# *3TX–DAT Datalogger and MODbusmaster*

- Datalogger for 3TX transmitters with RS485 MODbus output option for pH, ORP, ion selective (ISE), conductivity, dissolved oxygen & temperature measurements
- Available both prewired & preconfigured with 3TX-HiQ-pH, 3TX-pH, 3TX-ISE, 3TX-TOT, 3TX-DO & 3TX-CON as a complete turn-key measurement package
- Simultaneous datalogging of up to 63 each 3TX transmitter nodes at distances up to two (2) kilometers between measurement transmitter(s) and DAT datalogger
- Onboard 8MB serial flash memory allows for extensive datalogging capacity
- Total datalogging capacity for various node configurations and sampling rates in provided on page 4 as a guideline for best configurations and use in the field
- User field configurable sampling rates from once per second to once per hour
- Logged data downloaded via RS232 or USB with included Windows software for graphing & visualization of data; Export to Excel for reporting & compliance uses
- Built-in circuit for time and date (RTC) with 10 years battery backup on RTC
- Comes standard for use in 35mm DIN-RAIL mountable OEM systems OR
- Field installations using weatherproof NEMA 4X & IP65 enclosures for up to 8 ea pH/ORP/ISE/DO or conductivity measurements in single enclosure assembly
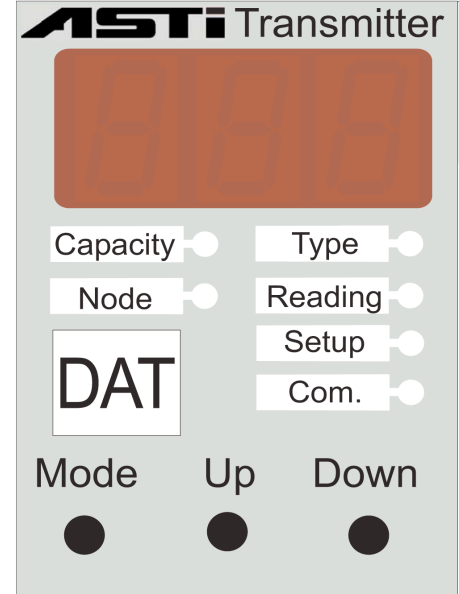
FEATURES

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 0/4-20mA 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 software "lock" which must be set to 'Off' to change ANY parameter or settings at all.**

* 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 3TX-DAT Module Main Features

The 3TX-DAT is a low-power, simple to use field MODbus datalogger for interfacing simultaneously up to 63 each 3TX-HiQ-pH or 3TX-TOT transmitters and the 3TX-pH, 3TX-ISE, 3TX-DO & 3TX-CON measurement modules if the MODBUS output option is selected at time of order. The sampling rate is configurable anywhere from once per second to once per hour. The 3TX-DAT acts as the MODbusMaster on the RS485 network and so no other MODbusMaster may be present on the same network. As with all 3TX modules, the DAT may be powered on and off at will with a very short boot time (about 1 second) making it an ideal fit for remote battery powered installations that are only energized a portion of the time to conserve power.

MODbus & Configuration Setup

The 3TX-DAT aquires data from the 3TX nodes using the MODbus standard for multidrop communication. The units are connected using the RS485 system (see wiring scheme on page 2). Configuration of the nodes is performed via the included Windows software & (optionally) preconfigured at the ASTI factory. The DAT module has a built in clock and calender circuit with a 10 year battery backup.

Transfer of Data to Windows Tablet or PC

The data accumulated in the 3TX-DAT may be transfered to a PC using the the RS232 (standard) or USB connection (see optional adapters/converters). The transfered data may be graphed & visualized or imported to Microsoft Excel for further data analysis using the included software packages.

TECHNICAL SPECIFICATIONS

Mechanical

Housing: Lexan UL94V-0 (Upper part)
Noryl UL94V-0 (Lower part)
Mounting: M36 for 35 mm DIN rail
IP 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 (7.06 ounces)
Dimensions: D 58 x W 36 x H 86 mm (2.3" X 1.4" X 3.4")
CE mark: EN61326A

Electrical

Power Supply: 24Vdc ±10%
Consumption: 60 mA max
Serial Memory: 8 Megabytes (8MB)
Number Nodes: Max 63 each 3TX Transmitters
Clock/Calendar RTC with 10 year battery backup
Serial Port 1: RS485, 9.6/19.2 K Baudrate
Serial Port 2: RS232, 115 K Baudrate

✓RoHS COMPLIANT

PARAMETERS

Function and Programming

The 14 progammable parameters are shown to the right. For access see the paragraph about programming on page 1.

If the softwarelock (Par. no. 1) is "On" the parameter can only be read. Set Software Lock to "Off "to change values.

Par. no. 2 selects sampling rate to be in seconds or minutes units.
Par. no. 3 selects number of seconds or minutes (see P02) to be used for the sampling of all connected nodes.
Par. no. 4 sets the year, **Par. no. 5** sets of the month, **Par. no. 6** sets the date. Please note the formats for setting the RTC.
Par. no. 7 sets the hour and **Par. no. 8** sets the minutes.
Par. no. 9 sets number of seconds delay before datalogging starts. Contact ASTI to ensure optimal logged results after initial boot.
Par. no. 10 selects the baudrate as 9,600 or 19,200. All slaves as well as the DAT MODbusmaster must use the same baudrate.
Par. no. 11 displays the total number of nodes being datalogged in the current configuration (display only). Changes to the node configuration can only be made using the Windows software.
Par. no. 12 sets the action taken when the memory is full. If 'Old' is selected, datalogging will cease when memory is full. If 'dEL' is selected, datalogging will continue by erasing the oldest value.
Par. no. 13 sets the energy save mode mode. When enabled, the display will only periodically flash to conserve power to the LED.
Par. no. 14 erases all of the logged data. **Note that this action cannot be undone!** Care should be taken that the logged data is downloaded and checked for integrity prior to taking this action. To erase, select 'dEI' and press the 'Mode' key. See details in the summary of usage for situations when the data should first be downloaded prior to making changes & erasing the data.

List of Parameters

No	Parameter	Description	Range	Default
P01	Lock	Software Lock	On / Off	On
P02	Sample Rate Units	Selects Seconds or Minutes for the Units of the Sampling	Seconds or Minutes	Minutes
P03	Sample Rate	Data Acquisition Frequency in Seconds/Minutes	1, 2, 5, 10, 15, 30, 60	2
P04	RTC, Year	Set Date (Year)	00-99 (2000 – 2099)	2013
P05	Month	Set Date (Month)	01-12	01
P06	Date	Set Date (Date)	01-31	01
P07	Hour	Set Date (Hour)	00-23	00
P08	Minute	Set Date (Minute)	00-59	00
P09	Delay from Startup	# of seconds delay before datalogging	0, 2, 5, 10, 15, 30, 60, 120, 300	15
P10	Baudrate	MODbus baudrate	9,600 or 19,200	19,200
P11	Nodes	Total # of nodes datalogged	1 to 63	From Configuration
P12	Memory Full	Action taken when the memory is full	Old= Stop logging dEL= Keep logging	dEL
P13	Saver	Energy Save	On / Off	On
P14	Erase Flash	**Erase all data** (See Notes About When this is Required)	dAt= Keep dEI= Erase	dAt

DIGITAL COMMUNCATIONS

RS485 & RS232

The DAT module contains two modes of digital communications. Data is acquired via the RS485 network from terminals 9 & 10, with the DAT as MODbusmaster. Upload and download of node configuration and download of data is accomplished via RS232 (or USB connection with suitable converter) from singals on terminals on 1, 2 & 3. No special MODbus protocol specifications are required when the 3TX transmitters are paired with the DAT datalogging module since all communications are handled either entirely between the modules or else the Windows software.
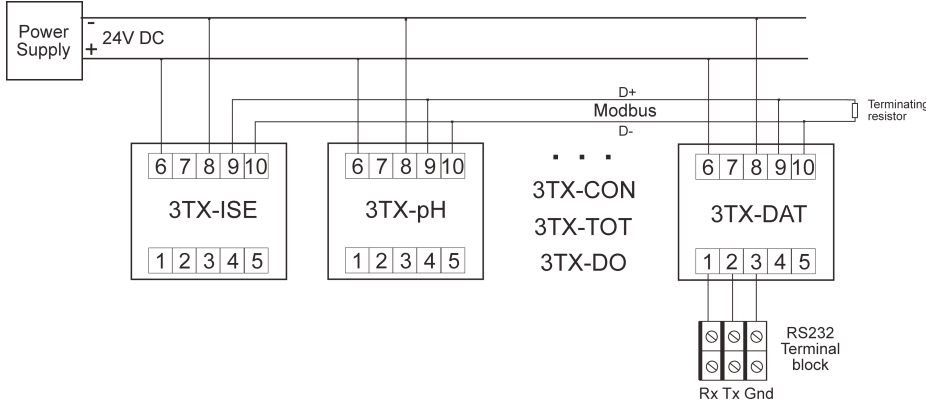
Error Codes

The 3TX-DAT module is equipped with diagnostics used to test if the network is operating as expected. If not, an error message is displayed; the format & type of error messages are listed below:

An error is displayed as E.AA, where E is the error code and AA is the node or the faulty input on the DAT:

Error code 2: Communication error, typically network problem.
Error code 3: Wrong setup of either master or node.

TYPICAL MODBUS WIRING INSTALLATION SCHEME

NOTES:

Power Supply | + 24V DC

D+
Modbus
D-

Terminating resistor

| 6 | 7 | 8 | 9 | 10 |

3TX-ISE

| 1 | 2 | 3 | 4 | 5 |

| 6 | 7 | 8 | 9 | 10 |

3TX-pH

| 1 | 2 | 3 | 4 | 5 |

. . .

3TX-CON
3TX-TOT
3TX-DO

| 6 | 7 | 8 | 9 | 10 |

3TX-DAT

| 1 | 2 | 3 | 4 | 5 |

RS232 Terminal block

Rx Tx Gnd

1. Up to 63 each 3TX-HiQ-pH, 3TX-TOT, 3TX-ISE, 3TX-pH, 3TX-CON, & 3TX-DO modules may be connected to a single 3TX-DAT. Each connected 3TX transmitter must have a unique valid node address from 1 to 247.

2. The value of the terminating resistor will vary based upon the number of connected nodes. Contact factory for assistance to choose the correct resistor.

3. The RS232 can be converted to a USB type interface with a suitable adapter (see page 5 for details on this option).

SUMMARY OF USAGE

*   The following summary of usage assumes both the Windows datalogging & graphing software for 3TX transmitters with MODbus (and all necessary RS485 MODbus wiring connections for the same) and the separate Windows software for the DAT have been correctly installed in the default configuration and are working on a single PC/tablet.

*   The user (or the ASTI factory) will create a configuration file using the 3TX Windows MODbus datalogging and graphing software. This configuration file shall contain all of the information necessary for the 3TX-DAT module to display and record all values from all of the connected 3TX modules in engineering units. Specifically this includes the node type (pH, ORP, ISE, CON, DO or TOT) and the scaling associated with the 0-1000 10-bit MODbus output for each value transmitted from each node. It is assumed that each pH, ORP, ISE, CON and DO node will send both the process parameter and temperature values. The DO will always send 3 values, namely the DO ppm, DO % saturation and temperature. The TOT can send as many as 5 values (Total ISE, Free ISE, pH, Temperature & Aux if present).

*   Once a configuration file has been created and tested this program shall be closed and the RS485 connection removed. The 3TX-DAT Windows software will be opened which will search for the current 3TX MODbus datalogging configuration file. The Windows DAT software will automatically load the last used configuration file. An alternate configuration file can be selected if desired (or else if the last used file cannot be found the config file must be chosen).

*   The appropriate COM port to which the 3TX-DAT must be selected before the configuration file can be loaded. This COM port either be a native RS232 connection using just the supplied DB9 (a.k.a. D-sub) terminal block adapter or else a USB connection using a RS232 to USB converter as detailed in page 5 section "Order Options & Accessories".

*   Connect the 2-wire RS485 leads that were previously interfaced to the Windows datalogging & graphing software used to create the needed configuration file to terminal 9 & 10 on the 3TX-DAT module. If all units are energized, you should now be datalogging all connected modules at the sampling rate set forth in P02 & P03. Be sure to check that you have also properly set the year, month, date, hour and minutes before connecting the live RS485 MODbus leads.

*   It is possible to validate that the uploaded configuration file is correctly working on the DAT module and that datalogging is commencing as expected by using the functionality as described in the "Display Features" section as detailed in page 4. If you want further validation of proper function, you can download an initial data set to confirm that all expected datalogging is occurring properly prior to completion of commissioning (see below & manual).

*   The user will be able to download a data set from the 3TX-DAT module if it is correctly connected (either by RS232 or converted USB) and the corresponding COM port has been properly selected in the Windows DAT software. The configuration file active in the Windows 3TX-DAT module must match the configuration file of the 3TX-DAT that will be downloaded to ensure data integrity. The memory of the 3TX-DAT module must be manually erased from the module itself using P14. Erasing the stored logged data on the DAT module cannot be done from the Windows software as this can only upload and download a configuration or else download a set of logged data.

*   After download, the data can be graphed and otherwise worked up and manipulated (e.g. export to Excel) by importing the downloaded *.db file into the same Datalogging & Graphing software for 3TX transmitters with MODbus that was used to create the configuration loaded onto the 3TX-DAT module. Be sure to note where you saved the downloaded DAT data set (*.db) and to give it a meaningful file name (e.g. "RemoteRiverSite42_2013-01-01_to_2013-05-01.log" or something similarly useful) so that you can make sense of the data in the future.

DATALOGGING CAPACITY IN DAYS OF 3TX-DAT FOR VARIOUS EXAMPLE NODE CONFIGURATIONS & SAMPLING RATES

Number of 3TX pH, ISE or CON Transmitters	SAMPLING RATE		
	Every 30 Seconds	Every 5 Minutes	Every 15 Minutes
1	694	6,944	20,833
4	174	1,736	5,208
8	87	868	2,604
16	43	434	1,302
32	22	217	651
63	11	110	331

Number of 3TX DO Transmitters	SAMPLING RATE		
	Every 30 Seconds	Every 5 Minutes	Every 15 Minutes
1	463	4,630	13,889
4	116	1,157	3,472
8	58	579	1,736
16	29	289	868
32	14	145	434
63	7	73	220

Number of 3TX TOT Transmitters	SAMPLING RATE		
	Every 30 Seconds	Every 5 Minutes	Every 15 Minutes
1	278	2,778	8,333
4	69	694	2,083
8	35	347	1,042
16	17	174	521
32	9	87	260
63	4	44	132

NOTES:
1. ***Times for datalogging capacity are shown in units of UNDERLINE DAYS.***
2. *Datalogging capacity shown are approximate for reference purposes*
3. *3TX-pH/ISE/CON send process parameter & temp for each node*
4. *3TX-DO sends DO ppm, % Saturation & temp for each node*
5. *3TX-TOT sends Total ISE, Free ISE, pH, Temp & Aux each node*
6. *Contact ASTI factory for specific samping rate recommendations*
7. *DAT module comes standard with two (2) year warranty*

DISPLAY FEATURES

CAPACITY
- The default main display mode shows the percent of the available 8MB memory that is used. This percent of memory used is shown in percentage units and is updated continuously (in real time).
- When in the "Capacity" mode, push the 'Down' button to show the number of days that datalogging can commence assuming the node configuration and sampling rate are unchanged. If you are getting close to full capacity and cannot download the data set, it is recommended to change the sampling rate with P02 & P03 (see page 2 & 3) and then go back to the capacity mode to see the new number of days that you can datalog with the revised sampling rate.
- When over 80% of capacity is exceeded, the capacity LED will flash continuously as a notification and warning.

NODE
- Push 'Up' or 'Down' key to find the node of interest. Press 'Mode' button to select the displayed node number.

TYPE
- The type of module for the selected "Node" is shown in the "Type" LED mode (pH, ORP, ISE, CON, DO or TOT).
- The temperature is shown in °C units by pushing the 'Down' button when in the "Type" mode of that selected node.

READING
- For the pH, ORP, ISE and conductivity module types, the value of the process parameter is displayed (in the native units for that type) in the "Reading" mode for the selected "Node". Negative values will show as flashing.
- For the DO module type, the ppm units are shown. To see the value in % saturation units, press the 'Down' key.
- For the TOT, the value in the main "Reading" mode shall be the Total ISE. Pushing the 'Up' button will show the Free ISE while pushing the 'Down' button will show the pH. Pushing the 'Up' & 'Down' keys together simultaneously in the "Reading" display mode for a TOT node type will show the Auxiliary value (if present).

NOTES
- The scaling details and user defined name of each node can be found on the original configuration file uploaded via RS232/USB to the DAT. This configuration file must be saved as it will be required to workup all downloaded data.
- Before adding or removing any nodes, the logged data from the DAT should be downloaded BEFORE creating and loading the new configuration file. This is critical to prevent loss of integrity to the logged data.
- Any change to the range and/or scaling of any connected 3TX modules will necessitate download of the data and creation of a new modified configuration file that must be reloaded onto the DAT. Recall that since many (most) of the 3TX modules have the MODbus output scaling follow the analog 4-20mA setpoints, in most cases if the 4-20mA scaling (or associated range) is changed then a new configuration file must be created to ensure proper datalogging operation of the mating DAT. The data should be downloaded BEFORE creating & loading a new configuration file.
- The sampling rate on the DAT module can be changed without compromising the integrity of the logged data set.

ORDERING OPTIONS & ACCESSORIES

The 3TX-DAT module comes standard with the 35mm DIN-RAIL mountable module itself (supplied either as just the standalone module itself, preinstalled onto a 35mm DIN-RAIL or else integrated into an enclosure assembly with mating transmitters as desired) as well as 2 meters (~6 feet) of multiconductor RS232 cable to mate with the included DB9 (a.k.a. D-sub) female terminal block adapter to interface with any standard RS232 port on a Windows PC. Some additional adapters and converters are available. These can be supplied either complete by ASTI as optional accessory items or else can be sourced separately from various commercial vendors:

OPTIONAL ACCESSORY # 1:   RS232 to USB Adapter for DAT Module (when no RS232 port is available on the Windows PC)
OPTIONAL ACCESSORY # 2:   RS485 to USB Converter for Windows Datalogging Software (for USB node configuration setup)
OPTIONAL ACCESSORY # 3:   RS485 to RS232 Converter for Windows Datalogging Software (for RS232 node configuration setup)

BACKGROUND ON MODBUS & USE IN RS485 RTU NETWORKS WITH 3TX

A Brief History
MODbus is an industrial standard for serial communication introduced in 1979 by the company Modicon for use in client/server communication between units, which may be connected via different networks. MODbus is now a completely open standard available for all without the need for licenses or rights. MODbus has been called the "de facto standard in multi-vendor integration".

Digital Communications for the 3TX family of Transmitters
Since the 3TX family of transmitters is modular concept, a multi-drop bus digital communication protocol is needed to handle an "arbitrary" number of modules dynamicaly such such that it always possible to always add or remove a unit. The license and royalty free MODbus standard was chosen as it fulfills all such requirements and is extensively supported by industry for mating with data acquisition and control equipment. All transmitters in the 3TX family are capable of communicating not only with the master 3TX-DAT but with any system as long as the system has a MODbus interface. This makes the 3TX transmitter family capable to interface most any SCADA system and gives the user the possibility of building a simple network and enhancing it later if the need arises.

Structure
The implementation of the MODbus in the 3TX family is based on an RS485 connection between the units. The driver circuit in each of the transmitters allows up to 32 units without the use of repeaters, while the address may be set within the whole address space of the MODbus standard (247). Using the 3TX-DAT as the master means that only a total of 63 addresses can be used at one time (although each 3TX can be assigned any node from 1 to 247). Naturally two units on the network are not allowed to share the same address.

3TX-DAT Wiring
The "typical modbus wiring installation scheme on page 3" shows 3TX transmitters connected to the master 3TX-DAT. The exact order is not of importantance. The MODbus standard prescribes a terminating resistor (Rt) should be present at both ends of the network. The value of the terminating resistor(s) will vary based upon the number of connected nodes and for shorter distances may in fact be altogether unnecessary. Contact factory for assistance to choose the correct resistor(s) and arrangement for your specific installation.

SCADA system
The principle of a network with a SCADA system as the master is the same as prescribed in the Windows datalogging and graphing software for 3TX transmitters with MODbus. Here the MODbus standard sets the limit of the number of units, since the maximum valid address is 247. Up to 32 units may be connected without the use of a repeater. The same demands apply to the terminating resistor as described in the paragraph about the 3TX-DAT wiring.

Protocol
The basic communication information for the RS485 MODbus RTU protocol as implemented in the 3TX family of transmitters is as follows: 8-bit, even parity with 1 stop bit (all standards compliant). The MODbus standard includes a number of function codes giving the master of the network the ability of gathering or placing values and parameters in every slave connected to the network. The transmitters in the 3TX family have all the required function codes built-in as well as the relevant codes for each unit. The 3TX transmitters each contain a number of measurements (anywhere from 1 to 5 depending upon the module type), which may be collected via the MODbus protocol. Access to these measurements is common to all units in the 3TX family and is gained via the function code Read_Input_Registers (04). Furthermore the units give access to various diagnostics values via Diagnostics Function Code (08). The details of these function codes are described in the relevant sections of the given 3TX-pH, 3TX-ISE, 3TX-TOT, 3TX-CON and 3TX-DO transmitter specification sheets and manuals.

For a detailed description of the MODbus protocol please refer to the MODbus website: http://www.modbus.org

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 (NH₃) 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 (NH₃) 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).