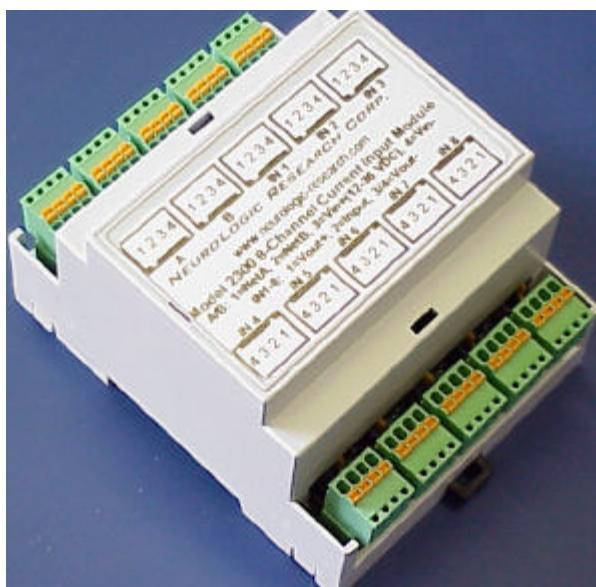


## HIGH RESOLUTION 8-CHANNEL CURRENT INPUT NETWORK NODE



- 8-Channel, 19-bit resolution, 0-25 mA input range.
- All connections are made via high-quality removable terminal blocks.

- Input power is distributed to each sensor's terminal block to cut down on external wiring.
- Output power to each sensor is reverse voltage protected and fused.
- Input sense resistor is protected from over-voltage.
- All inputs have factory default configuration of 4-20 mA, which allows instant integration of any standard 4-20 mA transmitter into the LonWorks® digital network.
- Supports loop and self powered sensors.
- Digitally calibrated at the factory for high accuracy. Additionally, the customer can re-calibrate the unit for custom input ranges.
- Compact DIN Rail mount enclosure that is only 2.8" W x 3.54" L x 2.28" H footprint.
- All data is available using Standard Network Variables (SNVT)
- Analog inputs can be processed as digital inputs with custom trigger points
- Analog inputs can be averaged over multiple samples.

## DESCRIPTION

The Model 2300 is a High Resolution, 19-bit, 8-Channel Current Input Network Node that is housed in a compact DIN rail enclosure. It allows integration of up to 8 current output transmitters into the LonWorks distributed digital network. Using the Model 2300 allows multiple sensors to be used over a simple four-wire bus installation. Two wires are used for power, the other are used for digital communication. The communication interface is the FTT-10 transceiver.

All connections to the Model 2300 are made via high quality removable terminal blocks. Power into the Model 2300 is reverse voltage protected, individually fused, and finally made available to the sensor terminal blocks. This feature allows simple power distribution to each 4-20 mA transmitter and reduces external wiring. Additionally, the input current sense resistors are individually protected against over-current conditions by a unique circuit. The protection circuit will limit the input current and return an error value to attached network device. The protection circuit will automatically recover when the fault condition is removed and will resume normal measurement.

## WIRING AND INSTALLATION

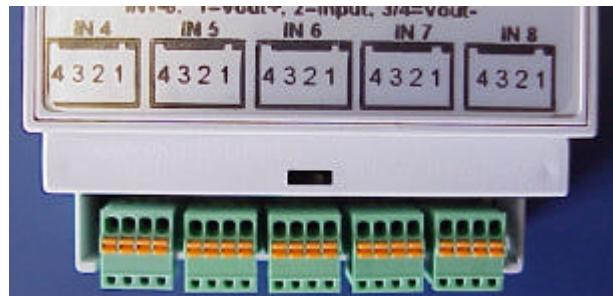
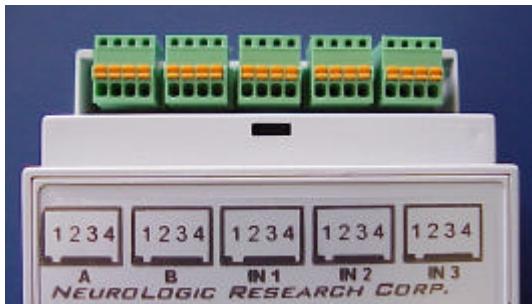
Input power and network communication is done via two identical 4-position terminal blocks labeled A and B. The terminal blocks are duplicated to allow easy in/out bus wiring of multiple units. Please see the wiring diagram below for attaching power and network wiring. If the A/B connectors are used to daisy chain multiple devices, please keep the overall current going through any one Model 2300 to less than 3 amps. The Model 2300 can be powered by a voltage source between 12 and 36 VDC. Please see the table below for identification of each position on the A/B terminal blocks.

# MODEL 2300

The on-board Service switch and LED allow installation on to the LonWorks network. The Service LED is in the lower right hand corner to the right of the IN8 terminal block. The Service Switch can be found under the top cover. The top cover can be removed using a small screwdriver and gently pulling up on the side of the top cover.

A & B Terminal Blocks	Connection
1	<b>NetA:</b> Position 1 and 2 labeled NetA and NetB connect the Model 2300 to the LONWORKS FTT-10 network. These wires are not polarity sensitive.
2	<b>NetB:</b> See above
3	<b>VIN+:</b> Positive end of input voltage source to power the unit. 12 –36 VDC is allowed. This voltage after being fused and reverse voltage protected is supplied to the VOUT+ connectors on IN1-IN8 terminal blocks.
4	<b>VIN-:</b> Negative connection of DC input voltage source. This terminal is essentially connected directly to the VOUT- terminals of IN1-8.

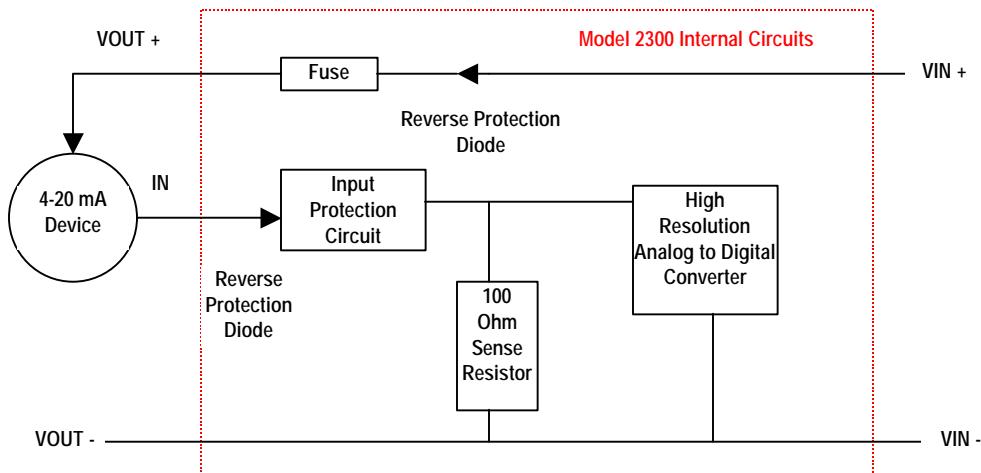
IN1 - 8 Terminal Blocks	Connection
1	<b>VOUT+:</b> Output voltage source to transmitters. This output is essentially the voltage at the VIN+ terminal on A/B terminal blocks minus about 1 volt. The VOUT+ terminal is individually fused with 100 mA resettable fuse and reverse voltage protected.
2	<b>INPUT:</b> This pin is where the current to be measure enters the Model 2300. Please see the wiring diagrams that follow.
3&4	<b>VOUT-:</b> Negative connection of output DC voltage source. This terminal is essentially connected directly to the VIN- terminals of A/B.



Each transmitter is attached to the Model 2300 via a 4-position removable terminal block labeled IN1-8. Please see the table above for identification of each position on those terminal blocks. Not all connections are used on all installation.

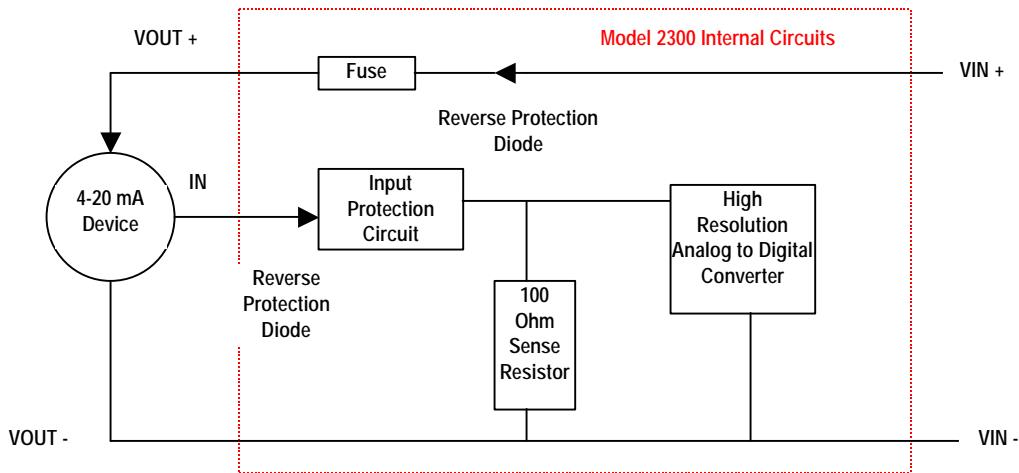
Please see the following diagram for connection to a loop-powered 4-20 mA transmitter. A loop-powered transmitter draws power from the loop and can be interfaced using only two wires.

# MODEL 2300



Loop Powered 4-20 mA Transmitter Wiring Diagram

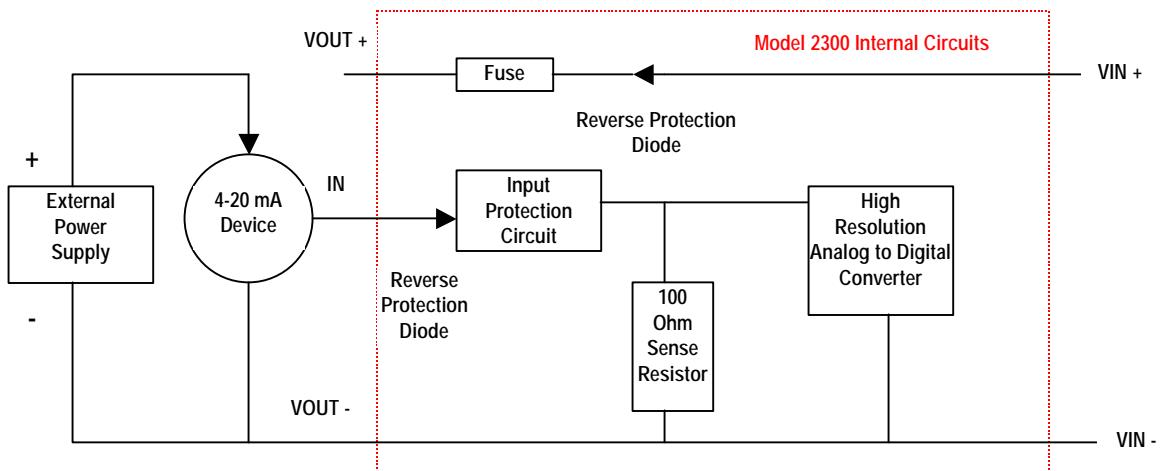
The following wiring diagram show how a self-powered transmitter can be wired to the Model 2300. In the following diagram, the Model 2300 can supply power to the device up to 100 mA over the full temperature range of -40 to 85C. As can be seen from the wiring diagram the Vout+ line is the output supply to the 4-20 mA transmitter.



Self-Powered 4-20 mA Transmitter Wiring Diagram Up To 100 mA

# MODEL 2300

The following wiring diagram show how a self-powered transmitter can be wired to the Model 2300. In the following diagram, the Model 2300 does not supply power to the device. Instead, a separate external power supply powers the 4-20 mA transmitter.



Self-Powered 4-20 mA Transmitter Wiring Diagram >100 mA

## Custom Digital Calibration of Analog Inputs

By default, the Model 2300 is calibrated for 4 mA as the 0% value and 20 mA as the 100% value. Many 4-20 mA sensors provide a local mean to adjust the 4 mA and 20 mA to re-range the transmitter's current output. If this approach is used, there are no further calibration or adjustments to be made.

The Model 2300 provides a digital calibration scheme. This approach allows each current input to be calibrated via commands sent across the network. Digital calibration is much more precise and does not suffer from long-term component drift. The nviCalibrate and nviCalibVal network variables are used to digitally change the calibration. See the Network Objects section for explanation of the values. However, to simply offset the nvoAI[] output data, use the nciAIOffset[] configuration variable. This has the effect of shifting the calibration curve up and down without changing its shape.

The Model 2300's calibration is very flexible allowing any current value in the range of 0 to 25 mA to be specified. Calibration of the Model 2300 includes zero and span to re-define the 0% and 100% points as well as an offset. For convenience, the Model 2300 allows the customer to also calibrate any two custom points. For example precision input sources may only be available at 23% and 68%. The net result is to simply define the lower and upper points on a straight line. This is then used to internally correlate the input signal to the output percentage value. The offset is used to move the straight line up and down without changing its slope.

The Model 2300 does not impose any limits on the upper or lower calibration points. This is useful since you can actually re-define the upper point to be less than the lower point and thus define a characteristic line with a negative slope. In this case, the percentage output, nvoAI[], will actually go down as the input current goes up.

## ***Software Averaging of Analog Inputs***

The Model 2300 firmware allows the user to select averaging of 1 to 8 samples before reporting the data on the network. All inputs are internally updated once every 1.2 seconds. The default number of samples averaged is 1 or no averaging. However, the user can change this value by changing the network variable nciAvgSamples[].

## ***Using Analog Inputs as Digital Inputs***

In some cases it may desirable to interpret the analog input data as a digital ON/OFF type value. This may be useful when interfacing to 4-20 mA switch-type device. Another use is perhaps turning a device on or off when a particular analog input level is reached.

The nvoDI[] network variables are used to read the analog input after they have been interpreted as a discrete input. Note, this does not interfere with the nvoAI[] network values reporting the current level. Both values can be used simultaneously.

The trigger points are set using the nciDILow[] and nciDIHigh[] network variables. The nvoDI[] network variable will be set to “OFF” if the input signal is lower than nciDILow[] setpoint and “ON” when the input signal is higher than nciDIHigh[] setpoint. The factory defaults are set at 25% for nciDILow[] and 75% for nciDIHigh[]. That equates to 8 mA and 16 mA respectively if the factory configuration of 4-20 mA is used.

## ***Enabling 50 Hz Filter***

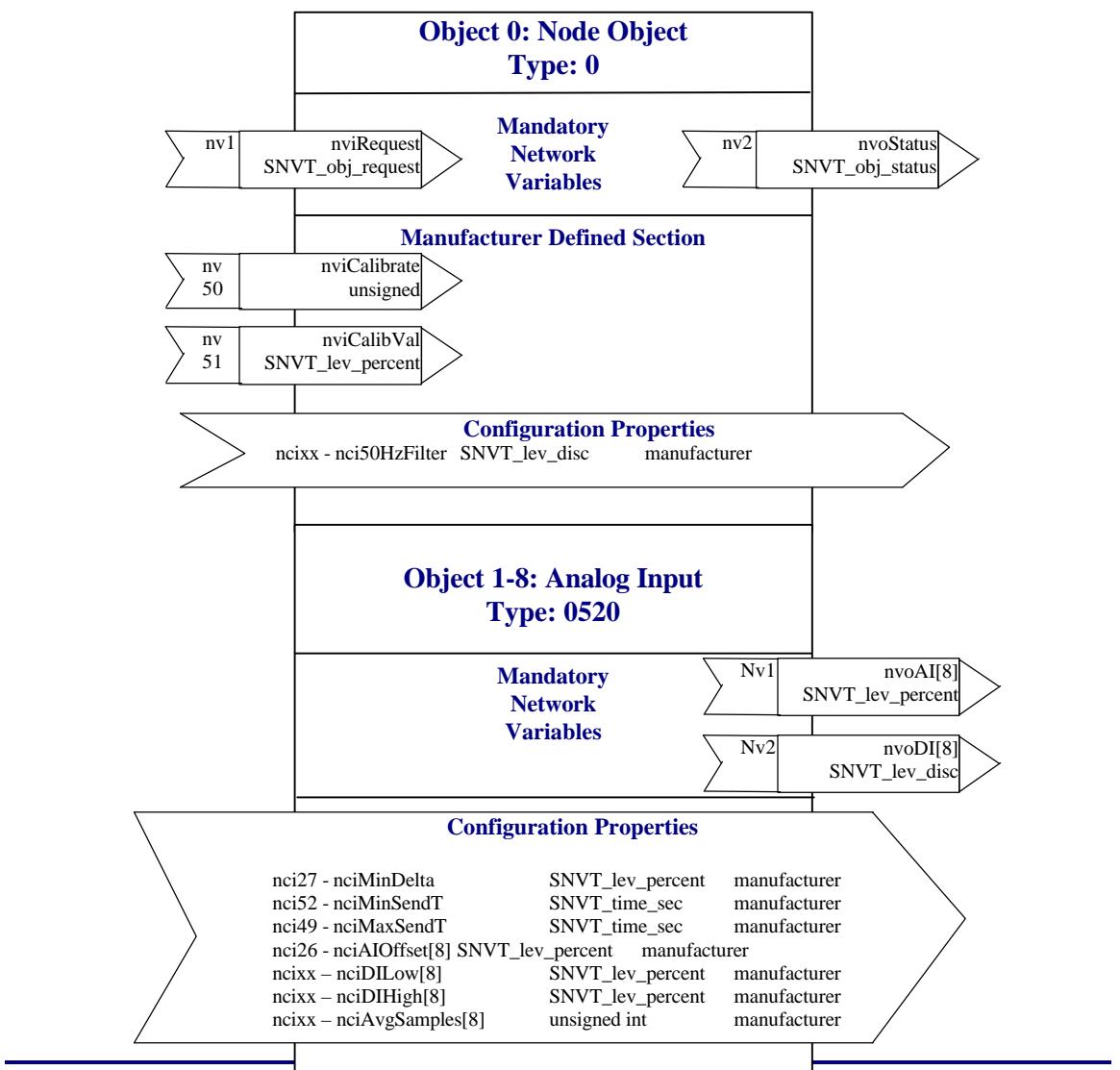
By default, the Model 2300 hardware has high rejection of 60 Hz noise that may be induced on to the analog signals. If the units are installed in an environment where 50 Hz power lines are used the 50 Hz filter can be enabled by setting the nci50HzFilter Configuration Network Variable to “ON”.

# MODEL 2300

## NETWORK OBJECTS

The Model 2300 contains a Node Object and eight identical LONMARK Analog Input Profiles, 0520, with input and output data shown below. The nviCalibrate and nviCalibVal network variables allow the Model 2300 to be calibrated and re-ranged by the customer. Specific calibration functions for channel #1 are accomplished by writing the following values into nviCalibrate. The calibrate by value functions assume that nviCalibVal contains a valid value before the command is written into nviCalibrate. Note, for the second channel add 16 to the command, for the third channel add 32, and so on. Finally for the eighth channel add 112 to the command.

- 00 - Zero. The current input signal corresponds to 0%.
- 01 - Span. The current input signal corresponds to 100%.
- 02 - Calibrate Value #1. The current input signal corresponds to lower value which is contained in nviCalibVal.
- 03 - Calibrate Value #2. The current input signal corresponds to upper value which is contained in nviCalibVal.
- 15 - Reset calibration to factory



## GENERAL SPECIFICATION

### General

CPU	3120 Neuron
Network Transceiver	FTT-10A
A/D resolution	20 bits delta sigma with digital filter
Operating Temperature	-40 – 85° C
Operating Humidity	0-95% Relative Humidity non-condensing
Input Power	12 to 36 VDC
Input Power Protection	Input power is fused and transient voltage protected. (Fuses do not need to be replaced)
Current Consumption	35 mA typical plus power used by 4-20 mA devices. Plan for an additional 25 mA for each loop powered 4-20mA sensor.
Network Transceiver Type	Echelon FTT-10A transceiver at 78 kbps. DC blocking capacitors for LPT10 network.
Input Power and Network Wiring	Removable terminal blocks. Accepts up to 20 GA wire. Input power is reverse voltage protected. Network wiring is polarity insensitive.

### Analog Inputs

Inputs	8
Input Types	0-25 mA current. Factory default is scaled for 4-20 mA
Input Sense Resistor	100 Ohm
Accuracy	+/- 1 uA at 25 C
Internal Hardware Resolution	+/- 0.05 uA
Software Update Frequency	All 8 channels are read and processed once every 1.2 seconds.
Software Resolution	0.005% = SNVT_lev_percent network variable resolution
Temp Coefficient	< 15 ppm per degree C
Hardware Resolution	20 bits
Hardware Interface	20-bit delta sigma A/D with digital filtering. 60Hz or 50Hz filtering is network selectable.
Protection	Can tolerate up to 40 VDC across current input signal without damage to internal sense resistor.

### Dimension and Materials

External Dimension	72 mm (2.8") W x 90 mm (3.54") L x 58 mm (2.28") H
Enclosure Type	DIN rail mount to 35 mm rail
Enclosure Material	Grey frame retardant Noryl UL94_V0

## ORDERING INFORMATION

2300	Model 2300 High Resolution 8-Channel Current Input Network Node	
Code	Network Transceiver Option	
-0	TP/FTT-10A	
2300	-0	Model 2300 with FTT-10A transceiver

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