



# WT-LTX/RX

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## Through beam laser transceiver system

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### Description:

The WTLTX through beam transceiver system was designed for use in systems requiring through beam sensing at resolutions of less than 1mm and operating at a total burden current of less than 20ma. The output is an open collector configuration rated at 100mA.

### Features:

- Very wide range operating voltage range
- System electrical noise tolerant \*
- Very low operating current requirement.
- Built in reverse voltage protection.
- Industrial grade 615nm red laser with precision glass optics.
- Precision narrow band glass pass filters.
- Built in reverse supply voltage protection.
- Small footprint – only 10mm x 20mm x 32mm.

### Functions:

- Accurate detection of beam break conditions within 200um using columnated visible red laser.
- Visual error indication of under voltage, over voltage, beam swamp and beam break.

### Operating Characteristics:

- Recommended operating distance\*:
  - 1m to 6m
- Operating Voltage Range:
  - 4.5 to 25.5V (see specifications \*\*)
- Operating current combined (total LTX + LRX)
  - < than 20ma
- Temperature Range:
  - Industrial: -10°C to +85°C
- Output sink capability 100mA @ 12vdc

\* *ALL light is susceptible to heat haze, the common name for light diffraction through heated air*

\*\* *Sophisticated voltage stabilisation circuitry ensures correct operation over the entire recommended range .*

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## Operating characteristics

The WT-LTX system comprises a modulated 615nm industrial laser with precision glass notch filter and optics and high speed custom controller with built in precision analog to digital conversion. Precisely shaped pulses are transferred to the laser module through a highly efficient driver system to produce clean high-speed pulses of visible laser light.

The input voltage is constantly monitored during operation and the status is displayed on the green LED. When the LED displays a steady illumination indicates that the voltage input is within the recommended range.

The WT-LRX comprises a high-quality beam sensor with built in lens, a precision 615nm glass notch filter and high quality laser cut aperture plate. The LRX also has a high speed custom controller chip with on board precision analog to digital converter which is used to measure the incoming modulated laser light. The intensity of each pulse is individually measured and compared to an internal reference for calculating the integrity of the laser beam input

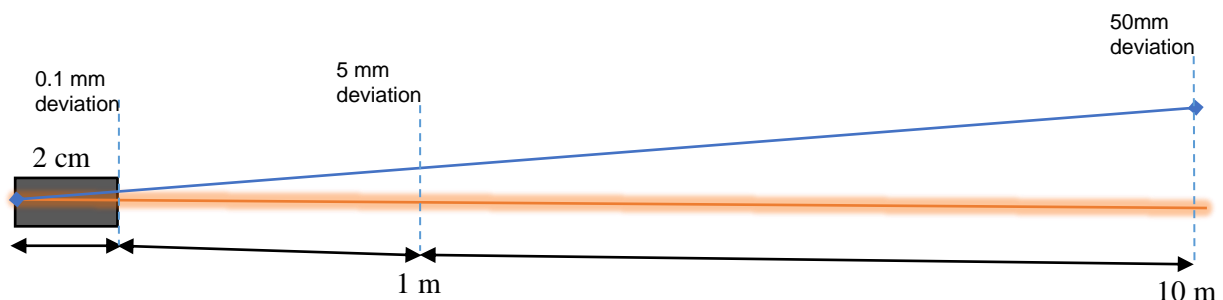
When the received laser input does not meet the required quality the WT-LRX will turn it's open collector output circuitry ON and effectively connect the BLACK wire internally to the BLUE wire and essentially ground the BLACK wire.

The WT-LTX/RX is designed to work over a distance of between 1000mm and 5000mm although the system will operate up to twice this distance. It is important to understand the when working with small apertures and narrow beam measurements that mechanical deviation becomes a critical issue. The larger the distance the more susceptible the system can become to positional shifts in the mounting points of the units.

For instance, a laser beam that is 200um being transmitted from a rigid fixed point will maintain it's integrity quite well over 10 meters, as long as the beam power output is sufficient and the mounting is physically rigid and stable. But even over 10 meters visual disturbance will often be noticeable on the receiving side (a flat non-reflective surface for instance) as small movements. This is because the deviation is greatly multiplied by distance.

Refer to figure 3 below. The WT-LRTX/RX module is 20mm wide. If there is a deviation of 0.1mm between the angular position of the front of the module in relation to the back of the module then the beam will be 5mm off centre at one meter, and 5cm (50mm) at a distance of 10 m). This deviation angle is a 0.29° from centre.

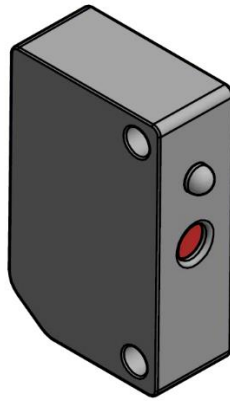
**Fig 1**



**Important Note :** The angular deviation described above is not specific to the WT-LTX/RX but is a phenomenon dictated by natural physics. Light is also affected by thermal deflection or haze. When light passes through air pockets of different temperatures it is deflected, the magnitude of deflection is directly related to the difference in temperatures.

## MODULE WIRING CHART

*Fig 2*



WIRE	Direction	NAME	LTX FUNCTION
BROWN	input	V <sub>DD</sub>	Supply voltage input
BLUE	input	Ground	Ground
BLACK	none		No connection
WIRE	Direction	NAME	LRX FUNCTION
BROWN	input	V <sub>DD</sub>	Supply voltage input
BLUE	input	Ground	Ground
BLACK	input	Output	Open collector output

## MODULE IDENTIFICATION

The modules are identified by their part labels located on the rear of each housing.

*Fig3*



## MODULE STATUS INDICATOR

*Fig 4*

ACTION	COLOR	LTX FUNCTION
On	Green	Supply voltage is within recommended range
Slow flash	Green	Supply voltage is below recommended limit
Fast flash	Green	Supply voltage is above recommended limit
ACTION	COLOR	LRX FUNCTION
On	Green	Laser beam input is at optimum level
On	Amber	Laser beam input is below recommended level
On	Red	Laser beam not detected
Flashing	Red	Input level is being swamped by another source

## Application tips

This device is designed to function with no external components; however it is recommended to have a current limiting resistor on the BLACK output wire. No localised decoupling is required.

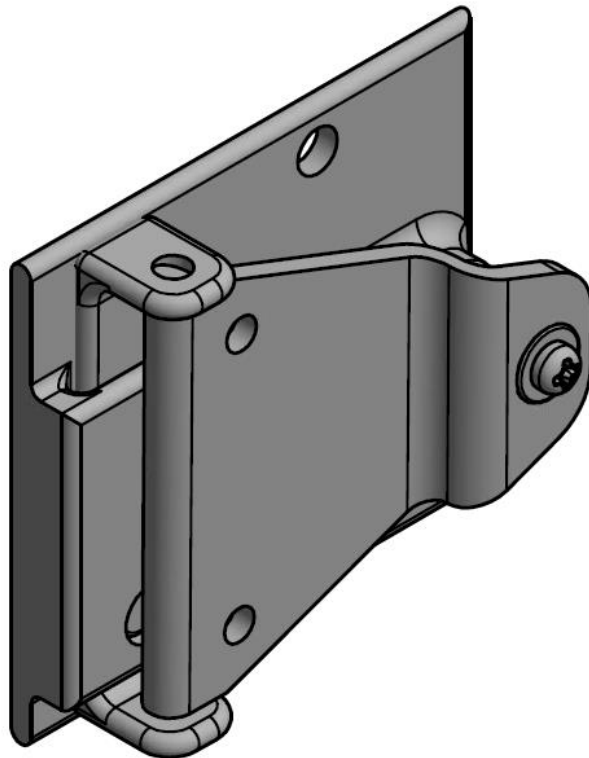
For best results the module should be mounted in such a way that it's angle can be adjusted in both the horizontal and the vertical plane.

The LED on the WT-LRX indicates the strength of the received beam, with GREEN being the recommended operating mode. Although the module will operate in the AMBER condition, this is not recommended because there is no way of estimating the safety margin or headroom.

The ability to function from GREEN through AMBER may allow the module to compensate for variances such as those encountered in haze conditions and therefore offer some immunity to its effects.

It is recommended that the WT mounting bracket in Fig.4 below be used with the WT-LTX/RX module as it is designed to allow easy adjustment on X,Y and Z axis. The only user requirement is a vertical slot from which a 4mm bolt or screw can be installed.

*Fig 5*



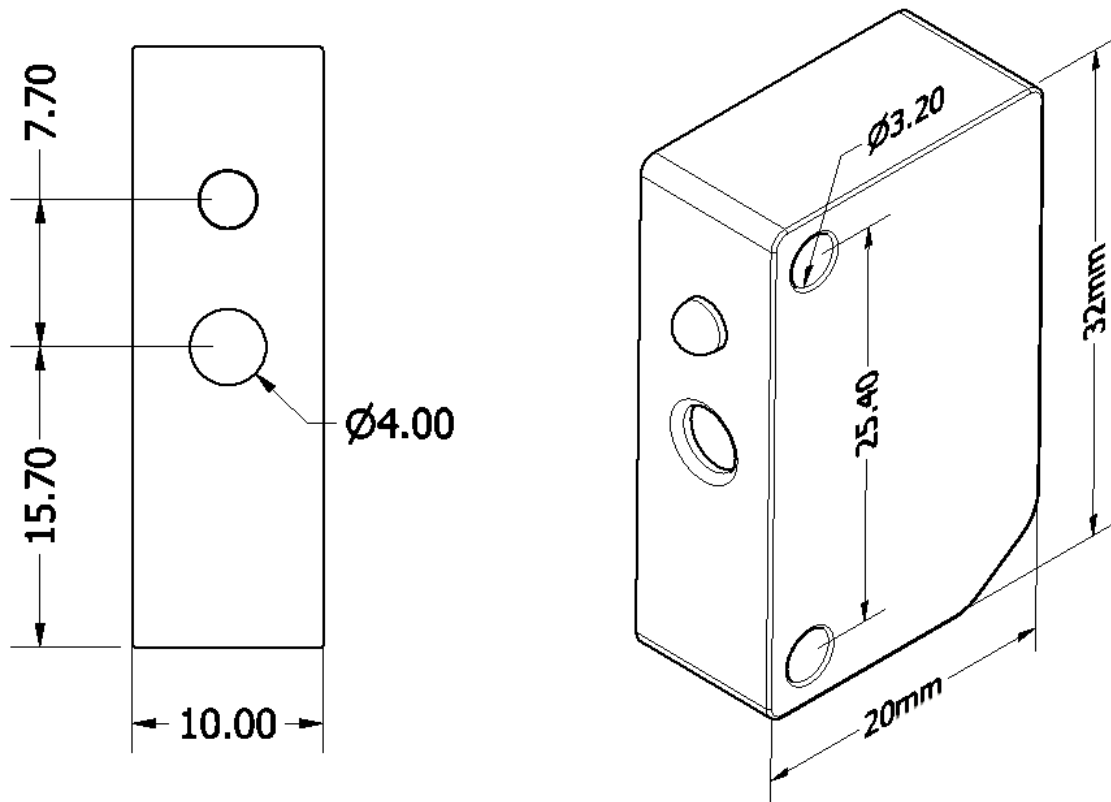
The sensor is mounted onto the adjuster plate by means of two M3x15 cap screws inserted from the underside of the plate. To do this the adjustment screw must be removed. It is **IMPORTANT** to take care not to lose the two washers or the special load spring when doing so.

## Module dimensions

The WT-LTX/RX module body comprises carbon fibre PLA+ shell with an impact resistant polymer infill.

It is mounted using 2 x M3 machine screws through mounting holes on the side of the module.

*Fig 6*



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## MODULE ELECTRICAL SPECIFICATIONS

### Absolute Maximum Ratings (†)

Ambient temperature under bias.....	-10°C to +85°C
Storage temperature .....	-15°C to +90°C
<b>Voltage on pins with respect to ground wire:</b>	
On VIN wire .....	-0.3V to +28.0vdc
On output wire.....	-0.3V to +48.0vdc
<b>Maximum current:</b>	
On VIN wire	
-10°C ≤ TA ≤ +25°C .....	<20 mA
+25°C ≤ TA ≤ +55°C .....	<20 mA
On output wire (1)	
-10°C ≤ TA ≤ +25°C.....	<100 mA
+25°C ≤ TA ≤ +55°C.....	<95 mA
Sunk by output wire.....	<100 mA
Total power sink .....	200 mW
Output low condition.....	0.6V

**Note 1:** Maximum current rating may be limited by the total power dissipation characterizations, see “Thermal Characteristics” to calculate device specifications.

† IMPORTANT NOTICE: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure above maximum rating conditions for extended periods may affect device reliability.

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