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NetAlert!™



NetMeter™ for DeviceNet™

Patent Pending

User's Guide

P/N 715-0016 V1.2

Woodhead Connectivity

applicom Brad Harrison mPm NetAlert RJ-Lnxx SST

Essentials

Read this first!

NetMeter requires 2 'AA' Alkaline batteries for viewing measurements offline. NetMeter must be plugged into a powered network to get most measurements. NetMeter will run off DeviceNet network power, even without batteries installed. Remember to install batteries if you plan to use the Lock and offline viewing features.

AutoSearch Mode 1

AutoSearch mode saves you time by finding the network measurements that exceed acceptable limits. It works by examining all measurements and then pinpointing any that exceed ☹ or are close to 😐 specified limits. For each problem measurement NetMeter indicates the measurement's switch position number in the upper left corner of the display. Rotate the selector switch to the indicated setting to view related measurements.

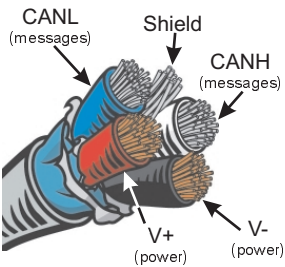
How to Use AutoSearch ...

1. Make sure the Lock switch is in the "Run" position and turn the selector switch to AutoSearch
2. If you see ☺ - all measurements are within limits.
3. If you see 😐 or ☹ then read the display like this ...

   "Switch setting <Setting #>, <MIN> or <MAX> and/or <P-P> is close to 😐 or Exceeds ☹ the spec limits."

   Then press ◉ and repeat the process for the next bad/marginal value.To get more detail, turn the selector switch to the indicated position and use the buttons ◉ ⊕ ⊖ to access related measurements.

DeviceNet Cable Essentials

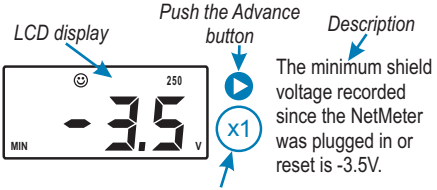


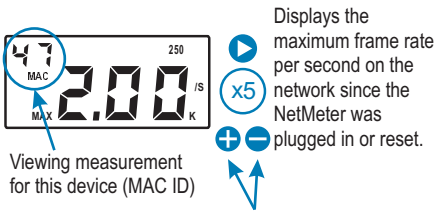
DeviceNet cable has five wires inside. Each has a specific purpose which is referenced in this manual.

How to use this manual

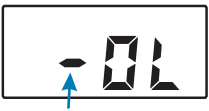
This is a reference manual for the DeviceNet NetMeter (DN-MTR). For each NetMeter switch position you will find a page explaining the measurements available, and suggested actions and/or remedies if your network is not healthy.

On each page you'll find:





Special Conditions:



The measured value exceeds the positive or negative input range.

Sign indicates negative over-range



No measurement taken (see additional details for specific measurements).

Using the NetMeter



Viewing Measurements

Each selector switch position accesses a different bus measurement, and each supports several different measurement types.

Pressing ⊙ cycles the display through the different measurements available at each switch position.

Some measurements allow a detailed view for each MAC ID. Press ⊕ OR ⊖ to cycle through the active MAC IDs. Press ⊕ AND ⊖ together to return to the overall network view

Display Lock

To lock measurements for offline viewing move the lock switch to the 🔒 position. To erase stored values and restart bus analysis move the lock switch to “Run”.

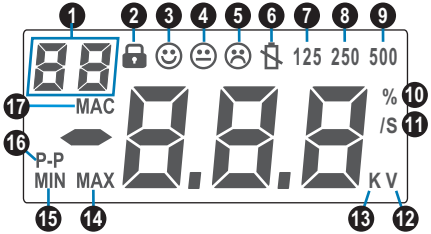
Stored values are retained indefinitely, providing the lock switch is left in the 🔒 position, and the batteries are good - even if the meter is turned off.

Resetting Min/Max Measurements

The NetMeter is reset (Min/Max and other stored measurements cleared) when the Lock switch is moved to the "Run" position, and when the power switch is turned On while the Lock switch is in the "Run" position.

You may reset stored measurements by either turning the meter off and on again, or by moving the Lock switch to 🔒 and back to “Run”.

Display



1 Network MAC ID (node #) or NetMeter switch setting number (AutoSearch)

2 Display locked indicator ("lock" switch is on)

3 Measurement displayed is acceptable

4 Measurement displayed is marginal

5 Measurement displayed is unacceptable

6 Battery low - stored measurements may be lost

7 125 Kbaud network activity detected

8 250 Kbaud network activity detected

9 500 Kbaud network activity detected

10 Measurement unit is % bandwidth

11 Measurement unit is errors / messages per second

12 Measurement unit is volts

13 Measurement displayed is in thousands (kilo)

14 Measurement displayed is a maximum value

15 Measurement displayed is a minimum value

16 Measurement displayed is a peak-to-peak value

17 Displayed when viewing measurements for a particular MAC ID. Not displayed in AutoSearch mode when the value shown in the top left corner is a switch position.

***** If none of MIN, MAX or P-P are shown then the value displayed is a "live" measurement, or the most recent "Live" measurement if the "lock" switch is on.

Bus Errors

2

NetMeter tracks network data transmission errors in real-time, and lets you know if the error rate is acceptable ☺, marginal 😐, or unacceptable ☹. Any error rate greater than zero is undesirable (although your network may still function since CAN automatically retransmits after errors). An error rate greater than 10/s indicates a problem that should be investigated.

NetMeter uses unique technology to accurately determine which node was attempting to transmit when a bus error occurs

Display	What it means
	Real-time error rate of 14 errors/second
	Minimum bus error rate on whole network since NetMeter was connected to the network or reset.
	Maximum bus error rate on the whole network since NetMeter was connected or reset.
	Incremental error count on the entire network since the NetMeter was connected or reset.

Node error measurements only include errors known to have occurred when the node is transmitting. Frames with corrupt ID fields, and frames that cannot be attributed to specific nodes are not included in node measurements. It is common for the sum of per-node results to be less than the overall network values.

Bus Errors

2

Thresholds:

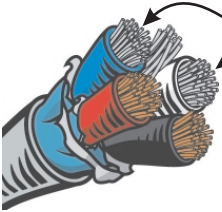
Error Rate High Fault	☹	15 /s
Error Rate High Warn	😐	1 /s

What do to when you see 😐 or ☹ :

- Press ⊕ or ⊖ to identify the device(s) with higher error rates than other nodes. Calculate the ratio of error rate to frame rate of suspect nodes and check for above average ratios. Devices with above average error ratios should be investigated further.
- Check the other measurements and investigate the suspect device(s) for faults consistent with the observed symptoms.
  Some techniques you can use are:
  - Replace the device and/or cabling
  - Temporarily remove the device from the network to see of the errors cease.
- If you suspect an intermittent cable or connector, shake, bend or twist the suspected cable and/or connector while watching the error rate for changes (up or down).

A node set to the wrong baudrate causes bus errors (affecting other nodes) when it attempts to go online.

Excessive cable lengths and faulty nodes can cause errors in the transmissions of some/all other nodes. Do not assume that the node(s) with the highest error rate is faulty.



Bus Errors deal with these two wires (CANL & CANH)

Bus Traffic

3

NetMeter continuously monitors the CAN bit-stream for message traffic. NetMeter reports Bus Traffic as either network bandwidth consumed (including bandwidth consumed by errors/retries) or bus frames per second.

Display	What it means
	Current network or node bandwidth utilization.
	Minimum network or node bandwidth recorded since the NetMeter was plugged into the network or reset.
	Maximum network or node bandwidth recorded since NetMeter was connected or reset.
	Number of message frames per second on the network or node.
	Miinimum frame rate (/S) on the network or node since the NetMeter was plugged in or reset.
	Maximum frame rate(/S) on the network or node since the NetMeter was plugged in or reset.

Node traffic measurements include only messages transmitted by the device except Group 2 master/slave traffic, where ALL traffic shows up on the slave MAC ID.

Bus Traffic

3

Note about frame rate: If you know the input and output size (in bytes) for a polled or strobed device (see your configuration or the device documentation) you can determine the scan rate (per second) as follows:

Input Frames = *Input Bytes* ÷ 8 *(÷ 7 if > 8 bytes)*
(round up to whole number)

Output Frames = *Output Size* ÷ 8 *(÷ 7 if > 8 bytes)*
(round up to whole number, always 1 frame for strobe devices)

$$\textit{Scan rate} = \frac{\textit{Frame Rate (from NetMeter)}}{\textit{Input Frames} + \textit{Output Frames}}$$

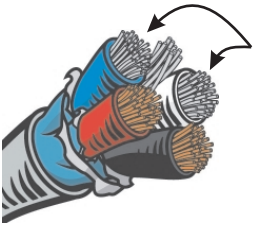
Thresholds:

Bus Traffic High Warn	😐	90.0%
Bus Traffic Low Warn	😐	10.0%

For networks with 😐 bandwidth we suggest:

- Check the scanner configuration.
  - Setting the scan interval (or inter-scan delay) too short can cause device timeouts due to bandwidth or node performance limitations.
  - Setting the scan interval (or inter-scan delay) too long reduces system performance and makes inefficient use of available bandwidth.
- Check for Change-of-State devices consuming excessive bandwidth (look for one or more nodes with excessive bandwidth or a MAX bandwidth much higher than average)

Bus Traffic of 0% for a single node means that the node (MACID) has stopped communicating since the NetMeter was plugged in or reset!



Bus Traffic deals with these two wires (CANL & CANH)

Bus Power

4

NetMeter continuously monitors the DeviceNet bus power quality.

Display	What it means
	Current network bus voltage is 17.2V.
 x1	Minimum bus voltage recorded since NetMeter was plugged in or reset is 17.1V.
 x2	Maximum bus voltage recorded since NetMeter was plugged in or reset is 17.4V.
 x3	Current peak-to-peak (P-P) voltage (transient or ripple) is 0.1Vp-p.
 x4	Maximum peak-to-peak (P-P) voltage recorded since NetMeter was plugged in or reset is 0.6V.

What's a transient?

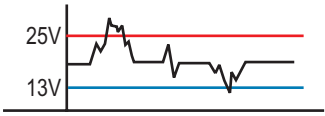
A transient is a short, temporary deviation of the bus voltage level.

Every DeviceNet network has some level of bus power transients, which is perfectly acceptable. Transients in excess of 2V P-P can contribute to node failures and communication errors in some cases and should be investigated. Transients in excess of 10V P-P are an indication of serious network problems..

Bus Power

4

Examples of transients



Thresholds:

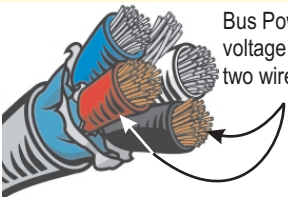
High Voltage Fault	☹	25.0V
Low Voltage Warning	😐	14.0V
Low Voltage Fault	☹	13.0V
High P-P Voltage Fault	☹	10.0V
High P-P Voltage Warning	😐	2.0V

For ☹ bus power voltage levels we suggest:

- Check your power supply for proper installation and correct output voltage under load.
- Are your trunk/drop cables too long?
- Is one or more of your devices drawing too much current?

For ☹ p-p (noise) levels we suggest:

- Check for output devices (like contactors) powered from the network (they shouldn't be).
- Check for network cables routed too close to strong sources of interference
  - Check for aging network power supply with output ripple increasing over time
- If you suspect an intermittent cable or connector, shake, bend or twist the suspected cable and/or connector while watching the P-P measurement for changes (up or down).



Bus Power measures voltage levels on these two wires (V+ / V-)

Shield Voltage

5

NetMeter measures live, minimum, and maximum DC shield voltage (between shield and V-).

Display	What it means
	Current shield voltage is -3.4V.
 x1	The minimum shield voltage recorded since the NetMeter was plugged in or reset is -3.5V.
 x2	The maximum shield voltage recorded since the NetMeter was plugged in or reset is -3.2V.

Thresholds:

High Voltage Fault	☹	1.0V
High Voltage Warning	😐	0.3V
Low Voltage Warning	😐	-4.0V
Low Voltage Fault	☹	-5.0V

About DeviceNet Shield Votlage

The DeviceNet specification requires that the shield and V- be connected together, and both to earth ground at the power supply. This has the following effects:

- A correctly connected shield has no current flow in it and is at the same voltage (grounded power supply V-) throughout the system.
- Current flow in V- causes a voltage rise in V-
- Rising V- voltage causes an apparent negative shift in the shield voltage when measured relative to V-
- Since the maximum voltage drop in V- is 5V, the negative shift in shield voltage is between -5V and 0V
- Systems connected in accordance with the DeviceNet installation guidelines (except flat media) have a "normal" shield voltage between -5V and 0V

Shield Voltage

5

Important! *Some industrial applications and some end-users employ different shield connection techniques to meet specific requirements. In these cases the shield voiltage will differ from that expected in "typical" DeviceNet installations.*

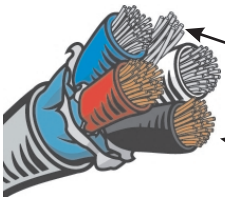
Important! *DeviceNet Flat Media has no shield, and shield voltage measurements are not relevant.*

For ☹ shield voltage levels we suggest:

- Make sure the Shield and V- are connected to each other and to earth ground at the power supply (very important)
- Check for shorted or open shield wiring
- Check that your shield wire is actually grounded correctly (it's so important you check it twice!)
- The NetMeter displays "OL" if the shield is not connected (or if the voltage is high).

Semiconductor Fab Applications:
Disregard 😐 or ☹ shield voltage indications if the shield is intentionally connected differently than defined in the DeviceNet Specification.

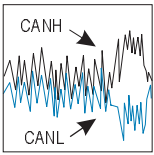
Flat Media Applications:
Disregard 😐 or ☹ shield voltage indications in flat media applications as flat media has no shield. NetMeter should always display OL when connected to a flat media system.



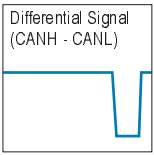
CAN Primer

DeviceNet is based on the CAN protocol. A fundamental understanding of CAN will help you take full advantage of the NetMeter's features and significantly improve your ability to diagnose network problems quickly.

CAN messages are transmitted as a difference in voltage between two separate wires, CANH (white) and CANL (blue). Differential transmission helps CAN and DeviceNet to operate well even with high levels of external interference (ie from sources like motors, welders, etc.) Here's what you might see if you captured CAN signals on an oscilloscope:

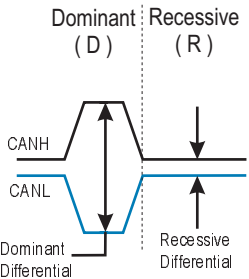


Individual wires include data + noise



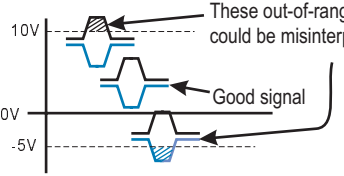
Differential receiver cancels noise and extracts data signal

CAN signals have two states, dominant (0) and recessive (1). The transceiver in each DeviceNet node determines whether a signal is a 1 or a 0 based on the differential voltage between CANH and CANL.



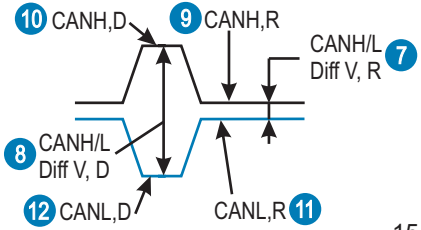
CAN Primer

Because the transceiver subtracts the CANH and CANL signals to determine the bit values, any noise induced in the cable (the same noise is induced in both wires) is cancelled. Transceiver chips require CANH and CANL voltages to be within specific limits otherwise a dominant (0) might be misinterpreted as a recessive (1) or vice-versa resulting in errors.



DC common mode voltage (caused by voltage drop in the cable, refer to page 16 and 17) is the primary cause of the voltage shift illustrated above. Noise induced in the data wires also contributes to the voltage offset.
If the combination of DC common mode voltage and induced noise causes the signal voltages to exceed the transceivers capabilities, bit errors are more likely to occur.

Six separate CAN voltage measurements are essential to rapid troubleshooting. The NetMeter accurately measures these voltages at the following switch settings:



Common Mode V 6

NetMeter measures the worst-case total Common Mode Voltage for your network (including DC CMV and noise).

Display	What it means
	Worst-case total CMV recorded since the NetMeter was plugged in or reset is 3.33V.
	Common Mode Voltage can not be determined because there is no bus activity.

What is Common Mode Voltage?

Common Mode Voltage is an incidental voltage that is common to both signal conductors in a differential transmission system. CMV manifests itself as an shift in signal voltage without any change in differential voltage.

Excessive CMV may cause signal voltages to exceed the capabilities of transceiver chips, ultimately resulting in communication errors.

The primary component of CMV is voltage drop in the power conductors. The cable resistance causes the V+ voltage to drop from 24 VDC with increasing distance from the power supply. Similarly, the V- voltage increases proportionally from 0VDC at the power supply. This offset results in each station having a slightly different reference point (V-) which causes an apparent shift in signal voltages from each node's point of view (the signal voltages don't really change, but the difference in V- makes it look that way).

Intermittent factors such as external interference, variations in network load current and electrical noise internal to nodes also contribute to CMV. Collectively, these intermittent factors are called "noise".

Total CMV is critical to network health. NetMeter measures total CMV over time and records the maximum. To measure worst-case total CMV, leave the NetMeter connected to the network for an appropriate period of time (one machine cycle, one shift, one day).

Common Mode V 6

Thresholds:

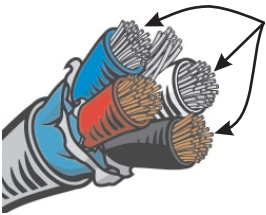
CMV High Fault	☹	6.50V
CMV High Warning	😐	5.00V

Notes About Common Mode Voltage (CMV)

- NetMeter's CMV measurements are not affected by where on the network you take the measurement.
- DC CMV problems are typically caused when devices draw more current than expected or when cable resistance is higher than expected (too much cable) or a combination of both.
- CMV problems can be intermittent since few devices have a constant load current.

For ☹ CMV levels we suggest:

- Check for devices that might be drawing more current than you expect
- Verify your network design with special attention to cable length and load current calculations
- Move the power supply toward the middle of the network, or toward the nodes that draw the most current
- Investigate adding another power supply to reduce voltage offset in V-
- High levels of external interference may require you to reduce the DC CMV limit below the 5V recommended in the DeviceNet Specification to keep total CMV below 6.5V



Common mode voltage deals with these three wires (CANL, CANH, and V-)

CANH/L Diff. V (R) 7

CANH/L differential (Recessive) shows you the difference between CANH and CANL for recessive bits:

CANH/L diff. V(R) = CANHV(R) - CANLV(R)

Switch 7 9 11

Display

What it means



Current CANH/L recessive voltage differential is 0.09V.



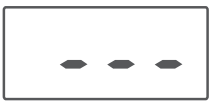
x1

Minimum CANH/L recessive voltage differential since the NetMeter was plugged in or reset is 0.08V.



x2

Maximum CANH/L recessive voltage differential since NetMeter was plugged in or reset is 0.09V.



Recessive differential bus voltage can not be measured because the bus is stuck dominant.

Why is this measurement important?

Data bits (0's and 1's) are transmitted as differences in voltage between the CANH and CANL wires. The differential voltage measurements are essentially a measurement of "signal quality".

The recessive differential voltage is ideally zero, but typically is +/- a few millivolts.

A recessive differential voltage that is not sufficiently close to zero may be mis-interpreted by a transceiver as a dominant bit - resulting in communication errors.

CANH/L Diff. V (R) 7

Thresholds:

Diff R Voltage High Fault	☹	0.08V
Diff R Voltage Low Fault	☹	-0.18V

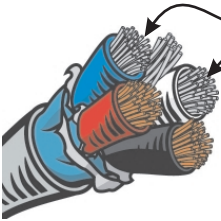
What is "recessive?"

DeviceNet messages consist of 1's and 0's. The recessive state of the bus (where the differential voltage between CANH and CANL is close to zero) represents the logical value 1 (opposite from what you might expect). The bus is always in the recessive state except when a node is transmitting.

NetMeter measures the difference between CANH and CANL for recessive bits on the network, and if the difference is not close to 0 volts, NetMeter indicates a warning or a fault.

For ☹ CANH/L differential recessive voltage levels we suggest:

- Check for shorts and opens on the CANH and CANL wires
- Check for a missing or bad terminator (should be two 120 ohm terminators from CANH to CANL - one at each end of the network)
- Disconnect nodes one at a time or temporarily split the network to check for faulty transceivers or cables.



CANH/L Diff. V deals with these two wires (CANL & CANH)

CANH/L Diff. V (D) 8

CANH/L differential shows you the difference between CANH and CANL for dominant bits:

CANH/L diff. V(D) = CANHV(D) - CANLV(D)

Switch 8 10 12

Display

What it means



Current CANH/L dominant voltage differential is 1.67V.



x1

Minimum CANH/L dominant voltage differential since the NetMeter was plugged in or reset is 1.00V.



x2

Maximum CANH/L dominant voltage differential since NetMeter was plugged in or reset is 1.76V.



Dominant differential bus voltage can not be measured because there is no bus activity.

Why is this measurement important?

See the description of "recessive" on page 18.

The dominant differential voltage is usually around 2V. A lesser differential voltage may be mis-interpreted by a transceiver as a recessive bit - causing bus errors.

At the beginning of each frame it is possible for several nodes to transmit simultaneously resulting in a dominant differential >3V. NetMeter accurately measures dominant voltage by sampling only when one node is transmitting.

A measured dominant differential (single node transmitting) larger than 3V is a clear indication of a network problem.

CANH/L Diff. V (D) 8

Thresholds:

Diff D Voltage High Fault	☹	3.00V
Diff D Voltage High Warning	😐	2.75V
Diff D Voltage Low Warning	😐	1.45V
Diff D Voltage Low Fault	☹	1.20V

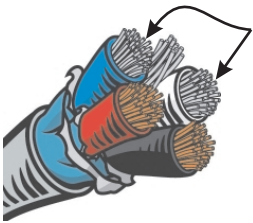
What is "Dominant"?

DeviceNet messages consist of 1's and 0's. The dominant state of the bus (where the differential voltage between CANH and CANL is around 2V) represents the logical value 0 (opposite from what you might expect). The bus can only be in the dominant state when a node is actively transmitting.

NetMeter measures the difference between CANH and CANL for dominant bits on the network, and if the difference is not within acceptable limits, NetMeter indicates a warning or a fault.

For ☹ CANH/L differential dominant voltage levels we suggest:

- Check for shorts and opens on the CANH and CANL wires
- Check for a missing, bad, or extra terminators (should be two 120 ohm terminators from CANH to CANL - one at each end of the network and no more!)
- Disconnect nodes one at a time or temporarily split the network to check for faulty transceivers or cables.



CANH/L Diff. V deals with these two wires (CANL & CANH)

CAN Signal Thresholds

Thresholds:

Switch 9 11

CANH/L R Voltage High Fault	☹	8.50V
CANH/L R Voltage High Warning	😐	7.00V
CANH/L R Voltage Low Warning	😐	-2.00V
CANH/L R Voltage Low Fault	☹	-3.00V

Switch 10

CANH D Voltage High Fault	☹	10.00V
CANH D Voltage High Warning	😐	8.50V
CANH D Voltage Low Warning	😐	-1.25V
CANH D Voltage Low Fault	☹	-2.25V

Switch 12

CANL D Voltage High Fault	☹	7.75V
CANL D Voltage High Warning	😐	6.25V
CANL D Voltage Low Warning	😐	-3.50V
CANL D Voltage Low Fault	☹	-4.50V

DeviceNet messages consist of 1's and 0's, which are represented as differences in voltage between the CANH and CANL wires. However, if the absolute voltage of the signal (measured to the V- wire at any node) is too high or too low, bits may not be received correctly. NetMeter measures each of the key CANH, CANL and Differential voltages, and if the readings are too high or low, NetMeter indicates a warning or fault.

9 & 11



Recessive bus voltage can not be measured because the bus is stuck dominant. (or CAN wires are flipped)

10 & 12



Dominant bus voltage can not be measured because there is no bus activity.

DeviceNet Glossary

Bandwidth: DeviceNet, like other serial networks, supports a certain number of bits per second sent on the wire. The actual network traffic is reported as a percentage of the theoretical maximum, and is called % Bandwidth. NetMeter's measurements include bandwidth lost due to bus errors and retries but most other diagnostic tools only include *successful* messages in bandwidth calculations.

CANbus: DeviceNet is based on a low-level network standard known as CAN or CANbus. Other networks that use CAN include CANOpen and SDS. Although these networks are based on CAN, physical layer and upper layer protocol differences limit the use of the NetMeter with these networks.

Configuration: Because DeviceNet networks allow you to use devices in many different ways, each device must be configured before it will work properly on a DeviceNet network. For some devices, this is as simple as setting a switch to select the MACID (node address) and baud rate. Other devices require configuration from a PC-based software tool (Available from SST). Most importantly, configuration means that before you replace a device with another, identical device, you must configure the replacement device properly.

Determinism: Determinism is a measure of the predictability of the performance of a system (including but not limited to networks). Communication errors and delays caused by high bandwidth utilization reduce determinism, making the system less predictable in its operation (less deterministic).

Frame Rate: DeviceNet messages are sent in one or more CAN message structures called Frames. Frame Rate is the number of these structures sent in 1 second. Since one DeviceNet message may require several CAN frames, the frame rate is not necessarily the same as the message rate.

MACID: Each device on a DeviceNet network has a unique "Address", a number between 0 and 63. This Address is known as the MACID or Node number.

DeviceNet Glossary

Noise: An undesirable intermittent voltage on a network signal or power wire.

P-P: Peak to peak measurements of varying voltage signals indicate the difference between the minimum and maximum values within a specific interval.

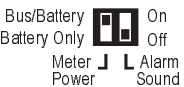
Ripple: A regular, repeated deviation from the mean voltage of a power or signal conductor.

Terminator: 1) A resistor connected at the end of a transmission line (network cable) to prevent signal reflections caused by impedance mismatches. DeviceNet requires two 120 ohm terminators, one at each end of the network. DeviceNet terminating resistors also define the recessive state of the network by ensuring that CANH and CANL return to zero differential after a dominant bit.

Transceiver: A transceiver is a circuit (typically a chip) that converts digital bits to/from the differential voltages on the network cable. Transceiver is a contraction of transmitter and receiver.

Transient: A temporary deviation from the mean voltage of a power or signal conductor.

Switch Settings



The NetMeter has two configuration switches located in the battery compartment.

The Meter Power switch (on left) selects between bus/battery power (powered by bus when available) and battery only power. Selecting battery only power eliminates the possibility of inadvertently contributing to common mode voltage problems on extremely long networks but limits NetMeter use to about 7 hours on fresh batteries..

The Alarm Sound switch (on right) enables and disables the “beep on error/transient” feature. With this feature enabled NetMeter beeps each time a bus error or transient occurs when the selector switch is in the corresponding position.

Certifications



This device meets or exceeds the requirements of the following standard(s):

UL3111-1 Can/CSA C22.2

CAT II 30V

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Changes or modifications not expressly approved by SST, a division of Woodhead Canada, could void the user's authority to operate the equipment.

Industry Canada

This Class (A) digital apparatus complies with Canadian ICES-003.

Certifications



Marking of this equipment with the symbol CE indicates compliance with European Council Directive 89/336/EEC - The EMC Directive as amended by 92/31/EEC and 93/68/EEC.

Note: To maintain compliance with the limits and requirements of the EMC Directive it is required to use quality interfacing cables and connectors when connecting this device. Refer to the cable specifications in the Hardware Guide for selection of cable types.

This device meets or exceeds the requirements of the following standard:

EN 61326:1997 including amendment A1:1998 - "Electrical equipment for measurement, control and laboratory use - EMC requirements."

Warning!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Caution!

This equipment is neither designed for, nor intended for operation in installations where it is subject to hazardous voltages and/or hazardous currents.

Cables

The NetMeter is designed for use with the supplied cables or the following Brad Harrison replacement cables:

DND-21A-M010 **DND-22A-M010**

Information & Support

For more information or technical support for the NetMeter for DeviceNet or any other NetAlert product, please contact your local Woodhead Connectivity Distributor or one of our offices below:

SST division of Woodhead Canada Limited
Toll free: 877-427-0850
Direct: 519-725-5136
Email: Sales@myNetAlert.com
TechSupport@myNetAlert.com

Woodhead LP
Toll free: 877-427-0850
Direct: 847-272-7990

Woodhead Canada Limited
Direct: 905-624-6518

Warranty

SST/Woodhead Connectivity guarantees that all new products are free from defects in material and workmanship when applied in the manner for which they were intended and according to SST's published information on proper installation. The Warranty period for the NetAlert NetMeter for Devicenet is one year from the date of shipment.

SST/Woodhead Connectivity will repair or replace, at our option, all products returned freight prepaid, which prove upon examination to be within the Warranty definitions and time period.

The Warranty does not cover costs of installation, removal, or damage to user property or any contingent expenses or consequential damages. Maximum liability of SST/Woodhead Connectivity is the cost of the product(s).

Care & Cleaning

If your NetMeter requires cleaning we recommend using only a soft dry cloth. Solvents or water may enter the enclosure with undesirable consequences.

Specifications

Environment	
Storage Temperature	-40ºC to 85ºC
Operating Temperature	0ºC to 40ºC
Humidity	5% to 90% (non-condensing)
Maximum Limits	
Voltage between any two terminals	±30Vdc
Power Supply	
Network Power	60mA @ 11Vdc to 30Vdc
Battery Power	2 X AA Alkaline Batteries
Bus Power Voltage Measurement	
Range	2V to 26V & reverse polarity
Calibrated Accuracy (DC)	0.5% ±1 count
Calibrated Accuracy (P-P)	1.0% ±2 counts
Shield Voltage Measurement	
Range	-10V to 1V
Calibrated Accuracy	0.5% ±1 count
CAN Voltage Measurement	
Range	-5.25V to 9.98V
Calibrated Accuracy (signal)	0.5% ±20mV ±2 counts
Calibrated Accuracy (diff.)	1.0% ±20mV ±4 counts

Document Info

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SST, part of Woodhead Connectivity
50 Northland Road, Waterloo, Ontario
Canada N2V 1N3 Tel (519) 725-5136
www.myNetAlert.com
www.mySST.com
www.woodheadconnectivity.com

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