Module Overview

The AMCI NX2A4T-11 is a four resolver input module that communicates on Modbus TCP/IP. The four resolvers connected to this module can be configured as four single turn transducers, two single turn transducers and one multi turn transducer, or two multi turn transducers.

This unit has two discrete inputs labeled *Brake* and *Preset*. The Brake Input is used to capture the current channel 1 position and the Preset Input is used to Apply the programmed Preset Value to the channel 1 position data. Both of these inputs can be programmed to act on the 0 to 1 (off to on) and or the 1 to 0 (on to off) transitions of the inputs. Please note that any changes made to the channel 1 position data by the preset input are not saved through power down. However, Apply Preset operations performed over the network are saved through power down.

The NX2A4T-11 uses 21 input and 10 output words to communicate on Modbus TCP/IP.

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General Information

Important User Information

The products and application data described in this manual are useful in a wide variety of different applications. Therefore, the user and others responsible for applying these products described herein are responsible for determining the acceptability for each application. While efforts have been made to provide accurate information within this manual, AMCI assumes no responsibility for the application or the completeness of the information contained herein. Throughout this manual the following two notices are used to highlight important points.

WARNINGS tell you when people may be hurt or equipment may be damaged if the procedure is not followed properly.

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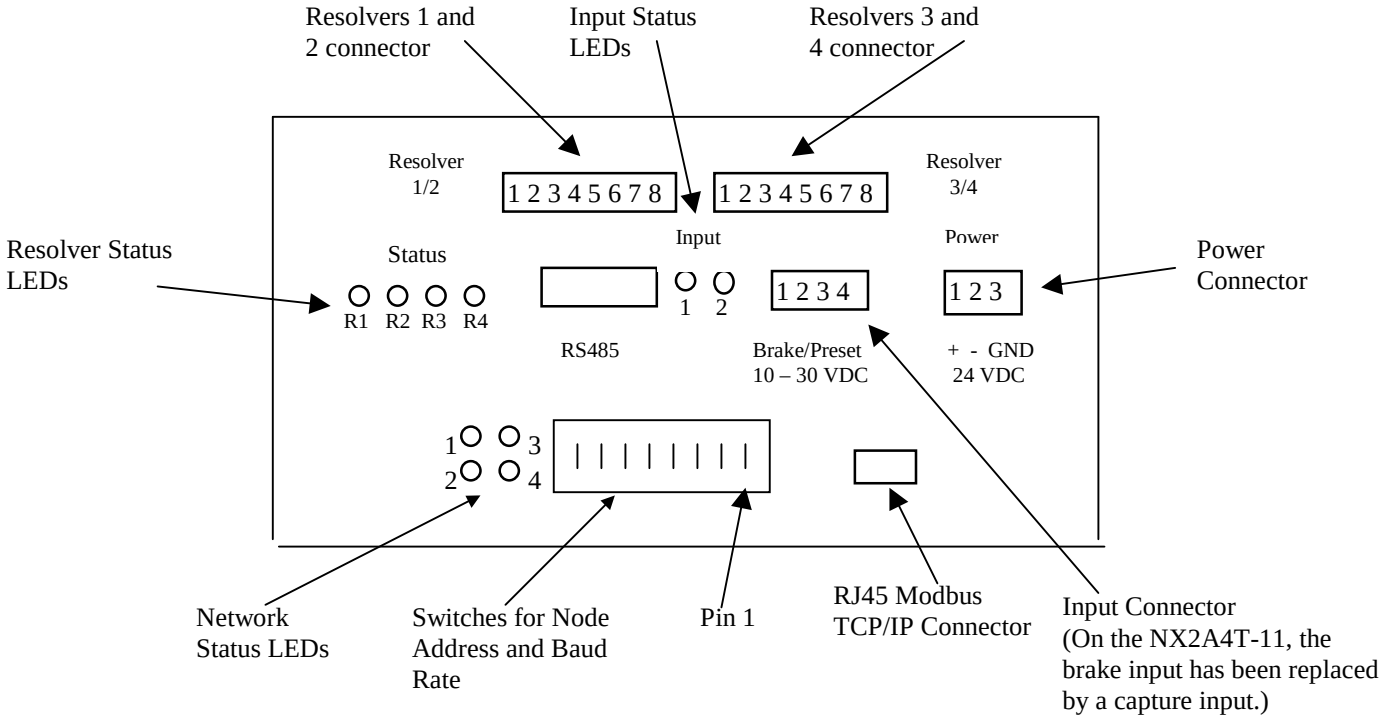
All equipment being returned to AMCI for repair or replacement, regardless of warranty status, must have a Return Merchandise Authorization number issued by AMCI. Call (860) 585-1254 with the model and serial numbers along with a description of the problem. A “RMA” number will be issued. Equipment must be shipped to AMCI with transportation charges prepaid. Title and risk of loss or damage remains with the customer until shipment is received by AMCI.

24 Hour Technical Support Number

Technical Support, in the form of documents, FAQs, and sample programs, is available from our website, www.amci.com. 24 Hour technical support is also available on this product. For technical support, call (860) 583-7271. Your call will be answered by the factory during regular business hours, Monday through Friday, 8AM - 5PM EST. During non-business hours, an automated system will ask you to leave a detailed message and the telephone number that you can be reached at. The system will page an engineer on call. Please have your product model number and a description of the problem ready before you call.

Chapter 1: Installation

NX2A4T-11 Hardware Overview



Dimensions:

Length = 5.75 inches, Height = 3 inches, Width = 3.76 inches

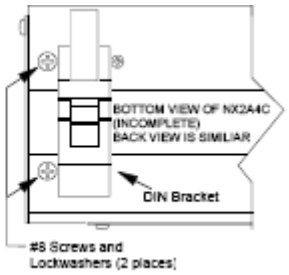
Mounting

The NX2A4T-11 can be panel mounted in two ways, either on a DIN rail or panel mounted. The mounting kit, included with the unit, contains two DIN brackets, two panel brackets, and four #8 screws needed to attach your choice of brackets to the NX2A4T-11. Note that the enclosure is not sealed and the NX2A4T-11 must be installed in an adequate enclosure to protect it from environmental contaminates.

Attaching the DIN Brackets

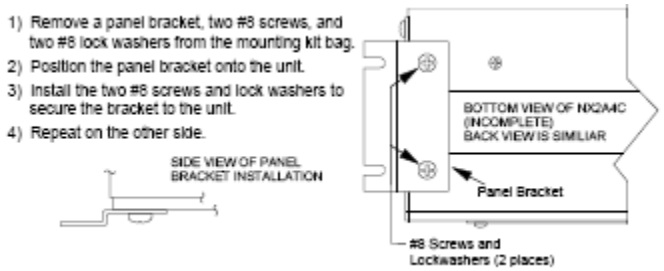
The following figure shows how to install the DIN brackets so that the NX2A4T-11 can be mounted on EN 50 022 or EN 50 035 rail. Note that the bottom view of the unit is shown. The rear view is similar and the brackets are installed in the same fashion.

1) Remove a DIN bracket, two #8 screws, and two #8 lock washers from the mounting kit bag.
2) Slide the DIN bracket onto the unit.
3) Install the two #8 screws and lock washers to secure the bracket on the unit.
4) Repeat on the other side.



Attaching the Panel Brackets

The following figure shows how to install the panel brackets so that the NX2A4T-11 can be securely mounted to an enclosure. Note that the bottom view of the unit is shown. The rear view is similar and the brackets are installed in the same fashion.



Resolver Transducer Connections

The four resolvers connected to this module can be configured as four single turn transducers, two single turn transducers and one multi turn transducer, or two multi turn transducers. The Transducer Input Connectors, labeled "RESOLVER 1/2" and "RESOLVER 3/4" have eight contacts. The mating connectors are supplied with the NX2A4T-11. The AMCI part number for the mating connector is MS-8, while the Phoenix Contact part number is MSTB2.5/8-ST-5.08, order number 1757077.

The RESOLVER 1 / 2 connector is used for connecting to Single turn Transducers channels 1 and 2 or Multi turn Transducers channel 1. The RESOLVER 3 / 4 connector is used for connecting to Single turn Transducers channels 3 and 4 or Multi turn Transducers channel 2.

The following table shows the connections between the NX2A4T-11 and the various resolver transducers that AMCI offers.

Resolver Connectors

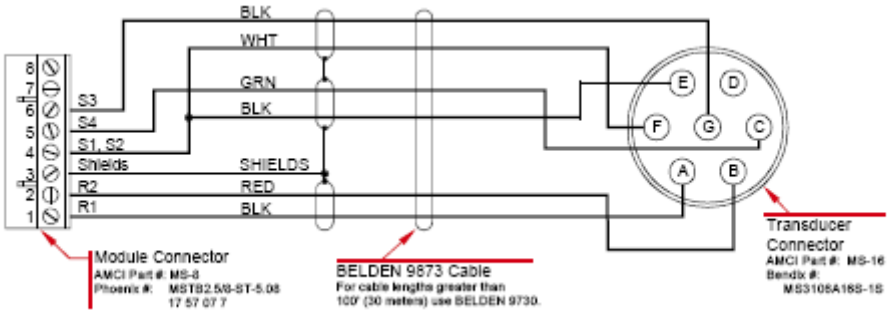
Pin Number	Single turn Function	Multi turn Function
1	R1 both channels	R1
2	R2 both channels	R2
3	Shields	Shields
4	S1 & S2 both channels	S3F, S2F, S1C, S2C
5	S4 channel 1	S3C
6	S3 channel 1	S4C
7	S4 channel 2	S1F
8	S3 channel 2	S4F

Note: The reference voltage signal, R1 and R2, of both connectors, is common.

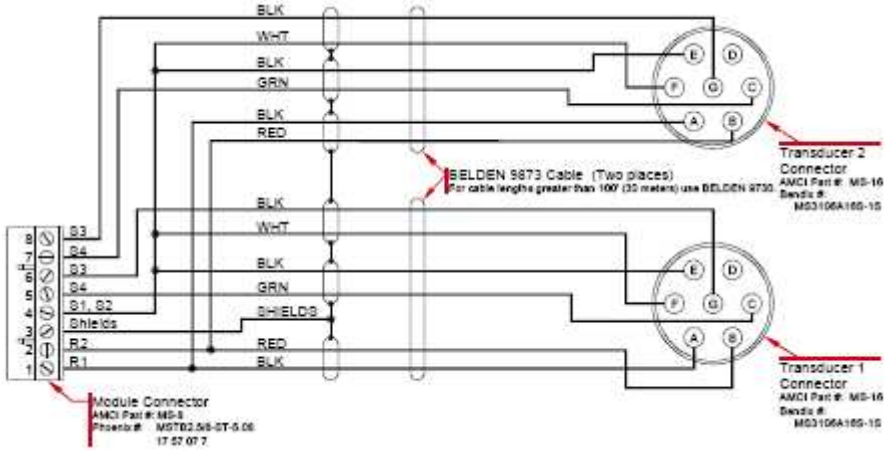
Pre made cables are available from AMCI. These cables come with a Bendix connector that mates with the resolver transducer. The other end is pigtailed at the factory for easy connection to the MS-8 connector included with the NX2A4T-11. These cables have a part number of CTL-X for single turn transducers and CML-X for the multiturn transducers. In both cases, X equals the length in feet.

The following three diagrams show how to wire the CTL-X and CML-X cables to the NX2A4T-11.

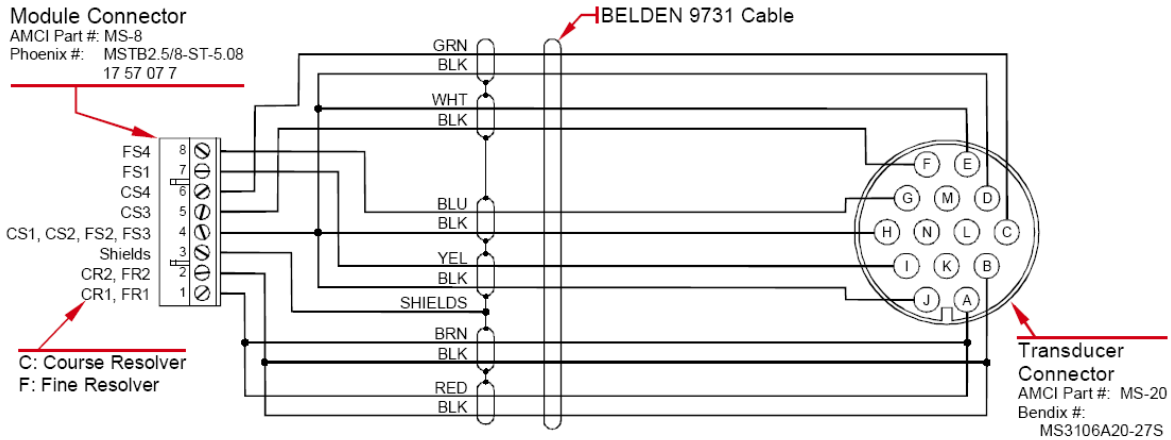
One Single turn Transducer Cable



Two Single turn Transducer Cable



One Multi turn Transducer Cable



Wiring Notes:

- Resolver signals are low voltage, low power signals. It can be installed in conduit along with other low power cabling such as communication cables and low power ac/dc I/O lines. It cannot be installed in conduit with ac power lines or high power ac/dc I/O lines.
- AMCI recommends the use of either the Beldin 9873 or 9730 or equivalent cables to connect the resolver to the NX2A4T-11 module. While the Beldin 9730 can be used for any length of cable run, the 9783 can only be used for runs less than 100 feet.
- To reduce or eliminate the influence of electrical noise on the system, the resolver cable shields must be connected to shield pin 3. The shields pins on the Transducer Input Connectors are brought to the Chassis Ground pin on the power supply connector.
- The shields must be connected to only one end of the cable run and treated as conductors at any junctions. Do not ground the shields at the junction box.
- If electrical noise is causing your resolver counts to jump, try running a heavy wire from the power connectors Chassis Ground pin to your earth ground bus. This will provide a better low impedance path to ground.
- If the resolver cable must cross power feed lines, it should do so at right angles.
- Route the cable at least five feet from high voltage enclosures, or sources of “rf” radiation.

Resolver Status LEDs

The following table describes the function of the four resolver status LEDs.
1 = Resolver 1, 2= Resolver 2, 3 = Resolver 3, 4 = Resolver 4

LED Pattern	Function
off	LED Disabled
solid green	Resolver OK
flashing green	Clearable Transducer Fault
flashing red	Non Clearable Transducer Fault
solid red	Module Fault

Power Requirements

Power Connector

Pin	Function
1	+24Vdc
2	DC Common
3	Chassis Ground

Note: The Chassis Ground Pin is connected to the NX2A4T-11’s body and must be connected to your earth ground bus for proper module operation.

The Nexus Module requires 500mA of current @24Vdc to operate.

New Position Update Time

200 microseconds

Tachometer Resolution and Range

Resolution: 1 RPM
Range: 1 to 5000 RPM

Input Function and Status LEDs

The NX2A4T-11 has two discrete inputs labeled *Brake* and *Preset*. The Brake Input is used to capture the current channel 1 position and the Preset Input is used to Apply the programmed Preset Value to the channel 1 position data. The inputs are bipolar. Connecting one of the inputs pins to +Vdc and the other to the power supply common will cause the input to activate.

- Logic 0 = 0 to 2Vdc
- Logic 1 = 10 to 30Vdc
- 10mA minimum current required to activate the input

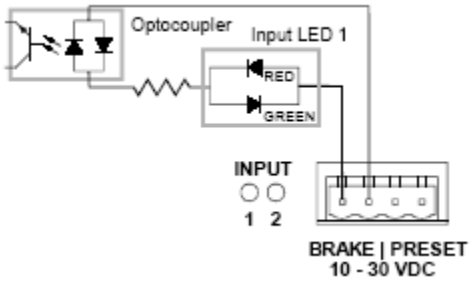
Input Connector

Pins	Function
1 to 2	Brake / Capture Input
3 to 4	Preset Input

Input LED Active State

LED Color	
Red	Pin 1 or 3 = Vdc Pin 2 or 4 = Common
Green	Pin 2 or 4 = Vdc Pin 1 or 3 = Common

The following figure shows the pin out and simplified schematic of the Brake (Capture) Input. The schematic of the Preset input is identical.



Both of these inputs can be programmed to act on the 0 to 1 (off to on) and or the 1 to 0 (on to off) transitions of the inputs. Please note that any changes made to the channel 1 position data by the preset input <u>are not</u> saved through power down.

Modbus TCP/IP Ethernet Status LEDs

The following table describes the function of the four network status LEDs.

LED Number	Name	LED Pattern	Function
1	Network Status	Flashing Green with 2 seconds interval	This LED indicates the number of established Modbus/TCP connections to the module. The number of connections is equal to the number of flashes on this LED.
		Flashing Green/Red	Power-on self test
2	Module Status	Steady Off	No Power
		Steady Green	The module is operating correctly
		Flashing Green	The module has not been initialized
		Flashing Red	Minor recoverable fault
		Steady Red	Major internal error
		Flashing Green/Red	Power-on self test
3	Activity	Flashing Green	This LED flashes green each time a packet is received or transmitted
4	Link	Steady Green	This LED indicates that the module is connected to an Ethernet network

Ethernet IP Address

The NX2A4T-11 has a default IP address of 192.168.000.XXX where "XXX" can be any number between 1 and 254.

Every Ethernet IP unit, including those made by AMCI, has a unique MAC ID number. This number is located directly below the label on the side of the unit and identifies the unit to the Ethernet Network.

If you have a computer running a BOOTP server, you can use this MAC ID address to change the unit's IP address. After changing the IP address, you must cycle power to the NX2A4T-11 to make the changes to the IP address take affect.

The DIP switches will no longer have any function after you have changed the IP address.

Ethernet Address Selection using the DIP switches

The NX2A4T-11 uses an IP address of 192.168.000.XXX where "XXX" can be any number between 1 and 254. Eight dip switches on the NX2A4T-11 are used to set the "XXX" portion of the address. Switch 8, the left most switch, is the least significant bit and switch 1, the right most switch, is the most significant bit. The address is programmed using the following procedure.

1. Determine the address of the NX2A4T-11. It can be any unused address between 1 and 254.
2. Convert the address to a binary number. A value of 50 will be 0011 0010.
3. Enter the address on the dip switches. Continuing the above example, switches 8, 6, 5, 2 and 1 will be off (down) and switches 7, 4, and 3 will be on (up).

Setup Example

AMCI NX2A4T-11 to Group Schneider's 140 NOE 771 01 module

This setup example assumes that the 140 NOE 771 01 module has already been installed in the PLC system.

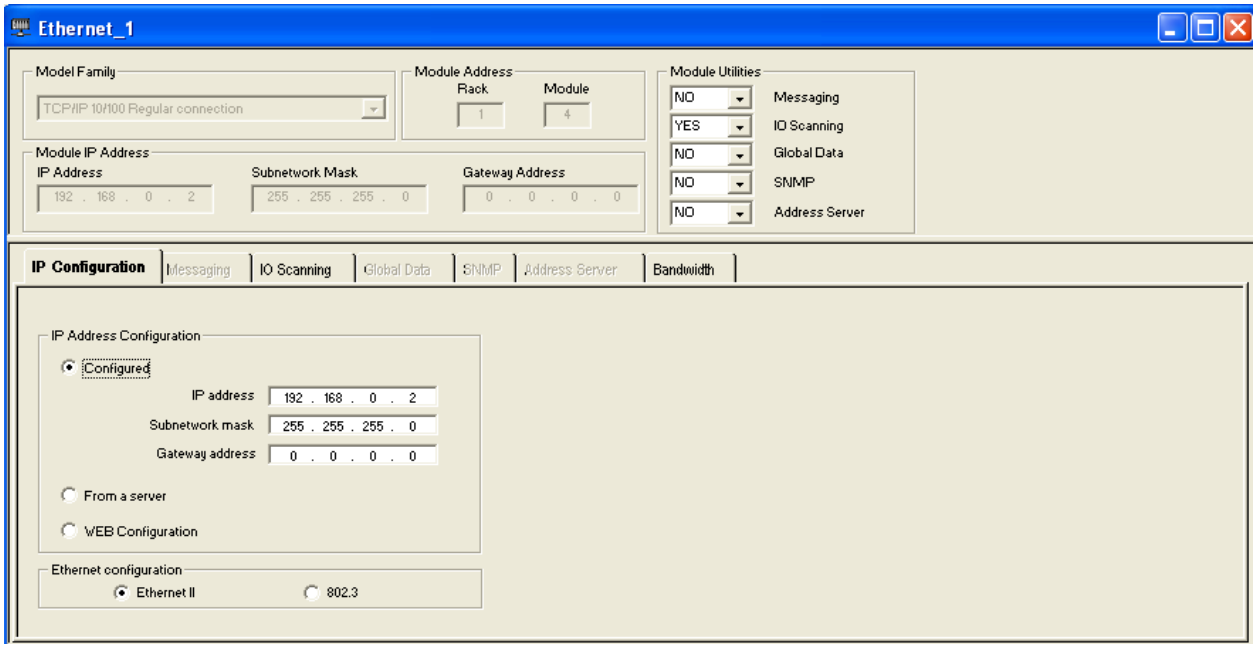
1. With power removed, use the dip switches to set the IP address of the NX2A4T-11.
2. Open an existing or create a new Unity program.
3. Open the Project Browser and click on the + symbol next to Communication.
4. Click on the + symbol next to Networks to show the available networks.
5. If you are creating a new network for the NX2A4T-11, right click on Networks and select New Network from the window that appears. If you are adding the NX2A4T-11 to an existing network, ignore this step.

   Click on the down arrow to the right of the *List of available Networks* field and select *Ethernet* from the drop down menu that appears.

   Type the new networks name in the Change Name field

   Click on OK to create the new network.

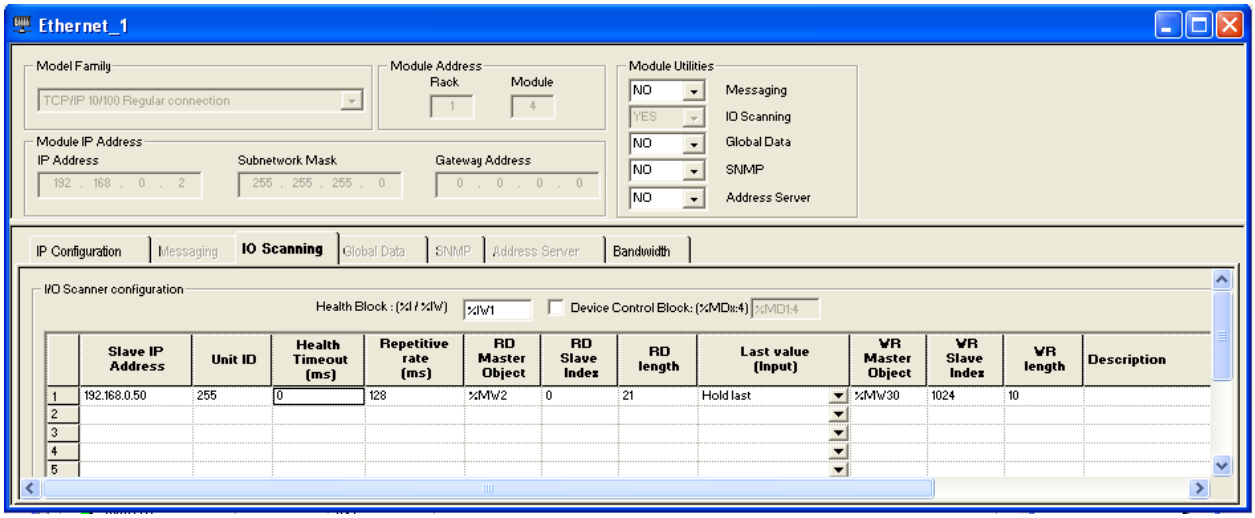
6. Right click on the existing network and select open from the window that appears. The following window will appear.



7. Enter the following parameters.

Module Family:	TCP/IP 10/100 Regular Connection
Module Address:	Location of the 140 NOE 771 01 module
IP Address:	The TCP/IP address of the 140 NOE 771 01 module
Subnet Mask:	255.255.255.000

8. Click on the I/O scanning tab. The following screen will appear.



9. Enter the following parameters.

Slave IP Address:	IP Address of the NX2A4T-11 module.
Unit ID:	Not necessary for the NX2A4T-11 module. The default value of 255 can remain.
Health Timeout:	Timeout value measured in ms. Can be any value for the NX2A4T-11 module
Repetitive Rate:	Update time of the NX2A4T-11 in ms. A value of zero will result in the fastest transfer of data between the NX2A4T-11 and the NOE module. A value other than zero must be in a multiple of 16.
RD Master Object.	First destination address register where the data transmitted from the NX2A4T-11 will be located.
RD Slave Index:	Must be 0.
RD Length:	Must be set to 21. (The NX2A4T-11 uses 21 16 bit input words)
Last Value (input):	Status of the input registers, either last state or zero, in the event of an error. The data from the NX2A4T-11 will remain in the registers if communications are lost.
WR Master Object:	First source address register location where the data sent from the PLC to the NX2A4T-11 is located.
WR Slave Index:	Must be set to 1024
WR Length:	Must be set to 10 (The NX2A4T-11 uses 10 16 bit output words)
Description:	Your choice of text or leave blank.

10. Close the network.
11. Click on Yes when asked “Do you want to save your modifications?”
12. Click on Yes when asked “Do you Confirm the Modification?”
13. On the Project Tree, expand the I/O configuration by clicking on the + symbol to the left of Configuration.
14. Further expand the I/O configuration by clicking on + symbol to the left of the Local Bus.
15. Continue to expand the I/O configuration by clicking on the + symbol to the left of the Local Quantum Drop.
16. Continue to expand the I/O configuration by clicking on + symbol to the left of the rack that contains the 140 NOE 771 01 module.
17. Expand the networks attached to the NOE module by clicking on the + symbol to the left of the 140 NOE 771 01 module.
18. Right click on the network associated with the 140 NOE 771 01 module and select OPEN from the window that appears.
19. Click on the down arrow on the field just below where it asks you to “Please choose a Network.” Select the network that was created above.
20. Save and build the project, and download it to the PLC. If the NX2A4T-11 is powered up and attached to the network, network LED 3 (the upper right network status LED) should now be flashing and network LED 4 (the lower right network status LED) should now be on solid.

Chapter 2: Programmable Parameters

You configure your unit by setting the values of its *Programmable Parameters*. These parameters are stored in nonvolatile memory. Therefore, there is no need to configure the NX2A4T-11 after every power up. The nonvolatile memory is an EEPROM that is rated for approximately 100,000 write cycles.

Apply Preset

There are four Apply Preset bits, one for each channel. Setting one of these bits while programming the NX2A4T-11 module will cause the channel's current position data to be changed to the programmed Preset value. The result of the Apply Preset operation is saved through power down.

Note: Programming a channel's setup data will undo the result of an Apply Preset operation.

Count Direction

This parameter sets the direction of transducer shaft rotation that increases the position count. *If the transducer is wired as specified in this manual* and the count direction is set to *positive,* the count will increase with clockwise rotation, (looking at the shaft). If the count direction is set to *negative,* the position count will increase with counter-clockwise rotation.

- The default Count Direction Value is *positive.*

Note: It is also possible to reverse the count direction by reversing S2 S4 wire pairs in the transducer cable. If you are designing the NX2A4T-11 into an older system, it is possible that your drawings already have the pairs reversed and you may not need to set this parameter. Once the machine is setup, you can easily change this parameter if the position is increasing in the wrong direction.

Transducer Fault Latch

Normally, a transducer fault is latched by the NX2A4T-11. Transducer faults can be caused by improper wiring, electrical noise, or a damaged transducer. When the unit detects a fault condition, it reports this fault over the network until a *Clear Errors* command is issued to it. If you have a situation where electrical noise is causing spurious transducer faults that you can safely ignore, you can disable the Transducer Fault Latch and force the NX2A4T-11 to clear a fault as soon as possible. Note that an intermittent wiring problem may also cause spurious faults. If you want to reliably capture these transient faults, then you must leave the Transducer Fault Latch enabled because the NX2A4T-11 can detect and clear transducer faults much faster than the network scans the unit.

- The default Transducer Fault Latch value is *enabled.*

Tachometer Response

This parameter sets the time between tachometer updates. It *only* affects the update time of the tachometer. It *does not* affect the update time of the position value, which is always 200 microseconds.

- The default Tachometer Response is 120 milliseconds.
- The Tachometer Response can be set to 120 or 24 milliseconds.

Resolver Type

The *Resolver Type* parameter allows you to use the NX2A4T-11 with Autotech transducers. Unlike the other NX2A4T-11 parameters, the Resolver Type parameter only exists on channel 1 because this parameter affects all channels.

- The default Resolver Type value is *AMCI*.

Note

1. AMCI has bolt-in replacements for most Autotech transducers and we strongly suggest using them in place of Autotech transducers whenever possible.
2. You can bring both AMCI and Autotech single-turn resolvers into one unit. Set the Resolver Type to *AMCI* and install a RM-3 to interface the Autotech transducers.
3. You can bring AMCI single-resolver transducers into a NX2A4T-11 with an Autotech multi-turn transducer. Set the Resolver Type to *Autotech* and install an RM-3 Reference Module to interface the AMCI transducers.
4. You cannot bring AMCI and Autotech multi-turn transducers into one unit.
5. For more information on interfacing with Autotech transducer, see the AMCI's FAQ,*"Using Transducers From Other Manufacturers"*, posted on our website, *www.amci.com*.

Channel LED Enable

This bit level parameter allows you to enable or disable the resolver status LEDs. This parameter is useful if you do not want the NX2A4T-11 to display resolver errors on channels that are not being used in your application.

- The default state of the channel 1 resolver status LED is enabled
- The default state of the channel 2 through 4 resolver status LEDs is disabled.

Input Configuration

The NX2A4T-11 has two inputs labeled *Brake* and *Preset*. The Brake input is used to capture the current channel 1 position data and the Preset input changes the channel 1 position data to the channel 1 Preset Value.

However, before either of these inputs can be used, the transition on which these operations occur must be programmed with the channel 1 setup data. Each input has two programming bits. One determines if the input will activate on the 0 to 1 (off to on) transition and the other determines if the input will activate on the 1 to 0 (on to off) transition. It is possible to set both of these bits so that the input is acted on both the 0 to 1 and 1 to 0 transition of the input. If both of these programming bits are reset, the NX2A4T-11 will ignore any transitions on the input.

- The default Input Configuration is disabled.

Full Scale Count

The Full Scale Count specifies the total number of counts generated by the NX2A4T-11. In the case of single turn transducers, it is the total number of counts over the one turn. In the case of multi turn transducers, it is the total number of counts over the programmed Number of Turns.

For All Single-Resolver Transducers

- The default Full Scale Count is 8,192.
- Range is 2 to 8,192. Setting the Full Scale Count to 360 gives 1 degree resolution.

For AMCI Multi turn Transducers

- Default value is (Number of Turns * 4,096) if Transducer Type equals 100 or 180
- Default value is (Number of Turns * 409.6) if Transducer Type equals 1,000 or 1,800
- Range is 2 to (Default Value)

For Autotech Multi turn Transducers (Transducer Type equals 128)

- Default value is (Number of Turns parameter) * 1,024
- Range is 2 to (Default Value)

Linear Offset

The Linear Offset parameter changes the *range* of count values output by the unit and is used when the transducer position directly correlates to a linear measurement that does not start at zero. One such example is an overhead crane. Another example is a press shut height measurement. As an example of how the Linear offset works, when the ***Full Scale Count*** is set to 1,500 and the Linear Offset is set to zero, the NX2A4T-11 will output position values from 0 to 1,499. If the Linear Offset is changed to 100, then the unit will then output values from 100 to 1,599.

- The default Linear Offset is zero.
- For single-turn channels, the range of the Linear Offset is 0 to (32,767 – Full Scale Count).
- For multi-turn transducers, the range of the Linear Offset is 0 to 999,999.

Preset Value

The Preset Value parameter allows you to set the value of the position data to any count value within its range. The range of the count values is (Linear Offset) to (Linear Offset + (Full Scale Count - 1)). When the ***Linear Offset*** equals zero, this translates into 0 to (Full Scale Count -1). Programming the Preset Value does not change the position data, it only sets the value that the position will change to when an *Apply Preset Command* (or when the Preset Input is used on channel 1) is initiated.

- The default Preset Value is equal to the Linear Offset, which is typically zero. Programming the Linear Offset resets the Preset Value to equal it.
- The Preset Value range is (Linear Offset) to (Linear Offset + (Full Scale Count - 1)). When the Linear offset equals zero, this reduces to 0 to (Full Scale Count -1)

Transducer Type
(Multi turn Transducer Parameter Only)

The Transducer Type parameter exists for multi-turn transducers only. If a channel is programmed to be used with a single-resolver transducer, then this parameter does not exist for that channel. The Transducer Type parameter defines the type of multi-turn transducer attached to the channel. The NX2A4T-11 needs this information in order to decode the multi-turn position correctly. This parameter also defines the values that can be programmed into the ***Number of Turns*** parameter.

- If the ***Resolver Type*** parameter is set to *AMCI*, the Transducer Type parameter can be set to 100, 180,1,000, or 1,800.
- If the ***Resolver Type*** parameter is set to *Autotech*, the Transducer Type parameter must be set to 128.

Number of Turns
(Multi turn Transducer Parameter Only)

The maximum number of turns a multi-turn transducer can encode is fixed by the gearing inside of it. However, the NX2A4T-11 has the ability to divide this maximum number of turns into smaller multi-turn cycles. The unit does this without loss of absolute position within the smaller cycle. For example, the 180 turn mechanical cycle of an HTT-20-180 can be broken down into three electronic cycles of sixty turns each. The 180 turn cycle could also be broken down into sixty cycles of three turns each.

The range of values for the Number of Turns parameter is dependent on the value of the ***Transducer Type*** parameter.

- **When Transducer Type = 100:** Number of Turns is programmable to 1, 2, 4, 5, 10, 20, 25, 50, or 100.
- **When Transducer Type = 180:** Number of Turns is programmable to 1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18,20, 30, 36, 45, 60, 90, or 180.
- **When Transducer Type = 1,000:** Number of Turns is programmable to 10, 20, 40, 50, 100, 200, 250,500, or 1,000.
- **When Transducer Type = 1,800:** Number of Turns is programmable to 10, 20, 30, 40, 50, 60, 90, 100,120, 150, 180, 200, 300, 360, 450, 600, 900, or 1,800.
- **When Transducer Type = 128:** Number of Turns is programmable to 1, 2, 4, 8, 16, 32, 64, or 128.

Chapter 3: Input Registers (Data sent from the NX2A4T-11 module to the network)

The following table shows the input data format for the NX2A4T-11 module.

Word Number	Single turn Transducers	Multi turn Transducers
0	Channel 1 Status	Channel 1 Status
1	0	Channel 1 upper 3 digits position
2	Channel 1 Position	Channel 1 lower 3 digits position
3	Channel 1 Velocity	Channel 1 velocity
4	Channel 2 Status	0
5	0	0
6	Channel 2 Position	0
7	Channel 2 Velocity	0
8	Channel 3 Status	Channel 2 Status
9	0	Channel 2 upper 3 digits position
10	Channel 3 Position	Channel 2 lower 3 digits position
11	Channel 3 Velocity	Channel 2 velocity
12	Channel 4 Status	0
13	0	0
14	Channel 4 Position	0
15	Channel 4 Velocity	0
16	0	Channel 1 Upper Capture Value
17	Channel 1 Capture Value	Channel 1 Lower Capture Value
18	0	0
19	0	0
20	0	0

Status Word Layout

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
Acknowledge bit (ch 1 only)	Module Fault	Transducer Fault Bit	Preset Input Status (ch 1 only)	Capture Input Status (ch 1 only)	Resolver Type (0=single, 1=multi turn)	Velocity at zero	Motion Direction (0=increasing, 1=decreasing)	Message Ignored	Command Error	Preset Value Error	Linear Offset Error	Full Scale Count Error	Number of Turns Error	Transducer Type Error	Configuration Error

Configuration Error: Set if any of the unused bits in the configuration word are set. This bit will also be set if the Capture and Preset input transition types are programmed on channels 2 through 4.

Transducer Type Error: Multi turn Transducer Programming Error only. This bit is set if the transducer type is not equal to 100, 180, 1000, or 1800 if the module is configured for AMCI transducers, or 128 if the module is configured for Autotech transducers. This bit will always be reset when the module is being used as a single turn resolver.

Number of Turns Error: Multi turn Transducer Error only. This bit is set if the number of turns is invalid for the transducer type selected. This bit will always be reset when the module is being used as a single turn resolver.

Full Scale Count Error: Set if the Full Scale Count is outside of the range of:
2 to 8192 for Single turn transducers
2 to (4096 * Number of Turns) for 100 or 180 turn transducer
2 to (409.6 * Number of Turns) for 1000 or 1800 turn transducer
2 to (1024 * Number of Turns) for an Autotech 128 turn transducer

Linear Offset Error: Set if the linear offset is outside of the range of:
0 to (32767 - Full Scale Count) for single turn transducers
0 to 999,999 for multi turn transducers

Preset Value Error: Set if the preset value is outside of the range of Linear Offset to (Linear Offset -(Full Scale Count -1))

Command Error: Set if any of unused bits in the command word are set, if you try to program a channel that is not present, if you try to program more than one channel at a time, or if you attempt to preset single channels 2 or 4 if they have been configured as multiturn channels.

Message Ignored: Set if an attempt is made to program a parameter if an error already exits on a different parameter. This bit will also be set if you use the Apply Preset command (including the Preset Input) on a channel that is in transducer fault.

Motion Direction: This bit will be "0" if the counts are increasing, or "1" if the counts are decreasing. The bit will remain in its last state when there is no motion.

Velocity at Zero: This bit will be set if there has been no motion for 125ms.

Resolver Type: This bit will be reset if the input channel is configured to be used with single turn transducers, and set if the input channel is configured to be used with multi turn transducers.

Capture Input Status: This bit will be set if power is applied to the Capture Input. This bit is present only in the channel 1 status data and shows the state of the Capture Input even if the input's transition type has not been programmed in the Configuration word.

Preset Input Status: This bit will be set if power is applied to the preset input. This bit is present only in the channel 1 status data and shows the state of the Preset Input even if the input's transition type has not been programmed in the Configuration word.

Transducer Fault: This bit will be set if a transducer Fault has been detected.

Module Fault: Set if there is a module fault, such as an EEPROM error.

Acknowledge Bit: Set when the Transmit bit is set in output word 0. This bit is present only in the channel 1 status data.

Position Data: This register shows the current position data from the resolver transducer. This register will count from 0 to (Full Scale Count –1). If the resolver transducer continues to rotate in the same direction, the count value will then roll over to zero and start counting again. The position data is updated every 200 microseconds.

Velocity Data: This register shows the current rate of change of the position data and has units of Revolutions/Minute. The velocity data is updated every 120 or 24ms, depending on the channel's configuration.

Capture Value: Only the Channel 1 position data can be captured on either the 0 to 1 and or the 1 to 0 transition of the Capture Input. (This input is labeled as the brake input on the front of the NX2A4T-11.) The capture value will remain in the register until one of the following has occurred.

- A new capture value is detected.
- The module is programmed, including sending the Apply Preset command to any of the channels.
- The Preset Input has been configured and is activated.
- The NX2A4T-11's power is cycled.

Input Data Notes

1. It is possible to configure the module for one Multi turn and two Single turn transducers at the same time. If channel 1 is used for the Multi turn input, than the channel 1 and 2 Single turn data is replaced by the channel 1 Multi turn data. However, the channel 3 and 4 single turn data will remain. If the channel 2 Multi turn is used, than the channel 3 and 4 Single turn data is replaced by the channel 2 Multi turn data, and the channel 1 and 2 Single turn data remains. It is not necessary to use the channel 1 Multi turn data before using the channel 2 Multi turn data.
2. If the module is configured to work with Multi turn transducers, programming either of the Single turn channels associated with the Multi turn channel will replace the Multi turn channel data with the data of both Single turn channels. For example if Multi turn channel 1 is being used, and Single turn channel 2 is programmed, than single turn channel 1 and channel 2 data will replace Multi turn channel 1 data in the input registers.
3. The data in the input registers remains in its last state if the Nexus module is removed from the network.

Chapter 4: Output Registers (Data sent from network to the NX2A4T-11)

The format of the output data is shown in the following table. Please note that only one channel can be programmed at a time. However, the position of more than one channel can be preset, and a channel programmed, with one write operation.

Word Number	Single Resolver Transducers	Multi turn Transducers
0	Control	Control
1	Configuration	Configuration
2	0	Upper 3 Digits Full Scale Count
3	Full Scale Count	Lower 3 Digits Full Scale Count
4	0	Upper 3 Digits Linear Offset
5	Linear Offset	Lower 3 Digits Linear Offset
6	0	Upper 3 Digits Preset Value
7	Preset	Lower 3 Digits Preset Value
8	0	Transducer Type
9	0	Number of Turns

Control Word Function

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
Transmit Bit	Clear Errors					Program Multi turn channel 2	Program Multi turn channel 1	Program Single turn channel 4	Program Single turn channel 3	Program Single turn channel 2	Program Single turn channel 1	Apply Preset channel 4	Apply Preset channel 3 (Single or Multi turn)	Apply Preset channel 2	Apply Preset channel 1 (Single or Multi turn)

Configuration Word Function

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 09	Bit 08	Bit 07	Bit 06	Bit 05	Bit 04	Bit 03	Bit 02	Bit 01	Bit 00
			Capture Input Rising (channel 1 only)	Preset Input Falling (channel 1 only)	Capture Input Rising (channel 1 only)	Capture Input Falling (channel 1 only)	Enable Channel LED (0=disable, 1=enable)					Resolver Type (0=AMCI, 1=Autotech) (Programmed on channel 1 only)	Tachometer Response (0=120ms, 1=24ms)	Transducer Fault Latch (0=yes, 1=no)	Direction (0=Cw, 1=CCW increasing)

Transducer Type Range: Single Turn: "don't care."
Multiturn: 100, 180, 1000, 1800 for AMCI or 128 for Autotech

Number of Turns Range: Single Turn: "don't care."

Multiturn
100 turn = 100, 50, 25, 20, 10, 5, 4, 2, or 1
180 turn = 180, 90, 60, 45, 36, 30, 20, 18, 15, 12, 10, 9, 6, 5, 4, 3, 2, 1
1000 turn = 1000, 500, 250, 200, 100, 50, 40, 20, 10
1800 turn = 1800, 900, 600, 450, 360, 300, 200, 180, 150, 120, 100, 90 60, 50, 40, 30, 20, 10
128 turn = 128, 64, 32, 16, 8, 4, 2, 1

Full Scale Count Range: 2 to 8192 for Single Turn resolvers
2 to (4096 * Number of Turns) for 100 or 180 turn transducer
2 to (409.6 * Number of Turns) for 1000 or 1800 turn transducer
2 to (1024 * Number of Turns) for an Autotech 128 turn transducer

Linear Offset Range: 0 to (32767 - Scale Factor) for single turn resolvers
0 to 999,999 for multiturn resolvers

Preset Range: Linear Offset to (Linear Offset + (Full Scale Count -1))

1. Words 8 and 9, the transducer type and number of turns parameter, apply only for multiturn channels and are not used for single turn resolvers. When programming single turn resolvers, words 8 and 9 are "don't cares."
2. When programming multiturn transducers for Autotech, channel 1 must be programmed before channel 2 because channel 1 configures the module for Autotech transducers.

Programming Sequence

1. The ladder logic program writes the data into the output registers.
2. The ladder logic program then sets the transmit bit.
3. When the module detects the 0 to 1 transition of the transmit bit, it will respond by setting any error bits and the Acknowledge bit in the input registers.
4. When the ladder logic program sees that the acknowledge bit is set, it will examine any error bits, and then reset the transmit bit.
5. The module will reset the Acknowledge bit.
6. The programming sequence is now complete.

Warning: The EEPROM used to store parameter values, and the internal offset that is calculated every time you use the Apply Preset Command, is guaranteed for approximately 100,000 write cycles before writing to it will cause it to fail. Therefore, continuously presetting the position or writing new parameters should be avoided. If your application requires you to continuously preset the position, consider calculating the required position offset in you ladder logic program. A description of how to perform this operation is shown in the FAQ section of our website, www.AMCI.com. .

Revision History

Revision 0.0 was released on 6/3/05 and was the initial release of the specifications.

Revision 1.0 was released on 8/24/05 and added mounting, wiring, and network configuration data to the specifications. More detailed programming information was also added to the specifications.

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