



## What is Grove Sensor Adapter

Grove Sensor Adapter is an in-line adapter to connect Grove sensors to NXT or EV3.



## How it Works

### Analog:

Reads the analog voltage (0 to 5V) of the Grove analog sensor and scales it to give analog output ranging from 0 to 1024.

### Digital:

Writes a 1 or 0 to the Grove digital sensor.

**\*\*\*Grove Sensor I2C addresses must be decimal and in 8-bit format. Multiply the decimal value of the 7-bit address to convert to 8-bit.\*\*\***

### I2C Write:

User must define the Grove sensor I2C address, register address, how many bytes to write, and the data to write.

### I2C Read:

User must first enable I2C auto-polling and define the Grove sensor I2C address, register address, how many bytes to read, and polling interval.

The Grove Sensor Adapter will then continuously read the user-defined register(s) of the Grove device and store the data.

Now the user can read the data directly from the Grove Sensor Adapter.

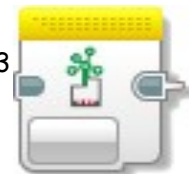
**\*\*\*See Advanced Information section below for more information on I2C\*\*\***

## Programming Techniques for SensorMUX

### EV3:

To use capabilities of the sensor, please download EV3 blocks available at following URL:

[http://www.mindensors.com/index.php?controller=attachment&id\\_attachment=165](http://www.mindensors.com/index.php?controller=attachment&id_attachment=165)



Installation instructions for EV3 block are available at:

<http://www.mindsensors.com/content/13-how-to-install-blocks-in-ev3>

Download EV3 sample program from following URL and modify it to suit your needs.

[http://www.mindsensors.com/index.php?controller=attachment&id\\_attachment=166](http://www.mindsensors.com/index.php?controller=attachment&id_attachment=166)

**NXT-G:**

Not supported. It is recommended to use the new EV3 software for your NXT programming.

**NXC:**

To be implemented.

**RobotC:**

To be implemented.

## Advanced Information

### I2C Bus address

Factory Default Addresses: 0x42 (66)

### I2C commands and operations

Following table lists the I2C commands

Commands		Action
ASCII	Hex	
P	0x50	Enable Auto-Polling
R	0x52	Read I2C
T	0x54	Write I2C

### I2C Registers:

The Grove Sensor Adapter appears as a set of registers with the following interpretation and operations.

Register	Read	Write
0x00-0x07	Software version - <i>Vx.nn</i>	-
0x08-0x0f	Vendor Id - <i>mndsnsrs</i>	-
0x10-0x17	Device ID - <i>Gadptor</i>	-
<b>Configuration</b>		
0x41	-	Command Register
0x42	-	Operation Mode (See Section below for more information)
0x43	-	I2C Auto-Poll interval
<b>Analog</b>		
0x44	Analog Read Low Byte	-
0x45	Analog Read High Byte	-
<b>I2C Read</b>		
0x46	I2C status	-
0x47	-	Grove device I2C address
0x48	-	Length to read
0x49	-	Grove device register address
0x4A-0x69	Grove sensor data (32 byte max)	
<b>I2C Write</b>		
0x6A	-	Grove device I2C address

0x6B	-	Length to write
0x6C	-	Grove device register address
0x6D-0x8C	-	Data to write (32 byte max)

## Current Consumption

Average measured current profile is as follows:

Current Consumption	Duration
3mA	Continuous

## Operation Modes

Write the value (1-4) to register 0x42 to select your mode of operation.

Analog	1	Reads analog voltage
Digital_0	2	Writes digital 0
Digital_1	3	Writes digital 1
I2C	4	I2C mode

## I2C Status Register

Expected values from the I2C Status Register

1	Completed
-1 or 255	Error

## I2C Polling Intervals

I2C polling speed in milliseconds.

Minimum	15
Default	50
Maximum	255

## Examples:

### Using Analog Sensor

Write 1 to register 0x42 (66),

Read integer value from registers 0x44 (68) and 0x45 (69).

## Using Digital Sensor

Write 0 or 1 to register 0x42(66) to turn the sensor on or off.

## Using I2C Digital Light Sensor

EV3 programming Environment must use only decimal values.

**\*\*\*Grove Sensor I2C addresses 8-bit format.\*\*\***

7-bit address: 0x29 (41)

Convert to 8 bit :  $41 * 2 = 82$

8-bit address: 0x52 (82)

**\*\*\*Disregard underlined sections if using the EV3 Block.\*\*\***

Configure I2C sensor:

Write I2C command 'T' to register 0x41 (65).

Write Operation Mode 4 to register 0x42 (66).

Set Grove I2C address to 0x52 (82) at register 0x6A (106).

Write the Data Length 1 to register 0x6B (107).

Set Grove register address to 0x80 (128) at register 0x6C (107).

Set Write Value to 3 at register 0x6D (109).

Enable Auto-Polling:

Write I2C command 'P' to register 0x41 (65).

Write Operation Mode 4 to register 0x42 (66).

Write Polling Interval 50 to register 0x43 (67)

Set Grove I2C address to 0x52 (82) at register 0x47 (71),

Set Grove register address to 0x80 (128) at register 0x49 (73).

Set Length to 4 (2 bytes per channel) at register 0x48 (72).

Before reading the data:

Write I2C command 'R' to register 0x41 (65).

Write Operation Mode 4 to register 0x42 (66).

Read Channel 0:

Read unsigned 16 bit integer from Grove Sensor Adapter register 0x4A (74).

Read Channel 1:

Read unsigned 16 bit integer from Grove Sensor Adapter register 0x4C (76).

## Compatible Grove Sensors

This list contains some, but not all, compatible Grove sensors.

If you do not see your sensor on this list, please contact our support team for further information.

- Digital Light Sensor
- Light Sensor
- Barometer (advanced programming knowledge and calculations required)
- Gas Sensor
- Temperature Sensor
- Air Quality Sensor
- Infrared Receiver, Emitter
- Relays
- Button
- Touch
- Switch
- Thumb Joystick
- Water Sensor
- Alcohol Sensor
- Electricity Sensor
- Sound Sensor
- Moisture Sensor
- PH Sensor
- UV Sensor