Guide for ScanView Windows Software to Configure HiQDT-EX-LEDTX Explosion-Proof (EX) Controllers in Master Configuration for Smart Digital RS-485 MODBUS RTU HiQDT pH, ORP & D.O. Sensors

Proven Solutions for Liquid Analytical Measurements for Aggressive & Hazardous Installation Locations

Single Channel HiQDT-EX-LEDTX Explosion-Proof Controller with Fully Submersible Dehydration Resistant MODBUS RTU pH Sensor

ATEX
II 2 G D
Ex d IIC T* Gb
Ex tb IIIC T90°C Db IP68
Ta = -40°C to +*°C
*T6 = -40°C to +60°C
*T5 = -40°C to +65°C
Certificate number: Sira 12ATEX1182

Controller Ratings and Approvals

FM
Enclosure: Type 4X; IP66
Class I, Division 1, Groups B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1, T5/T6
Class I, Zone 1, AEx d, IIC Gb T5/T6
Zone 21, AEx tb IIIC T90°C; Ta -40°C to +65°C
T6 Ta = -40°C to +60°C; T5 Ta = -40°C to +65°C
Certificate Number: 3047283

CSA
Class I, Division 1, Groups B, C, D
Class II, Division 1, Groups E, F, G
Class III, Division 1
Class I Zone 1 Ex d IIC
Zone 21 Ex tb IIIC T90°C
-40°C < Tamb. < +60° C; Temperature Code T6
-40°C < Tamb. < +65° C; Temperature Code T5
Enclosure Type 4X & IP66
Certificate Number: 2531731

IECEx
Ex d IIC T* Gb
Ex tb IIIC T90°C Db IP68
Ta = -40°C to +*°C
*T6 = -40°C to +60°C
*T5 = -40°C to +65°C
Certificate Number: IECEx SIR 12.0073

SCANVIEW WINDOWS CONFIGURATION GUIDE - Revised September 19, 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 in hazardous locations and aggressive field environments 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-EX-LEDTX controller manual.** Commissioning & maintenance information are also detailed in this guide in addition to use of the ScanView software to serve as a quick-start guide as well.

EXPLOSION-PROOF LEDTX CONTROLLERS IN MASTER CONFIGURATION

Model: **HiQDT-EX-PSAC**
or
Model: **HiQDT-EX-PSDC**

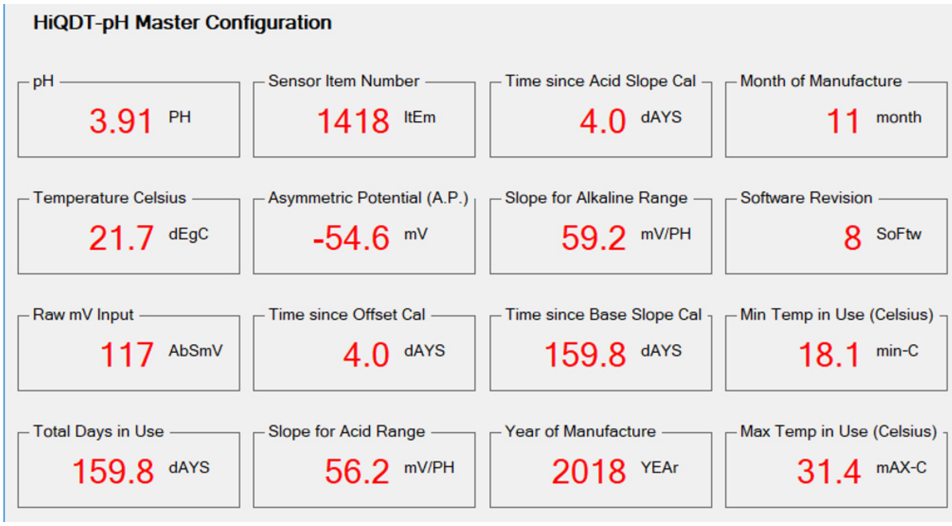
Short Description:
Explosion-Proof Controller for Smart HiQDT MODBUS RTU Sensors for 85-265 VAC (-PSAC) or 12-24 VDC (-PSDC); Four SafeTouch® Buttons for operation in hazardous areas through glass without removing cover; 1 each 4-20mA output; 4 each Programmable Contact Relays; Max 1 each Sensor for Hazardous Locations; Max 8 each Sensors for Safe Areas

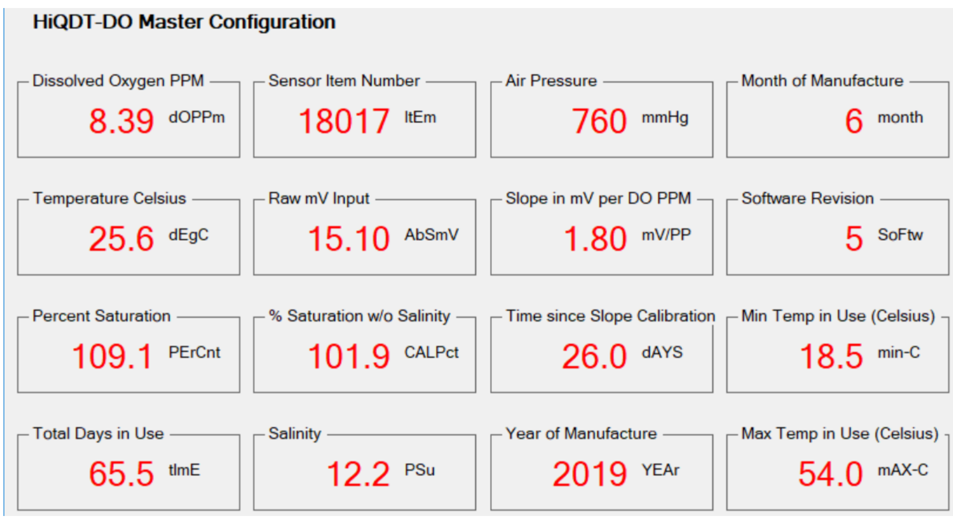
Long Description:

- **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.
  - **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 ALL 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 Ω 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 -PSAC power configuration & 12-24 VDC power operation with -PSDC power configuration. Both power configurations always includes isolated 12VDC power to energize smart digital HiQDT MODBUS RTU sensor slaves; Max 1 each sensor can be energized in hazardous locations while up to 8 each sensors can be energized in safe non-hazardous areas. Inquire to factory assistance with commissiong scheme.
- CERTIFICATIONS: See Page 1 of this guide for a listing of all agency approvals and hazardous location ratings

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

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



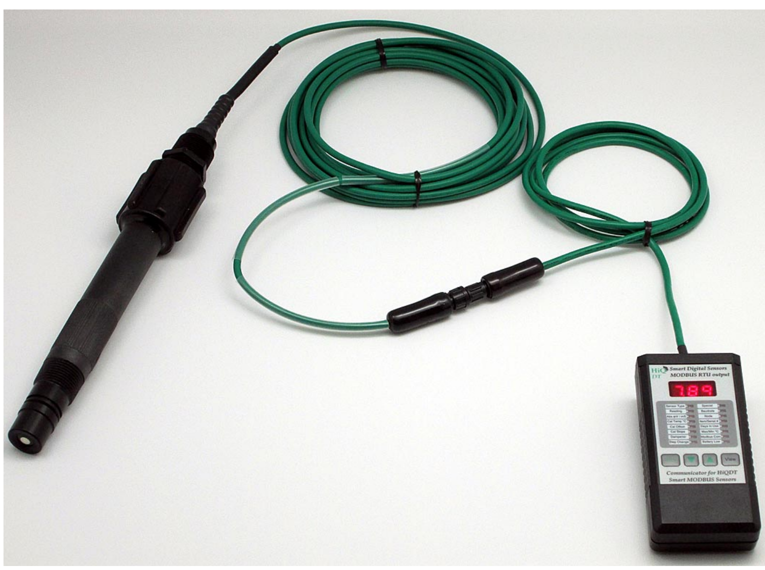


NOTES:

- 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-EX-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-EX-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 HiQ4F-Xm-TL feamle snap to tinned lead extension cable on HiQDT-EX-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.

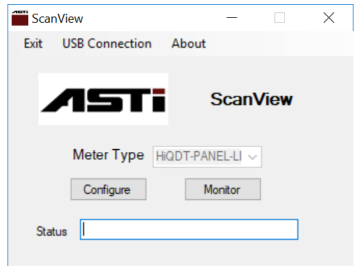
For ongoing maintenance the HHC can modify the sensor node to the desired value for the channel to which it is to be hot-swap exchanged in a plug and play manner for ease of field workflow.

MASTER CONFIGURATION & INSTALLATION GUIDE

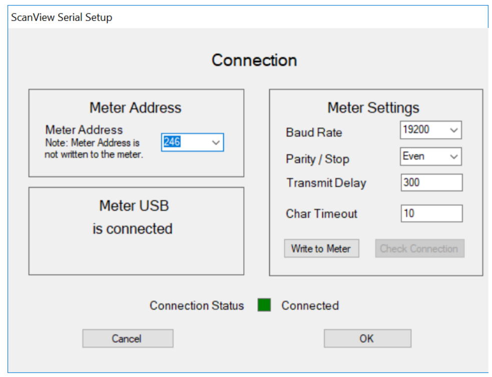
The configurations in the HiQDT-EX-LEDTX controllers is specifically designed to be used with IOTRON™ & ZEUS™ series smart digital RS-485 MODBUS RTU HiQDT pH, ORP & dissolved oxygen (D.O.) sensors. The ASTI supplied HiQDT-EX-LEDTX controller package in the master configuration re turn-key systems available for purchase ready for plug and play commissioning right out of the box. Alternatively when the HiQDT-EX-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.

"General Controller Setup"

When the USB cable from the HiQDT-EX-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.

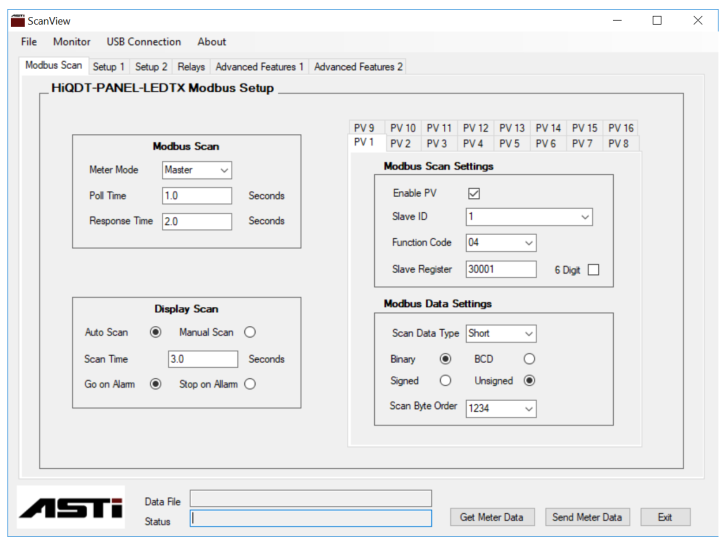


Clicking on the "USB" connection will load the screen shown to the right. The baudrate, parity, transmit delay and char timeout must be as shown to ensure proper communications between the smart digital HiQDT MODBUS RTU sensors and your HiQDT-EX-LEDTX controller. The meter address is of no consequence 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.

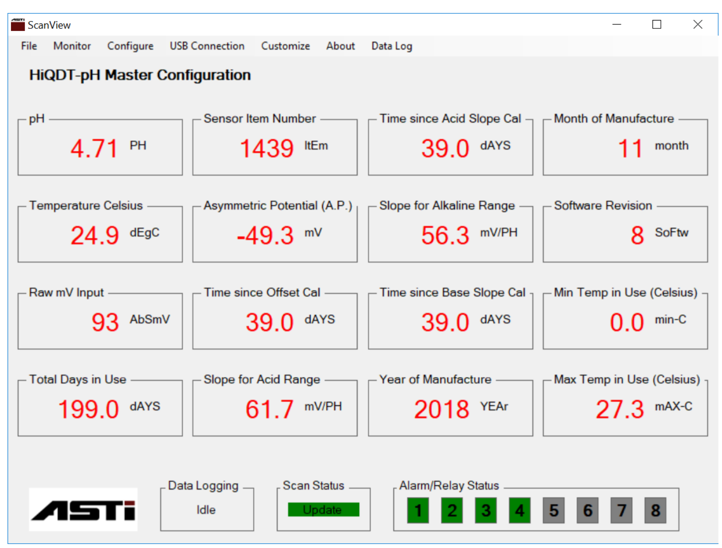


Clicking on the "Configure" button from the main default screen will load the screen shown to the right. The remainder of this guide will walk through proper configuration for each tab for the various sensor types.

It is VERY strongly recommended to first click on the "Get Meter Data" and then to save the downloaded configuration of the HiQDT-EX-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.



"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-EX-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-EX-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: ONLY 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).

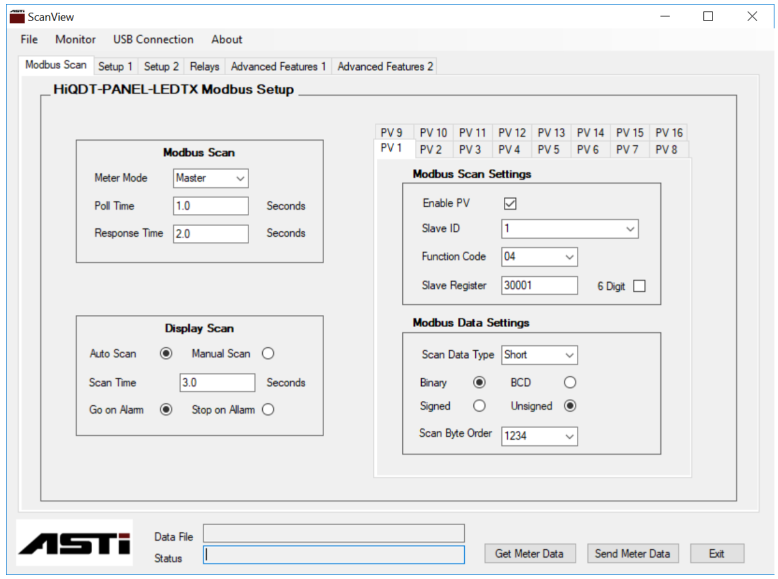
CALIBRATION NOTES:

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.

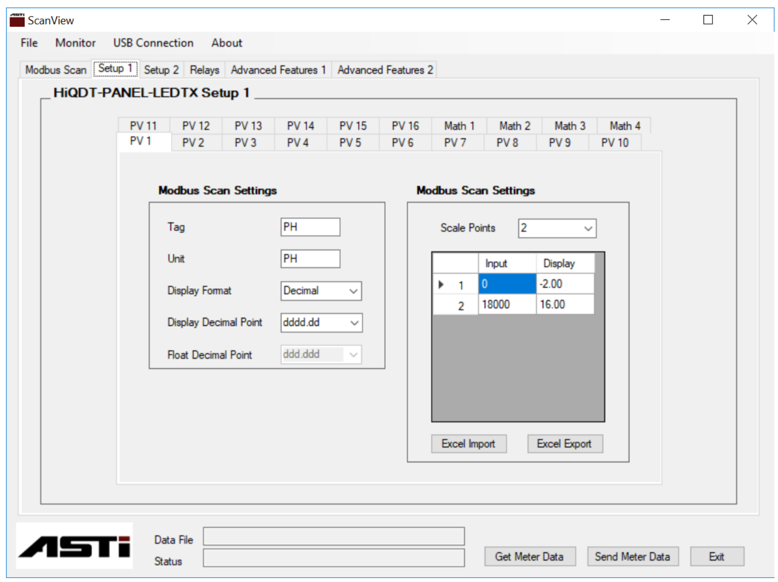
"Process Values for pH Sensors" – Page 1 of 2

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.

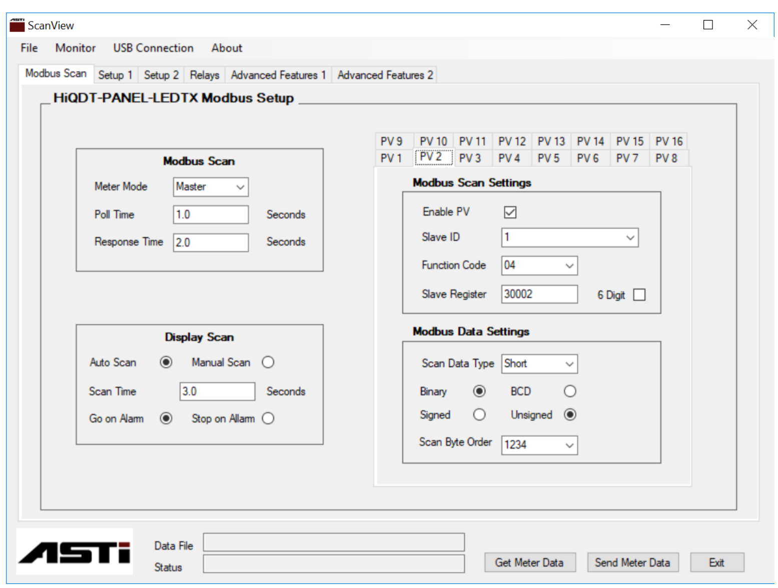


The scaling for PV1 is performed under the Setup 1 tab. The calibrated and temperature compensated pH value is sent as 0 to 16,000 corresponding to engineered values of -2.000 to +16.000 pH. In reality the third position of the pH value sent is quite uncertain and so the display should be set to show 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.



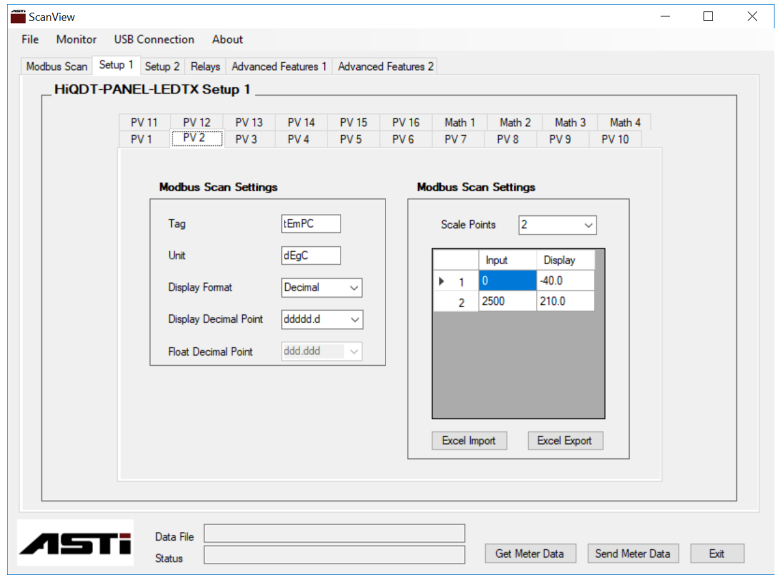
PV2 is configured to display calibrated temperature from the connected HiQDT pH sensor. This is read as register 30002 as an unsigned 16 bit integer.

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.



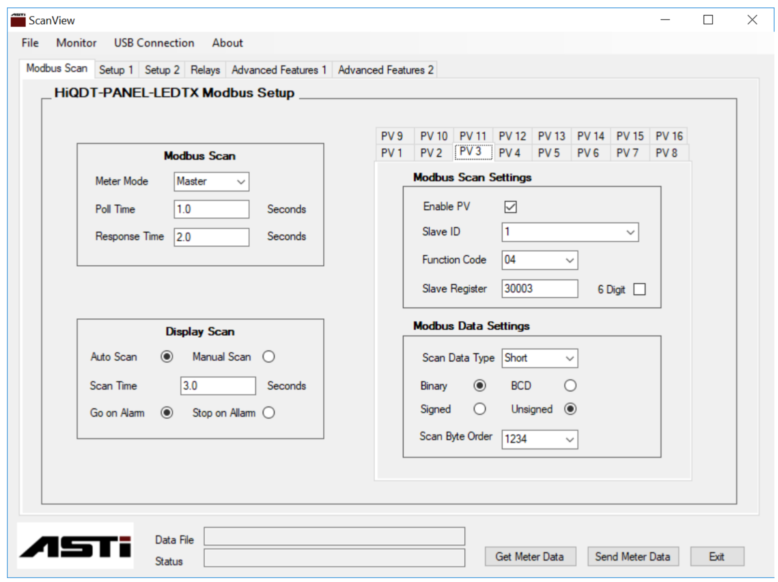
"Process Values for pH Sensors" Page 2 of 2

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.

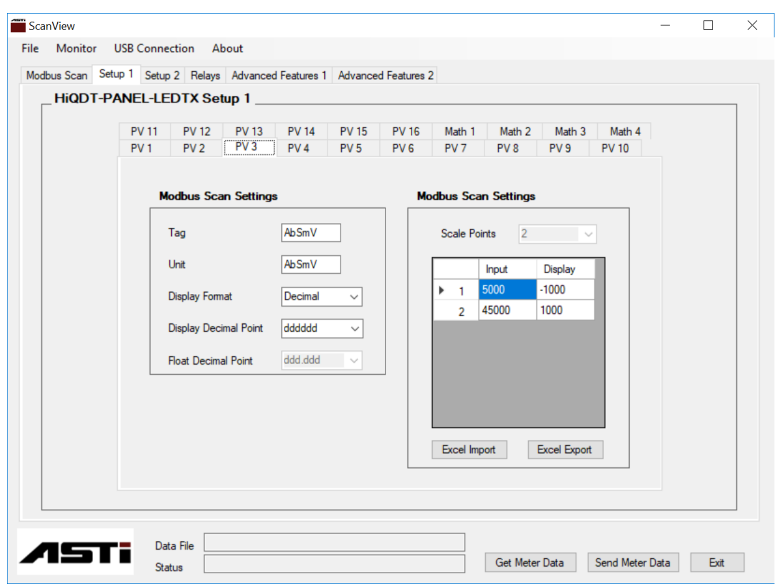


PV3 is configured to display the raw absolute mV input from connected HiQDT pH sensor. This is read as register 30003 as an unsigned 16 bit integer.

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.



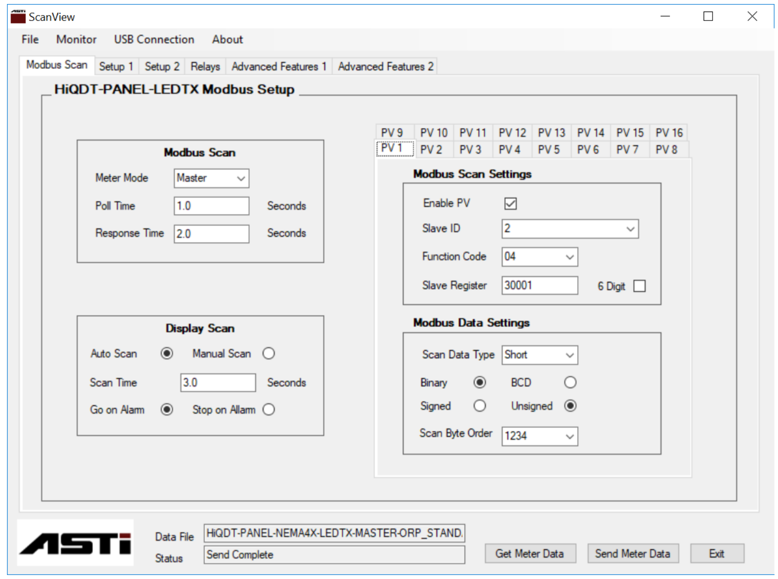
The scaling for PV3 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 5,000 to 45,000 corresponding to engineered values of -1,000 to +1,000 mV. Although this raw mV input is sent in a very high resolution format (0.05mV) for the diagnostic purposes that this information 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.



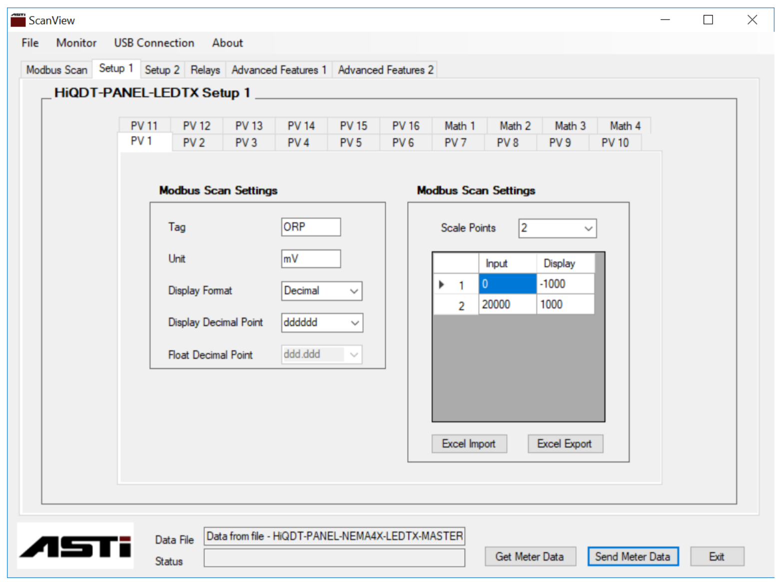
"Process Values for Standard ORP Sensors" – Page 1 of 2

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.

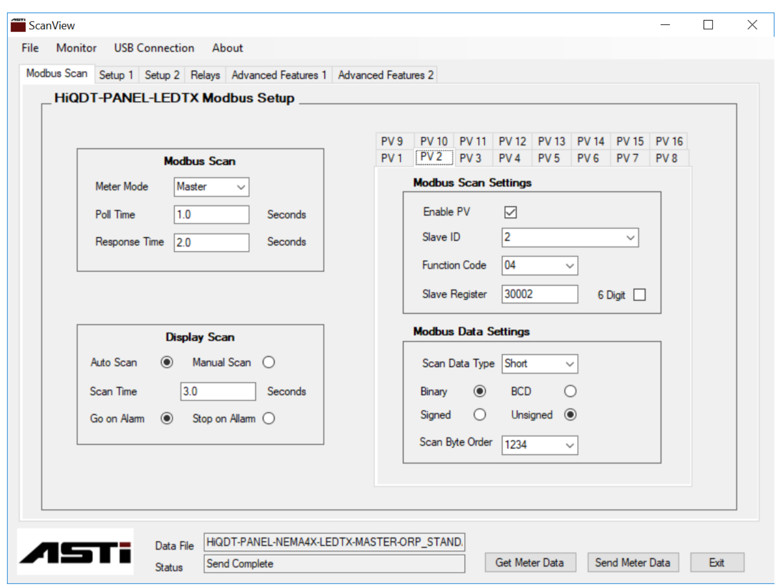


Scaling for PV1 is performed under the Setup 1 tab. Calibrated ORP sent as 0 to 20,000 corresponding to engineered values of -1,000 to +1,000 mV.



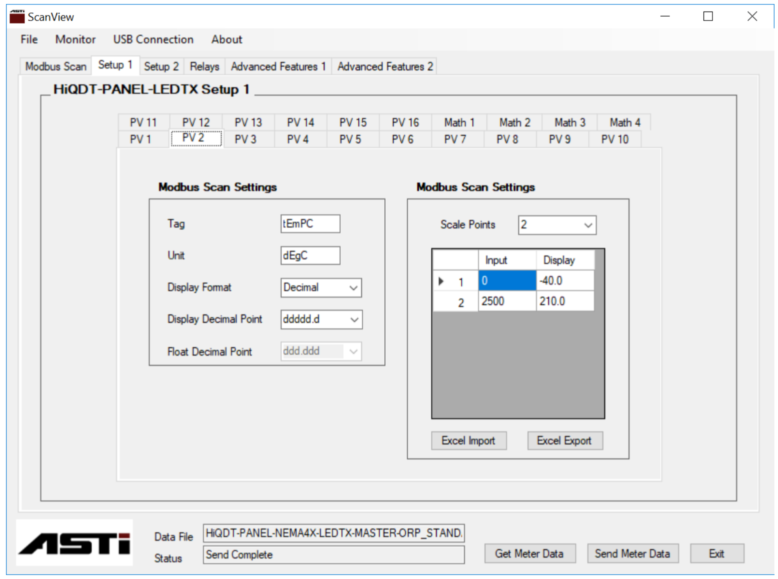
PV2 is configured to display calibrated temperature value from connected HiQDT ORP sensor. This is read as register 30002 as an unsigned 16 bit integer.

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.



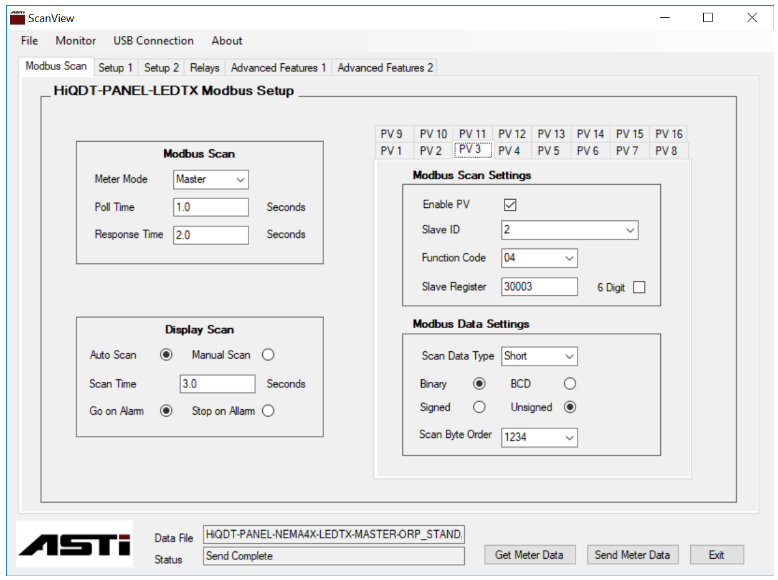
"Process Values for Standard ORP Sensors" - Page 2 of 2

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.

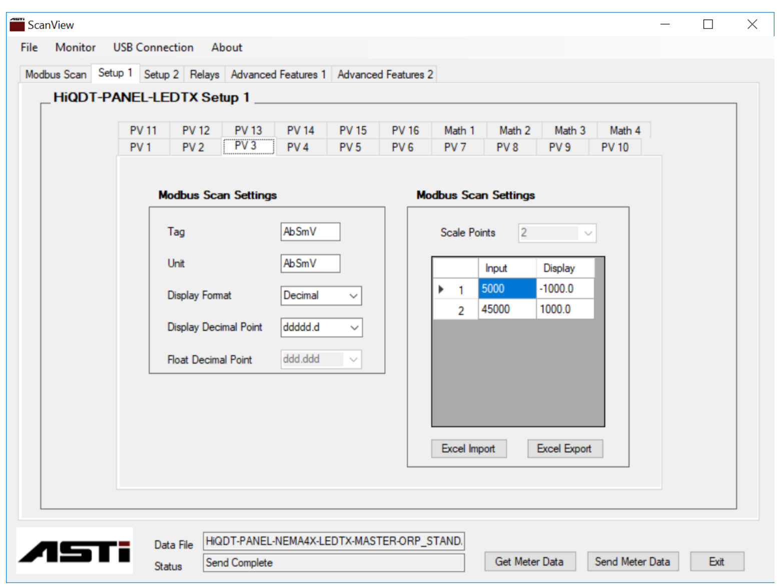


PV3 is configured to display the raw absolute mV input from connected HiQDT ORP sensor. This is read as register 30003 as an unsigned 16 bit integer.

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.



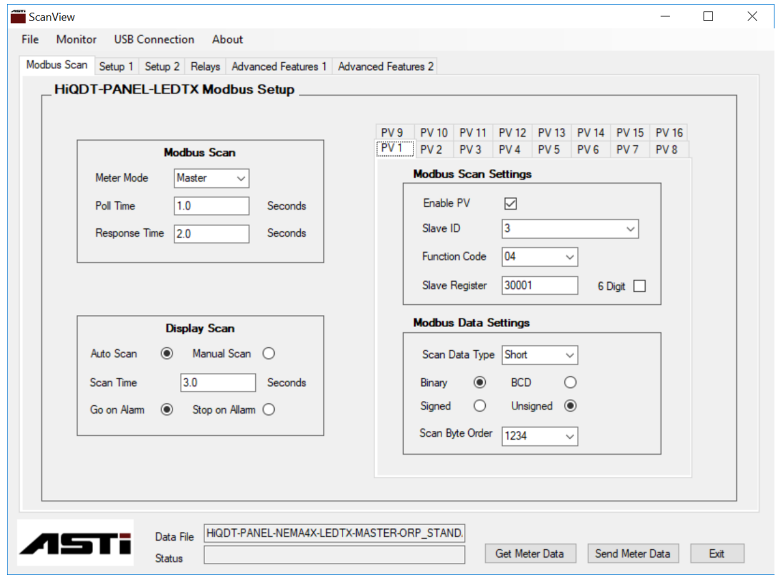
The scaling for PV3 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 5,000 to 45,000 corresponding to engineered values of -1,000 to +1,000 mV. Although this raw mV input is sent in a very high resolution format (0.05mV) for the diagnostic purposes that this information 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.



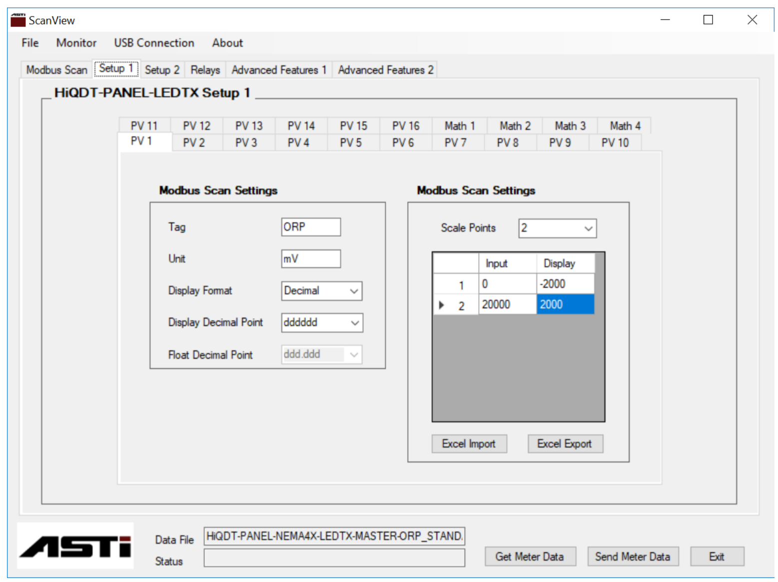
"Process Values for Wide Range ORP Sensors" – Page 1 of 2

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.

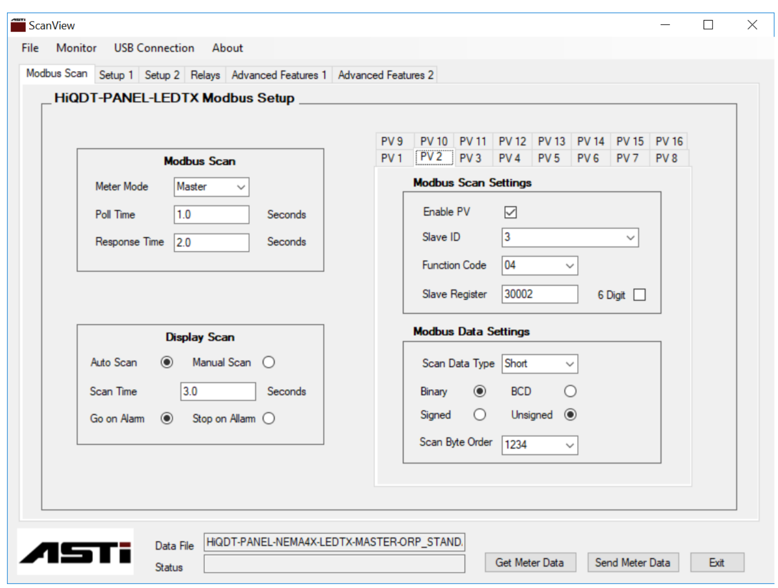


Scaling for PV1 is performed under the Setup 1 tab. Calibrated ORP sent as 0 to 20,000 corresponding to engineered values of -2,000 to +2,000 mV.



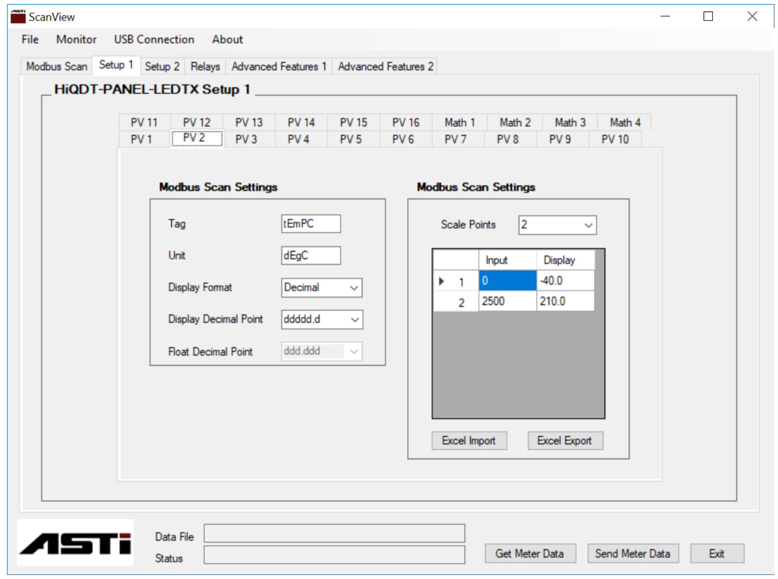
PV2 is configured to display calibrated temperature value from connected HiQDT ORP sensor. This is read as register 30002 as an unsigned 16 bit integer.

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.



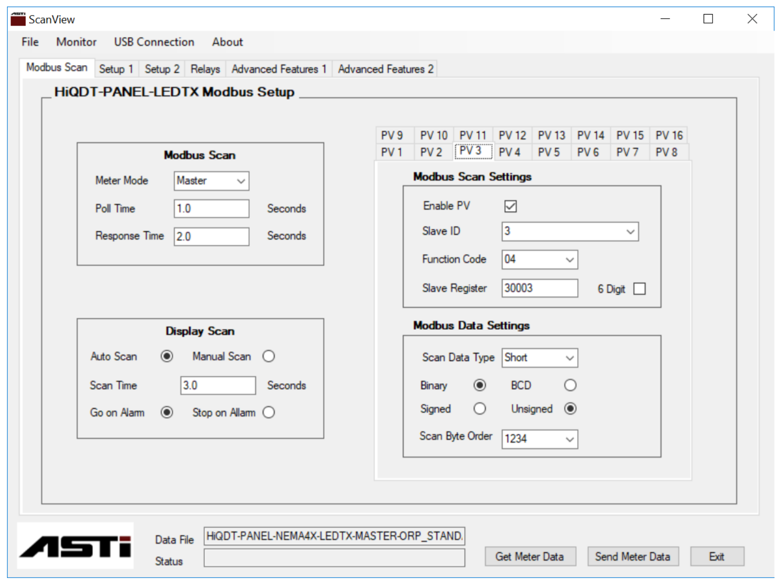
"Process Values for <u>Wide Range</u> ORP Sensors" - Page 2 of 2

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.

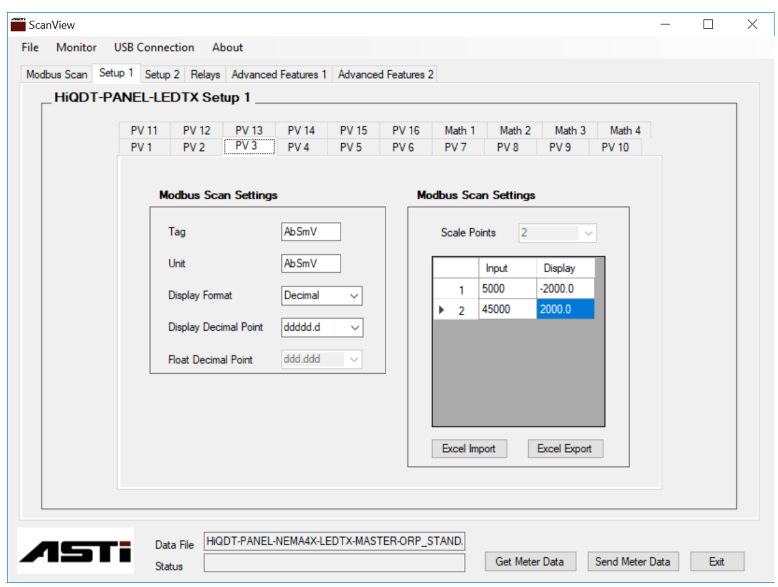


PV3 is configured to display the raw absolute mV input from connected HiQDT ORP sensor. This is read as register 30003 as an unsigned 16 bit integer.

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.



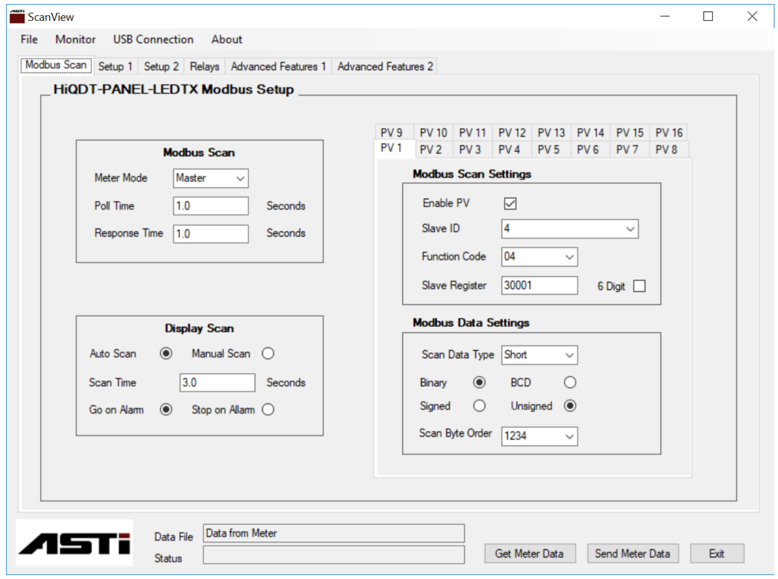
The scaling for PV3 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 5,000 to 45,000 corresponding to engineered values of -2,000 to +2,000 mV. Although this raw mV input is sent in a very high resolution format (0.1mV) for the diagnostic purposes that this information 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.



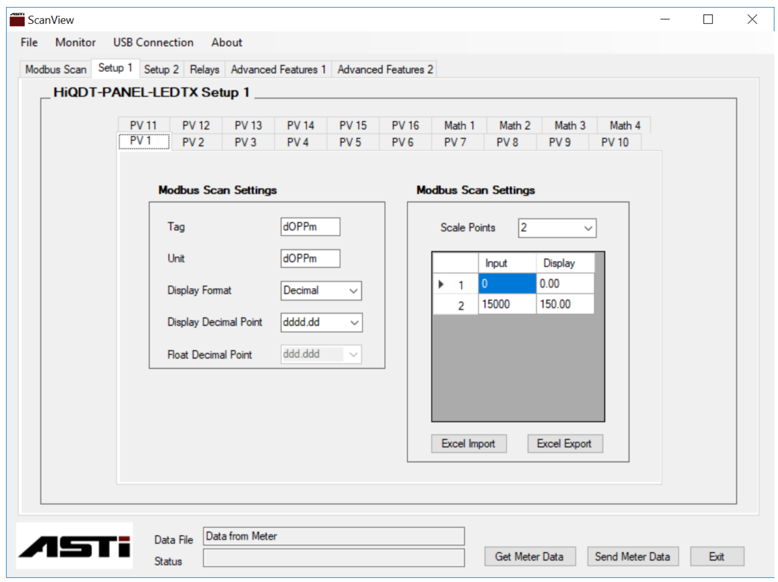
"Process Values for Dissolved Oxygen (D.O.) Sensors" – Page 1 of 5

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.

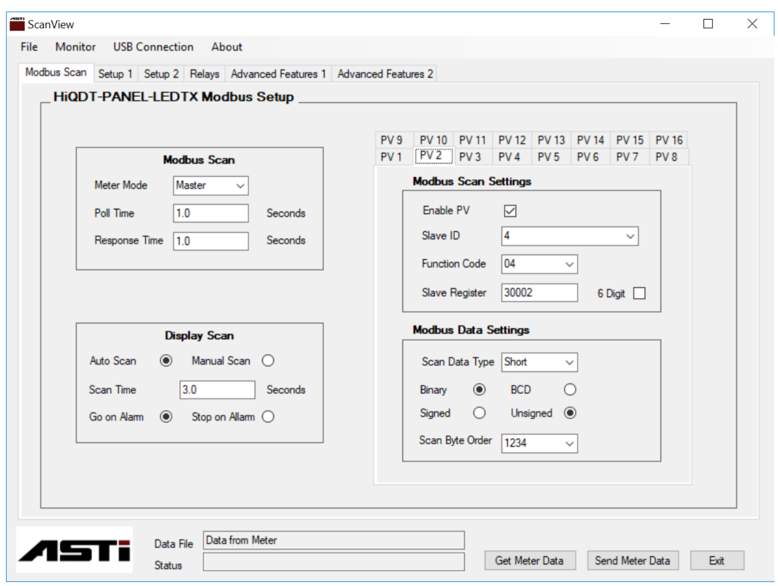


The scaling for PV1 is performed under the Setup 1 tab. The calibrated and temperature compensated DO ppm value is sent as 0 to 15,000 corresponding to engineered values of 0.00 to 150.00 dissolved oxygen ppm units.



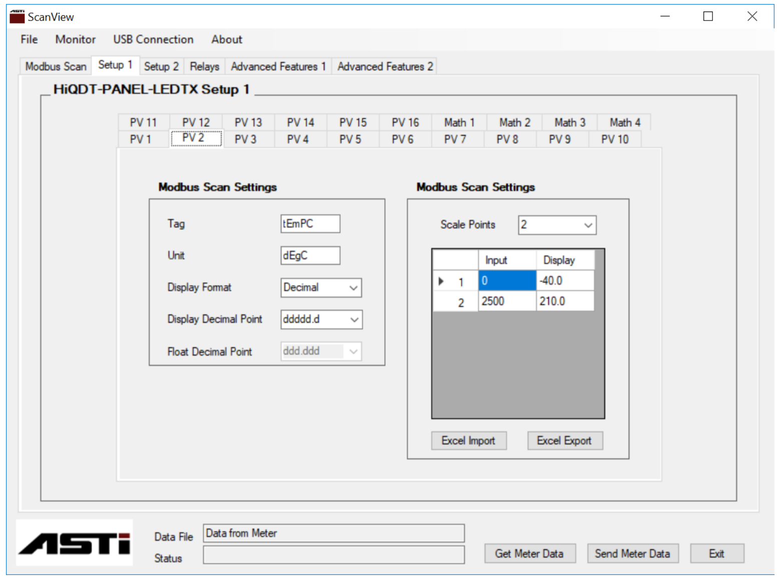
PV2 is configured to display calibrated temperature from the connected HiQDT DO sensor. This is read as register 30002 as an unsigned 16 bit integer.

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.



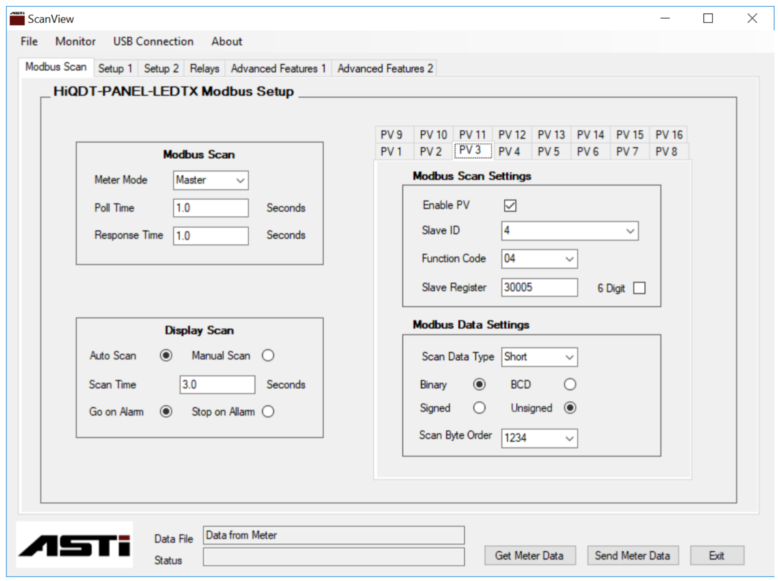
"Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 2 of 5

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.

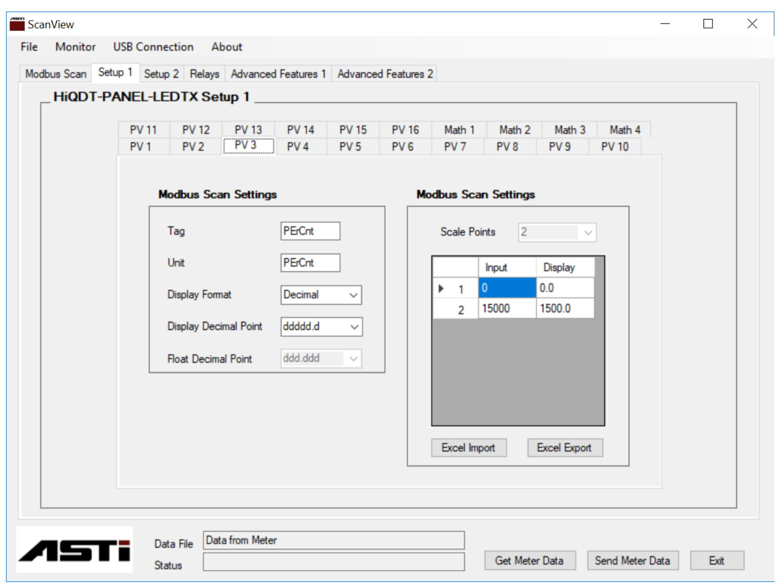


PV3 is configured to display the computed percent (%) saturation value including salinity correction from the connected HiQDT DO sensor. This is read as register 30005 as an unsigned 16 bit integer.

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.



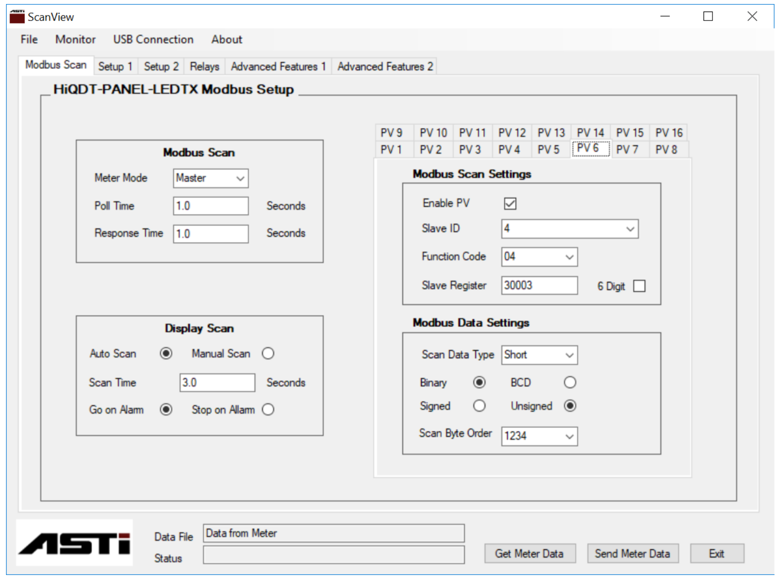
Scaling for PV3 is performed under the Setup 1 tab. The computed percent (%) saturation including salinity correction value is sent as 0 to 15,000 corresponding to engineered values of 0.0 to 1,500.0 % saturation.



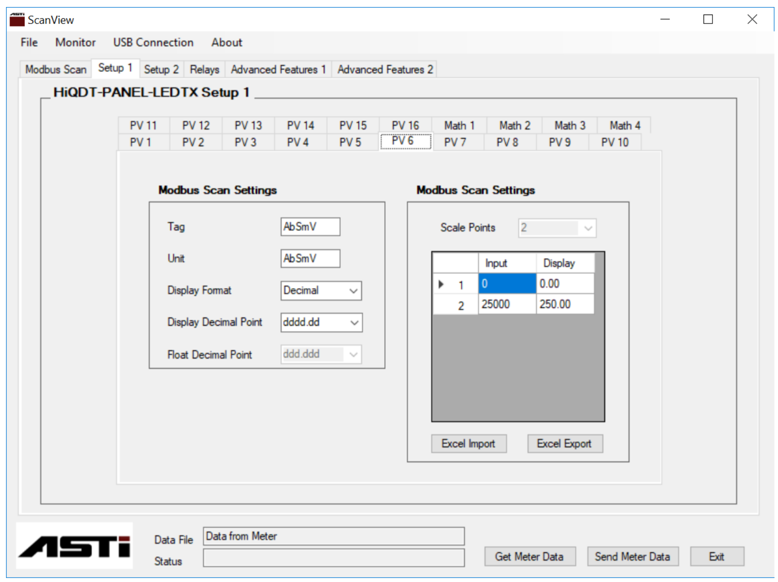
"Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 3 of 5

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.

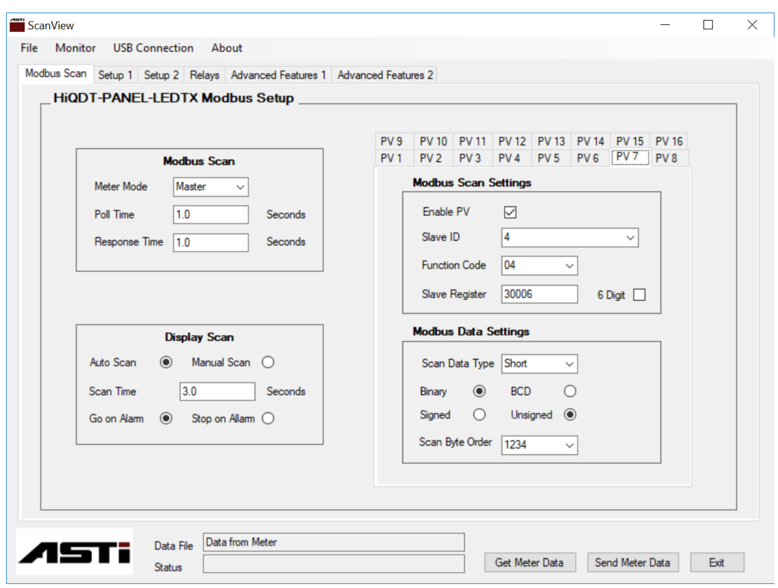


The scaling for PV6 is performed under the Setup 1 tab again. The raw absolute mV input value is sent as 0 to 25,000 corresponding to engineered values of 0.00 to 250.00 mV.



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.

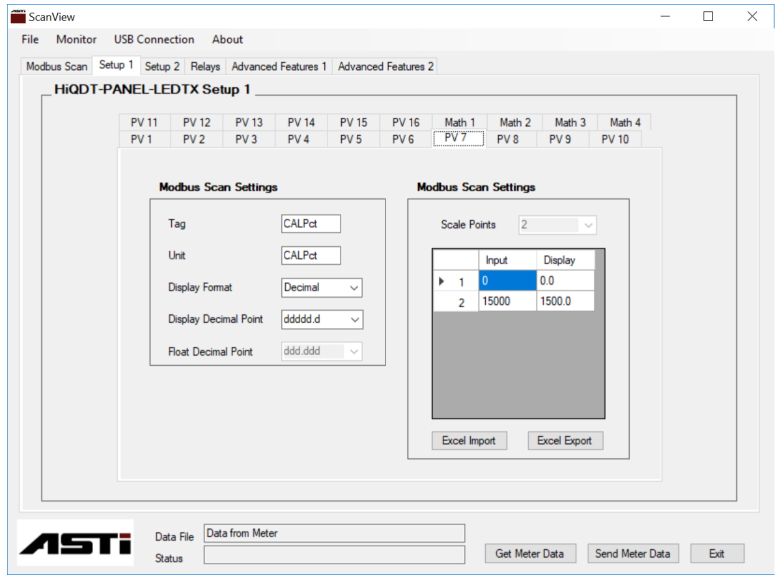
The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



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

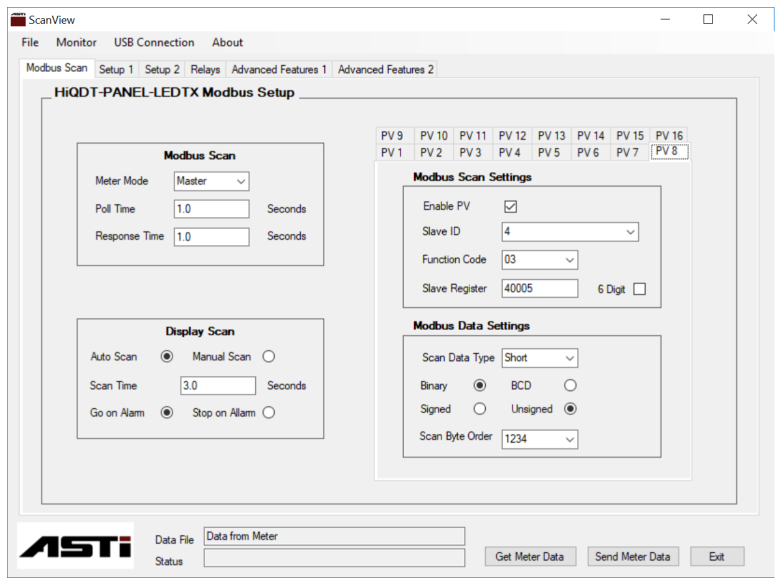
Scaling for PV7 is performed under the Setup 1 tab. Computed percent (%) saturation WITHOUT salinity correction sent as 0 to 15,000 corresponding to engineered values of 0.0 to 1,500.0 % saturation.

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.

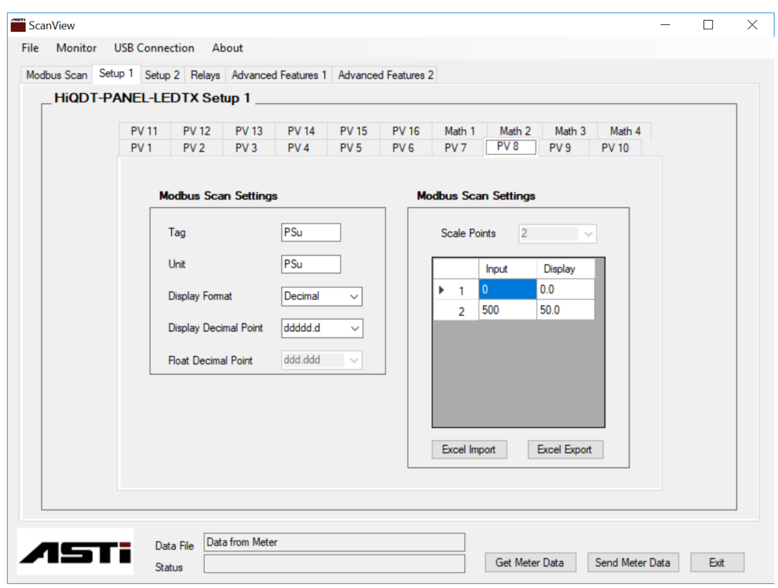


PV8 is configured to display the programmed salinity of the measured solution used in the percent saturation computed for PV3 from the connected HiQDT DO sensor. This is read as register 40005 as an unsigned 16 bit integer.

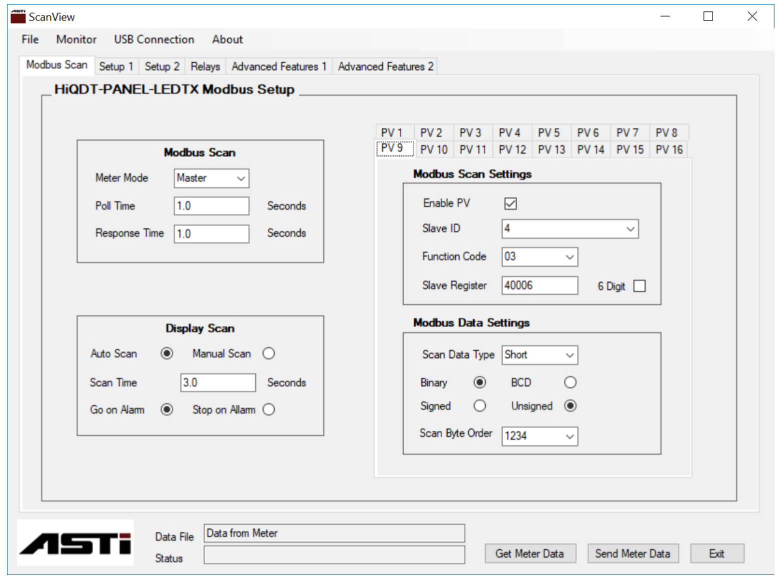
The default node address for the DO sensor is 4 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



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.

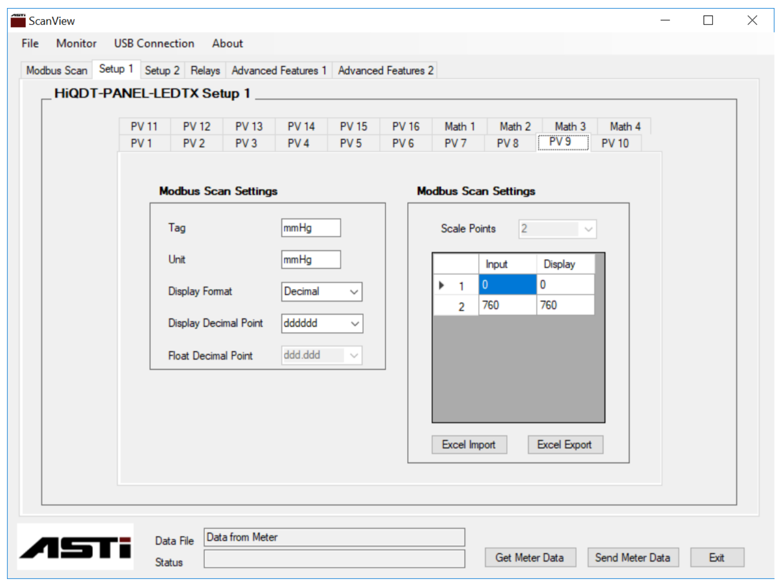


"Process Values for Dissolved Oxygen (D.O.) Sensors" - Page 5 of 5

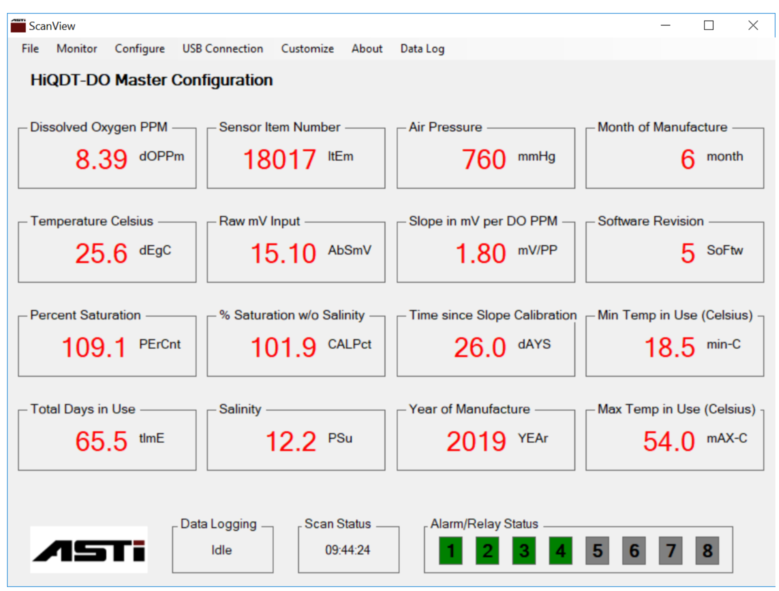


PV9 is configured to display the programmed air pressure at the measurement location. This value is used to in the autocalibration routine as well as for all precent saturation value (PV3 & PV7). This is read as register 40006 as an unsigned 16 bit integer.

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.

"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:

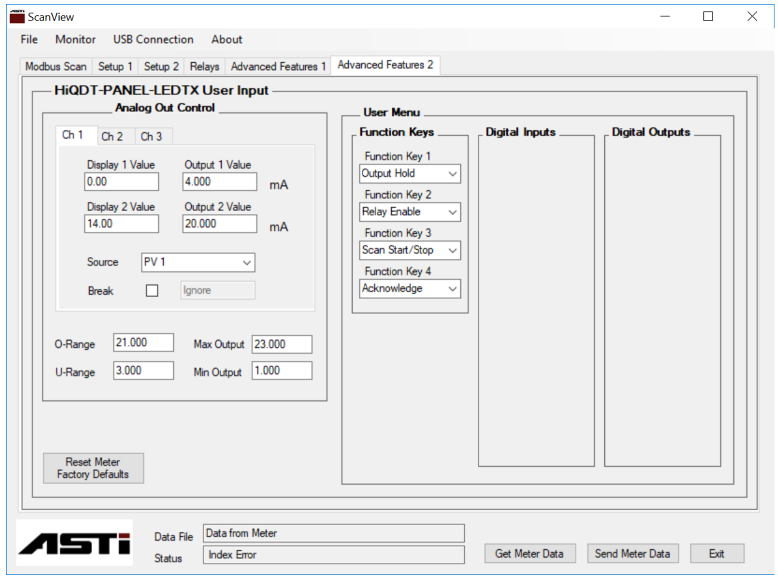
Relay 1 is setup as a high setpoint at pH14 and Relay 2 is setup as a low setpoint at pH0. *Alternate setpoints can be used. Reset value defines the deadband; On & Off delay can be adjusted as desired.*

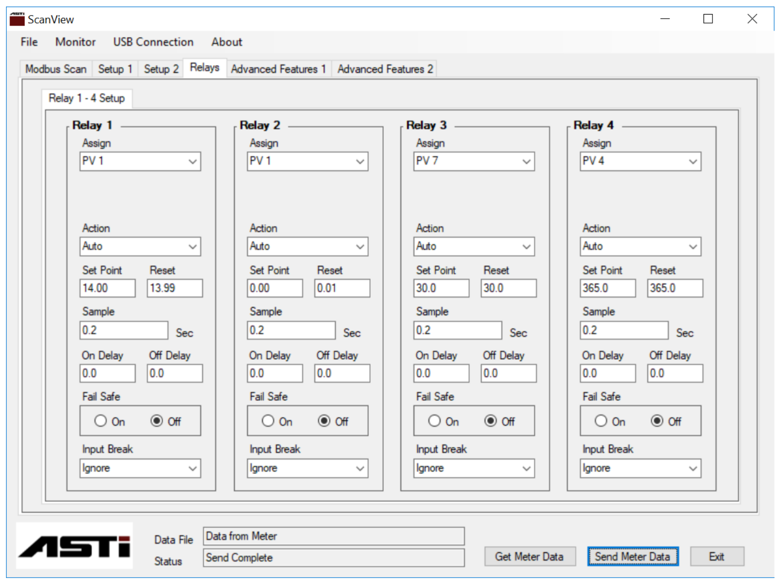
Relay 3 is setup for predictive maintenance for when it is time to perform a new calibration. In the example to the right this value is set to 30 days. In this case PV7 is used which is the days since offset calibration was last performed. This is suitable if the sensor type is pH, ORP or Wide ORP. If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

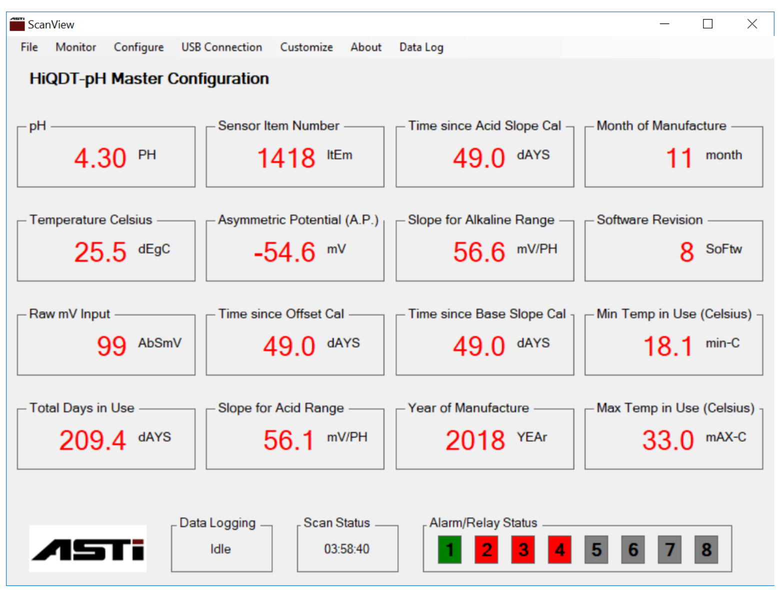
Relay 4 is setup as predictive maintenance for when a spare sensor should be ordered. For all sensor types this would be PV4 which is the total days in field use. In the example to the right 365 days is set as the threshold value for when a spare sensor is to be ordered. Obviously this is just an example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

Refer to main HiQDT-EX-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).



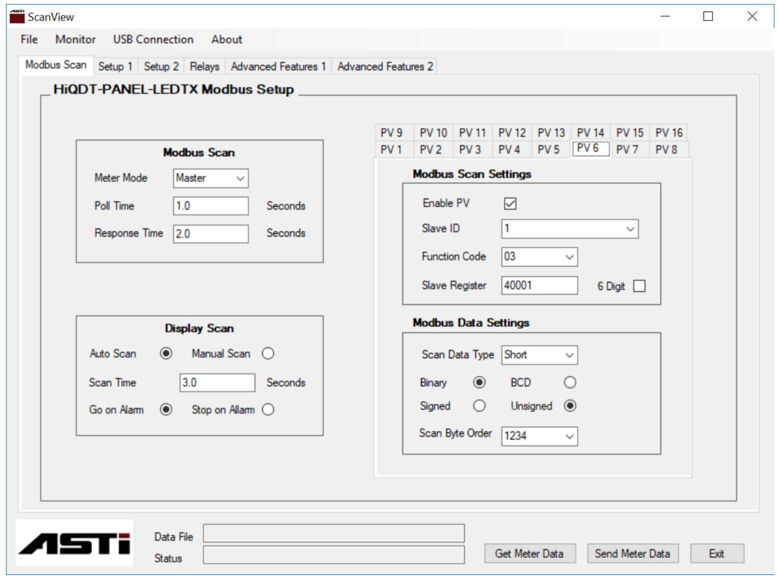




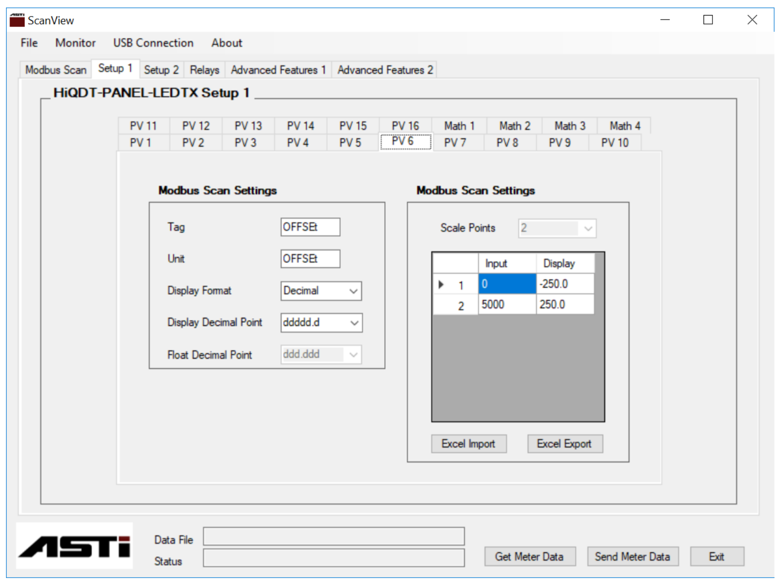
"Calibration Values for pH Sensors"– Page 1 of 4

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.

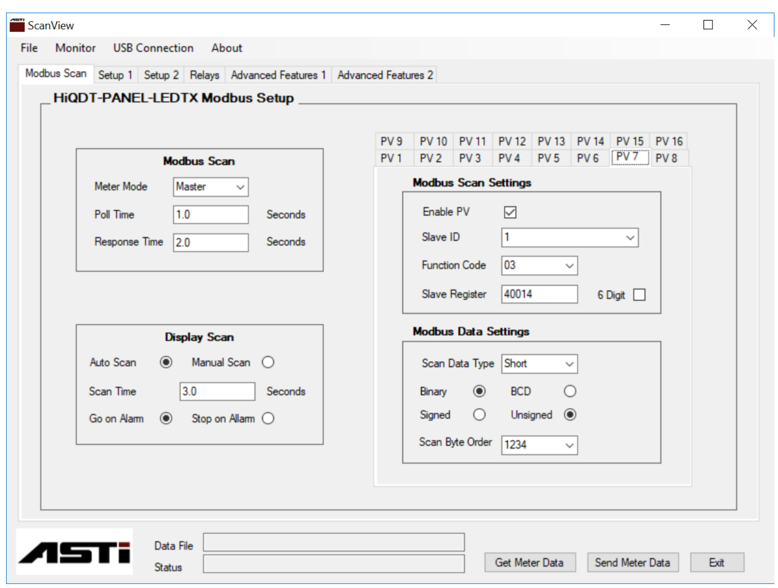


The scaling for PV6 is performed under the Setup 1 tab. The offset calibration value is sent as 0 to 5000 corresponding to engineered values of -250.0 to +250.0 mV. The asymmetric potential is the mV value at pH7 isopotential point. The pH sensor is expected to have this offset value when it is at pH7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



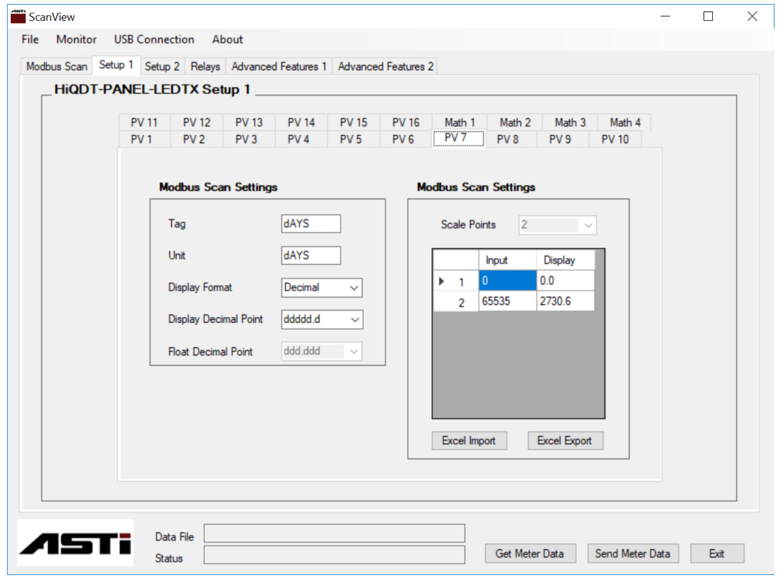
PV7 is configured to display the total days in use since the offset calibration was performed. This is read as register 40014 as an unsigned 16 bit integer.

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.



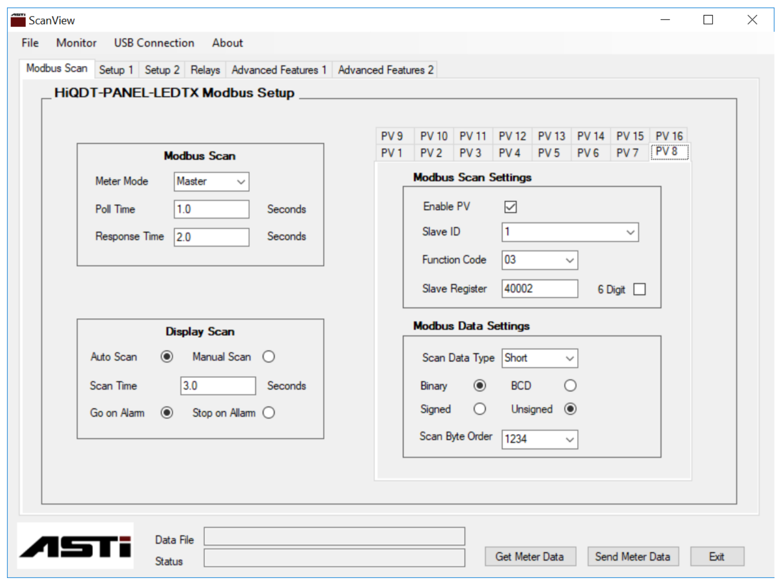
"Calibration Values for pH Sensors"
Page 2 of 4

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 ~7.5 years) and displayed with one decimal point.

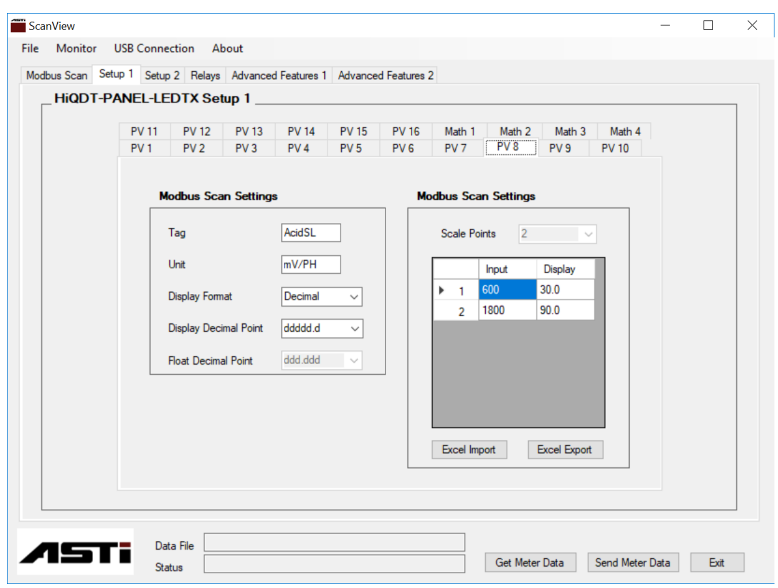


PV8 is configured to display the result of the slope calibration in mV per pH units performed on the connected HiQDT pH sensor for measurements that are performed in the acidic region (below pH7). This is read as register 40002 as an unsigned 16 bit integer.

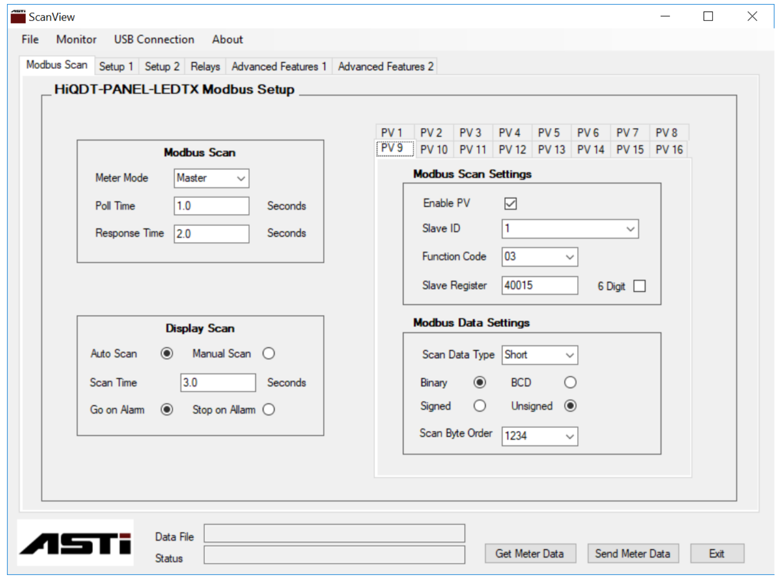
The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.



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.

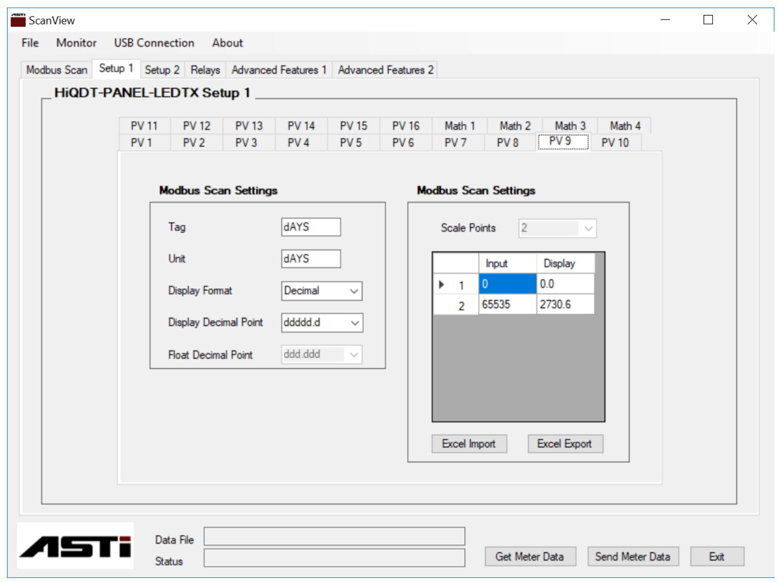


"Calibration Values for pH Sensors" Page 3 of 4

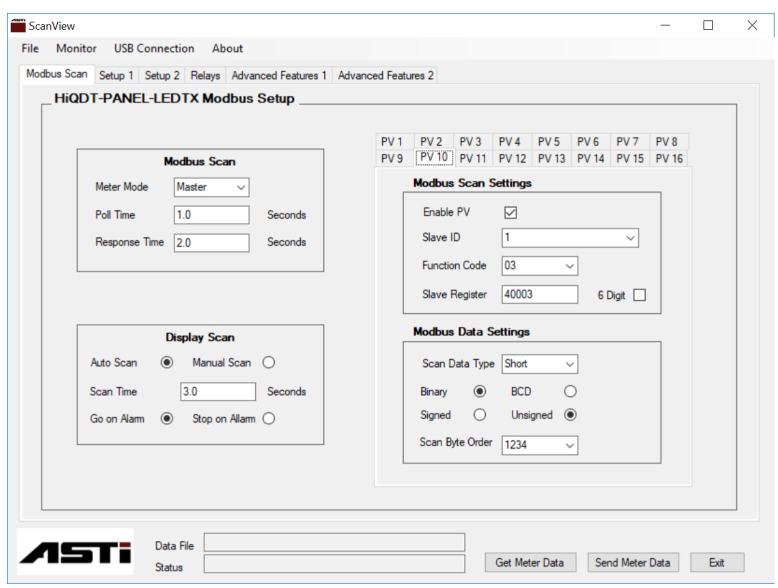


PV9 is configured to display the total days in use since the acid slope calibration was performed. This is read as register 40015 as an unsigned 16 bit integer.

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 ~7.5 years) and displayed with one decimal point.

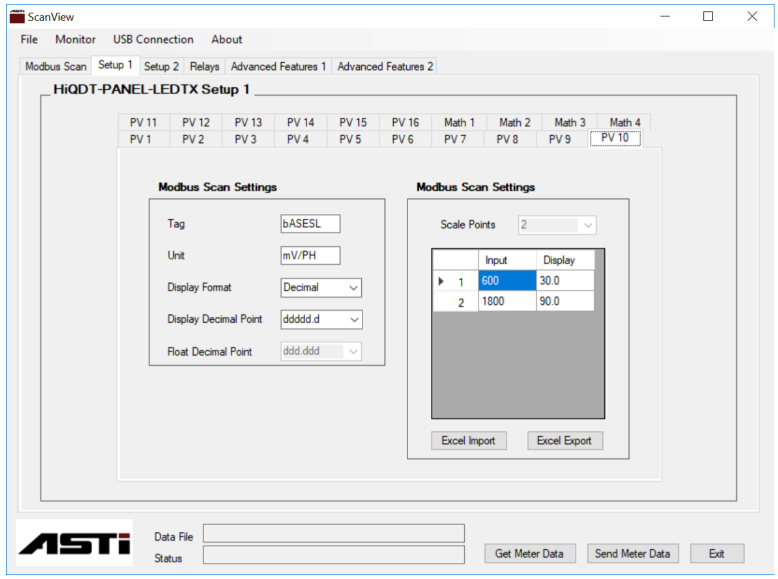


PV10 is configured to display the result of the slope calibration in mV per pH units performed on the connected HiQDT pH sensor for measurements that are performed in the alkaline region (above pH7). This is read as register 40003 as an unsigned 16 bit integer.

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.

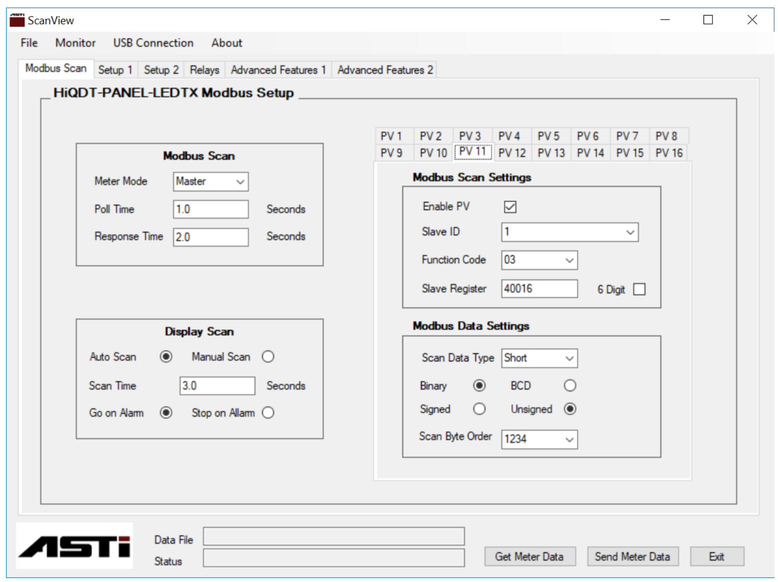
"Calibration Values for pH Sensors"
Page 4 of 4

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.

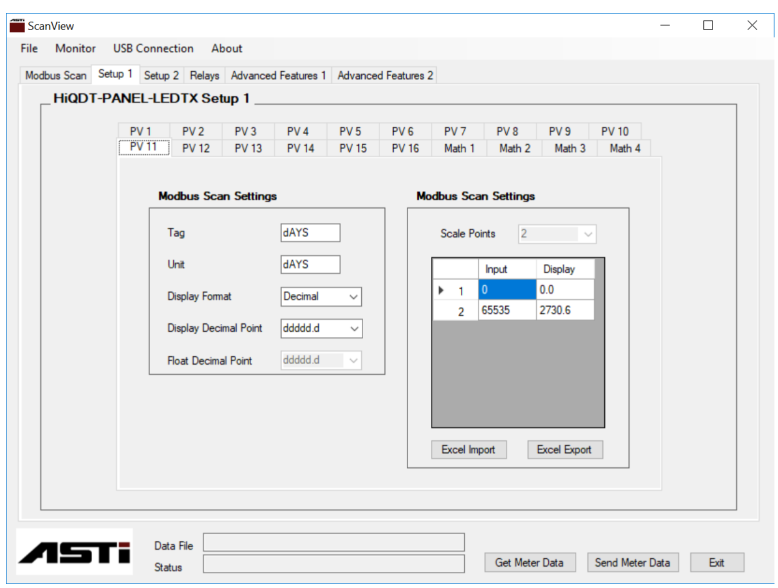


PV11 is configured to display the total days in use since the alkaline slope calibration was performed. This is read as register 40016 as an unsigned 16 bit integer.

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.



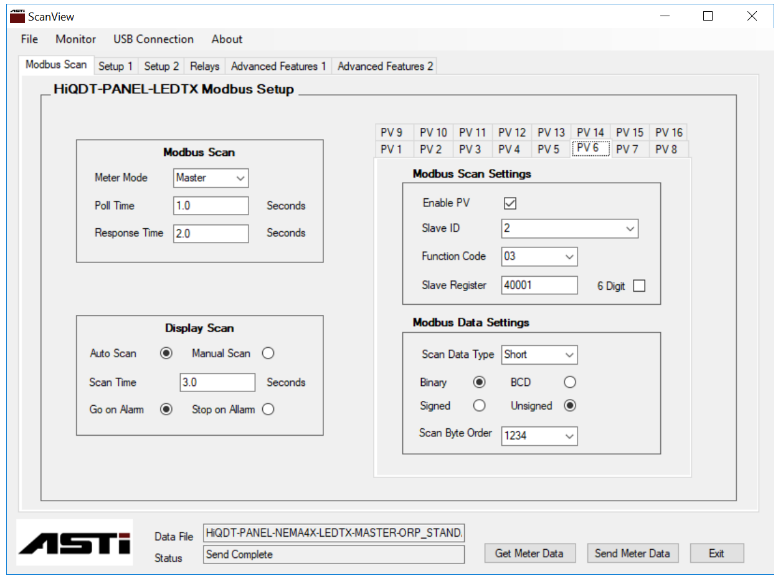
The scaling for PV11 is performed under the Setup 1 tab. The total hours in use since alkaline slope calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds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



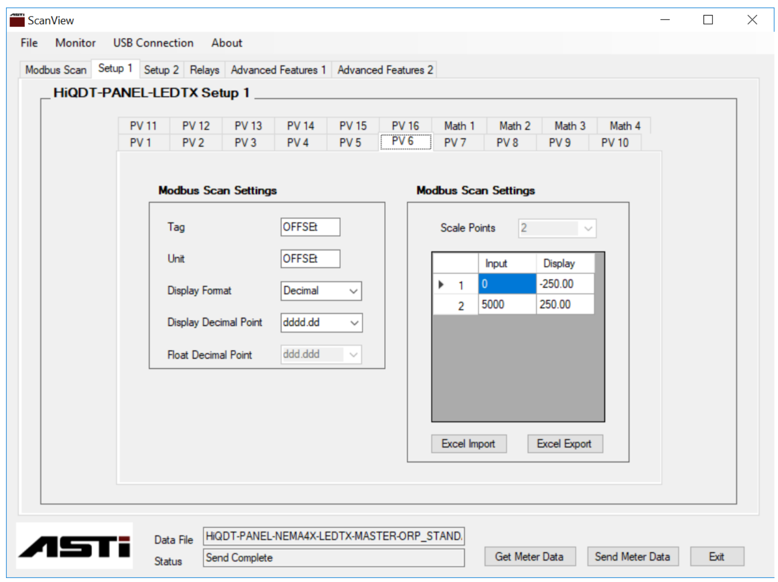
"Calibration Values for Standard Range ORP Sensors"– Page 1 of 2

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.

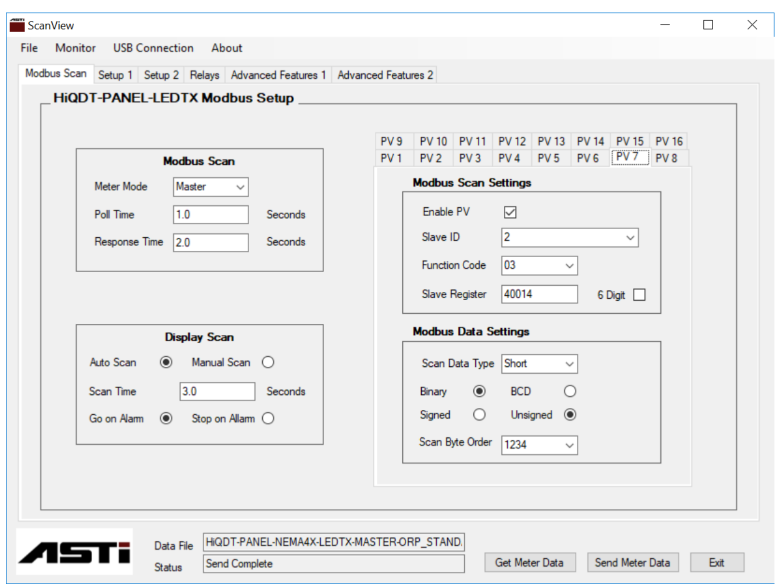


The scaling for PV6 is performed under the Setup 1 tab. The offset calibration value is sent as 0 to 5000 corresponding to engineered values of -250.0 to +250.0 mV.



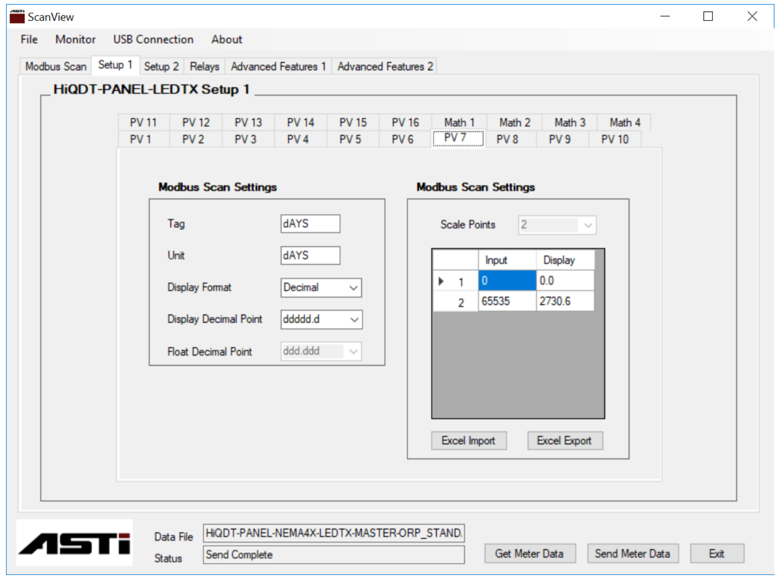
PV7 is configured to display the total days in use since the offset calibration was performed. This is read as register 40014 as an unsigned 16 bit integer.

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.

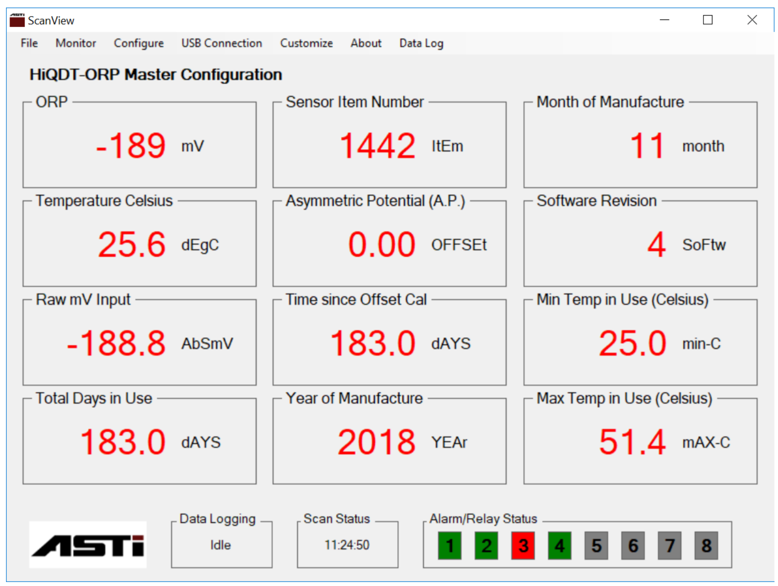


"Calibration Values for Standard Range ORP Sensors"– Page 2 of 2

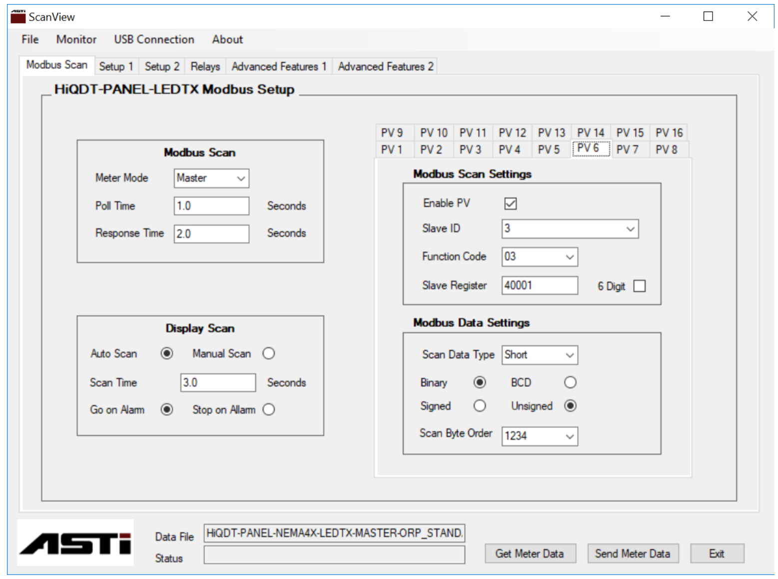
The scaling for PV7 is performed under the Setup 1 tab. The total hours in use since offset calibration was last performed is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to ~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.

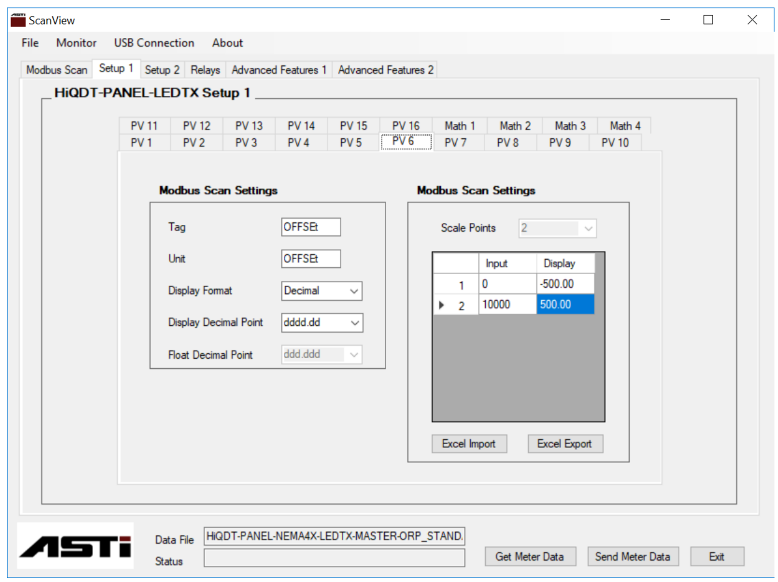


"Calibration Values for <u>Wide Range</u> ORP Sensors"– Page 1 of 2

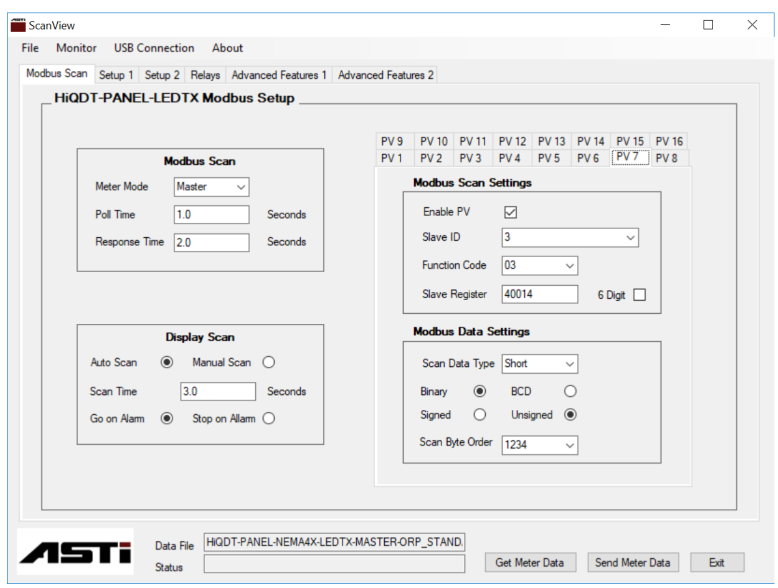


PV6 is configured to display the results from an offset calibration performed on the connected HiQDT Wide Range ORP sensor. This is read as register 40001 as an unsigned 16 bit integer.

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.

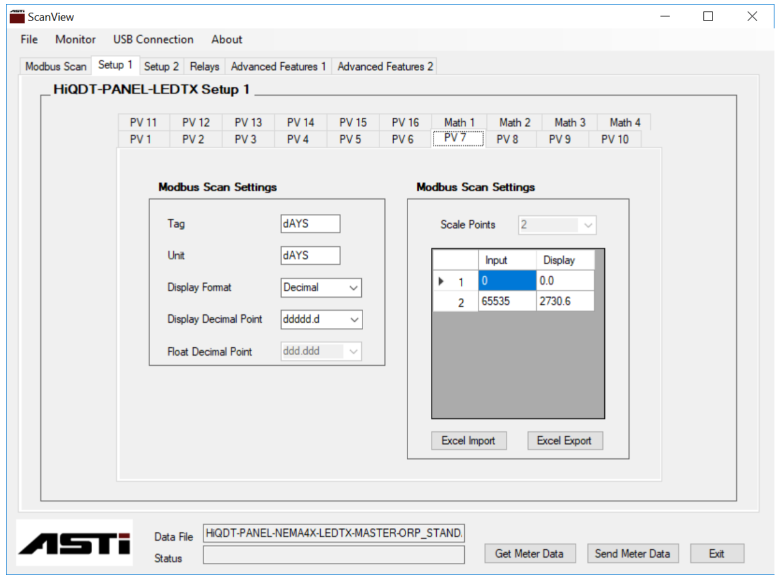


PV7 is configured to display the total days in use since the offset calibration was performed. This is read as register 40014 as an unsigned 16 bit integer.

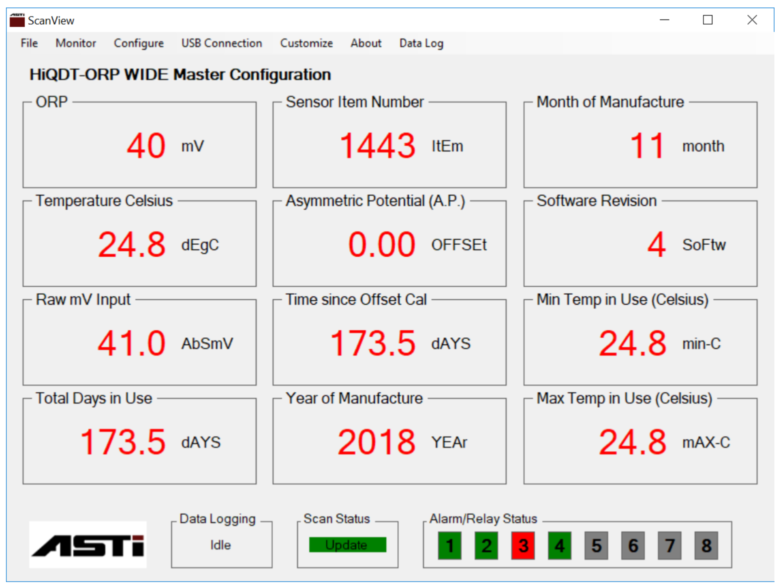
The default node address for the Wide Range ORP sensor is 3 which is what is shown in the screenshot to the right. If you have changed the node address of your sensor with the HiQDT Windows software or handheld communicator (HHC), you will need to modify the slave ID as appropriate in this screen.

"Calibration Values for Wide 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 ~7.5 years) and displayed with one decimal point.

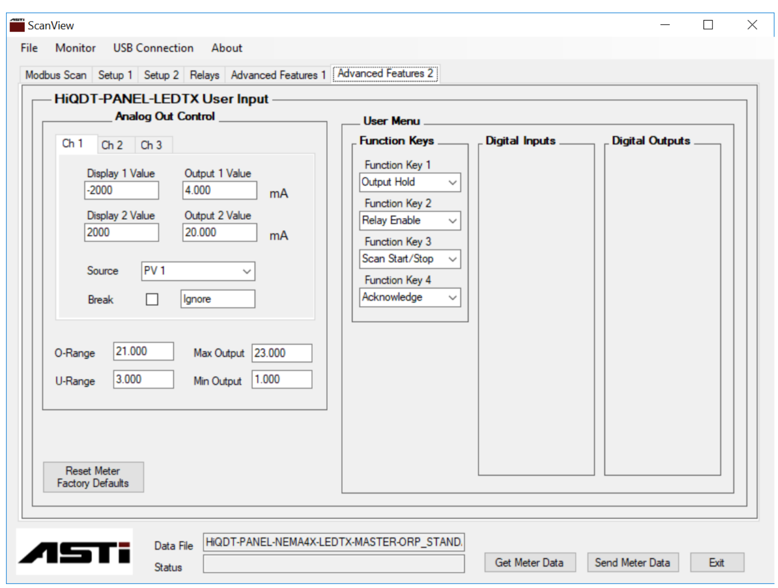


The ScanView Windows software can be used to simultaneously display all 12 PV registers from the connected HiQDT Wide Range ORP sensor in the master configuration. In addition, the process and analytic values P6 and P7 calibration type values are also displayed. Please see the display process values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

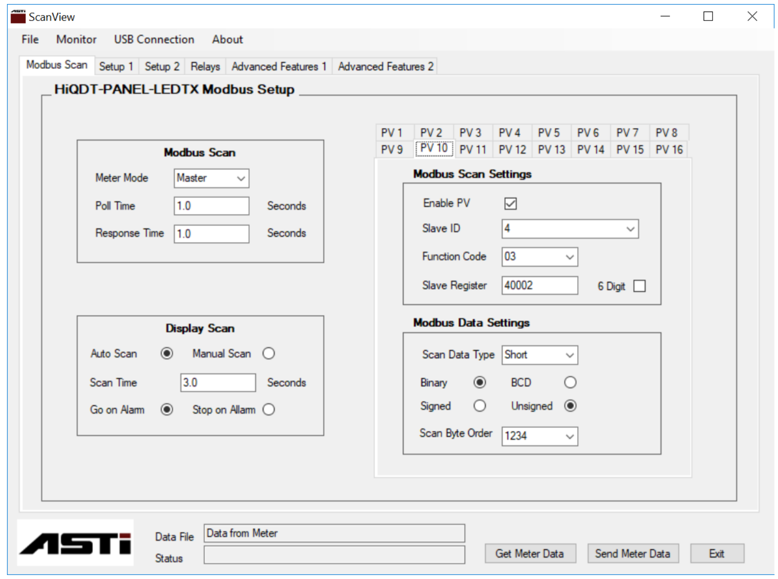
When break box is unchecked the analog output will hold last value before break occurs effectively acting as a retentive register if sensor is accidentally disconnected or loses communications.



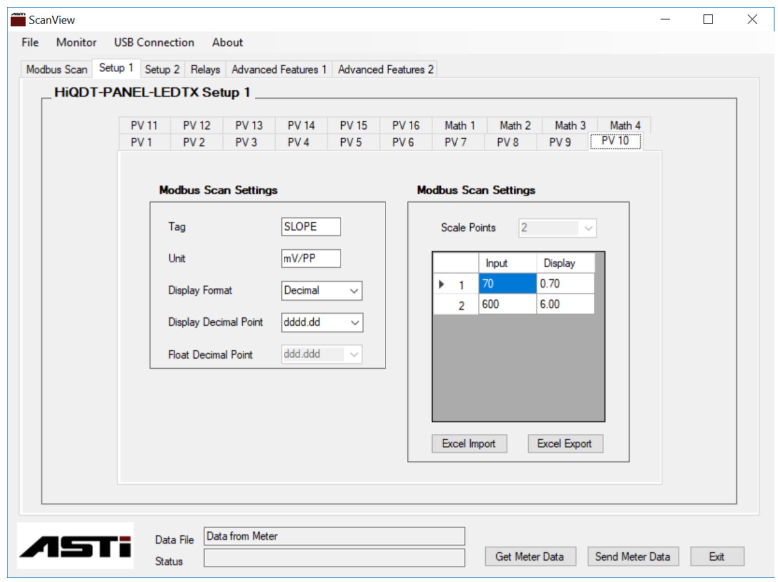
"Calibration Values for Dissolved Oxygen (D.O.) Sensors" Page 1 of 2

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.

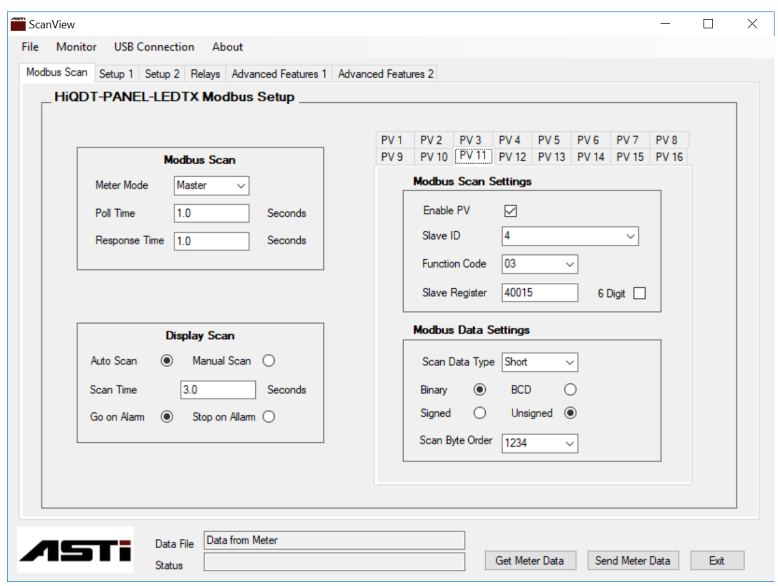


The scaling for PV10 is performed under the Setup 1 tab. The slope calibration value is sent as 70 to 600 corresponding to engineered values of 0.70 to 6.00 mV per DO ppm.



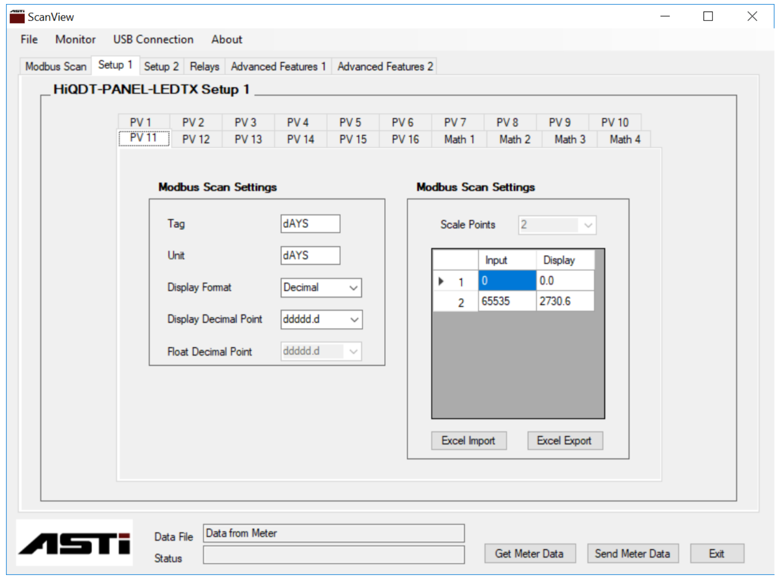
PV11 is configured to display the total days in use since the offset calibration was performed. This is read as register 40015 as an unsigned 16 bit integer.

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.



"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 ~7.5 years) and displayed with one decimal point.

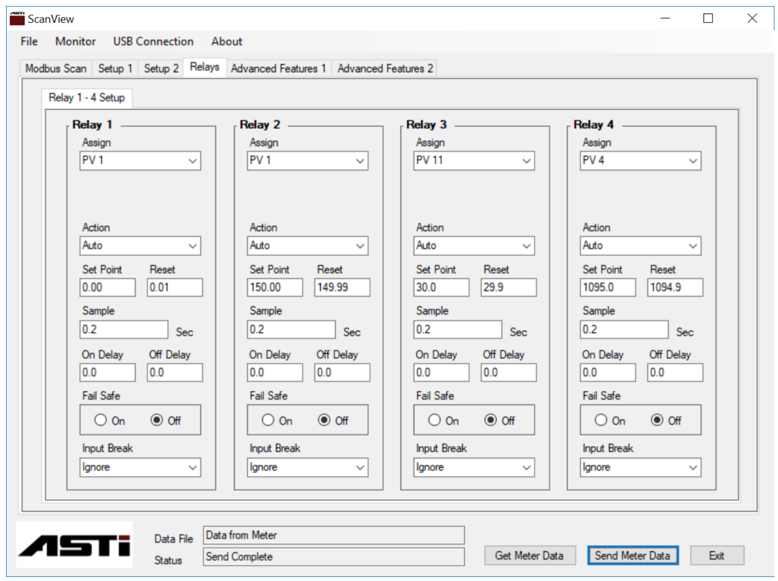


Relays can be programmed in any configuration as desired. Typical configuration shown to the right:

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.

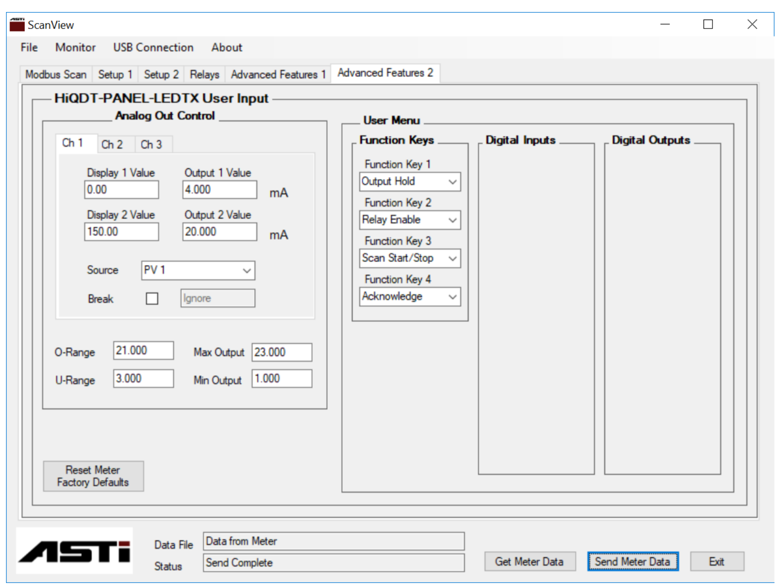
Relay 4 is setup as predictive maintenance for when a spare sensor should be ordered. For all sensor types this would be PV4 which is the total days in field use. In the example to the right 1,095 days is set as the threshold value for when a spare sensor is to be ordered. Obviously this is just an example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

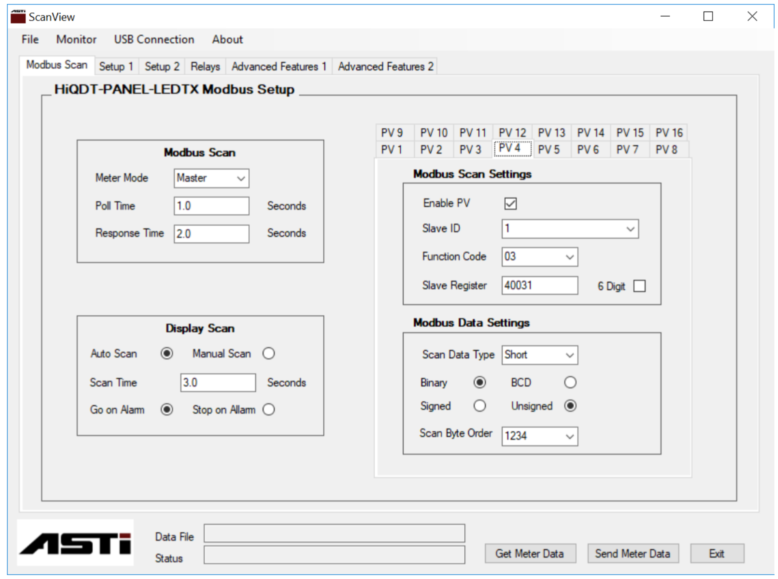
When break box is unchecked the analog output will hold last value before break occurs effectively acting as a retentive register if sensor is accidentally disconnected or loses communications.



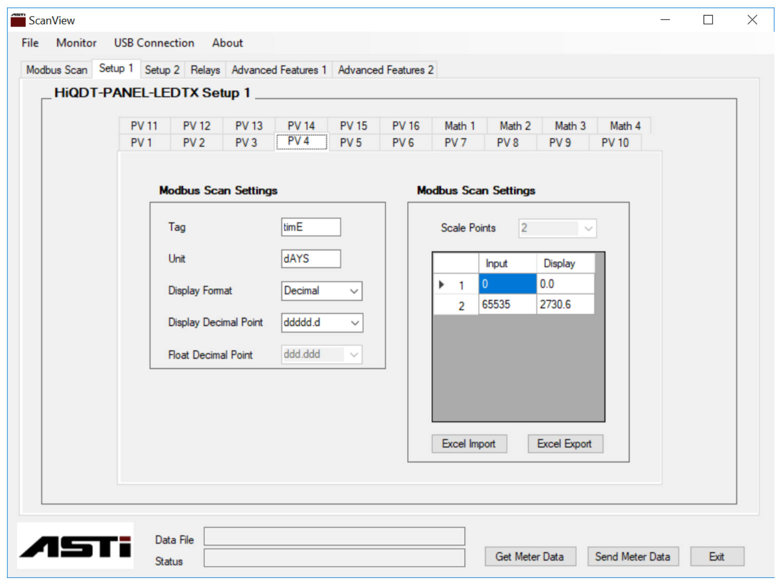
"Analytic Info Shared for ALL Sensor Types" – Page 1 of 5

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.

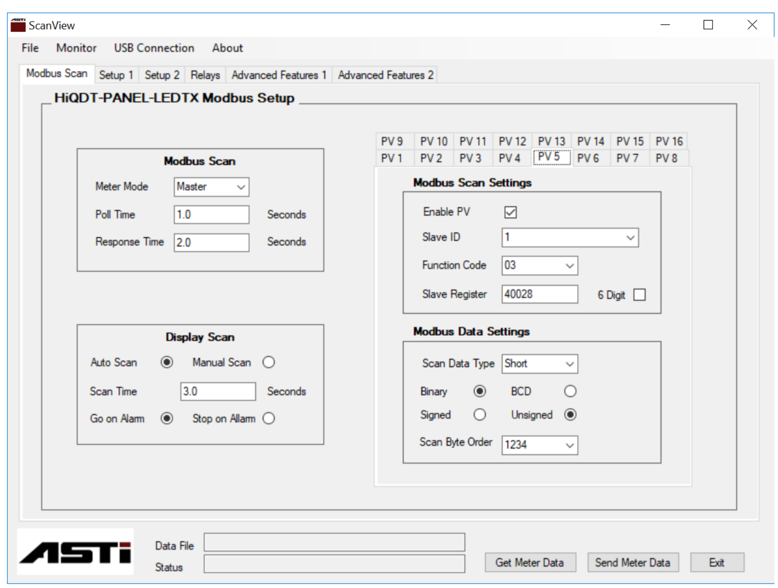


The scaling for PV4 is performed under the Setup 1 tab. The total hours in use is sent as 0 to 65,535 corresponding to engineered values of 0 hours to 65,535 hours. The total hours in use is converted into total days where 65,535 hours in use corresponds to 2,730.6 days in use (equivalent to ~7.5 years)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



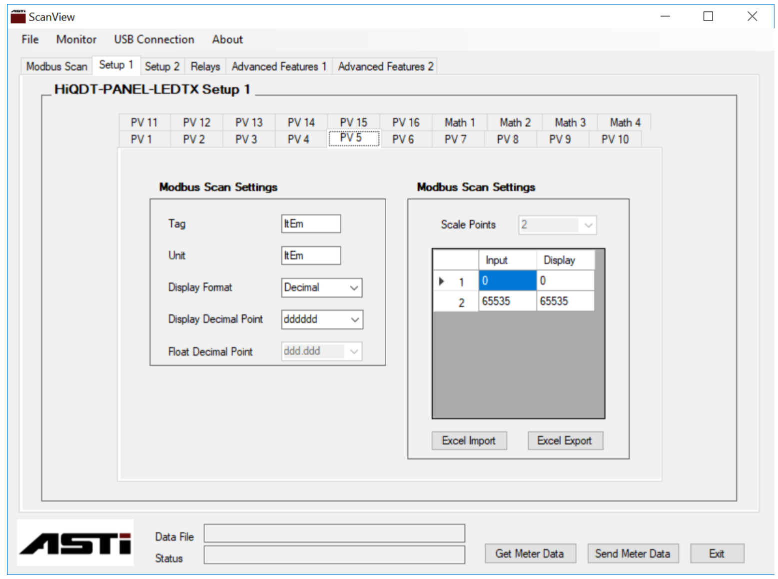
PV5 is configured to display the sensor item number of the connected HiQDT pH sensor. This is read as register 40028 as an unsigned 16 bit integer.

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.



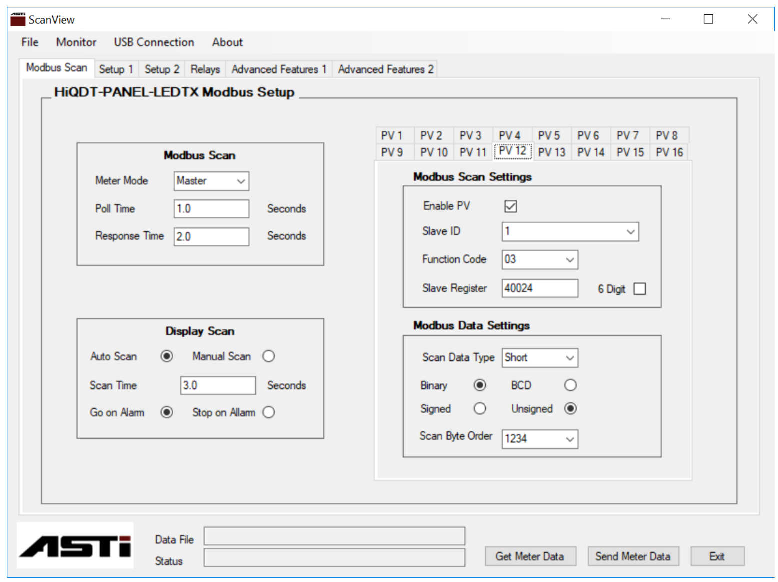
"Analytic Info Shared for ALL Sensor Types" – Page 2 of 5

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.

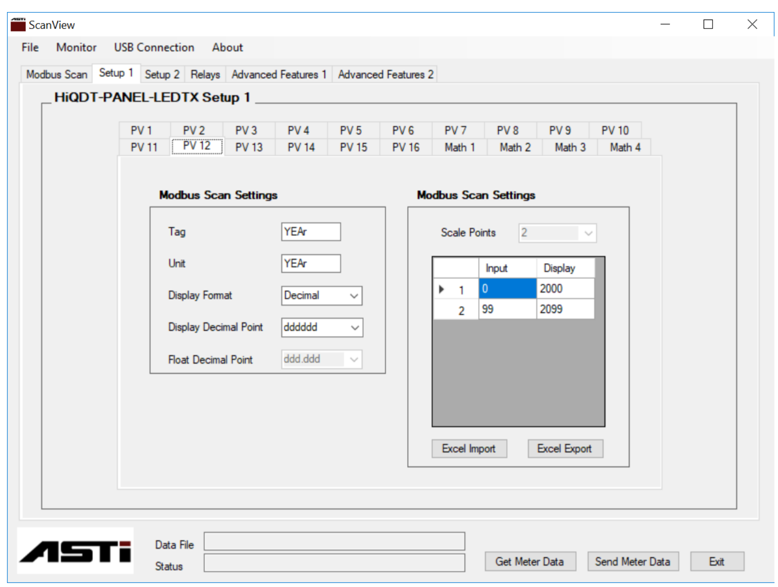


PV12 is configured to display the year of manufacture of the connected HiQDT pH sensor. This is read as register 40024 as an unsigned 16 bit integer.

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.

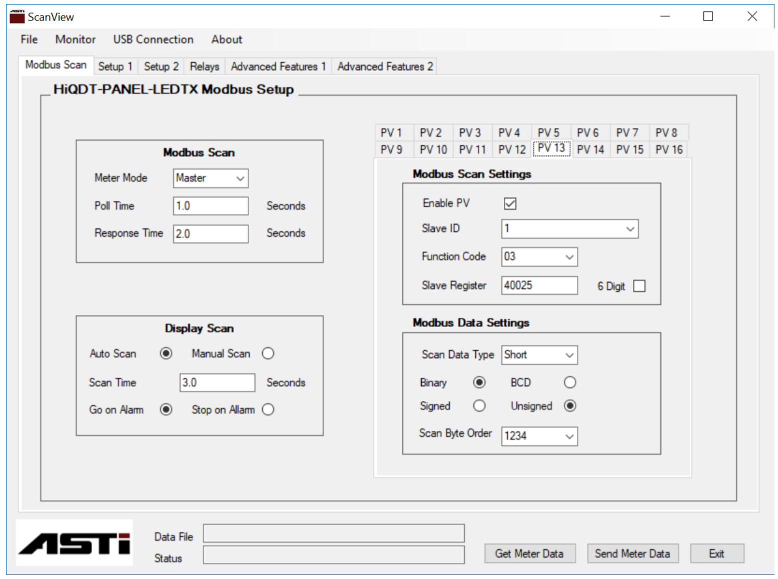


The scaling for PV12 is performed under the Setup 1 tab again. The scaling is quite simple for this register. The value of 00 corresponds to the year 2000 and the value of 99 corresponds to the year 2099.



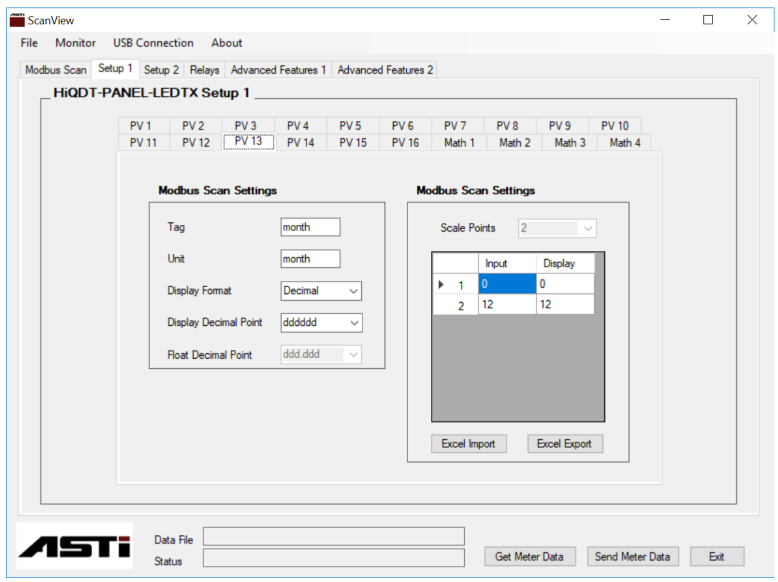
"Analytic Info Shared for ALL Sensor Types" – Page 3 of 5

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.

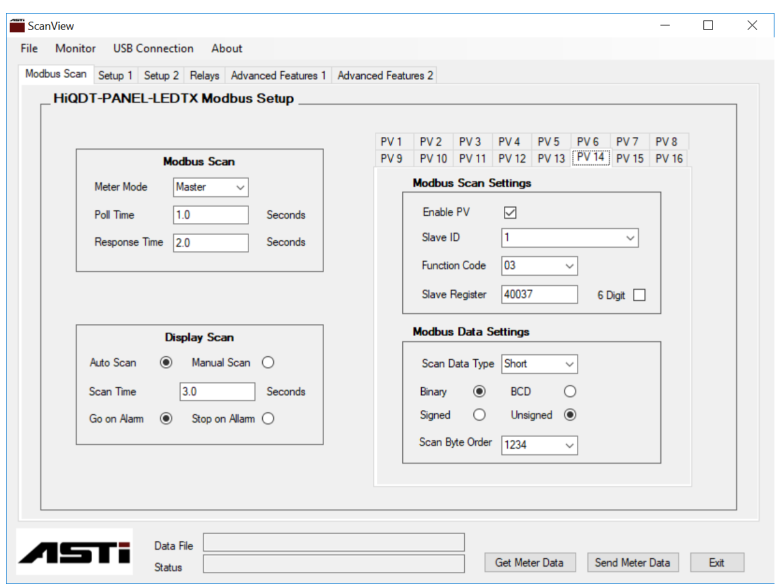


The default node address for the pH sensor is 1 which is what is shown in the screenshot to the right. If the connected sensor is Standard ORP the default node address is 2, while for Wide Range ORP the default node address is 3 and finally for dissolved oxygen (D.O.) the default node address is 4. If 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.



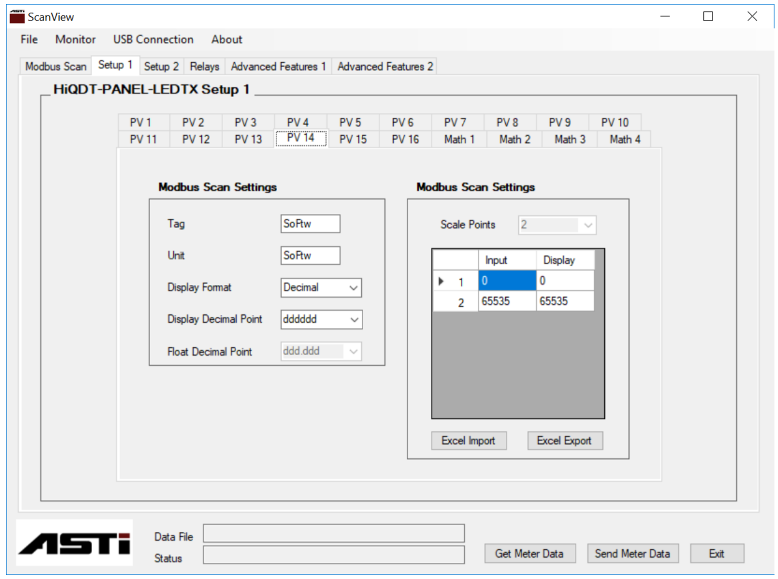
PV14 is configured to display the software revision of the connected HiQDT pH sensor. This is read as register 40037 as an unsigned 16 bit integer.



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.

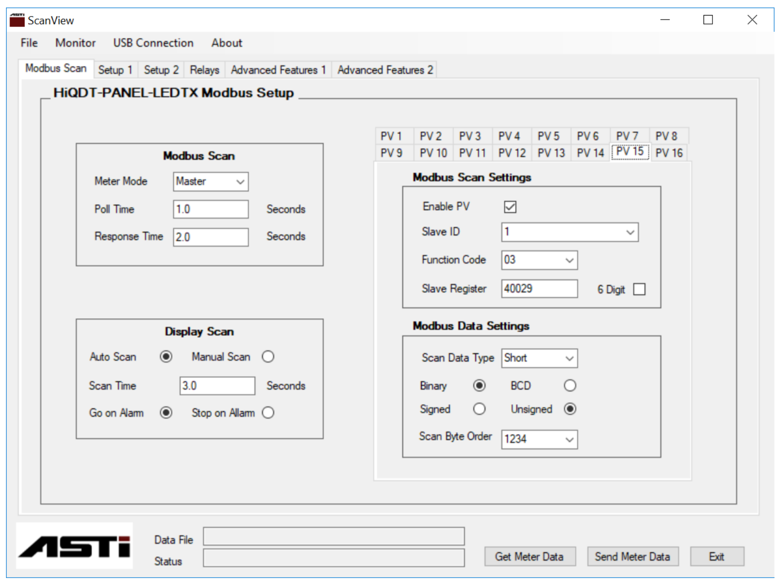
"Analytic Info Shared for ALL Sensor Types" – Page 4 of 5

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.

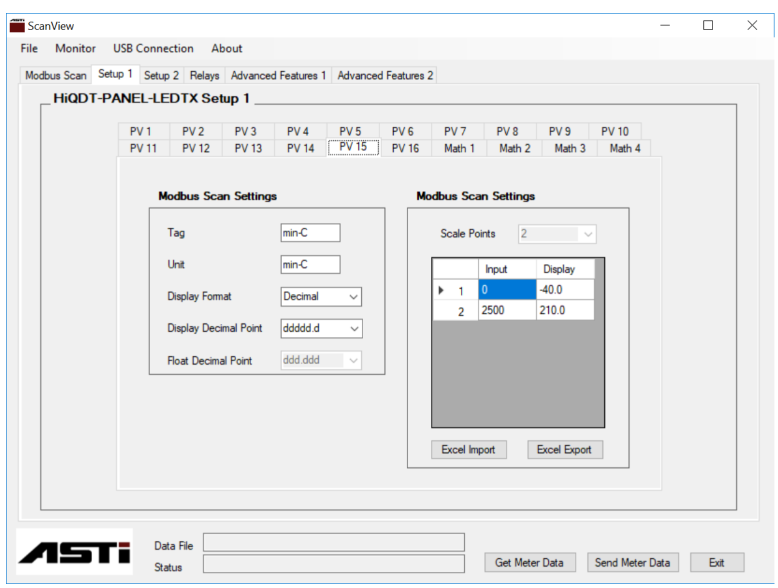


PV15 is configured to display the minimum temperature during field use of the connected HiQDT pH sensor. This is read as register 40029 as an unsigned 16 bit integer.

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.



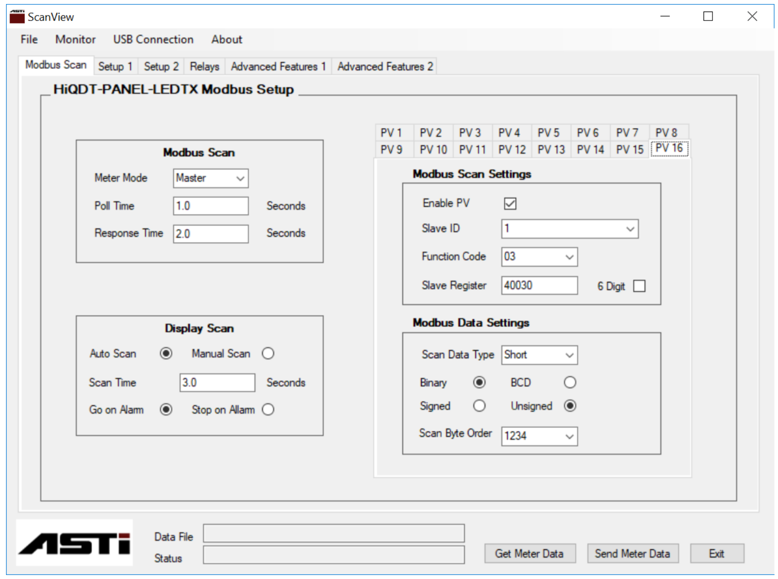
The scaling for PV15 is performed under the Setup 1 tab. The temperature value is sent as 0 to 2,500 corresponding to engineered values of -40.0 to +210.0 degrees Celsius (°C) with one decimal place.



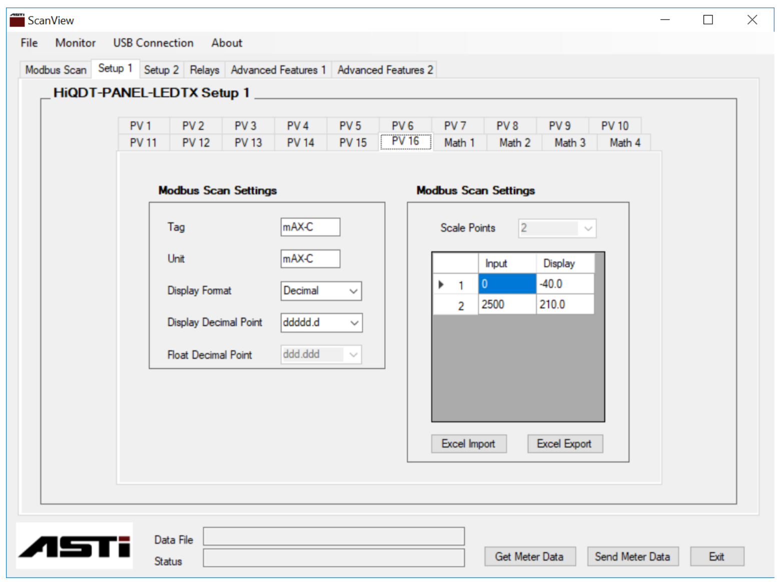
"Analytic Info Shared for ALL Sensor Types" – Page 5 of 5

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.



EXPLOSION-PROOF LEDTX CONTROLLERS IN SNOOPER CONFIGURATION

Model: **HiQDT-EX-PSAC-SNOOPER**
or
Model: **HiQDT-EX-PSDC-SNOOPER**

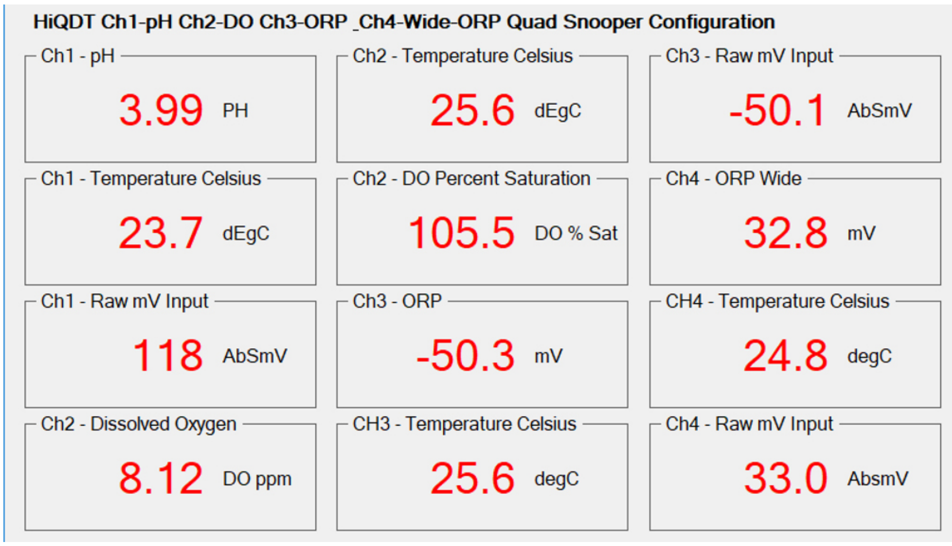
Short Description:
Explosion-Proof SNOOPER for Smart HiQDT MODBUS RTU Sensors for 85-265 VAC (-PSAC) or 12-24 VDC (-PSDC); Four SafeTouch® Buttons for operation in hazardous areas through glass without removing cover; 1 each 4-20mA output; 4 each Programmable Contact Relays; Max 1 each Sensor for Hazardous Locations; Max 8 each Sensors for Safe Areas; Up to 16 modbus registers can be scanned & displayed with configuration done with ScanView Windows Software

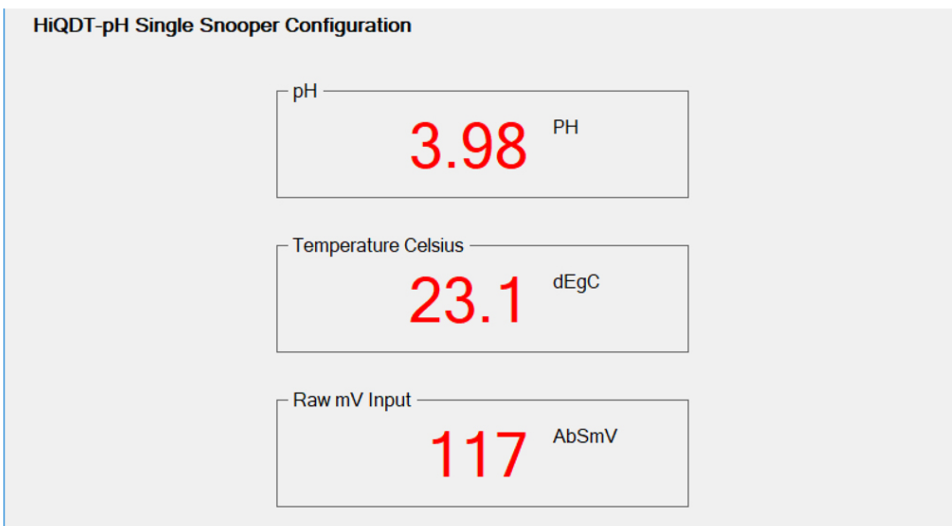
Long Description:

- **EXPLOSION-PROOF 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.
    - **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: 1 each isolated, scalable & reversible 4-20mA with trim calibrations, Max 700 Ω 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 -PSAC power configuration & 12-24 VDC power operation with -PSDC power configuration. Both power configurations always includes isolated 12VDC power to energize smart digital HiQDT MODBUS RTU sensor slaves; Max 1 each sensor can be energized in hazardous locations while up to 8 each sensors can be energized in safe non-hazardous areas. Inquire to factory assistance with commissiong scheme.
- CERTIFICATIONS: See Page 1 of this guide for a listing of all agency approvals and hazardous location ratings

** 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





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

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

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

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™ 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.

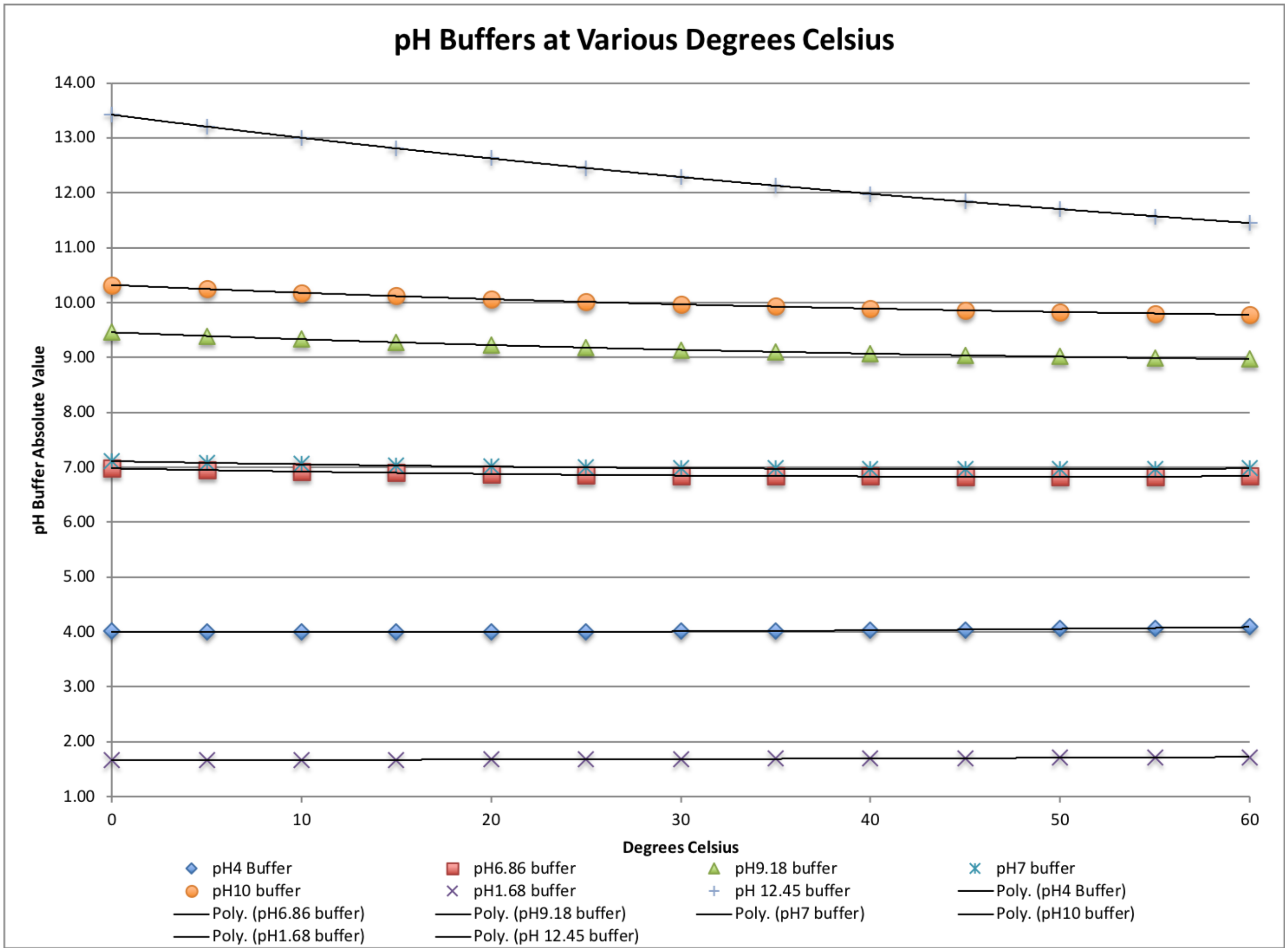
NOTE: ASTI HiQDT touchscreen controller software automatically corrects for temperature induced change to buffer to compute the exact pH value of buffer automatically when calibrations are performed with autobuffer calibration mode. Exact pH value of the buffer at the current temperature obtained from 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 relativley 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 coefficient. Contact the ASTI factory for assistance with such situations requiring special 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.

APPENDIX "D"

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.

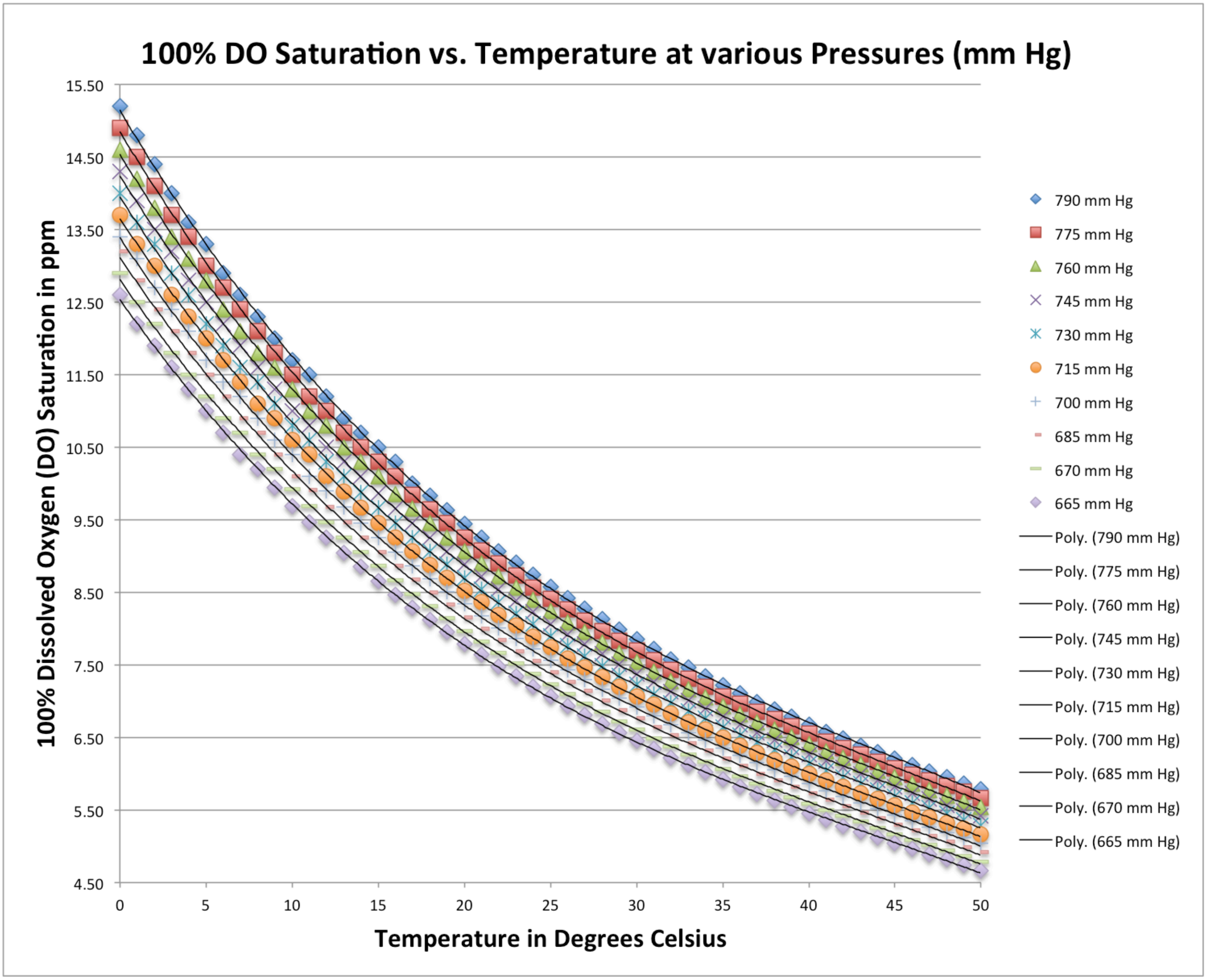
GENERAL BEST PRACTICE COMMENTS FOR CALIBRATION WITH pH BUFFERS

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.

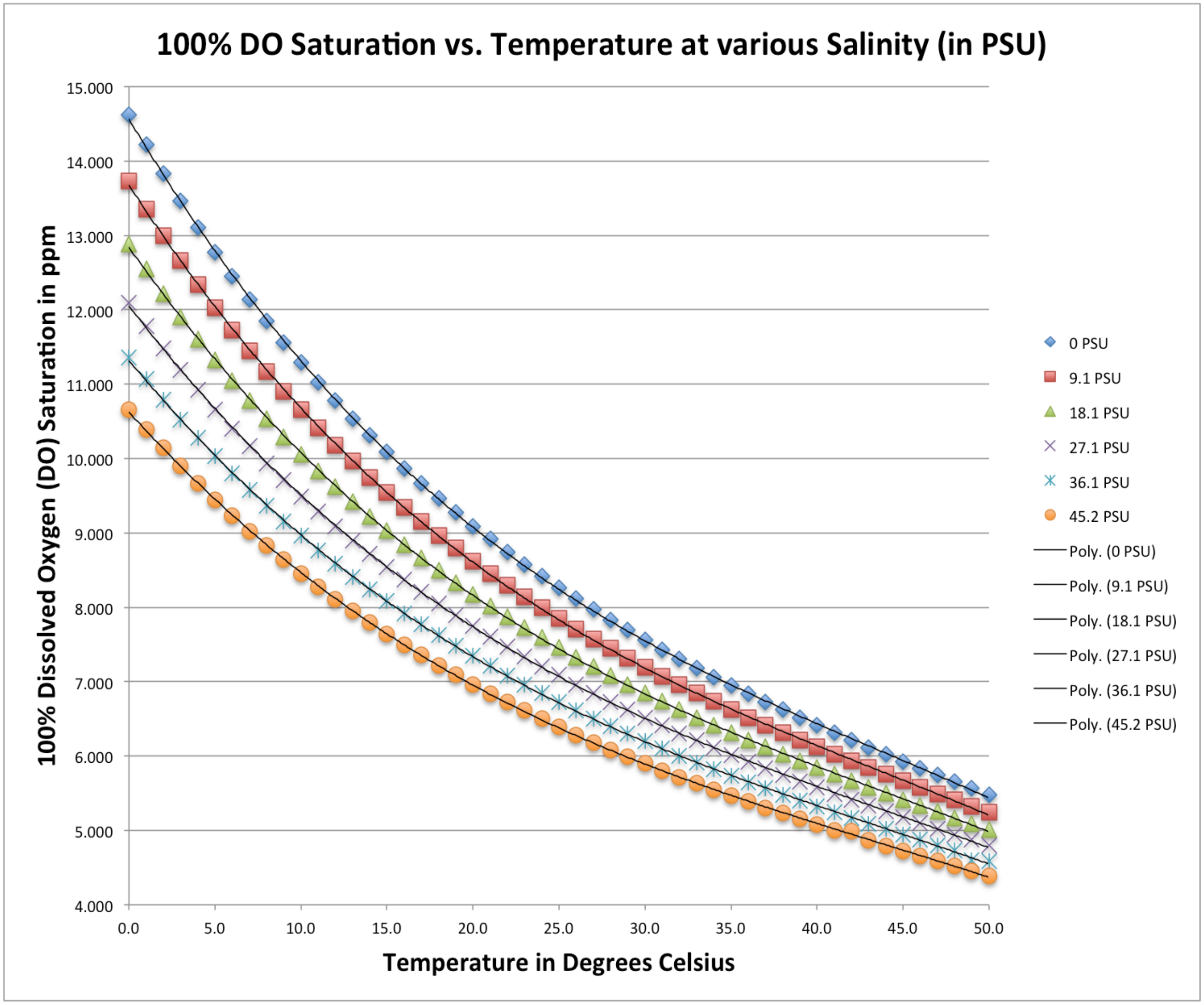


For the calibration function, either the field condition should be 100% relative humidity for best accuracy or else the sensor should be suspended dry in air but over a water source to simulate locally the 100% relative humidity condition. The water molecule in air (humidity) is then saturated with oxygen 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.

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.

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)

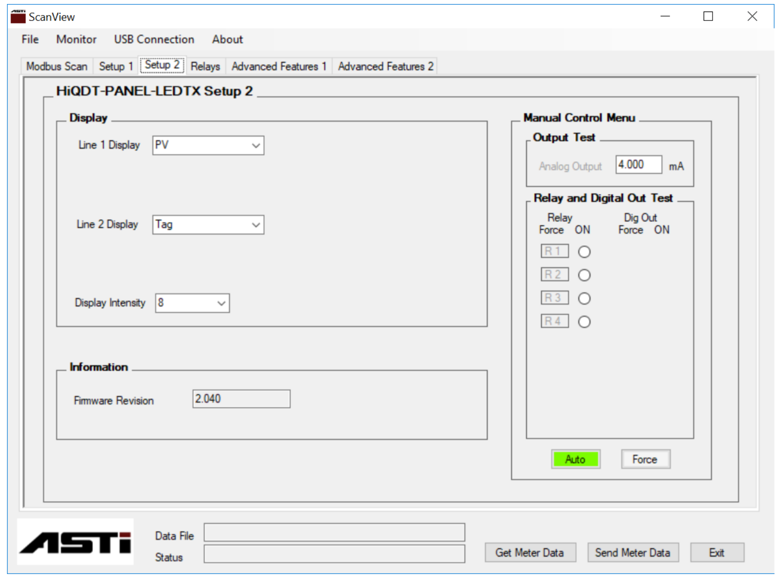
- Absolute Raw mV value
- Month & year of manufacture for sensor
- Sensor Serial Number (unique traceability for each sensor)
- Sensor Item Number (unique identifier for all aspects of sensor configuration)
- Total time in field use (recorded in hours)
- Minimum & Maximum temperature in field use

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

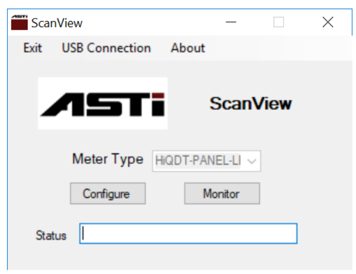
"Core LED Display Configuration Setup"

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.

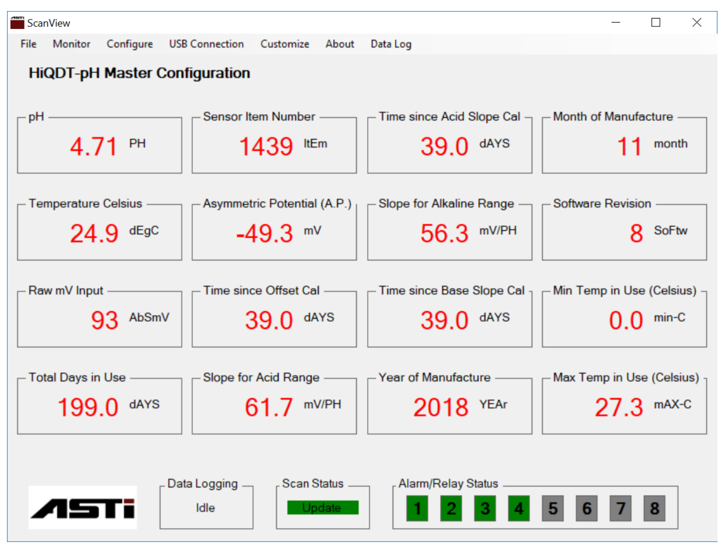


"Datalogging with ScanView Software"

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	pH	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	98	AbSmV
9/6/19 4:00	pH	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	97	AbSmV
9/6/19 4:00	pH	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	98	AbSmV
9/6/19 4:00	pH	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pH	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pH	4.29	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pH	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	99	AbSmV
9/6/19 4:01	pH	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	97	AbSmV
9/6/19 4:01	pH	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	95	AbSmV
9/6/19 4:01	pH	4.3	PH	Temperature Celsius	25.5	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:03	pH	4.68	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:04	pH	4.67	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	93	AbSmV
9/6/19 4:04	pH	4.66	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:04	pH	4.66	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	93	AbSmV
9/6/19 4:04	pH	4.66	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:04	pH	4.67	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	93	AbSmV
9/6/19 4:04	pH	4.69	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	95	AbSmV
9/6/19 4:05	pH	4.65	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:05	pH	4.68	PH	Temperature Celsius	24.6	dEgC	Raw mV Input	96	AbSmV
9/6/19 4:05	pH	4.65	PH	Temperature Celsius	24.9	dEgC	Raw mV Input	95	AbSmV
9/6/19 4:05	pH	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
9/6/19 4:00	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:00	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:00	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:00	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:01	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:01	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:01	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:01	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:01	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:01	Total Days in Use	209.4	dAYS	Sensor Item Number	1418	ItEm	Asymmetric Potential (A.P.)	-54.6	mV
9/6/19 4:03	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:04	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:04	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:04	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:04	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:04	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:04	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:05	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:05	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:05	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric Potential (A.P.)	-49.3	mV
9/6/19 4:05	Total Days in Use	199	dAYS	Sensor Item Number	1439	ItEm	Asymmetric 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
9/6/19 4:00	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:00	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:00	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:00	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:01	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:01	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:01	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:01	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:01	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:01	Time since Offset Cal	49	dAYS	Slope for Acid Range	56.1	mV/ PH	Time since Acid Slope Cal	49	dAYS
9/6/19 4:03	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:04	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:04	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:04	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:04	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:04	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:04	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:05	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:05	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:05	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid Slope Cal	39	dAYS
9/6/19 4:05	Time since Offset Cal	39	dAYS	Slope for Acid Range	61.7	mV/ PH	Time since Acid 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
9/6/19 4:00	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:00	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:00	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:00	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:01	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:01	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:01	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:01	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:01	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:01	Slope for Alkaline Range	56.6	mV/ PH	Time since Base Slope Cal	49	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:03	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:04	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:04	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:04	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:04	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:04	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:04	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:05	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:05	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:05	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr
9/6/19 4:05	Slope for Alkaline Range	56.3	mV/ PH	Time since Base Slope Cal	39	dAYS	Year of Manufacture	2018	YEAr

"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
9/6/19 4:00	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:00	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:00	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:00	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	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		
9/6/19 4:01	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:01	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:01	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:01	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:01	Min Temp in Use (Celsius)	18.1	min-C	Max Temp in Use (Celsius)	33	mAX-C			Off	On	On	On		
9/6/19 4:03	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:04	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:04	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:04	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:04	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:04	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:04	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:05	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:05	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:05	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		
9/6/19 4:05	Min Temp in Use (Celsius)	0	min-C	Max Temp in Use (Celsius)	27.3	mAX-C			Off	Off	Off	Off		