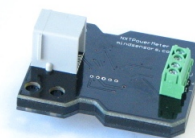


What is NXTPowerMeter

NXTPowerMeter is a data acquisition sensor designed to acquire current and voltage of a device or a circuit.



NOTE

NXTPowerMeter is rated for following capacity. Ensure to not exceed these values:

Max current: 3 Amps

Max voltage: 13.5 volts

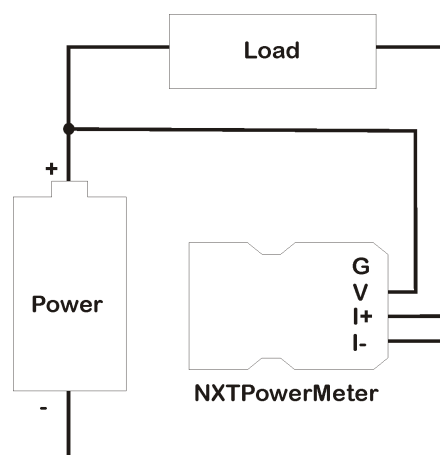
Connections and Placement

NXTPowerMeter can be connected to any of the four sensor ports of NXT by using standard cables from NXT set, or FlexiCable from mindsensors.com.

Connecting NXTPowerMeter in your Circuit

The NXTPowerMeter has four screw-in terminals to connect the probes.

While connecting to NXT battery, the ground connection is not necessary. Adjacent diagram illustrates connections while connecting to NXT. If you are connecting to an external circuit, ensure to connect the ground terminal to common ground of your circuit.



Terminal	Connection
G	Ground (For external devices only - not needed while measuring power consumption of NXT)
V	Voltage in
I+	Current on high side
I-	Current on low side (while measuring power consumption of NXT, connect this to battery -ve terminal of NXT)



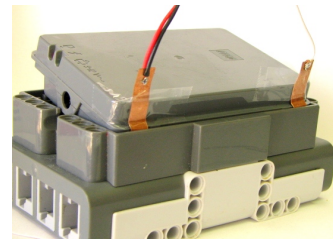
NOTE

Ensure the correct positioning of I+ and I- leads.
Reversed positioning will result in zero current reading and incorrect voltage reading.

If you are measuring power consumption of an external circuit/device, ensure that PowerMeter ground is connected the ground of the device you are measuring. (Missing ground connection can result in fluctuating readings).

To connect the probes to NXT:

The probe designs are different for AA batteries Vs Rechargeable battery pack. Use the correct probes for your batteries. Follow the steps in the Readme that came with the probes.



NOTE

These probes are only needed when you want to measure power consumption of NXT load. You may need to connect differently while measuring power consumption of an external circuit/device.

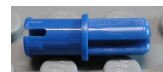
Mounting NXTPowerMeter on your contraption

The holes on the NXTPowerMeter enclosure are designed for tight fit of Technic pins (or axles) with '+' cross section. The holes however are not designed for repeated insertions/removals of these pins.



To mount NXTPowerMeter on your contraption we suggest that you use two dark gray 'Technic Axle 3 with Stud' as shown. Insert axles from the top of the device and secure with a bushing on the back or mount it on your contraption directly.

Alternately, you may use blue 'Technic Axle Pin with Friction', as shown.



While disassembling contraption, leave the pins on the device.

I2C Registers:

The NXTPowerMeter appears as a set of registers as follows:

Register	Read	Write
0x00-0x07	Firmware version - <i>Vxxxx</i>	-
0x08-0x0f	Vendor Id - <i>mndsnsrs</i>	-

0x10-0x17	Device ID - IVSens	-
0x41	-	Command
0x42	Present Current in mA (integer - 2 bytes)	-
0x44	Present Voltage in mV (integer - 2bytes)	-
0x46	Capacity used since last reset command (integer - 2 bytes)	-
0x48	Present Power (integer - 2 bytes)	-
0x4A	Total Power consumed since last reset (long - 4 bytes)	-
0x4E	Max Current (integer - 2 bytes)	-
0x50	Min Current (integer - 2 bytes)	-
0x52	Max Voltage (integer - 2 bytes)	-
0x54	Min Voltage (integer - 2 bytes)	-
0x56	Time (long - 4 bytes)	-
0x5A	User Gain (long - 4 bytes)	**
0x5E	Gain (char - 1 byte)	
0x5F	Error count (2bytes)	

** : Not Yet Implemented

Supported I2C Commands:

CMD	Description
R	Reset Counters

Current Consumption

Average current consumption of this sensor is about 10.0 mA.

I2C Bus address

Factory Default Address: 0x12

Changing the I2C Bus Address:

The I2C bus address of NXPtPowerMeter can be changed. To set an address different from default address, send sequence of following commands on the command register:

0xA0, 0xAA, 0xA5, <new I2C address>

Note: Send these commands with no break/read operation in between. This new address is effective immediately. Please note down your address carefully for future reference.

You can download the address change and scan functions from our website at www.mindsensors.com. These functions are written in RobotC.

Alternately, you can download NXT executable programs from following location: http://www.mindsensors.com/index.php?module=documents&JAS_DocumentManager_op=viewDocument&JAS_Document_id=91

APPENDIX A Advanced Information

Upgrading NXTPowerMeter firmware:

The NXTPowerMeter is shipped with latest stable firmware, if you need to change/upgrade the firmware, follow the procedure described at URL below. (Before you do this, you may need to get new firmware file from Mindsensors Technology team).

http://www.mindsensors.com/index.php?module=pagemaster&PAGE_user_op=view_page&PAGE_id=121