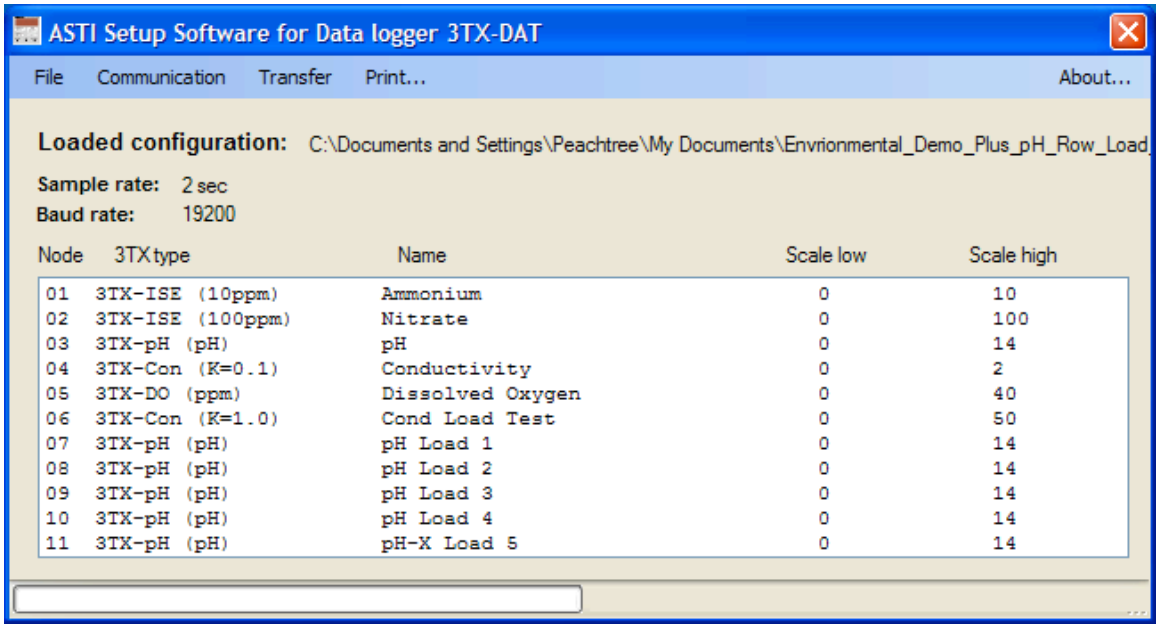
Installation and User Guide

DAT Configuration Upload & Logged Data Download Software, Rev. 1.5 for 3TX pH, ISE, TOT, DO, & CON Transmitters with MODbus



INSTALLATION GUIDE

Welcome to the ASTI 3TX DAT configuration upload & logged data download Windows software package. This software and guide are currently being provided by ASTI free of charge for use with the DAT datalogging module and mating 3TX MODbus transmitters, although you must complete a ticket inquiry form to receive the installer. If you have not already done so, you may initiate a request to receive this software using the following URL:

http://www.astisensor.com/cgi-bin/ttx.cgi

There are **three requirements** to use this software with ASTI 3TX MODbus transmitters:

1) First, you must have a **Windows computer with a .NET framework 4.0 and a compatible operating system (OS)** AND and an available RS232 or USB port. Only the following OS are currently supported:
   - Windows XP SP3 (Legacy Support Only)
   - Windows Server 2003 SP2
   - Windows Vista SP1 or later
   - Windows Server 2008 (not supported on Server Core Role)
   - Windows Server 2008 R2 & Windows Server 2008 R2 SP1 (also not supported on Server Core Role)
   - Windows 7 & Windows 7 SP1 or later
   - Windows 8 & Windows 8.1
   - Windows Server 2012

   Many modern computers already have the .NET framework 4.0 (or higher compatible version) installed. If yours does not already have it, the software installer will detect that and automatically prompt you to install it.

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2) Second, you must have a **USB to RS-232 converter** to allow data from the 3TX-DAT RS-232 digital interface to connect with a COM port in your Windows computer. You may purchase a converter from ASTI (to be shipped with your 3TX transmitter order or at a later time), or you may buy it from another company. In that latter case you would also be responsible for proper installation of the driver and ensuring that an accessible COM port is assigned by the Windows system.

   Although there are a number of USB to RS-232 converters available that are compatible with the ASTI DAT configuration & download software, the "USB to Serial Adapter – Pro Mini" (XS882) together with the "DB9 Terminal Block Header w/ units" (DB9T) from US Converters is preferred because it has been tested with this software and is reasonably priced. This hardware device may be purchased from ASTI for your convenience, or may be purchased directly from USConverters through the following link:

   http://www.usconverters.com/usb-serial-adapter-xs882

   http://www.usconverters.com/db9-terminal-block-header

   Please note that both the ASTI 3TX-DAT MODbus datalogger module can support up to a 63-node maximum. If you require support for more than 32 nodes (3TX transmitters), please contact the ASTI factory for assistance.

3) Follow the instructions contained in the ASTI Datalogging & Graphing Windows Software for 3TX transmitters with MODbus. This will require that you have a suitable RS-485 to USB converter as well as the referenced software above installed onto the PC as you plan to perform the configuration and download of logged data from the 3TX-DAT module. Please first download the manual and follow the instructions as this is the first step of the process that must be completed prior to installation and use of the DAT Configuration Upload & Logged Data Download Software descibed here.

   A few notes regarding best practice for creation of a configuration file using the "ASTI Datalogging & Graphing Windows Software for 3TX transmitters with MODbus" software:

   - Although in principle nodes can be numbered in any order without respect to their physical location, best practice is to order them starting at 01 and not exceeding 63. It is perfectly fine to remove nodes at some time in the future and to simple remove the corresponding node from the configuration accordingly. Best practice is to download the complete data set from the DAT module prior to loading any new configuration (more details on page 4 are provided about this topic).
   - It is important that datalogging occurs without any errors being reported. Please see page 9 of the manual for details on reported error codes.
   - All of the standard 3TX modules for pH, ORP, ISE, conductivity and dissolved oxygen measurement with the MODbus output option are compatible for interfacing with the DAT module. All configurations of the TOT are compatible with the DAT module. There are, however, a few selected special modules that are ONLY compatible with the "ASTI Datalogging & Graphing Windows Software for 3TX transmitters with MODbus" software and more specifically NOT compatible with the DAT. Some examples include:
     - 3TX-pHE
       - Special transmitter for pH with 0.001pH resolution or ORP/mV with 0.1mV resolution
     - 3TX-mVE
       - Special transmitter for raw mV measurement with 0.025mV resolution
     - 3TX-CON-E
       - Special contacting conductivity transmitter with high resolution MODbus output

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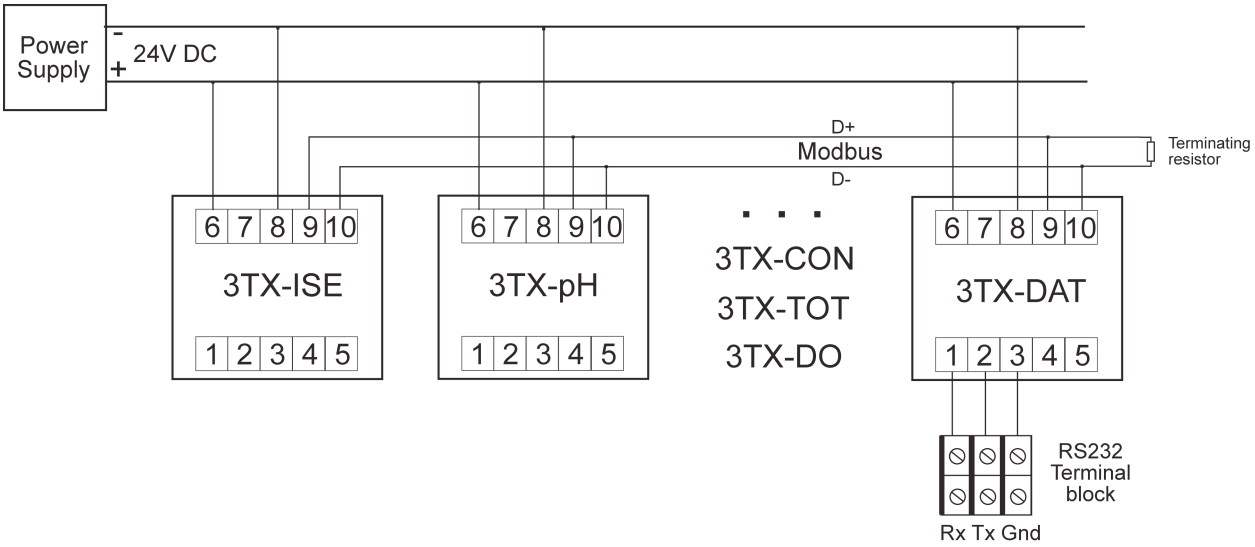
The following diagram is a sample wiring scheme for 3TX transmitters with MODbus to the 3TX-DAT logger:



In most cases it is possible to omit the terminating "RT" resistors detailed in the schematic above without causing any problems. If you have difficulties with the software operating without these resistors installed, please contact the ASTI factory for assistance with selecting the most suitable terminating resistors for your installation.

WIRING DETAIL FROM DAT to RS232 to USB CONVERTER

A three wire multiconductor cable is connected between the DAT terminals 1, 2 & 3 and the RS232 terminal 2, 3 & 5 by means of a A DB9 to terminal board (see photo below for visualization). This DB9 to terminal board adapter is in turn connected into the RS232 to USB converter which is plugged into the Windows PC to be used with this software.

Color Lead	DAT Terminal Number	DAT Terminal Description	DB9 Terminal Number	DB9 Terminal Description
White	1	Rx - Receive from PC	3	Tx – Transmit to DAT
Red	2	Tx – Transmit to PC	2	Rx – Receive from DAT
Black	3	Ground	5	Ground

If you have any specific wiring questions related to your 3TX transmitters (MODbus or otherwise), please inquire to the ASTI factory for further assistance.

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SUMMARY OF OPERATION FOR COFIGURATION AND USE OF DAT MODULE

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 configuation and are working on a single PC or tablet.

• The user (or the ASTI factory on request) 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 nodes will send 2 values, namely the process parameter and temperature. 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).

• 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 previously in page 2 of this manual. The supplied DAT software installer will create drivers for the RS232 to USB converter detailed on page 2 and this is the only combination of hardware & software that is officially supported by the ASTI factory.

• Set the year, month, date, hour and minutes before connecting the live RS485 MODbus leads. The clock on the DAT can be set using the parameters P04 (Year), P05 (Month), P06 (Date), P07 (Hour) and P08 (Minute) on the module itself or else by using the set Clock feature of the DAT software (see following pages for details on how to set the clock from the Windows software directly).

• 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 and this configuration created must be selected. Please see “File” menu operation in the following pages of this manual.

• Connect the RS485 D+ & D- leads that were previously interfaced to the Windows datalogging & graphing software to create the configuration file now 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 parameters P02 & P03. The initial values for the sampling rate will be as defined in the configuration file but this can be changed on the DAT module thereafter using these parameters P02 & P03 if desired.

• 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 of the DAT manual. If you want further validation of proper function, 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 but rather only the module itself.

• After download, the data can be graphed and otherwise worked up and manipulated (e.g. export to Excel) by importing the downloaded *.dbb file into the same Windows 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 (*.dbb) 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 and readily locate the file.

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USER GUIDE

The ASTI 3TX MODbus Windows Software is specifically designed to be used with ASTI 3TX transmitters to provide straightforward and easy-to-use datalogging and graphing funtionality.

PLEASE NOTE: This software must be correctly configured and running at all times you wish datalogging to occur.

As an overview, the software contains the following **menus** and **fields**, all of which are accessible starting with the main window once the application has been installed and launched.

These features are discussed in more detail below, in the approximate order in which you will likely use them:

"File" Menu

Clicking on this menu will access the "Open Configuration" drop-down which allows you to select the configuration file to be loaded on the DAT. Details of the selected configuration file will also be shown in the main window including the file path, baud rate, sampling rate and a summary of the connected nodes. Note that the baud rate and sampling rate can be changed on the DAT module itself whereas all of the node configuration details must be prepared using the "ASTI Datalogging & Graphing Windows Software for 3TX Transmitters with MODbus". Changes made on the DAT module itself (such as for the baud rate and sampling rate) will NOT be reflected in the configuration shown in the software.

"Communication" Menu

Clicking on this menu will reveal all addressable COM port on the Windows PC on which this DAT configuration and logged data download software is installed. Please select the COM port to which your RS232 DB9 terminal board is connected or the COM port to which your USB to RS232 converter has been assigned. An autoconnect feature is provided in case you are not sure which COM port is assigned to where your DAT module is connected. When using the ASTI factory supplied RS232 to USB converter assembly, the COM port described as "VCP0" should be selected. Please allow about one minute after connecting this RS232 to USB converter assembly before starting the DAT Configuration Upload & Logged Data Download Software so that the Windows OS has sufficient time to assign this COM port.

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"Transfer" Menu

Clicking on this transfer menu will reveal the drop-down selection to perform the following functions:

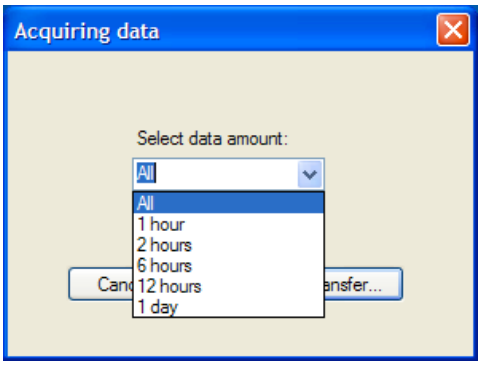
- Load the selected configuration onto the DAT
- Acquire Data - Download the logged data from the DAT
- Set the clock on the DAT (can be synchronized from the Windows time if desired)
    - *Import Raw Data*
        - *Special Function not normally used or required except for troubleshooting*
    - *Stop Transfer*
        - *Abort the current data transfer of logged data (same action as clicking on progress bar)*

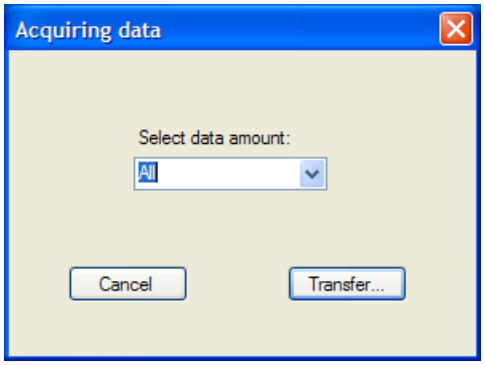
Loading Configuration File
The currently selected configuration will be loaded on the DAT. A status notification will be provided to advise if the transfer was successful or if any communication errors prevented successful loading of the configuration file. It is recommended that prior to each time a configuration file is uploaded, the entire logged data set is downloaded and visualized for integrity. It is also recommended that the memory is deleted (see P14) prior to uploading a new configuration file.

Acquire Data - Download logged data from DAT
Upon selecting this drop-down selection you will be prompted to choice the period to be downloaded. The selections are dynamically generated based upon the logged data set on the DAT module, with the download period options being:

"1 hour", "2 hours", "6 hours", "12 hours",
"1 day", "3 days",
"1 week", "2 weeks",
"1 month", "2 months", "3 months", "6 months", "9 months",
"1 year", "2 years"
or "All" which is the default selection.

See below some screenshots of the download period selection prompts. You will be prompted to select the file name to be used for the downloaded data after the period is chosen. Care should be taken to note where this file is saved as you will need to navigate to it for further visualization and workup from the "ASTI Datalogging & Graphing Windows Software for 3TX Transmitters with MODbus"





The acquired data will have a*.dbb file extension so that this downloaded formatted database file can be opened (restored) in the "ASTI Datalogging & Graphing Windows Software for 3TX Transmitters with MODbus" for further visualization and export to Excel. There will also be an accompanying file with the same name as the formatted database but a *.txt extension. This is the raw download data set and is not used except for troubleshooting and special purposes.

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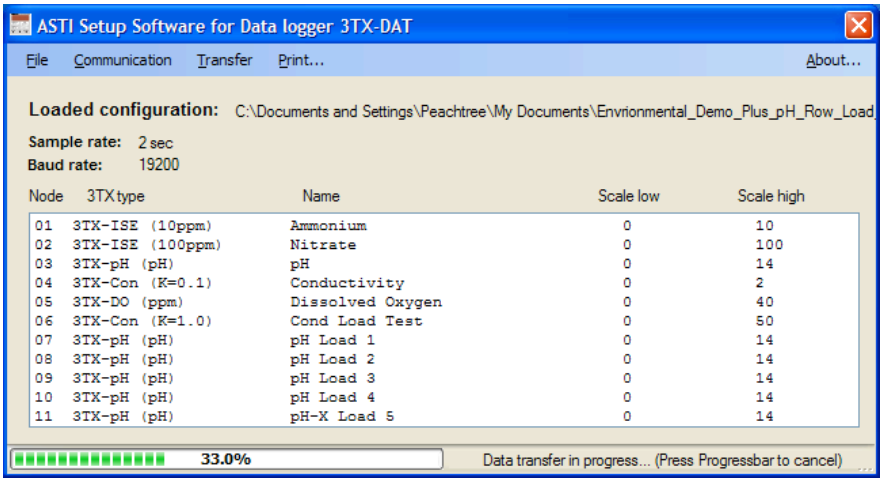
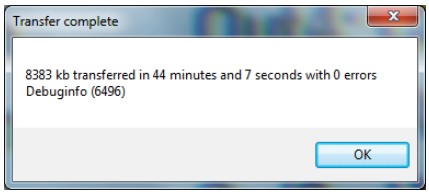
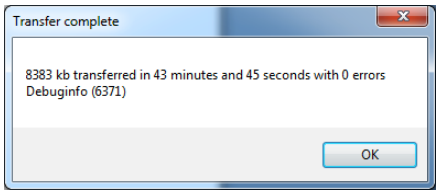
See below a screenshot of the the software during a download. Note the bottom left corner that the progress of the download is constantly updated. To abort (cancel) the download you can click on the progress bar or else go to "Transfer" → "*Stop Transfer*". Once a transfer is aborted is cannot be resumed.



Once a tranfser is completed, you will get a notification window giving the details of the transfer. A few examples are shown below for the transfer of a 100% full DAT module. A complete full DAT module (0.0% memory available) will download complete on most Windows PC machines in about 45 minutes or less. Due to the length of time for which the download process commences it is possible that up to about 10 errors may be reported in some situations when downloading a fully loaded module (100% full or 0.0% available). This amount of errors is considered normal and acceptable since **the total number of data sets for a complete full DAT module is between one to two <u>million</u>** depending mix of pH/ISE/CON, DO & TOT units, constituting at the very most a 0.001% data loss.





Any commuincation errors resulting in lost data points in no way compromises the integrity of the downloaded logged data set as a whole. In the case of a communication error, the missing data point is simply omitted from the database such that there is simply no data present for that given timestamp/node combination when loaded for visualization or export to Excel purposes. If you find that you are experiencing errors during the download process, it is recommended to set the logging frequency to once ever 60 minutes (P02="min" & P03="60") and to close all other running programs on the Windows PC. These two steps taken together will almost always lead to a download without any errors at all.

For the pH/ISE/CON modules two values are always logged, namely the process parameter and temperature. For the DO modules three values are logged, namely the DO ppm, % saturation and temperatures are always logged for each data point. For the TOT module, at least 4 values and up to 5 values are logged, namely: Total ISE (ppm), Free ISE (ppm), pH, Temperature and Aux (if present).

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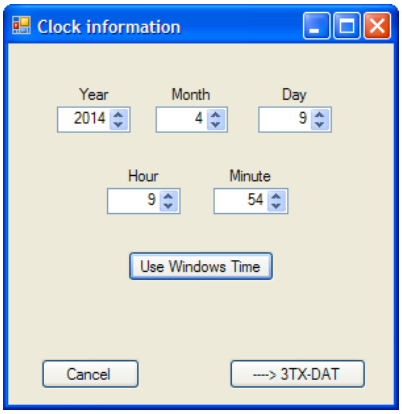
The DAT firmware will throttle the frequency of datalogging as follows if the selected sampling rate is above the specified threshold indicated below:

Number of Nodes	Max Sampling Rate During Transfer *
1 to 10 nodes	10 seconds
11 to 20 nodes	30 seconds
21+ nodes	60 seconds

* Sampling frequency is reduced to this value temporarily during transfer process if higher option is set on DAT module.

Set Clock on DAT

The clock on the DAT can be set using the parameters P04 (Year), P05 (Month), P06 (Date), P07 (Hour) and P08 (Minute) on the module itself. Alternatively, if may be more convenient to set these parameters on the DAT logging module directly from this Windows software. Upon selecting this Clock drop-down selection the dialog box shown below will be loaded. From here you can manually enter the exact date and time or else use the date and time from the Windows operating system. The clock information (exact date and time) are loaded onto DAT by clicking on the "---→ 3TX-DAT" button. A confirmation message will appear if the transfer of the clock information was successful. In addition, the loading of the clock (time and date) information can be confirmed by checking the parameters P04 to P08 as detailed above.



"Print" Menu

Clicking on this menu will load a prompt to print the currently displayed configuration file. This can be desirable so that a hard copy is available at the job site where the DAT is to be installed. Having such a hard copy listing of the various nodes and a desciption of their configuration then avoids having to scroll through all of the nodes via the display features to find this same information. In addition, this configuration file can be printed to PDF so that it can be sent electronically to any computer, tablent or smartphone. Naturally, the display features will detail the currently loaded configuration so care should be taken than any printed hard copy of the node configuration stored at the job site is current.

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DAT Communication Error Codes

Three simples but reasonably comprehensive error codes for the exist:

Error Code # 1: Timeout
A request was send to a node and the answer wasn't received within the time limit (I think 300ms)

Error Code # 2: Communication error
Parity or CRC check failed. The received telegram is corrupted and discarded.

Error Code # 3: Exception error
A request was send to a node and the node could not recognize this command. This error can only occur if a transmitter is replaced with a different one on the same address.

The DAT displays the errors codes with the address (aa) as well as the error (e) "E.AA" where "E" is the error code and "AA" is the MODbus node address (01 to 63). For example if commuincation # 1 described above was occuring on MODbus node 5, this would show as 1.05 flashing on the display. The presence of an any error is indicated by a flashing "Err" following by an indication of the error code and node as described above. In the case of such an error code, it is recommended to retest your loaded configuration and MODbus network by means of the "ASTI Datalogging & Graphing Windows Software for 3TX Transmitters with MODbus". If any nodes were added or removed or else the MODbus address was changed on any units, a corresponding modified configuration file will need to be created and uploaded to the 3TX-DAT module. It is recommended that prior to each time a configuration file is uploaded, the entire logged data set is downloaded and visualized for integrity. It is also recommended that the memory is deleted (see P14) prior to uploading a new configuration file.

Last Revised February 13th, 2015

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ASTI 3TX MODbus Windows Software License Agreement

Version 2.1 January, 2013

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10. *ASTI 3TX Team* periodically makes available upgrades to *SOFTWARE* from the *SOFTWARE* web server at http://www.astisensor.com. It is the *LICENSEE's* responsibility to keep its copies of the *SOFTWARE* as current as possible.

11. Should the *SOFTWARE* prove defective, the *LICENSEE* should immediately notify *ASTI 3TX Team* about such defects and provide all the material necessary to reproduce and correct them (such as Operating System, transmitter wiring and other related information as requested by *the ASTI 3TX Team*).

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13. In no event will *ASTI 3TX Team* be liable for any damages resulting from loss of data or use, lost profits, loss of anticipated savings, nor for any damages that are an indirect or secondary consequence of any act or omission of *the ASTI 3TX Team*, whether such damages were reasonably foreseeable or actually foreseen.

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16. This *SOFTWARE* includes a compiled binary DLL from the ZedGraph project. No changes to the source code were made. The source code for this included DLL can be obtained directly from the ZedGraph project page on Sourceforge (http://sourceforge.net/projects/zedgraph/).

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