

Date: 2008.04.09

Scanning Laser Range Sensor UTM-30LX Specification

Symbol	Amendment Details	Amendment	Date	Amended by	Number
Approved by	Checked by	Drawn by	Designed by	Title	UTM-30LX Specification
	MORI	KAMITANI	HINO	Drawing No	C-42-3615 1/7

1. Introduction

UTM-30LX/ use laser source ($\lambda = 870\text{nm}$) to scan 270° semicircular field (Figure 1). It measures distance to objects in the range and co-ordinates of those point calculated using the step angle. Sensor's measurement data along with the angle are transmitted via communication channel.

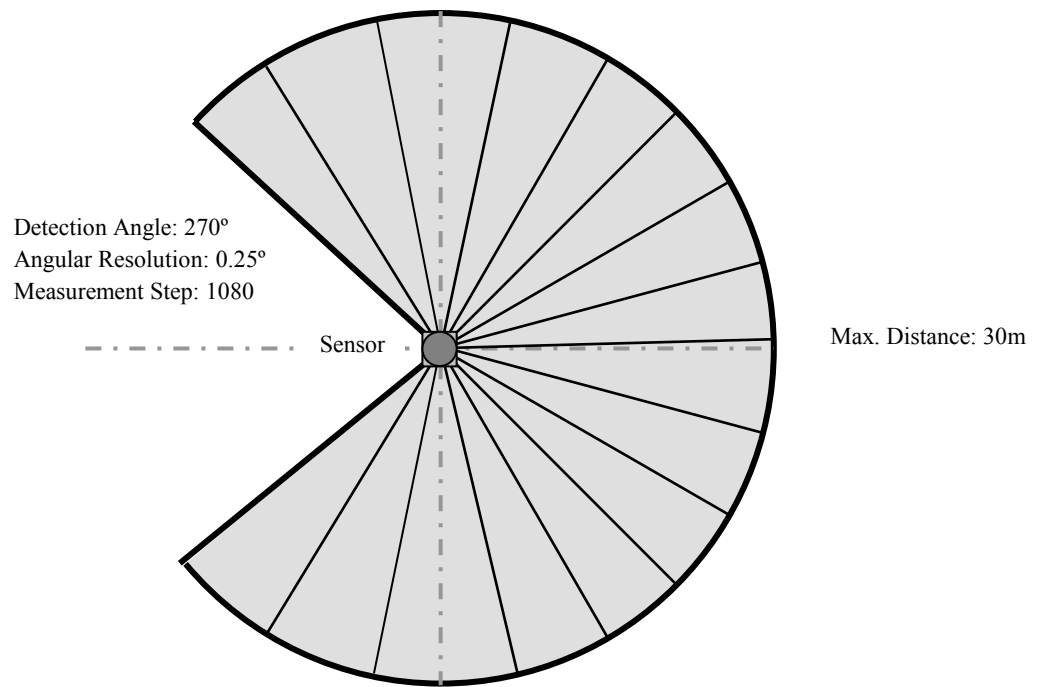


Figure 1

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2. Specifications

Product Name	Scanning Laser Range Sensor
Model	UTM-30LX
Light Source	Laser Semiconductor $\lambda = 870\text{nm}$, Laser Class 1
Supply Voltage	DC 12V $\pm 10\%$
Supply Current	Max: 1A, Normal : 0.7A
Power Consumption	Less than 8W
Detection Range and Detection Object	Guaranteed Range: 0.1 ~ 30m (White Kent Sheet) Maximum Range : 0.1 ~ 60m Minimum Width detected at 10m : 130mm (Change with distance)
Accuracy	Under 3000lx : White Kent Sheet: $\pm 30\text{mm}^{*1}$ (0.1m to 10m) Under 100000lx : White Kent Sheet: $\pm 50\text{mm}^{*1}$ (0.1m to 10m) (Also refer data sheet attached with the product.)
Measurement Resolution and Repeated Accuracy	1mm Under 3000lx : $\sigma = 10\text{mm}^{*1}$ (White Kent Sheet up to 10m) Under 100000lx : $\sigma = 50\text{mm}^{*1}$ (White Kent Sheet up to 10m)
Scan Angle	270°
Angular Resolution	0.25° (360°/1440)
Scan Speed	25ms (Motor rotation speed : 2400rpm)
Interface	USB Ver2.0 Full Speed OUTPUT : Synchronous
Output	Synchronous Output 1- Point
Ambient Condition (Temperature, Humidity)	-10°C ~ +50°C Less than 85%RH (Without Dew, Frost)
Preservation Temperature	-25~75°C
Environmental Effect	Measured distance will be shorter than the actual distance under rain, snow and direct sunlight*2.
Vibration Resistance	10 ~ 55Hz Double amplitude 1.5mm in each X, Y, Z axis for 2hrs. 55 ~ 200Hz 98m/s ² sweep of 2min in each X, Y, Z axis for 1hrs.
Impact Resistance	196m/s ² In each X, Y, Z axis 10 times.
Protective Structure	Optics: IP60
Insulation Resistance	10M Ω DC500V Megger
Weight	210g (Without cable)
Case	Polycarbonate
External Dimension (W×D×H)	60mm×60mm×85mm MC-40-3127

*1 Under Standard Test Condition (Accuracy can not be guaranteed under direct sunlight.)

*2 Confirm sensor functions under operating environment. Measures such as signal processing in LX type.

3. Quality Reference Value

Operating Vibration resistance	10~150Hz 19.6m/s ² Sweep of 2min in each X,Y,Z axis for 30min
Operating Impact resistance	49m/s ² X, Y,Z axis 10 times
Angular Speed	2 π /s (1Hz)
Angular Acceleration	$\pi/2\text{rad}/\text{s}^2$
Life	5 Years (Varies with operating conditions)
Sound Level	Less than 25dB at 300 mm
Certification	FDA Approval (21 CFR part 1040.10 and 1040.11)

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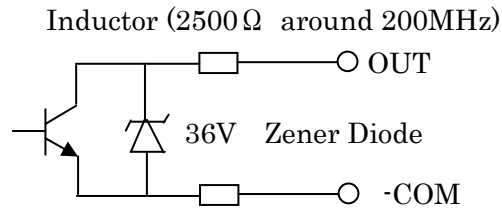
4. Interface

(1) Robot Cable 4Pin

Color	Function
Brown	+12v Power
Blue	0v Power
Green	Synchronous Output
White	COM Output (0V: Common to Power)

(2) USB Connector
TYPE-A

(3) Output circuit



Note:

SG for communication and GND are connected internally (Isolated with Input -VIN).
Isolate the device form any connection that generate electric noise.
This sensor is compatible with SCIP2.0 protocol standard.

5. Control Signal

(1) Synchronous Output

Output is one pulse for approximately 1msec after every scan (Figure 2).

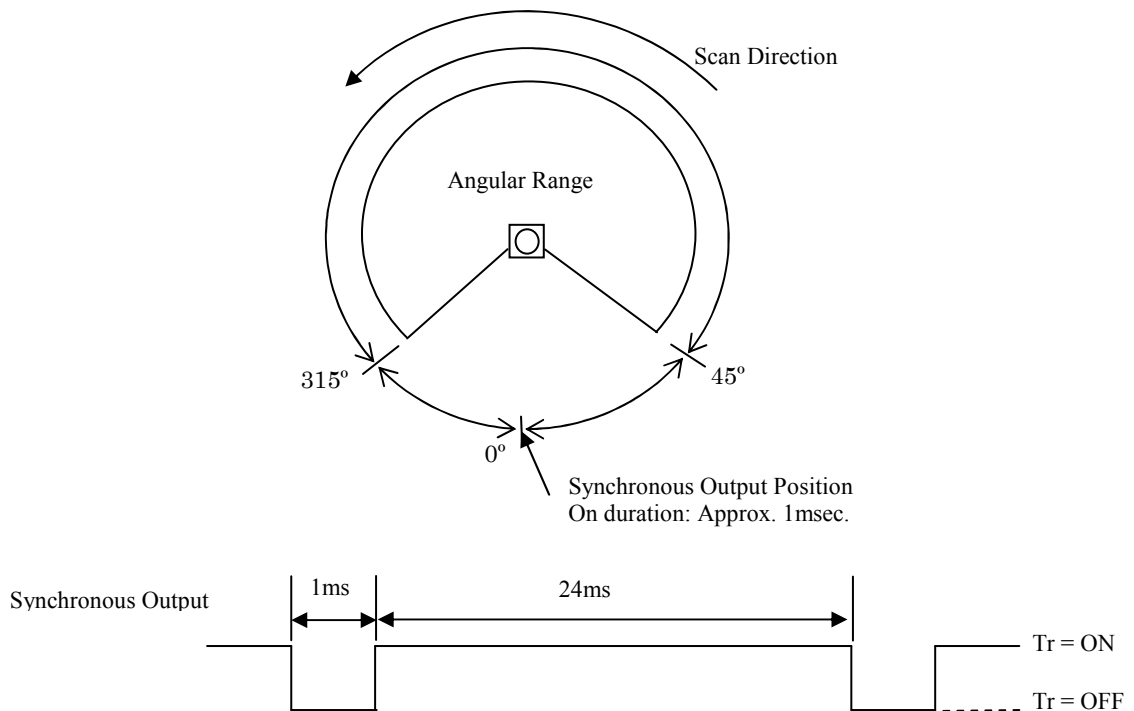


Figure 2

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(2) Malfunction Output:

1. Laser Malfunction : When laser does not radiate or exceeds safety class 1.
2. Motor Malfunction : When rotation speed is not equal to preset value.

When these malfunctions are detected synchronous/Warning signal is turned to OFF state. Error analysis can be done via communication.

6. Additional command

ME-Command

This command is used to obtain distance and intensity of the received laser pulse from the sensor. When sensor receives this command it replies with the data measured after command is processed.

Data size is double than the normal distance command (MDMS-Command) as it contains both distance and intensity measurement. It takes 2-cycles to transmit all the data.

(HOST→SENSOR)

'M'(4dh)	'E'(45h)		
Start Step (4byte)	End Step (4byte)	Cluster Count (2byte)	
Scan Interval (1byte)	Number of Scans (2byte)	String Characters	LF

(SENSOR→HOST)

(1) When status is not 99

'M'	'E'	Start Step (4byte)	End Step (4byte)	Cluster Count (2byte)	Scan Interval (1byte)
Number of Scans (2byte)		LF	String Characters	LF	
Status (2byte)		SUM (1byte)	LF	LF	

(2) When data size is less than 64 bytes

'M'	'E'	Start Step (4byte)	End Step (4byte)	Cluster Count (2byte)	Scan Interval (1byte)	
Number of Scans (2byte)		LF	String Characters	LF		
'9'	'9'	'b'	LF	Time Stamp (4 byte)	SUM (1byte)	LF
Data* (Less than 64 bytes)		SUM (1 byte)	LF	LF		

*Data contains distance (3 byte) and intensity value (3 byte) of each measurement step.

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(3) When data size is more than 64bytes and ends without remaining byte

'M'	'E'	Start Step (4byte)	End Step (4byte)	Cluster Count (2byte)	Scan Interval (1byte)
Number of Scans (2byte)		LF	String Characters	LF	
'9'	'9'	'b'	LF	Time Stamp (4 byte)	SUM (1byte) LF
Data Block 1 (64 bytes)		SUM (1 byte)	LF		
...			
Data Block N (64 bytes)		SUM (1 byte)	LF	LF	

(4) When data size is more than 64 bytes and ends with n-remaining bytes

'M'	'E'	Start Step (4byte)	End Step (4byte)	Cluster Count (2byte)	Scan Interval (1byte)
Number of Scans (2byte)		LF	String Characters	LF	
'9'	'9'	'b'	LF	Time Stamp (4 byte)	SUM (1byte) LF
Data Block 1 (64 bytes)		SUM (1 byte)	LF		
...			
Data Block N-1 (64 bytes)		SUM (1 byte)	LF		
Data Block N (n bytes)		SUM (1 byte)	LF	LF	

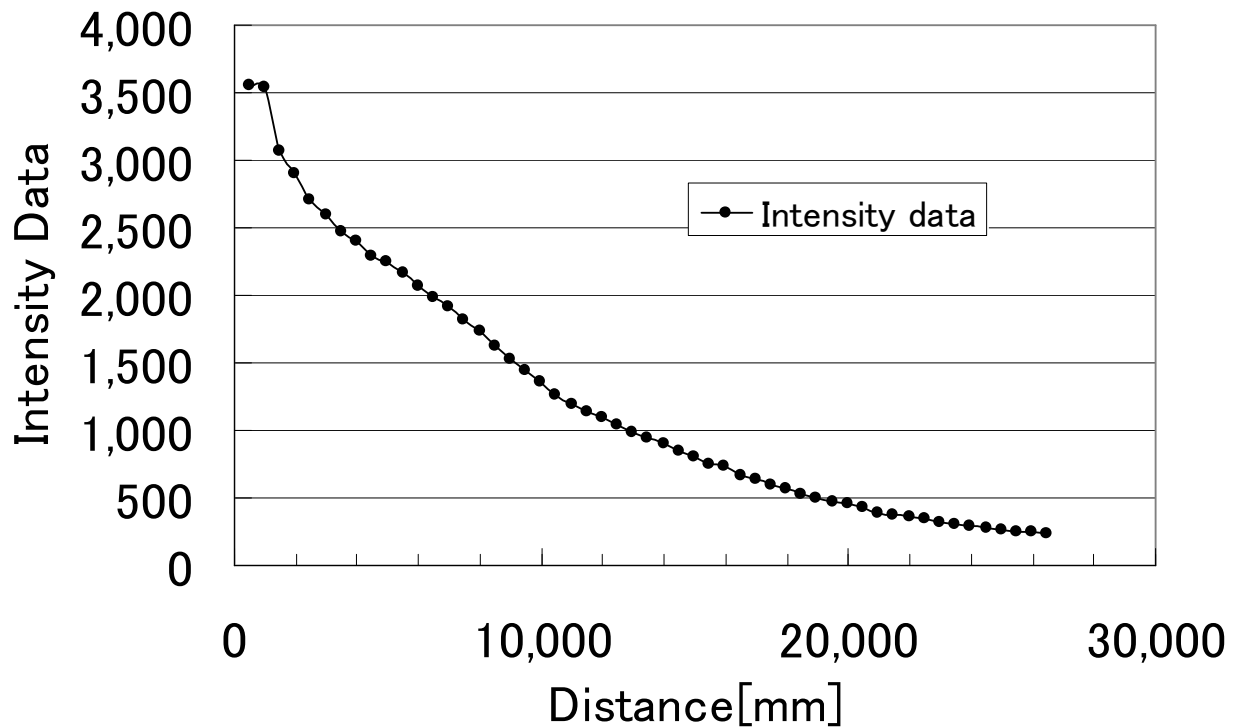
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About Intensity Data:

Intensity data is the strength of the reflected light from objects in the sensor's range that is received at the photodiode of the sensor.

Relation between the distance and the intensity is shown in figure below. Intensity of the reflected light from the same material will decrease when the distance is longer. It is necessary to calibrate the value with respect to the distance and angle of incidence to obtain the reflectivity of a material

Characteristic of Intensity Data obtained from Top-URG



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