



- Supports many common gas, water, and power meter output network variable types. Supports NeuroLogic Research’s Model 2200VM & 2200PM products as well as Continental Controls’ WattNode LonWorks product.
- Sunlight readable black over green or high visibility white over blue alphanumeric LCD display.
- Large 0.45” high numeric display format.
- 1/8 DIN panel-mount enclosure.
- Eight display parameters. Each can be one of 13 different types.

- Operates from 12-36 VDC or 14-26 VAC. Uses less than 15 mA at 24 VDC (0.35 W).
- Open communication standard using LonWorks® Free Topology Interface
- Firmware is upgrade able via network communication interface.
- User select able display format of one, two, or four parameters per screen



DESCRIPTION

The Model 1600LM Network Display is a 2 line by 16-character alphanumeric display using a high visibility LCD display with back lighting. It is available with a sunlight readable black on green background or a higher contrast white on blue background for indoor. The unit integrates the display, Neuron FT5000 network processor with a Free Topology LonWorks network communication interface, and a wide-input voltage switching power supply. It is housed in a 1/8 DIN panel-mount housing.

LonWorks communication protocol. The firmware allows display of up to eight different network variables. Each of the variables can be one of 13 different types supporting common network variable types as well as ones associated with Utility Meters. Please contact us regarding any special application requirements.

Display data and configuration information are exchanged with other devices via the Echelon®

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| NOTE | This PDF datasheet has attachments. To access them, it may be necessary to use an actual Adobe Reader. since some readers built into internet browsers do not allow access to attachments. |
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WIRING AND INSTALLATION

The Model 1600L is wired using four terminals. Two terminals are used to connect power. The other two connect the network communication channel. For convenience, the Model 1600LM accepts low voltage AC and DC power. Power and network wiring is polarity insensitive and can be reversed.

Network installation can be accomplished via the on-board Service Switch. The Service Switch and LED are on the back of the unit. The panel-mount housing is a standard 1/8 DIN. It requires a cutout to mount. Please



see the Specifications section for details on the recommended panel cutout size.

NETWORK INTERFACE

The 1600LM 2.0 firmware can display 8 different items. Each item can be one of 13 different types. This firmware version has many variable types that support many metering data types. It can easily be used with our Model 2200VM and 2200PM products. We also support many output network variable types from the WattNode product from Continental Controls. The 1600LM20.XIF file is attached to this PDF datasheet for convenience.

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Since the 1600LM firmware does not know what the application requires, it simply has 8 network variables for each of the 13 types. As an example, if you would like to display a SNVT_temp_p variable as the first item and a SNVT_percent as the second: Simply bind into nviTempP[0] and nviPercent[1]. The firmware will detect the correct format of each item and display it. Please see the section titled “Real-Time Data Input Network Variables“ for a list of the different types.

To configure how the Model 1600LM firmware will in general display the 8 different items, please see the “General Display Configuration Network Variables” section. nciVarstoDisplay specifies the number of variables to display if less than the maximum of 8. nviDescDispTime specifies the numbers of seconds to display the Description String, nviDescStr[]. nviValDispTime specifies the number of seconds to display the value of each item. Finally nciDispFormat specifies how the items are grouped.

To configure how each item is to be displayed, please see the “Real-Time Data Configuration Network Variables” section. Depending on the display format selected by the user, each variable can have up to a 16 character description string,. The description string, nviDescStr[], is displayed to identify the source of the data. The nviOffset[] and nviSpan[] configuration variables allow each item to be scaled. The nciDecPlaces[] configuration variable allows the user to specify the number of decimal places. nciUpdateTimeout[] specifies long to wait for an update before deciding something went wrong.

The following table describes what the Model 1600LM20 displays under different error conditions:

| Display | Condition |
|---------|--|
| ----- | No network updates have been received since the Model 1600LM20 firmware has been powered up. |
| ??????? | Excessive amount of time has elapsed since the last network update has been received. The time-out period is controlled by nciUpdateTimeout[]. Each of the eight inputs has a separate value. By default, it is zero and the Model 1600LM firmware will continue to display the last value received. |
| ***** | The number being displayed is too large for the number of display characters allowed. |
| ##### | The data received for the type of network variable indicates that the data is invalid. |



nciDispFormat = 0 nciDispFormat = 1 nciDispFormat = 3 nciDispFormat = 4

General Display Configuration Network Variables

The following configuration variables apply to display of all parameters. They are saved to non-volatile memory.

| Name | Type | Input Range | Resolution | Default | Description |
|------------------|---------------|----------------|------------|---------|--|
| nciDispFormat | SNVT_count | 0 - 4 | N/A | 1 | <p>Specifies how data is formatted for display.</p> <ul style="list-style-type: none"> - 0 - Single value per screen. The display toggles between displaying the description string and the numeric value. The first 16 characters of the description are displayed. The value is displayed using 8 large 0.45" high digits. - 1 - Single value per screen. Top line of display displays the first 16 characters of the description. The bottom line displays the value using 16 digits. - 2 - Two values per screen. The display toggles between the two description strings and the two values. The first 16 characters of the description are displayed. Values are displayed using 16 digits. - 3 - Two values per screen. The first 7 characters of the description are displayed followed by the value using 8 digits. - 4 - Four values per screen. The display toggles between the description text for each variable and the value. The first and second values are displayed on the left side of the screen with 8 positions each. The third and fourth values are displayed on the right side of the screen with 7 positions each. |
| nciVarsToDisplay | SNVT_count | 1 - 8 | N/A | 8 | The total number of variables to display. A value of 0 is the same as 1. |
| nciDescDispTime | SNVT_time_sec | 0 - 30 seconds | 0.1 | 1 | On display formats where the display toggles between the description and the value, this variable controls how long to display the description string. If 0, it disables toggle between the values and the description text. |
| nciValDispTime | SNVT_time_sec | 1 - 60 seconds | 0.1 | 1.5 | The length of time to display the value of a particular variable before displaying the next. Minimum is 0.5 seconds |

Real-Time Data Configuration Network Variables

The following network variables configure how data updates are to be displayed. They are saved into non-volatile memory. Each configuration is an array of eight input network variables. Writing to index 0 affect the

display of the first parameter on the display. Writing index 1 affects the display of the second parameter on the display and so on.

| Name | Type | Input Range | Resolution | Default | Description |
|----------------------|------------------|-----------------------|----------------|------------------------|--|
| nciDescStr[8] | SNVT_str_asc | Text string | N/A | “Item #1” .. “Item #8” | User specified text description of each variable. |
| nciUpdateTimeout [8] | SNVT_time_sec | 0 - 6553.5 seconds | 0.1 | 600 | Maximum amount of time allowed between network updates before the Model 1600LM assumes loss of data. When this occurs the Model 1600LM will display “????” to indicate loss of data. A value of 0 will cause the Model 1600LM to never assume data is lost and simply continue to display the last value received. |
| nciDecPlaces [8] | SNVT_count | 0 – 5 | N/A | 2 | Number of decimal places used to display each value. |
| nciSpan[8] | SNVT_count_inc_f | -3.48e-38 to 3.48e+38 | Floating point | 1.0 | Each value is multiplied by nciSpan and then nciOffset is added. Value Displayed = NetVariable*Span + Offset NetVariable is the converted network variable value. For SNVT_temp_p and SNVT_temp this is the temperature in C. To convert to degrees F, set nciSpan = 1.8 and nciOffset = 32.0. For SNVT_lev_percent this is the percentage value. For example to display actual current input from a 4-20 mA sensor use nciSpan = 0.16 and nciOffset = 4.0. |
| nciOffset[8] | SNVT_count_inc_f | -3.48e-38 to 3.48e+38 | Floating point | 0 | See nciSpan[] description |



Real-Time Data Input Network Variables

The following network variables are the network variables that are actually displayed. The 1600LM20 firmware supports the following Standard Network Variable Types

Each data type has 8 input network variables. Writing to index 0 updates the first parameter on the display. Writing index 1 updates the second parameter on the display and so on. The 1600LM20 Firmware

automatically figures out which variable is being updated and converts it to the appropriate value. The data is then multiplied by the nciSpan parameter and then the nciOffset parameter is added. Please see nciSpan description in the previous section.

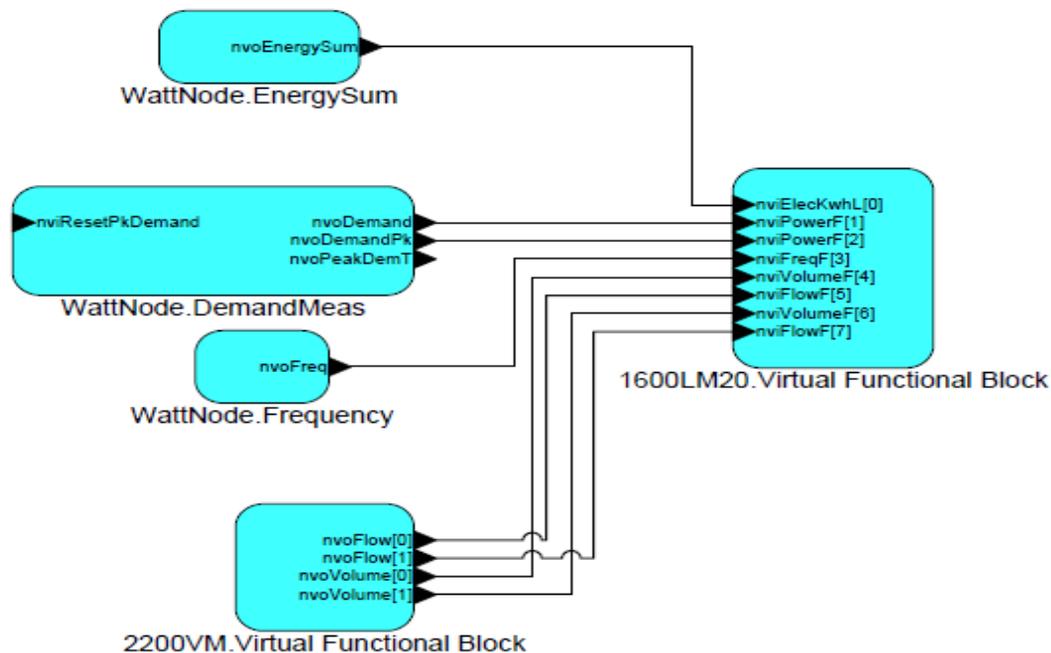
Please note, the nviText type can actually be used to display other data types if the source node is able to format the data into an ASCII string.

| Name | Type | Input Range | Resolution | Description |
|-----------------|------------------|------------------------------|-----------------------|---|
| nviTempP[8] | SNVT_temp_p | -273.17 .. +327.66 degrees C | 0.01 | Value written to display data in the SNVT_temp_p format. |
| nviTemp[8] | SNVT_temp | 274 .. 6,279.5 degrees C | 0.1 | Value written to display data in the SNVT_temp format. |
| nviPercent[8] | SNVT_lev_percent | -163.84% .. 163.83% | 0.005 % | Value written to display data in the SNVT_lev_percent format. |
| NviDiscrete [8] | SNVT_lev_disc | OFF, LOW, MED, HI, ON | N/A | Value written to display data in the SNVT_lev_discrete format. |
| nviText[8] | SNVT_str_asc | ASCII text | N/A | Value written if data is in the SNVT_str_asc format. |
| nviPowerF[8] | SNVT_power_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |
| nviElecKwhL[8] | SNVT_elec_kwh_l | | 32-bit signed integer | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |
| nviElecWhF [8] | SNVT_elec_whr_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |
| nviVolumeF [8] | SNVT_vol_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |



| | | | | |
|--------------|-------------|-----------------------|----------------|---|
| nviFlowF[8]; | SNVT_flow_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |
| nviVoltF[8] | SNVT_volt_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |
| nviAmpF[8]; | SNVT_amp_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |
| nviFreqF[8] | SNVT_freq_f | -3.48e-38 to 3.48e+38 | Floating point | Value written to display in the SNVT_count_inc_f format. This is basically an unrestricted floating point value. If your system allows you to change the format you could bind any floating point SNVT type. Use nciOffset[] and nciSpan[] to scale it for display or change its units. |

Example Network Configuration



The diagram above depicts three LonWorks devices that were installed and configured in LonMaker: Continental Control's Wattnode, NeuroLogic Research Model 2200VM and NeuroLogic Research Model 1600LM display. The diagram shows the interconnection of network variables between all three. The first four parameters that were displayed were from Wattnode: nvoEnergySum, nvoDemand, nvoDemandPk and nvoFreq. The last four items were from our Model 200VM: nvoVolume[0], nvoFlow[0], nvoVolume[1], and nvoFlow[1].

The configuration parameters for Model 1600LM20 were mostly default values except for nciDescStr[0] .. nciDescStr[7]. These are basically the labels that were assigned to each of the items displayed. By default all 8 items are displayed. Change nciVarsToDisplay to set the number of variables to display. In this case we are displaying 8 so the default value is valid. By default each item's value is displayed for 1.5 seconds. Change nciValDispTime to modify. By default the nciDisplayFormat is set to 1. Basically first line is description and second line is the value. Try nciDispFormat=0 to see the double height numbers as an alternative. Mostly good for displaying one or two values but in large format. Below are the only parameters that need to be changed from defaults:

- nciDecPlaces[0] = 1
- nciDescStr[0] = "Energy Sum"
- nciDescStr[1] = "Demand"
- nciDescStr[2] = "Demand Peek"
- nciDescStr[3] = "Frequency"
- nciDescStr[4] = "Volume 1"
- nciDescStr[5] = "Flow 1"
- nciDescStr[6] = "Volume 2"
- nciDescStr[7] = "Flow 2"

GENERAL SPECIFICATION

Electronics

| | |
|-----------------------|--|
| CPU | FT 5000 Neuron |
| Network Transceiver | Free Toplogy |
| Display Capability | 2 line x 16 character alphanumeric mode with 5 mm high characters 1 line x 8 numeric mode with 11 mm high characters |
| Display Technology | LCD Display with backlight Black characters over green background is sunlight readable White characters over blue background is also available for indoor/shaded outdoor use where direct sunlight is not encountered. |
| Operating Environment | -20 to 70 C 0-95% RH non-condensing Clean indoor air environment (in panel mount housing) ** Contact factory for NEMA 4 housing options |

Input Power

| | |
|---------------------|--|
| DC Power | 12 to 36 V |
| AC Power | 14 to 26 V |
| Current Consumption | 0.35 W typical power consumption (15 mA @ 24VDC) |
| Wiring | Two wire power connection (Polarity Insensitive) |
| Protection | Input power is fused and transient voltage protected. (Fuses do not need to be replaced) |

Network Communication

| | |
|------------------|---|
| Protocol | Echelon LonWorks Communication |
| Transceiver Type | Echelon FTT-10A transceiver at 78 kbps. DC blocking capacitors for LPT10 network. |
| Wiring | Two wire connection (Polarity Insensitive) |

Panel Mount 1/8 DIN Enclosure

| | |
|-----------------|---|
| Enclosure | 96 mm W X 48 mm H x 63 mm D / 3.8" W x 1.9" H x 2.48" D Conforms to DIN43700 standard. |
| Finish | Black |
| Mounting | 92 mm W x 45 mm H / 3.62" W x 1.77" H panel cutout. |
| Panel Thickness | 1 to 3.5 mm / 0.04 to 0.138" |

Note: Specifications subject to change without notice.

ORDERING INFORMATION

| | |
|-----------|---|
| 1600LM-BG | Model 1600LM Network Display with Metering Firmware, black characters over Green background LCD Display |
| 1600LM-WB | Model 1600LM Network Display with Metering Firmware, white characters over blue background LCD Display |

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