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Digital Power Probes, ACL120, ACL220, ACL Internal, and DCL5 (#30015, #30023, #30024, #30025)

This series of digital power probes by Networked Robotics is used to record a yes/no indication of the presence or absence of voltage from a variety of sources including standard wall outlets or DC sources like relay outputs or the voltage across indicator LEDs. All versions are optically isolated to prevent damage to the ACL or other Networked Robotics electronics.

These digital probes are used in conjunction with the Networked Robotics NTMS (Network Telemetry Monitoring System) hardware and Networked Robotics' Tempurity™ System Software. The Tempurity System is designed for remote data collection and monitoring in FDA-regulated environments including pharmaceutical, medical, and food industries.



Description

One end of the ACL probe is plugged into the wall power outlet, or in the case of ACL Internal – connected to the interior of the electric box, the other end is connected to one of the measurement ports of Networked Robotics' NTMS4 hardware. The ACL120, ACL220 and ACL Internal versions monitor the status of standard AC line voltage, either 120 Volt AC or 220 Volt AC, via computer networks. The figure above applies to the ACL120 and 220 versions of this series.

The ACL120 and ACL220 versions (#30015, #30023) plug into standard electric outlet sockets and can easily be self-installed by our customers. The ACL Internal version (#30025) can be used with either voltage level but must be installed by an electrician. The internal version is designed to be mounted partially inside an electric box in order to connect to power and ground wires inside the box.

The DCL5 probe (#30024) is used to sense the presence or absence of any DC voltage signal from 4 to 24 Volts such as the power across an LED, or the output of a relay. A common application for a DCL5 probe would be to connect into an alarm LED that was part of another instrument, such as a flow monitor in a fume hood. In this safety hood example, when the hood's alarm LED activates, the Tempurity System can sense this and distribute the information to the network where the status is logged and alarm notifications can be issued if appropriate via e-mail,

text message, or voice. For applications where DC voltage should be measured in a trending rather than a yes/no form, consider the Networked Robotics Low Voltage Probe (#30019).

Two LEDs controlled by an on-board processor indicate the status of the power measurement. A red-orange LED indicates the status of the probe. An amber LED indicates the on or off status of the monitored voltage.

Packing List

This package includes:

- (1) ACL or DCL Digital Power Probe
- (1) RJ-45 Coupler for extensions

Hardware Installation

There are three major steps in the installation of this hardware:

- 1) Physical installation
- 2) Configuration of the Networked Robotics NTMS hardware
- 3) Manual testing of data collection via the network

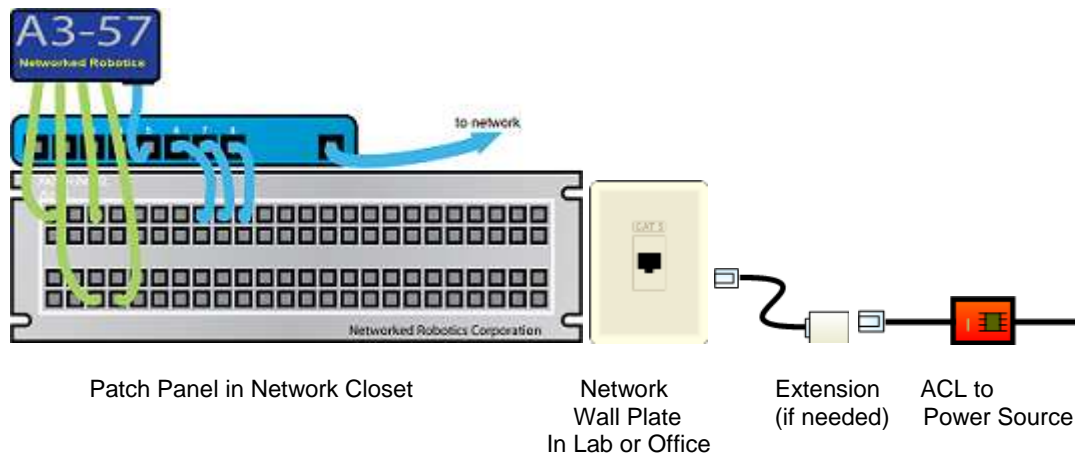
Each of these steps should be performed successfully, especially manual testing through the network, before attempting to configure continuous real-time data collection via the Tempurity System. Detailed information on configuring any “monitored device” through Tempurity is available in the Tempurity Systems User’s Guide (Networked Robotics document number “Tempurity-04-0006.5”) which is available from the Networked Robotics web site.

1. Physical Installation

Networked Robotics’ NTMS units require power in order to sense power. Thus in order to avoid common-mode failure it is best that the power source that supplies the NTMS should be different from the outlet being monitored.

ACL Version Installation – NTMS in Network Closet

One method of installing ACL versions is through your CATx infrastructure as shown below.



In the case above the connection to the wall power socket is “patched in” via your building’s CATx cable plant and network wall jacks (see figure below). In this case the power supplying NTMS hardware is remote from the outlet in the lab or office.

When connecting via this method it is easy to provide backup power (UPS) to both NTMS units and to your network switches. Your network closet may already have backup power since many companies protect their critical infrastructure in this way.

ACL 120/220 Version Installation – NTMS in Laboratory or Office

If your NTMS is located in a laboratory or office, consider using a UPS backup power supply to protect the NTMS temporarily in the case of power failure. This will give the NTMS time to report the power failure to the Tempurity System. The Tempurity System will alarm in all cases, whether the NTMS experiences a power failure or not, but the type of Tempurity System alarm notification will depend on whether the NTMS unit and the network are still functioning after the power-fail event. The best results are obtained if the power of the NTMS and any supporting network switches are protected temporarily. The table below shows a table of the conditions that are relevant to use of ACL probes and the alarm type issued by the Tempurity System:

NTMS Power	Monitored Power	Tempurity System Alarm Type
On	On	None
On	Off	Value
Off	On	Communications
Off	Off	Communications

ACL Internal Installation

The ACL Internal product should only be installed by a licensed electrician.

Disconnect the power to the electrical box and the fuse panel.

You will place the small black AC/DC converter in the electric box. The blue and gray wires will attach to the power and ground wires of the switch or outlet that you wish to monitor using the connectors provided.

ACL Probe Attachment

Secure the probe at the monitored site using the “dual-lock” provided on the back of the housing. If possible, the probe should be attached such that the LED status lights are visible in the room. The “dual-lock” sticks best to metal or plastic surfaces. It may not adhere as well to surfaces such as drywall or wood, or to porous materials such as concrete. The probe can be attached to a plastic wall or metal (except aluminum) wall plate, or to the black converter that is plugged into the socket on ACL120 and ACL220 versions.

DCL Version Installation

DCL5 probes include two wires as the sensing element. Because of the diverse possibilities of monitored instrumentation the connection method is determined by the customer (soldering, wire-wrap, terminals). For example to monitor the voltage across and LED the DCL’s leads should be soldered to the LED leads. Do not attempt to connect a DCL-version probe to wall outlets!

Ensure sure that the polarity is correct. The purple wire must be connected to the positive lead (usually red) of the voltage source, and orange wire to the negative lead (usually black) of the source. If you need to extend the wire you can do so with

Attach the probe body to a convenient firm plastic or metal substrate via the dual-lock backing.


Extensions


The probes can be located up to 300 feet from the Networked Robotics NTMS network hardware. You can easily extend the length of any connection using the included RJ-45 coupler and either 6-pin phone cable or CATx cable.

LED Operation

If the NTMS is powered up, and the connection is made correctly between the probe and the NTMS, the red-orange LED on the probe will illuminate briefly. The amber LED will be illuminated if the monitored power is present.

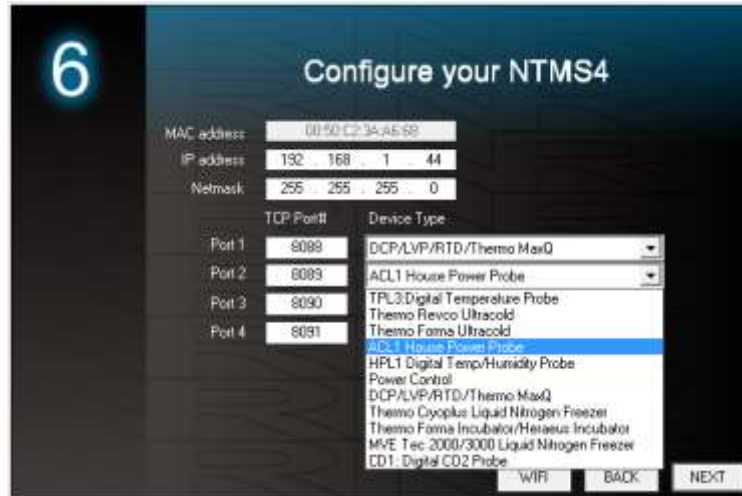
2. Configuring the NTMS

Configure your NTMS network hardware for data collection from this instrument. This is done by running the latest version of the NTMS Configuration Wizard  from any PC that is on the same subnet as the NTMS to be configured. You can obtain the configuration wizard from the “download” section of the Networked Robotics web page. New sensor and interface types are being added periodically to the wizard so the screens below may change.

1. Run the wizard from the same local area network as the NTMS and verify that the NTMS is discovered. (NTMS hardware must be running firmware revision 1.6 or higher. If it is not, stop the installation and upgrade your NTMS hardware’s firmware with the NTMS Upgrade Wizard  available from the Networked Robotics download-page.)



2. Select the NTMS, and proceed to the “NEXT” screen.
3. Enter the correct static IP address and subnet mask for your facility.
4. Click on the NTMS measurement port where the probe is connected, and under the “Device Type” drop down, select either the “ACL1” power probe option.



5. Click “NEXT” to complete the NTMS configuration.

Testing Manually through the Network

Once the configuration of the NTMS hardware is complete we recommend testing the ability to make remote network power status measurements by using the “Telnet” utility from any PC. This commonly-used network utility sends network commands that will elicit a reading from the ACL probe.

On Windows 7,8,10 computers you may need to enable the Telnet utility as follows: 1 Start 2 Control panel 3 Programs 4 Turn Windows Features on or off 5 Check “Telnet Client” 6 Click Ok

1. From Windows click “START”, then “RUN”, and then type “CMD” and return.
2. At the black screen type “Telnet” + *IP Port* (where *IP* is the IP address and *Port* is the network port address (e.g.8088) as selected by your use of the NTMS Configuration Wizard in screen 6 as described above.)



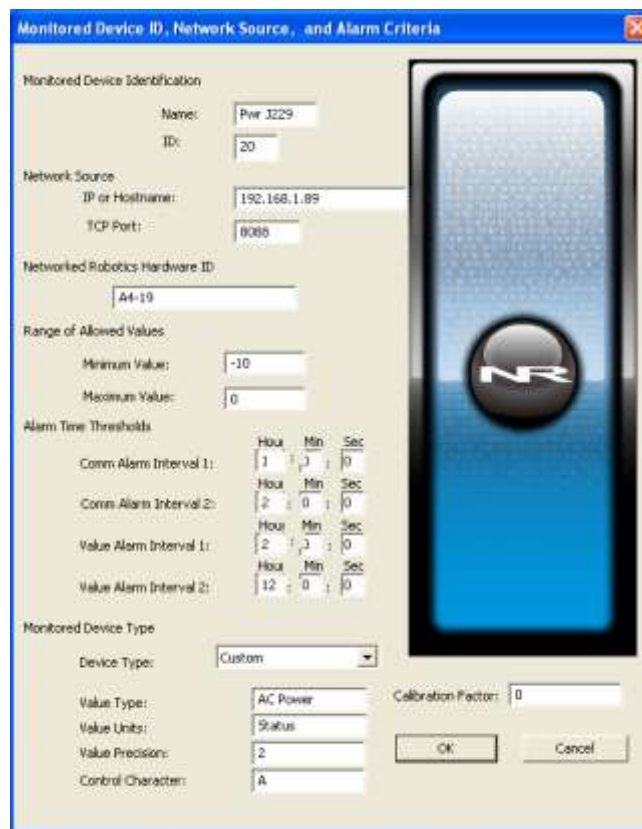
3. If you are successfully connected through the network you will see a blank screen.
4. Type a capital “A”; a number indicating power status (1 or 0) and the associated checksum value should be returned.

A response of 1 indicates that power is not present. A response of 0 indicates that the specified voltage is present. If a value is not returned, check network parameters, network ports, firewalls and connections and try again before attempting to configure data collection using Tempurity System software.

Some older NTMS firmware versions return 120 and 0 rather than 0 and 1 as response values.

Configuring Data Collection in Tempurity: the Tempurity Server Configuration Utility

The use of the AC or DC Probe versions requires the definition of a monitored device of type “Custom” in the Tempurity Server Configuration Utility. See the screenshot below and the Tempurity System User’s Guide especially pages 38 and 39 of the Version 2 User’s Guide (NR Document Number Tempurity 04 0006.5) and the section on Tempurity Server configuration for more information. The control character to acquire voltage status from both the ACL and DCL Probes is “A”. The figure below shows a potential configuration for AC voltage monitoring when using the ACL120.



The screenshot shows the 'Monitored Device ID, Network Source, and Alarm Criteria' dialog box. The configuration is as follows:

Section	Field	Value
Monitored Device Identification	Name	Pwr 3229
	ID	20
Network Source	IP or Hostname	192.168.1.89
	TCP Port	8088
Networked Robotics Hardware ID	Hardware ID	A4-19
Range of Allowed Values	Minimum Value	-10
	Maximum Value	0
Alarm Time Thresholds	Comm Alarm Interval 1 (H:Min:Sec)	1:0:0
	Comm Alarm Interval 2 (H:Min:Sec)	2:0:0
	Value Alarm Interval 1 (H:Min:Sec)	2:0:0
	Value Alarm Interval 2 (H:Min:Sec)	12:0:0
Monitored Device Type	Device Type	Custom
	Value Type	AC Power
	Value Units	Status
	Value Precision	2
	Control Character	A
	Calibration Factor	0

Buttons: OK, Cancel

The AC Power probe reports 0 when voltage is normal and 1 when the power is off. A minimum value of -10 and a maximum value of 0 are the recommended allowed value ranges. You could use -20 or -50 as the minimum value but the maximum value must be 0. The probe’s power-off value of “1” response will be out-of-range which will eventually elicit an alarm.

Operation

The NTMS network hardware continually reads power status from the ACL or DCL-series probes. Each reading takes about 7 seconds so the best possible time resolution for a power failure is about 7 seconds. The most recently collected status value is made available for remote network data collection requests by the Tempurity System software

Reference

Electronically Embedded Unique IDs

ACL and DCL-series digital power probes may contain electronically readable unique IDs. These IDs can be read and transferred to Windows® computers using Networked Robotics' Digital Probe Calibration Programmer and associated software. An example ID is shown below.

00-00-00-0C-D6-7B

Communications Specifications

The ACL and DCL Power probes communicate to the NTMS via a one-wire protocol specific to the Dallas DS2405 integrated circuit. For more information see the datasheet for this Dallas/Maxim part number.

Product History

The ACL 120 version was formerly listed as the ACL1 model number. All versions of the products in this manual are based on the ACL1 design. The electronics in all versions are equivalent except for the input to the embedded circuit.

Physical Specifications

The physical specifications below apply to all models. The data below reflects the body independent of the wire or wall adapter section of the probe.

Weight:	8 grams (with dual lock)
Length:	3.17 cm
Width:	1.90 cm
Height:	0.70 cm

Support

If you need assistance with your ACL or DCL-series probe or other products, contact Networked Robotics by phone at 877-FRZ-TEMP (877-379-8367) or by email at support@networkedrobotics.com