Date: 2012.12.3

Scanning Laser Range Finder
UTM-30LX-EW
Specification

Symbol	Amendment Details	Amendment	Date	Amended by	Number
④×1	Correction of External Dimension representation	3	2012.12.3	KAMON	RS-0159
③×1	The description of the Multiecho function was added.	6,7	2012.11.5	KAMON	RS-0147
②×1	Electric cable connection is modified	4	2012.3.28	TAMAKI	RS-0052
①×2	Error code table is added.	5,6	2011.11.25	TAMAKI	RS-0006

Approved by	Checked by	Drawn by	Designed by	Title	UTM-30LX-EW Specification	
KAMITANI	UTSUGI	KAMON	KAMON	Drawing No.	C-42-3785	1/7

1. Introduction

1.1 Operation principles

The UTM-30LX-EW uses a laser source (λ=905nm) to scan a 270º semicircular field (Figure 1). It measures the distance for each angular step to objects in its range. The measurement data along with its angular step are transmitted via a communication channel. The laser safety is class 1.

2. Diagram of Scanned Area

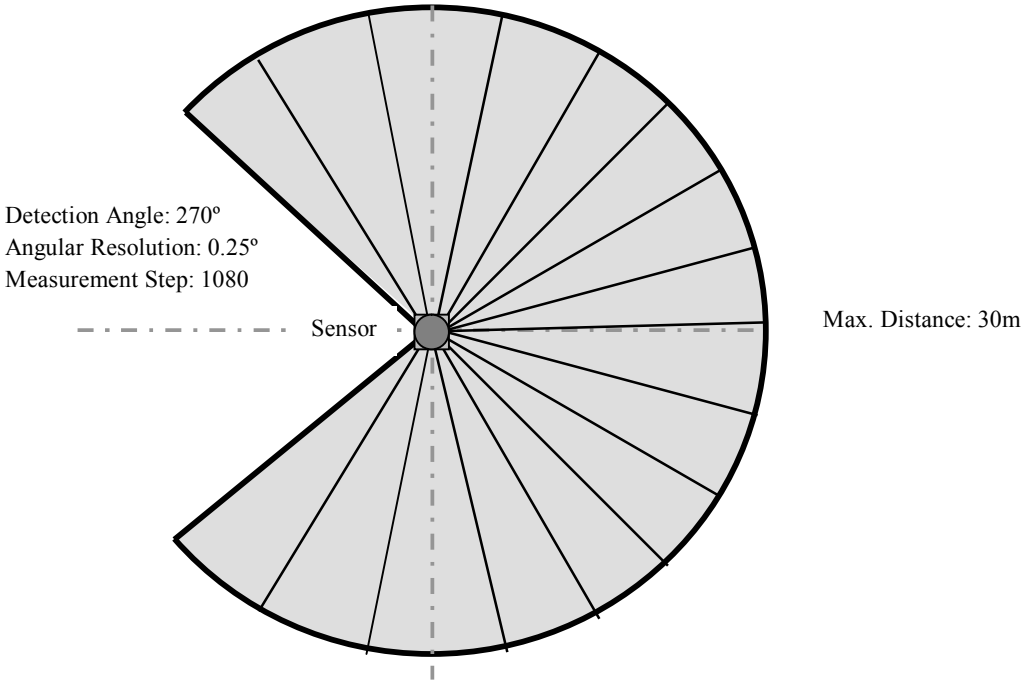


Figure 1

3. Important Notes

- This sensor is not a safety device/tool.
- This sensor is not for use in human detection.
- Hokuyo products are not developed and manufactured for use in weapons, equipment, or related technologies intended for destroying human lives or creating mass destruction. If such possibilities or usages are revealed, the sales of Hokuyo products to those customers might be halted by the laws of Japan such as Foreign Exchange Law, Foreign Trade Law or Export Trade Control Order. In addition, we will export Hokuyo products for the purpose of maintaining the global peace and security in accordance with the above laws of Japan
- Read specifications carefully before use.

4. Specifications

Product Name	Scanning Laser Range Finder
Model	**UTM-30LX-EW**
Light Source	Laser Semiconductor λ = 905nm Laser Class 1
Supply Voltage	12VDC ± 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) *2 Maximum Range : 0.1 ~ 60m Minimum detectable width at 10m : 130mm (Vary with distance)
Accuracy	0.1 – 10m : ±30mm, 10 – 30m : ±50mm (White Kent Sheet) *2 Under 3000lx : White Kent Sheet: ±30mm*1 (0.1m to 10m) Under 100000lx : White Kent Sheet: ±50mm*1 (0.1m to 10m)
Measurement Resolution and Repeated Accuracy	1mm 0.1 – 10m : σ <10mm, 10 – 30m : σ <30mm (White Kent Sheet) *2 Under 3000lx : σ = 10mm*1 (White Kent Sheet up to 10m) Under 100000lx : σ = 30mm*1 (White Kent Sheet up to 10m)
Scan Angle	270°
Angular Resolution	0.25° (360°/1440)
Scan Speed	25ms (Motor speed : 2400rpm)
Interface	Ethernet 100BASE-TX(Auto-negotiation)
Output	Synchronous Output 1- Point
LED Display	Green: Power supply. Red: Normal Operation (Continuous), Malfunction (Blink)
Ambient Condition (Temperature, Humidity)	-10°C ~ +50°C Less than 85%RH (Without Dew, Frost)
Storage 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: IP67 (Except Ethernet connector)
Insulation Resistance	10MΩ DC500V Megger
Weight	210g (Without cable)
Case	Polycarbonate
External Dimension (W×D×H)	62mm×62mm×87.5mm ④ MC-40-3240

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

*2 Indoor environment with less than 1000Lx.
Please perform necessary tests with the actual device in the working environment.
Use data filtering techniques to reduce the effect of water droplets when detecting objects under the rain.

5. Quality Reference Value

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

6. Interface

6.1 Robot Cable 4 Pin

Color	Function
Brown	+12 V
Blue	0 V
Green	Synchronous Output

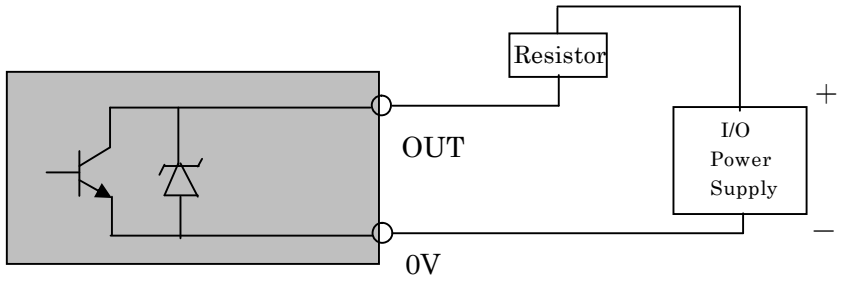
Note: 0 V of the power supply (Blue) and COM Output (0V) (White) are internally connected.

6.2 Ethernet Cable

RJ-45 plug is attached to the cable. (Length: 300mm)

This sensor is compatible with SCIP2.2 communication protocol standard.

6.3 Output Circuit Diagram



Rated power: 30V, 30mA (or less)

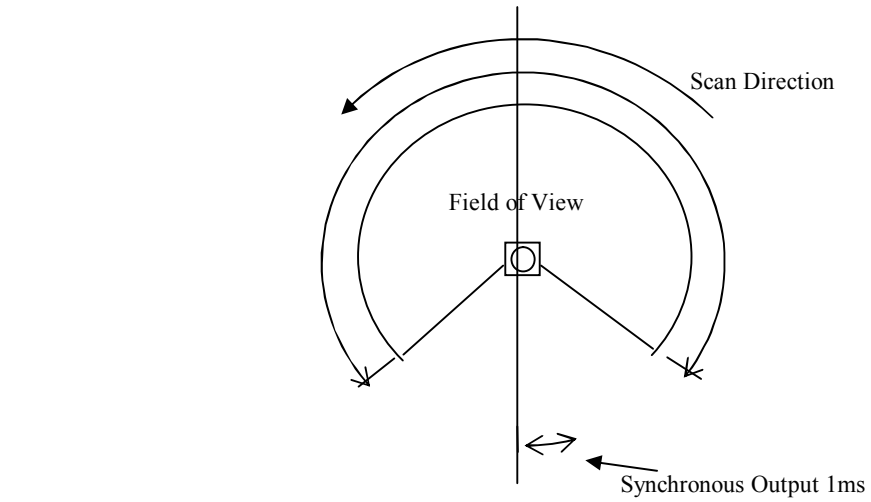
Note: Rated resistor should be used for the output.

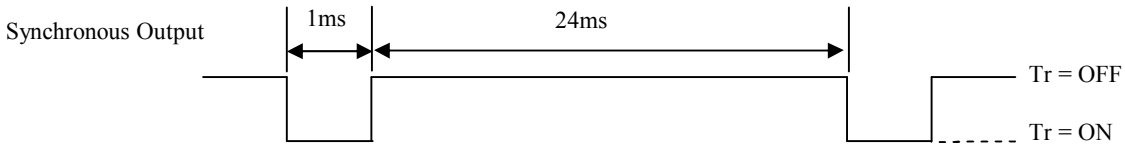
Figure 2

7. Control Signal

Synchronous Output (UTM-30LX)

1 pulse is approximately 1 ms. Output signal Synchronization timing chart is shown below (Figure 3).





Tr is OFF during Malfunction

Figure 3

8. Malfunction Output:

1. Laser malfunction: When the laser does not emit or exceeds safety class 1.
2. Motor malfunction: When the rotation speed differs from the default value (> 25 ms).

Synchronous/Warning signal will be turned OFF when these malfunctions are detected. The motor and laser will also stop. The details of error can be obtained via communication.

[Error code]

The cause of an error can be acquired from a "STAT" line of the "II" command response of the SCIP communications protocol. An error code and a solution acquired from a "STAT" line are as follows.

ID	Message	Meaning	Solution
000	no error.	Normal	No action is required
050	internal chip access failed.	Abnormal sensor processing system	Sensor has failed and needs to be repaired
100	Internal chip access failed.	Abnormal sensor processing system	
150	internal chip access failed.	Abnormal sensor processing system	
151	internal chip initialize failed.	Sensor processing system failed to initialize	
200	encoder error.	Encoder error	
250	motor startup failed.	Abnormality of the motor	
251	motor rotation error.	Motor rotation is not stable	Reduce the vibration and noise to the sensor
300	laser too high.	Abnormality of the laser light	Reduce the ambient light and noise to the sensor
301	laser too low.	Abnormality of the laser light	
302	laser no echo	Abnormality of the laser light	
303	measurement error.	The control process for measuring distance failed	Reduce the vibration and ambient light and noise to the sensor

△1

[The meaning of the distance value]

The meaning of “x” distance value of each step is as follows.

Distance value “x”	Meaning
x ＜ 23	Measurement error. The distance cannot be measured due to light interference or noise.
23 ≦ x ＜ 60000	Valid distance value [mm]
60000 ≦ x	Object does not exist or the object has low reflectivity.

△1

9. Multiecho Function △3

The sensor masures up to three echoes of reflection for each step (direction). Distance and intensity values of every echoes are obtained

Multiple echoes are produced by reflection on surface of transparent objects, reflection on objects' boundary and reflection from small particles such as rain drops, mist, dusts and fog.

This sensor feature of getting distance and intensity values of multiple reflections at the same direction is called Multiecho Function.

※ Two closely positioned objects or low reflectance objects may not produce multiple echoes, so that they are not detectable as separate ones.

9. Ethernet Settings

① Initial value

IP address: 192.168.0.10
Port number: 10940

② IP initialization

Remove the rubber cap located at the side of the bottom cover of the sensor. Press and hold the switch inside this hole for more than two seconds in order to start the IP initialization process. Release the switch after the LED flashes in orange color. This indicates the restart of the sensor. Finally, please insert the rubber cap to its original position.

10. Cautions

The heat is generated as the internal circuit of the sensor runs at a very high speed. The generated heat is concentrated at the bottom of the sensor. Please mount a heat sink or any appropriate component to release the heat. An aluminum plate (200mm x 200mm x 2mm) is recommended as the heat sink.

Mutual Interference could occur when two or more identical sensors are mounted at the same detection plane. This is because the sensor could not identify the origin of the received laser pulses. It causes measurement error for one or two steps. Performing data filtering could overcome this problem.