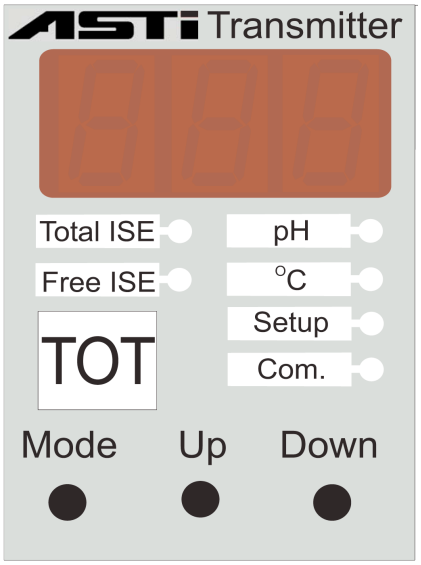
3TX–TOT pH Compensation Module for Total ISE

* The 3TX-TOT module determines Total ISE by using a compensation algorithm using Free ISE, pH and temperature as the primary process inputs
* Total ISE can at present be found for Ammonia ($NH_3 + NH_4^+$), Fluoride ($HF + F^-$), Cyanide ($HCN + CN^-$) and Sulfide ($HS^- + S^{2-}$)
* Total ISE computed is sent via 0/4-20mA analog output which is galvanically isolated from sensor inputs for use with mating data acquisition or controls
* Input 1 is always Free ISE and Input 2 is always pH
* Input 3 (Aux) can be for any pH, ORP, ISE, DO or Conductivity measurement
* All inputs and the computed total ISE are sent RS-485 MODbus digital outputs
* The analog inputs can be sent on to other data acquisiton and control devices
* Highly configurable set of user parameters always almost any input configuration to be supported and the total ISE output to be highly customized
* Temperature input can be obtained from splicing P100/Pt1000 TC input from ISE or pH sensor, from a separate Pt100/Pt1000 temperature sensor, or else from a scaled 4-20mA signal from a separate transmitter



FEATURES

The ASTI 3TX Family of Transmitters Consists Of:

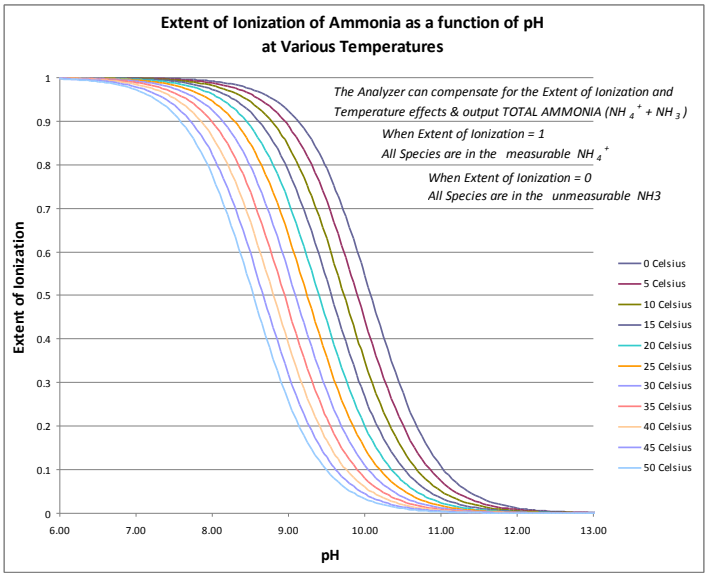
3TX-HiQ-pH: Intelligent Transmitter for Smart Digital pH/ORP Sensors; 4-20mA & MODBUS output standard
3TX-pH: pH, ORP/mV and Temperature Transmitter with fully scalable 0/4-20mA output and MODbus (optional)
3TX-CON: Contacting Conductivity Transmitter with fully scalable 0/4-20mA output and MODbus (optional)
3TX-ISE: Ion Selective * Transmitter with fully scalable 0/4-20mA output and MODbus (optional)
3TX-DO: Dissolved Oxygen Transmitter with fully scalable 0/4-20mA output and MODbus (optional)
3TX-TEM: Adds scalable 4-20mA output of Temperature to 3TX-pH, 3TX-ISE, 3TX-CON or 3TX-DO transmitter.
3TX-REL: Alarm & relay controller (On/Off, TPC, PFC) for pH/ORP, ISE, DO & Conductivity measurement modules
3TX-TOT: Compute pH compensated "Total ISE" from ISE & pH analog inputs, 0/4-20mA analog & MODbus outputs
3TX-DAT: Datalogger & MODbus Master for up to 63 each 3TX transmitter modules with RS485 MODbus output

The 3TX family has a 3 digit display and 6 LEDs for setup and displaying values. The 'Mode' key is used to navigate.

Programming

The module is programmed by 3 keys on the front panel. The 'Mode' toggles and the 'Up' or 'Down' scroll through parameters. The parameter is altered via the 'Mode' and the value is changed using the 'Up' or 'Down'. **Parameter P01 is a "lock" which must be set to 'Off' to change ANY parameter, including the temperature calibration.**

** Ion selective measurement must be validated by ASTI factory prior to order. 3TX-ISE sold only as part of complete ISE system with mating ISE sensor.*



The graph above shows the effects of pH and temperature on the extent of ionization for the weak base, ammonia. The dissolved ammonia gas is converted into the ionized ammonium ion, which is measured by the ISE sensor. The extent of ionization reveals the percent of the weak base which can be measured. When the extent of ionization is 1.00, then 100% is in the measurable form. When the extent of ionization is 0.00, then 0% is in the measurable form. The 3TX-TOT module is able to compute, display and transmit what would be 100% of the weak acid or base activity, even if only a small fraction is actually in the measurable form. The following pages explain how this pH compensation is performed continuously in real time.

TECHNICAL SPECIFICATIONS

Mechanical

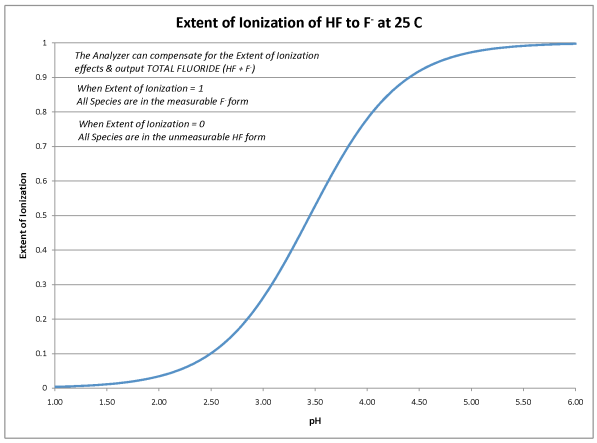
Housing:	Lexan UL94V-0 (Upper part) Noryl UL94V-0 (Lower part)
Mounting: IP	M36 for 35 mm DIN rail
Class:	Housing IP40. Connector IP20
Connector:	Max 16A. Max 2.5 mm², Max torque 0,6 Nm
Temp.:	Usage -15 to +50 °C (Storage -35 to +75 °C)
Weight:	200 grams (7.05 ounces)
Dimensions:	D 58 x W 36 x H 86 mm (2.3" X 1.4" X 3/4")

Electrical

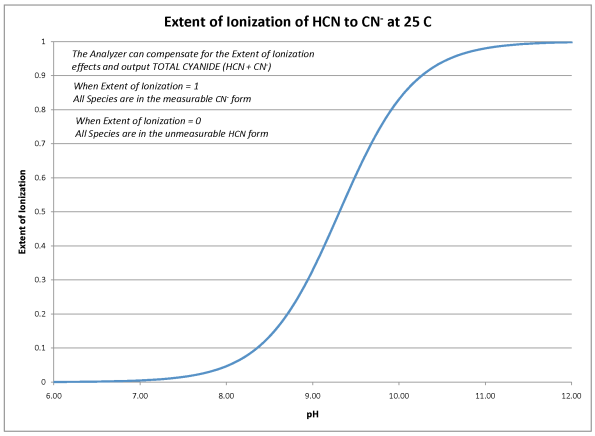
Power Supply:	24Vdc ±10%
Consumption:	60 mA max
Input Current:	0-20mA or 4-20mA, max. 250Ω
Accuracy:	Class 1%
Analog Output:	0-20mA or 4-20mA, max. 300Ω
Serial Port 1:	RS485, 9.6/19.2 K Baudrate
CE mark	EN61326A

RoHS COMPLIANT

The graphs to the right show the impact of pH on the extent of ionization of various weak acids as a function of pH. Unlike the graph on the first page for the conversion of the weak base ammonia to ammonium ion as function of pH shown at various temperatures, all of the graphs to the right are shown at a single temperature for a more simple visualization of these effects at the common 25 degrees Celsius condition. A short explanation of the chemistry behind the pH compensation to compute total ISE that the 3TX-TOT performs is below to understand the conditions under which this module should be used with the 3TX-ISE and 3TX-HiQ-pH/3TX-pH transmiters.



The extent of ionization defines the percent of the species of interest for the weak base (typically ammonia) or the weak acid (typically HF, HCN or HS-) is converted into the form which te ion selective sensor can detect, which is the free ionized species. On the vertical axes this extent of ionization is 0.00 when none of the species is in the measurable form for the ion selective sensor. In such cases, it is not posssible to use pH compensation is not possible since none of the species can be measured by the ISE sensor at all. When the extent of ionization is 1.00 then all of the weak base or weak acid is in the ionized form that can be detect by the ISE sensor and so not pH compensation is required. For example, all of the NH_3 gas is in the NH_4^+ ion form all of the HF gas is in the F^- ion form, all of the HCN gas is in the CN^- ion form and all of the HS^- ions is in the measurable S^{2-} ion form. The portion which is in the measurable form at that given pH and temperature (the extent of ionization) is called the "Free ISE". The "Total ISE" computed by the 3TX-TOT module is the value computed as though all 100% were in the measurable form. An simple example is given below for the purposes of illustration:

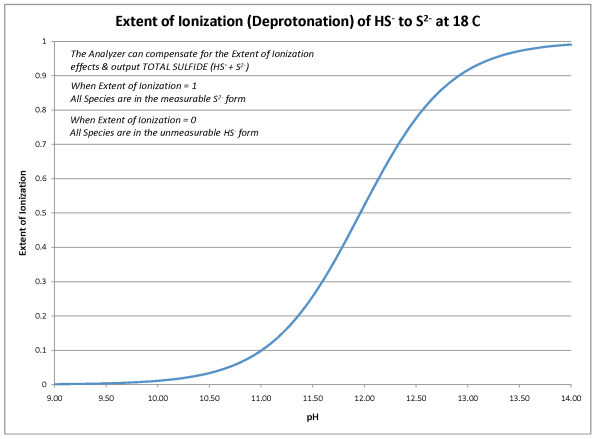


Samples conditions are Temp: 25.0 °C, pH: 3.45

The extent of Ionization at this pH and temperature for the HF/F- system is 0.50

Free ISE: 35.0 ppm Fluoride (F-), Computed Total ISE: 70.0 ppm Fluoride (F-)

The 3TX-TOT module uses built-in algorithms to compute the extent of ionization for the system of interest (NH_3, HF, HF or HS) at the current pH and temperature. The Total ISE is found by simply taking the Free ISE and diving it by this computed extent of ionization. The resulting Total ISE shows what would be the ion activity detected if all of the species where at a condition such that they were in the measurable form.



For the 3TX-TOT module, Input 1 shall always be the Free ISE and Input 2 shall always be the pH to be used for compensation (analog input from 3TX-HiQ-pH or 3TX-pH transmitter). If the pH input is not available or constant, the pH value used can be entered manually in parameter P28, when P27 is set to manual (Set) pH mode. The temperature input used for the pH compensation algorithm can be obtained from a spliced Pt100 or Pt1000 TC element (obtained from the ISE or pH sensor), a separate Pt100/Pt1000 temp. probe, or else a 4-20mA signal from a temperature transmitter. In all cases the temperature input is always connected as Input 3. There is an optional support for a fourth input on the 3TX-TOT module. This is often an ion selective measurement that does not require pH compensation, an additional pH/ORP measurement, or else a conductivity measurement. All input measurements as well as the computed Total ISE value can be sent for further use in other data acquisition or control devices via analog 0/4-20mA outputs and MODbus RS-485 digital output. The wiring schematics on the fourth page detail all of the supported input configurations whereas the set of configurable parameters on page 3 details all of the supported modes and options available in the module.

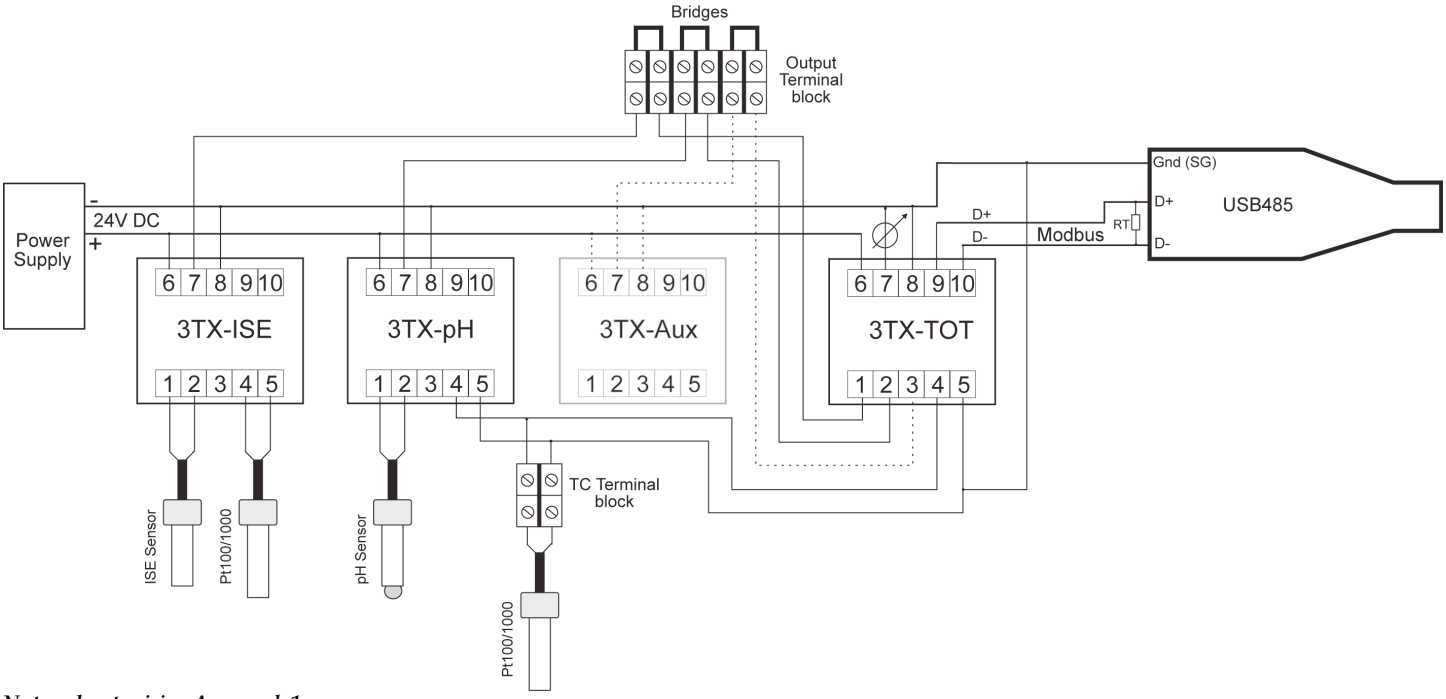
If the 3TX-TOT module was purchased part of a complete 3TX field assembly, then the user parameters will have been preconfigured at the ASTI factory in the must suitable manner possible based upon the information provided. As such, quite often very few of the parameters may need to be modified to begin using your 3TX-TOT module.

List of Parameters for Function and Programming

No	Parameter	Description	Range	Default
P01	Lock	Software Lock	On / Off	On
P02	Address	Address on MODbus	Off, 1…247	Off
P03	Input 1 - Free ISE	Free ISE Analog Input	Off, 4-20mA, 0-20mA	4-20mA
P04	Free ISE Range	Select 3TX-ISE Free ISE Input	Lo (0-10), Mi (0-100), Hi (0-999)	Lo
P05	0/4mA Scale - Free ISE	Reading @ 0/4mA	-	-
P06	20mA Scale – Free ISE	Reading @ 20 mA	-	-
P07	Input 2 - pH	pH for compensation	Off, 4-20mA, 0-20mA	4-20mA
P08	0/4mA Scale - pH	Reading @ 0/4mA	-	-
P09	20mA Scale – pH	Reading @ 20 mA	-	-
P10	Input 3 - Temp	Temperature Mode	Manual (Set) or Automatic (Aut)	Set
P11	Manual Temp	Sets the Operating Temp if P10 is Set	0…105	25
P12	Temp Mode	Sets the temperature input mode	Splice, Raw, 4-20mA	Splice
P13	TC Input Select	Temp Input if P12 is Splice or Raw	Pt100 or Pt1000	Pt1000
P14	Input 3 – Configure	Select Analog Input 3	Off, 4-20mA, 0-20mA	Off
P15	Input 3 - Variable	Type of Input Measurement	Temp, pH, ORP/mV, CON, ISE	ISE
P16	Input 3 - ISE Range *(If P15 is ISE)*	Select Working Input Range on 3TX-ISE Input 3	Lo (0-10), Mi (0-100), Hi (0-999)	Lo
P17	Input 3 – Conductivity Cell Constant	Select Conductivity Cell Constant and Associated Full Scale Range	0.01, 0.1, 1.0, 2.0, 10.0 *(If P15 is CON)*	1.0
P18	Input 3 – ORP/mV	Set ORP/mV Scaling *(If P15 is ORP)*	±1000, -1000 to 0 or 0 to +1000	±1000
P19	Input 3 – 0/4mA Scale	Reading @ 0/4mA	-	-
P20	Input 3 – 20mA Scale	Reading @ 20mA	-	-
P21	Display Input 3	Displays Real-Time Input 3 Reading	Temp, pH, ORP/mV, CON or ISE	Off (None)
P22	Type of pH Compensation	Select the Type of pH compensation to be performed	**Total Ammonia (nh3), Total Fluoride (hF), Total Cyanide (hcn) & Total Sulfide (hS)**	Depends on Request at Time of Order
P23	Type of Total ISE Output	Select 0-20mA or 4-20mA Output	4-20mA, 0-20mA	4-20mA
P24	Scaling for 0/4-20mA Total ISE Output	Select Working Output Range on Computed Total ISE Output	Lo (0-10), Mi (0-100), Hi (0-999)	Hi
P25	0/4mA Scale-Total ISE	Reading @ 0/4mA	-	-
P26	20mA Scale-Total ISE	Reading @ 20 mA	-	-
P27	Set pH Compensation Mode	Set Automatic or Manual pH Input Mode	Automatic (Aut) or Manual (Set)	Automatic
P28	Manual pH Value	User entry of pH value in Manual Mode	0.00 to 14.00	7.00
P29	Trim Low Input 1	0/4mA Offset Calibration for Input 1	As Defind by Free ISE Measurement	-
P30	Trim High Input 1	20mA Gain Calibration for Input 1	As Defind by Free ISE Measurement	-
P31	Trim Low Input 2	0/4mA Offset Calibration for Input 2	As Defind by pH Measurement	-
P32	Trim High Input 2	20mA Gain Calibration for Input 2	As Defind by pH Measurement	-
P33	Trim Low Input 3	0/4mA Offset Calibration for Input 3	As Defind by Input 3 Configuration	-
P34	Trim High Input 3	20mA Gain Calibration for Input 3	As Defind by Input 3 Configuration	-
P35	Trim Low Output	0/4mA Offset Cal for Output (Total ISE)	As Defind by P23, P24, P25 & P26	-
P36	Trim High Output	20mA Gain Cal for Output (Total ISE)	As Defind by P23, P24, P25 & P26	-
P37	Baudrate	MODbus	9,600/19,200	19,200
P38	Back to Default	Reset to Default	Def=Reset, Par=No Reset	Par

Par. no. 1 is a "lock" which must 'Off' to change ANY parameter.
Par. no. 2 sets module's address for MODbus communication.
Par. no. 3 sets Free ISE input to be 0-20mA or 4-20mA (P08 on 3TX-ISE).
Par. no. 4 sets Free ISE input to low, mid or high. This should match P09 on the 3TX-ISE transmitter that is used for the Free ISE input.
Par. no. 5 defines value of 0/4mA input for free ISE. This value should be adjusted to match P10 on 3TX-ISE module to which is it connected.
Par. no. 6 defines value of 20mA input for free ISE. This should match P11 on 3TX-ISE. P05 & P06 must be at least 20% of the operating range (P09 on the 3TX-ISE).
Par. no. 7 sets pH input to be 0-20mA or 4-20mA (P11 on 3TX-pH).
Par. no. 8 defines the value of 0/4mA input for pH. This value should be adjusted to match P13 on 3TX-pH module to which is it connected.
Par. no. 9 defines the value of 20mA input for pH. This value should be adjusted to match P14 on 3TX-pH module to which is it connected. The minimum difference between P08 and P09 when is at least 3 pH units.
Par. no. 10 sets temperature for pH compensation in auto or manual mode.
Par. no. 11 defines temperature when P10 is set (in manual mode).
Par. no. 12 sets temperature input mode when P10 is Auto. When in Splice or Raw Pt100/Pt1000 mode, this signal is gained from Input 3/Ground. When in 0/4-20mA temperature input mode, this signal is gained from Input 3/Ground and P13 must be set to Temperature. If P10 is manual, all temperature inputs are ignored.
Par. no. 13 sets Pt100 or Pt1000 TC input (if P12 is Splice or Raw mode).
Par. no. 14 sets 0-20mA or 4-20mA mode for Input 3.
Par. no. 15 sets types of signal to be provided on Input 3 to Temp, pH, ORP/mV, CON, or ISE. If P12 is 4-20mA then this must be set to Temp.
Par. no. 16 selects ISE Input 3 to low, mid or high when P15 is set to ISE. This should match P09 on the 3TX-ISE transmitter that is used as Input 3.
Par. no. 17 selects cell constant used on sensor for 3TX-CON Input 3 when P15 is set to CON (Conductivity).
Par. no. 18 selects range for Input 3 when P15 is set to ORP/mV mode.
Par. no. 19 defines the value of the 4mA input. When P15 is ORP/mV the minimum value of P18 range selected is set. When P15 is ISE the value should be adjusted to match P10 on mating 3TX-ISE. When P12 is CON, then this will always be 0mS. When P13 is pH, the value should match P13 on the mating 3TX-pH.
Par. no. 20 value of the 20mA input. When P15 is ORP/mV the maximum value of P18 range selected is set. When P13 is ISE the value should match P11 on 3TX-ISE. P19 and P20 when P15 is ISE must be at least 20% of the operating range (P09 on 3TX-ISE same as P16 on the 3TX-TOT). When P15 is CON should match P13 on 3TX-CON. When P15 is pH, the value should match P14 on the mating 3TX-pH.
Par. no. 21 displays the real time reading of Input 3.
Par. no. 22 selects the type of pH compensation being performed.
Par. no. 23 sets the Total ISE input to 0-20mA or 4-20mA.
Par. no. 24 sets Total ISE output to be low, mid or high.
Par. no. 25 sets Total ISE output at 0/4mA.
Par. no. 26 sets Total ISE output at 20mA. The difference between P25 and P26 should be at least 20% of the range selected by P24.
Par. no. 27 selects pH to be gained from Input 2 (Auto) or user defined (Manual)
Par. no. 28 sets the pH value when in P27 is in Manual mode
Par. no. 29 offset calibration of 0mA or 4mA current signal input 1 (Free ISE)
Par. no. 30 gain calibration adjustment of 20mA current signal input 1 (Free ISE)
Par. no. 31 offset calibration of 0mA or 4mA current signal input 2 (pH)
Par. no. 32 gain calibration adjustment of 20mA current signal input 2 (pH)
Par. no. 33 offset calibration of 0mA or 4mA current signal Input 3
Par. no. 34 gain calibration adjustment of 20mA current signal Input 3
Par. no. 35 offset calibration of 0mA or 4mA current signal Output (Total ISE)
Par. no. 36 gain calibration adjustment of 20mA current signal Output (Total ISE)
Par. no. 37 sets the baudrate in accordance with the MODbus-master.
Par. no. 38 Feature to reset the analyzer back to factory default.

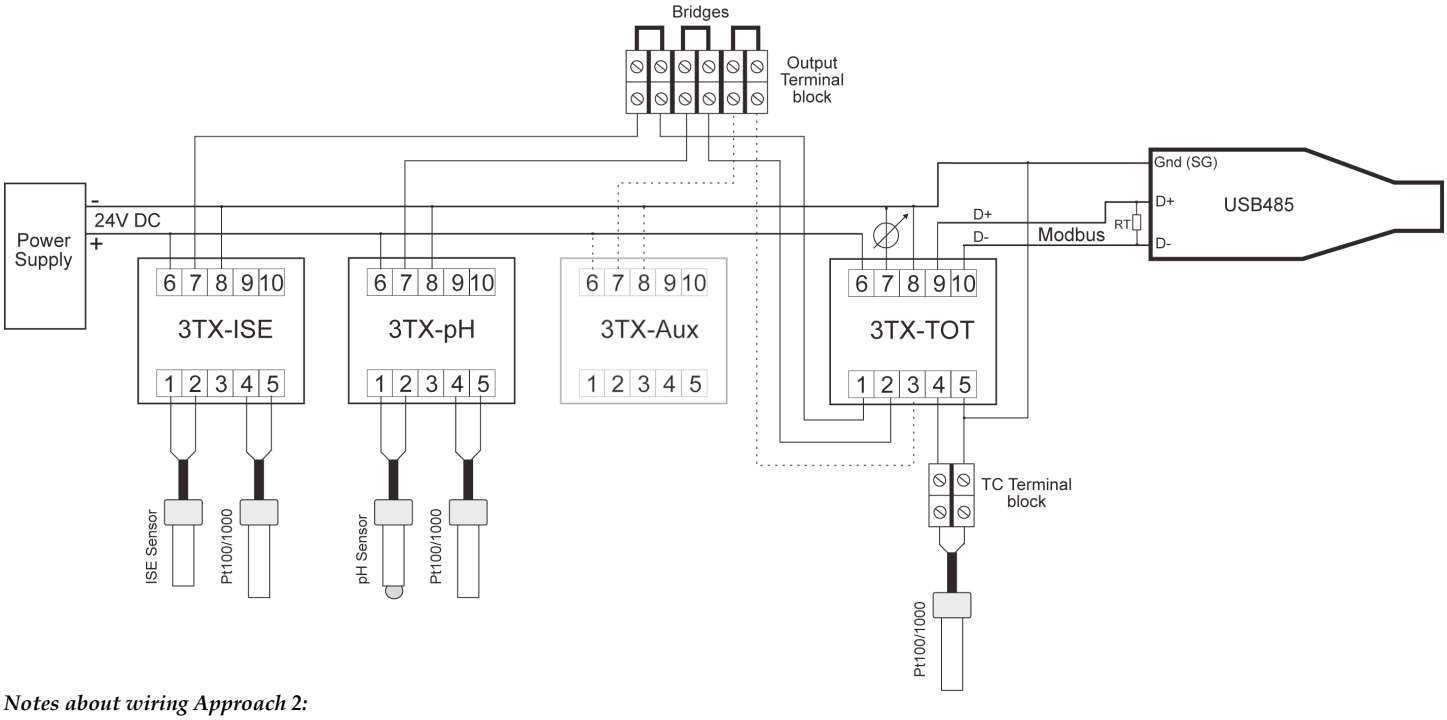
Wiring Approach 1: Spliced Pt100/Pt1000 Temperature Input to 3TX-TOT



Notes about wiring Approach 1:

** The optional 3TX-Aux shown can be any additional measurement transmitter such as 3TX-HiQ-pH, 3TX-pH, 3TX-ISE, 3TX-CON or 3TX-DO*
** The jumpers from the Output Terminal Block can be removed so that the current loop output can be sent to any data acquisition or control system.*
** When purchased as a complete assembly, specify your desired wiring approach and all units will be pre-wired at ASTI factory prior to dispatch.*

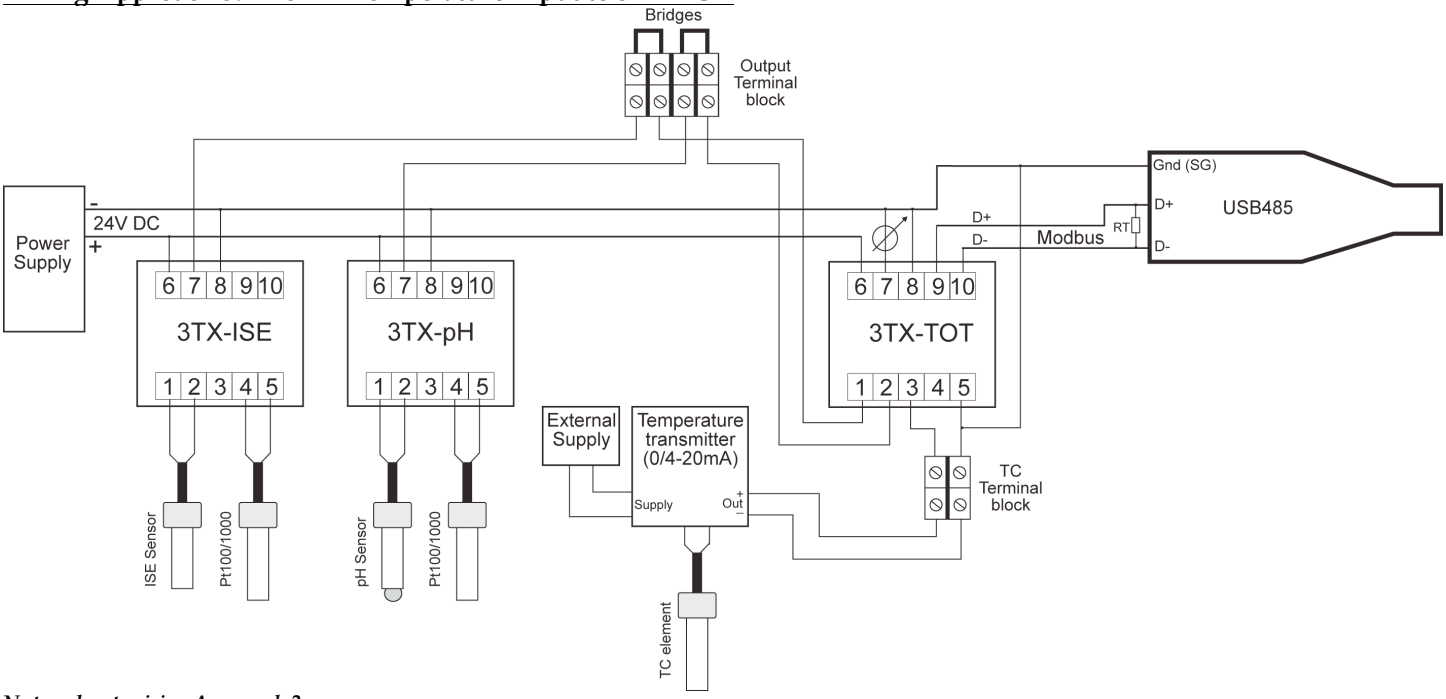
Wiring Approach 2: Raw Pt100/Pt1000 Temperature Input to 3TX-TOT



Notes about wiring Approach 2:

** The optional 3TX-Aux shown can be any additional measurement transmitter such as 3TX-HiQ-pH, 3TX-pH, 3TX-ISE, 3TX-CON or 3TX-DO*
** The jumpers from the Output Terminal Block can be removed so that the current loop outputs can be sent to any data acquisition or control system.*
** The TC terminal block shown is optional (can be wired directly into terminals 4 & 5 on 3TX-TOT module if desired)*

Wiring Approach 3: 4-20mA Temperature Input to 3TX-TOT



Notes about wiring Approach 3:

** In wiring Approach 3, it is not possible to have a third measurement transmitter (shown on Approach 1 & 2 as 3TX-Aux). The TC terminal block shown is optional.*
** The jumpers from the Output Terminal Block can be removed so that the current loop outputs can be sent to any data acquisition or control system.*
** When purchased as a complete assembly, specify your desired wiring approach and all units will be pre-wired at ASTI factory prior to dispatch.*

NOTES ON DISPLAY OPTIONS AND TEMPERATURE CALIBRATION:

- **The temperature is calibrated by pushing the "Up" or "Down" buttons when in the temperature display (°C) mode.**
- **The effective real-time pK (at the current tempature) is displayed by pressing the "Down"-key in main "TOTAL ISE" display mode.**
- **The effective real-time extent of ionization is displayed by pressing the "Up"-key in the main "TOTAL ISE" display mode.**

MODBUS

The 3TX-TOT may be used as a slave for the 3TX-DAT or as a slave in a SCADA system. The setup and communication for each case will be explained in the following and is available as a standalone supplement entitled "3TX-TOT-MODbus-Protocol-Summary.pdf" with more details.

With 3TX-TOT
If 3TX-TOT is used together with the 3TX-DAT, the user must pay attention to two things: The baud rate on the MODbus as well as the address of the 3TX-TOT. **The baud rate (P37)** must be set to the baud rate of the 3TX-DAT. Whether a baud rate of 19,200 or 9,600 is used is of no importance, as long as all units on the MODbus are the same baud rate.

The address (P02) must be unique in the network; Two units are not allowed to have the same address. In a network with the 3TX-DAT as the master, all addresses must be assigned without leaving any address out; The order of the addresses is of no importance. In a network with a 3TX-DAT, up to 63 slaves may be connected with valid addresses from 1 to 247.

In a SCADA system
Since different SCADA systems may have different restrictions only the general are mentioned here: **The baud rate (P37)** must be set to the baud rate of the SCADA system. **The address (P02)** must be unique in the network; Two units are not allowed to have the same address.

MODbus Scaling
The scaling for the computed Total ISE output is defined by the range selected in P24 (low 0-10ppm, mid 0-100ppm or high 0-999ppm). This MODbus output for the computed Total ISE may differ from the analog 0/4-20mA scaling defined by P25 & P26.

The 3TX-TOT contains a maximum of 4 input measurements (Free ISE, pH, Temp and Auxiliary) and a fifth value for the computed Total ISE as the output. All five of these can be transmitted on the MODbus. Access to these are gained through the function code *Read_Input_Registers (04)*. The 3TX-TOT gives access via *Diagnostics (08)*, as shown in the following.

Read_Input_Registers

Function code	Start address	Number of values
04	**1**	**1, 2, 3, 4 or 5**

Measurements are transmitted in sequence; All values are rated to 0-1000 corresponding to the range, Output (Total ISE – 1st value) has no offset, Input 1 (Free ISE – 2nd value) an offset of 1024, Input 2 (pH – 3rd value) an offset of 2048, Input 3 (Temp – 4th value) an offset of 3072 and Auxillary has no offset (5th value); Total ISE is sent as 0-1000, Free ISE as 1024-2024, pH as 2048-3048, Temp as 3072-4072, and Aux (when present) as 0-1000.

Diagnostics

Function Code	Sub Code (HEX)	Description
08	00	Return Query Data
	0A	Clear counters and diagnostics register
	0B	Return Bus Message Count
	0C	Return Bus Communication Error count
	0D	Return Exception Error count
	0E	Return Slave Message count
	0F	Return Slave No Response count
	12	Return Bus Character Overrun count

ORDERING INFORMATION FOR 3TX FAMILY OF TRANSMITTERS

ENCLOSURE TYPE	
CODE	**DESCRIPTION**
3TX-0M	3TX Transmitter with No Enclosure
3TX-DIN	3TX Transmitter with No Enclosure; Preinstalled onto 35mm DIN-Rail
3TX-2MW	3TX Transmitter(s) with IP65 WeatherProof Enclosure; Up to 2 Total Modules (**Wall Installations Only**)
3TX-2M	3TX Transmitter(s) with IP65 WeatherProof Enclosure; Up to 2 Total Modules (Wall or Pipe Installations)
3TX-3MP	3TX Transmitter(s) with NEMA 4X Enclosure for ½-DIN **Panel Only**; Up to 3 Modules (**with Panel Bracket Assembly**)
3TX-3MF	3TX Transmitter(s) with NEMA 4X Enclosure; Up to 3 Total Modules (Wall or Pipe Installations)
3TX-4MW	3TX Transmitter(s) with IP65 WeatherProof Enclosure; Up to 4 Total Modules (**Wall Installations Only**)
3TX-4M	3TX Transmitter(s) with IP65 WeatherProof Enclosure; Up to 4 Total Modules (Wall or Pipe Installations)
3TX-6M ***	3TX Transmitter(s) with IP65 WeatherProof Enclosure; Up to 6 Total Modules (Wall or Pipe Installations)
3TX-7MF ***	3TX Transmitter(s) with NEMA 4X Enclosure; Up to 7 Total Modules (Wall or Pipe Installations)
3TX-9MF ***	3TX Transmitter(s) with NEMA 4X Enclosure; Up to 9 Total Modules (Wall or Pipe Installations)
MEASUREMENT MODULES ONE (1) THROUGH SEVEN (7)	
CODE	**DESCRIPTION**
-pH **	pH/ORP/mV/Temp Measurement Module / Transmitter
-HiQ-pH	Intelligent pH & ORP Transmitter for Smart Digital pH & ORP Sensors; **Both 4-20mA & MODBUS outputs standard**
-CON-CELL/RANGE	Contacting Conductivity Measurement Module / Transmitter (CELL Constant & RANGE in mS Defined at Time of Order)
-ISE-ION **	Ion Selective (ISE) Measurement Module / Transmitter (Ion Measurement Type ION Must be Defined at Time of Order) *
-DO **	Dissolved Oxygen Measurement Module / Transmitter For Galvanic Type DO sensors
OUTPUT OPTIONS FOR ANALOG MEASUREMENT MODULES (ONE OPTION MUST BE SELECTED FOR EACH MODULE)	
CODE	**DESCRIPTION**
-A	Single Fully Scalable Analog 0-20 or 4-20 mA Ouput Only
-D	Single Fully Scalable Analog 0-20 or 4-20 mA Ouput Only AND RS-485 MODbus Digital Output
ADD-ON MODULES FOR MEASUREMENT MODULE ENCLOSURE ASSEMBLIES	
CODE	**DESCRIPTION**
-PS	100 to 240 VAC 50/60 Hz Universal Power Supply Adapter for Line Powered Operation
-PS/BAT	Dual Isolated & Regulated 24VDC Power Supply Step-Up Converter for operation from 5V, 6V & 9V Batteries
-TEM	Scalable Analog 0-20 or 4-20mA Temperature Transmitter for Raw or Spliced Pt100/Pt1000 temperature element
-SW	On/Off Power Switch (½ Width of power supply module and ¼ width of standard 3TX transmitter)
-REL	Alarm and Relay Controller Module for 3TX-pH, 3TX-ISE, 3TX-CON and 3TX-DO measurement modules
-TOT	Compute pH compensated "Total ISE" from analog inputs for ISE & pH, 0/4-20mA analog & MODbus digital ouputs
-DAT	Datalogger & MODbusmaster for 3TX Transmitters with RS485 MODbus; Download & Setup via RS232/USB on Windows

Contact the factory for specific recommendations & ALL ISE inqueries. Pipe mounting bracket kits supplied separately. For 3MP, 3MF, 6M & 7MF enclosures power supply is not counted as a module for space purposes.

Model: **3TX-2M-pH-A-CON-1.0/50-D**
Description: Dual Channel Transmitter Assy w/ Weatherproof Enclosure (2 Total Modules); 1 each pH Measurement w/ Analog Output; 1 each Contacting Conductivity Measurement w/ Cell Constant 1.0/cm & Full Range 0-50mS/cm (Min Scaling 0-5.0mS/cm); with Analog and Digital MODbus RS-485 Outputs (No AC Power Supply)

Model: **3TX-3MP-ISE-F-A-pH-A-TOT-PS**
Description: Dual Channel Total Fluoride Measurement Transmitter Assembly with NEMA 4X (UL) Enclosure for ½-DIN Panel Mounting Installations (for 3 Total Modules); 1 each ISE Fluoride Ion and 1 each pH Measurement Module with Analog Output Only; 1 each TOT module to compute total fluoride (HF + F^-) with Analog & MODbus Outputs for all free fluoride, total fluoride, pH and temperature; With Universal 11 Power Supply Module

Model: **3TX-3MF-DO-D-TEM-SW-PS**
Description: Dissolve Oxygen Transmitter Assembly with NEMA 4X CSA/UL rated Enclosure; Field or Wall Mounting Installations (3 Module Max); 1 each DO transmitter for galvanic type dissolved oxygen sensors; Scalable Analog & MODbus Output for DO ppm, saturation & Temperature; 115/230 Power Supply with On/Off Switch

Model: **3TX-4MW-ISE-NH4-A-pH-A-TOT-PS**
Description: Dual Channel Total Ammonia Measurement Transmitter Assembly; Weatherproof Wall Mount Only Enclosure (4 Modules Max); 1 each ISE Ammonium Ion and 1 each pH Measurement Module with Analog Output Only; 1 each TOT to compute total ammonia (NH_3) with Analog & MODbus Outputs; With 115/230 Power Supply

Model: **3TX-6M-ISE-NH4-A-pH-A-TOT-ISE-NO2-A-pH-D-DO-D-PS**
Description: Five Channel Transmitter Assembly with Weatherproof Enclosure (for 6 Total Modules); 1 each ISE Ammonium Ion and 1 each pH Measurement Module with Analog Output Only; 1 each TOT module to compute total ammonia (NH_3) with Analog & MODbus Outputs; 1 each ISE Nitrite Ion with Analog Output Only; 1 each ORP Measurement Module and 1 each DO transmitter for galvanic active self-polarizing type sensors both with Scalable Analog & MODbus Outputs; With 115/230 Power Supply

Model: **3TX-6M-ISE-X-F-D-REL-pH-X-D-REL-CON-10.0/500-D-DAT-PS**
Description: Triple Channel Transmitter Assembly with Weatherproof Enclosure (for 6 Total Modules Max); 1 each Preamp Style Fluoride ISE Measurement Module & 1 each Preamp Style pH Measurement Module with Alarm/Relay Controller for both Fluoride ISE & pH; 1 each Contacting Conductivity Measurement with K=10.0/cm & Full Range 0-500mS; Analog & MODbus Outputs for All Measurements; DAT Datalogger/MODbusmaster Module to record all parameters; Universal 115/230 Power Supply

Model: **3TX-7MF-ISE-NH4-D-ISE-NO3-D-ISE-NO2-D-pH-D-CON-1.0/50-D-DO-D-DAT**
Description: Six Channel Measuring Transmitter Assembly Optimized for Low-Power Battery Operation; with NEMA 4X CSA/UL rated Enclosure (7 Module Max); 1 each ISE Ammonium Ion, 1 each ISE Nitrate Ion and 1 each ISE Nitrite Ion Module; 1 each pH module; 1 each Contacting Conductivity K= 1.0/cm & Full Range 0-50mS; 1 each Dissolved Oxygen module; Analog & MODbus Outputs for all Measurements & Temp; DAT Datalogger/MODbusmaster for continuous datalogging of all parameters

** For sensors with integral **preamplifiers**, order the pH/ORP transmitters as **–pH-X** and the ion selective (ISE) transmitters as **–ISE-X** and dissolved oxygen (DO) transmitters as **–DO-X**
*** For 2" NPT pipe mounting installations, an additional adapter plate must also be ordered for the 6M, 7MF & 9MF enclosures (inquire to factory for details).

Last Modified April 16, 2013 Revision 8