



# **LEGO<sup>®</sup> MINDSTORMS<sup>®</sup> NXT Ultrasonic Sensor I<sup>2</sup>C Communication Protocol**

The table documents the low-speed communication protocol which is used for communicating with the LEGO® MINDSTORMS® NXT Ultrasonic Sensor. Not all of these commands are accessible within the software, but the ultrasonic sensor itself supports these commands and functionalities.

Command	Transmitted from NXT			Length	Received in NXT								Comments	
	Byte 0	Byte 1	Byte 2		Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7		Byte 8
	Addr.													
<b>Constants</b>														
Read version	0x02	0x00	R + 0x03	8	0x56	0x31	0x2E	0x30	0x00					V1.0
Read product ID	0x02	0x08	R + 0x03	8	0x4C	0x45	0x47	0x4F	0x00					LEGO
Read sensor type	0x02	0x10	R + 0x03	8	0x53	0x6F	0x6E	0x61	0x72	0x00				Sonar
Read factory zero (Cal 1)	0x02	0x11	R + 0x03	1	0x00									
Read factory scale factor (Cal 2)	0x02	0x12	R + 0x03	1	0x01									
Read factory scale divisor	0x02	0x13	R + 0x03	1	0x0E									
Read measurement units	0x02	0x14	R + 0x03	7	0x31	0x30	0x45	0x2D	0x32	0x6D	0x00			10E-2m
<b>Variables</b>														
Read continuous measurements interval	0x02	0x40	R + 0x03	1	Interval									
Read command state	0x02	0x41	R + 0x03	1	Command state									
Read Measurement Byte 0	0x02	0x42	R + 0x03	1	Result 1									
Read Measurement Byte 1	0x02	0x43	R + 0x03	1	Result 2									
Read Measurement Byte 2	0x02	0x44	R + 0x03	1	Result 3									
Read Measurement Byte 3	0x02	0x45	R + 0x03	1	Result 4									
Read Measurement Byte 4	0x02	0x46	R + 0x03	1	Result 5									
Read Measurement Byte 5	0x02	0x47	R + 0x03	1	Result 6									
Read Measurement Byte 6	0x02	0x48	R + 0x03	1	Result 7									
Read Measurement Byte 7	0x02	0x49	R + 0x03	1	Result 8									
Read actual zero (Cal 1)	0x02	0x50	R + 0x03	1	0x00									

Read actual scale factor (Cal 2)	0x02	0x51	R + 0x03	1	0x01
Read actual scale divisor	0x02	0x52	R + 0x03	1	0x0E

**Commands**

Off Command	0x02	0x41	0x00
Single shot command	0x02	0x41	0x01
Continuous measurement command (default)	0x02	0x41	0x02
Event capture command	0x02	0x41	0x03
Request warm reset	0x02	0x41	0x04
Set continuous measurement interval	0x02	0x40	"Interval"
Set actual zero (Cal 1)	0x02	0x50	"Value"
Set actual scale factor (Cal 2)	0x02	0x51	"Value"
Set actual scale divisor	0x02	0x52	"Value"

**Single shot command:**

In this mode the ultrasonic sensor will only make a new measurement every time the command byte is send to the sensor. The sensor will measure distances for up to 8 objects and save the distances within the “Read measurement byte 0 – 7”.

**Continuous measurement command:**

This is the default mode, where the sensor continuously makes new measurement with the specified interval.

**Event capture command:**

Within this mode the sensor will measure whether any other ultrasonic sensors are within the vicinity. With this information a program can evaluate when it is best to make a new measurement which will not conflict with other ultrasonic sensors.