/04	Slope for	= < 0	mV/	Time since Base	•	143/0	Year of	0010	
9/6/19 4:04	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
0///10/05	Slope for	54.0	mV/	Time since Base	20	143/0	Year of	0010	
9/6/19 4:05	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
0///10/05	Slope for		mV/	Time since Base	20	14.1/0	Year of	0010	
9/6/19 4:05	Alkaline Range	56.3	PH	Slope Cal	39	dAYS	Manufacture	2018	YEAr
	Slope for	ECO	mV/	Time since Base	20	141/0	Year of	2010	
9/6/19 4:05	Alkaline Range	56.3	PH mV/	Slope Cal	39	dAYS	Manufacture	2018	YEAr
0/6/10 4·0E	Slope for Alkaline Range	56.2	mV/ PH	Time since Base	20	JAVC	Year of Manufacture	2010	YEAr
9/6/19 4:05	ліканне канде	56.3	ГП	Slope Cal	39	dAYS	manufacture	2018	IEAſ



# "Sample of logged data with ScanView" - Page 5 of 6

Date & Time	Tag	Value	Units	Tag	Value	Units
9/6/19 4:00	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:00	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:00	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:00	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:01	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:01	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:01	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:01	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:01	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:01	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:03	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:04	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:04	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:04	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:04	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:04	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:04	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:05	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:05	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:05	Month of Manufacture	11	month	Software Revision	8	SoFtw
9/6/19 4:05	Month of Manufacture	11	month	Software Revision	8	SoFtw



# "Sample of logged data with ScanView" - Page 6 of 6

Date & Time	Tag	Value	Units	Tag	Value	Units	R1 R2 R3 R4 R5 R6 R7 R8
	Min Temp in			Max Temp in			
9/6/19 4:00	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
0///10/00	Min Temp in	10.1	• •	Max Temp in	20		
9/6/19 4:00	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
0///10/00	Min Temp in	10.1	• 6	Max Temp in	22		
9/6/19 4:00	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
0///10/00	Min Temp in	10.1		Max Temp in	22	AVC	
9/6/19 4:00	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
0///10/01	Min Temp in	101	min C	Max Temp in	22	m AV C	Off On On On
9/6/19 4:01	Use (Celsius) Min Tomp in	18.1	min-C	Use (Celsius) May Tamp in	33	mAX-C	On On On On
9/6/19 4:01	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C	Off On On On
9/0/194.01	Min Temp in	10.1	IIIIII-C	Max Temp in	33	IIIAA-C	
9/6/19 4:01	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
<i>)</i> / 0/ 1/ 4.01	Min Temp in	10.1	IIIII-C	Max Temp in	55	nu i/(-C	
9/6/19 4:01	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
)/0/1/4.01	Min Temp in	10.1	nun C	Max Temp in	00	nu i/ C	
9/6/19 4:01	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
)/0/1/4.01	Min Temp in	10.1	nun C	Max Temp in	00	nu i/ C	
9/6/19 4:01	Use (Celsius)	18.1	min-C	Use (Celsius)	33	mAX-C	Off On On On
<i>y oy iy i</i> .or	Min Temp in	10.1	nimi e	Max Temp in	00	nubre	
9/6/19 4:03	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in	-		Max Temp in			
9/6/19 4:04	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:04	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
, ,	Min Temp in			Max Temp in			
9/6/19 4:04	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
, ,	Min Temp in			Max Temp in			
9/6/19 4:04	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:04	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:04	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:05	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:05	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:05	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off
	Min Temp in			Max Temp in			
9/6/19 4:05	Use (Celsius)	0	min-C	Use (Celsius)	27.3	mAX-C	Off Off Off Off