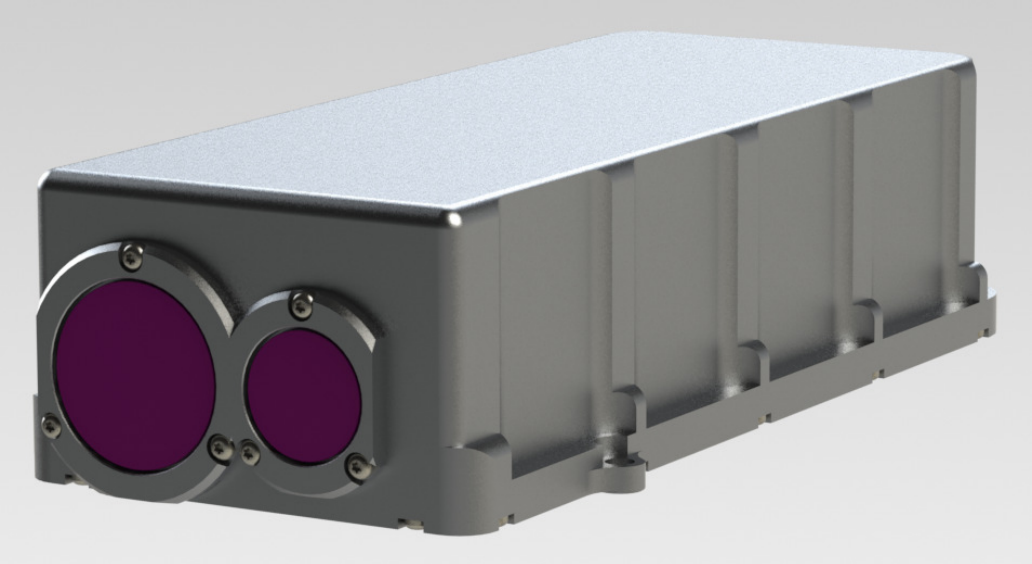
RangePRO Model GSLR-2K-R Laser Rangefinder Module



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$$P_R = \frac{P_L \times \chi^2 \times \delta \times D_L^2 \times A_I \times \cos\beta}{4 \times R^2 \times A_L}$$

RangePRO Model GSLR-2K-R Laser Rangefinder Module

1 DESCRIPTION

The RangePRO Model GSLR-2K-R is a compact OEM laser rangefinder module providing an advanced digital rangefinding capability for military, paramilitary and commercial applications. All assemblies are integrated onto a precision bore-sighted platform.

It integrates with host systems such as weapon, sensing, or surveillance and tracking stations, and thermal imaging cameras. It requires power and control command input, and provides range-to-target and self-diagnostic data output.

The GSLR-2K-R ranges at low repetition rates over distances to 10km depending on target size, target reflectivity, atmospheric conditions and customer supplied external optics (typically greater than 4.5km for vehicle type targets).

The transmitter is a collimated eye-safe laser system. It can provide ranging rates from single shot up to 1Hz continuously, providing sufficient heat transfer from the unit to the mounting surface is provided.

The unit is fully environmentally sealed and purged and utilises select materials and specialised surface treatments to prevent corrosion. This includes a RoHS compliant Ni-PTFE plated aluminium connector rated at 500h of salt mist.

Advanced digital signal processing techniques are employed to provide accurate, reliable ranging. Signals from the detector are digitally sampled. The samples are examined to determine all potential real target returns. If a valid target is detected within the user-set range gate it's range data is output, if more than one target is detected within the range gate the nearest or farthest may be selected for data output.

All signal and range computation is done "on the fly". Using this philosophy, the only task remaining after the sampling has expired is to transfer the range data through the serial port. Effectively the speed of the signal processing is limited only by the data output rate.

The system employs an adaptive range threshold to compensate for changing noise levels. The worst case for noise is when the system electronics are being operated at the high end of their temperature specification and when ranging is being performed in strong sunlight. The best case is the reverse situation. The adaptive range threshold feature results in more reliable ranging (fewer false alarms) when noise is elevated and higher sensitivity (further ranging) when noise is reduced, thus maximising the system capability under varying conditions. The threshold is calculated on a "shot-by-shot" basis.

RangePRO laser rangefinder software is easily upgradeable, upgrades can be downloaded in the field via a PC.

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2 SYSTEM SPECIFICATIONS

Notation - use of brackets in tables: [*notes & qualifications*] (*units*).

2.1 System Performance

PARAMETER		SPECIFICATION
Control		
Control Functions		all control functions and range data via comms port
Ranging		
Laser Type		Nd:YAG/OPO
Wavelength (nm)		1,565 to 1,575 [1,570 nominal]
Output Energy [per pulse] (mJ)		nominally 8 [up to max. allowable for Class 1M]
Beam Divergence [full angle; typical] (mrad)		1.5
Beam Diameter [at exit] (mm)		12.5
Receiver Aperture (mm)		23
Detector		InGaAs with time variant gain
Range Read-out Limits (m)	**minimum**	50
[factory selectable]	**maximum**	12,000
Ranging Performance[1]	**man [0.45x1.8m]**	3,000
[Std. Clear[2]; max.] (m)	**vehicle [2.3x2.3m]**	4,500
	building [large]	10,000
Extinction Ratio[3] (dB)		31.5
Range Accuracy [typical] (m)		± 2 [4 rms over 10 shots]
Target Dis-	**Lateral [1m² targets @ 5,000m]**	≤ 20
crimination (m)	**Axial [between 500 & 5,000m]**	≤ 20
Ranging Rate (Hz)	**typical**	0.2
	max.[4]	1

[1] Target albedo 0.2 @ 1,570nm.
[2] Standard clear atmosphere; extinction coefficient 0.0448 km^{-1} @ 1,570nm (Modtran3); sea level visibility = 23.5km.
[3] Target range 1000m; target albedo 100%; target size large; standard clear atmosphere; probability of detection 90%.
[4] For continuous operation at 1Hz repetition rate, a minimum heat transfer of 6W must be provided between the dedicated heat transfer interface pad of the unit to the mounting surface by the installer. This is equivalent to keeping the mounting surface temperature no higher than 5°C above ambient over the operating temperature range.

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PARAMETER	SPECIFICATION
Safety & Protection	
Laser Classification[5]	Class 1M
Visible Emission Filter	blocking
Visible Emission [@ ≥ 5m]	nil
Audible Emission [@ ≥ 5m]	nil
Support	
MTBF [ground mobile] (shots)	> 150,000
Operational Life (years)	10

2.2 Communications

PARAMETER	SPECIFICATION
Port(s)	one serial port [shared with power input]
Type	RS-422
Data Rate	19,200

2.3 Physical Characteristics

PARAMETER		SPECIFICATION
Mass [approx.] (g)		745
Dimensions (mm)	**Length [body only]**	179
	Length [overall]	186.5
	Width [body only]	78
	Width [overall]	87
	Height	46.5
Specific Gravity		> 1 [non-floatation]
Mounting		3-point mount [M4 clearance holes]; hole and slot for 3mm guide pins[6, 7]; thermal interface pad

[5] Australian/New Zealand Standard AS/NZS IEC 60825.1:2011 *Safety of Laser Products - Equipment classification and requirements.*
[6] Some kinematic isolation is recommended to be provided by the installer.
[7] Mounting holes and mechanical interface surfaces are electrically conductive.

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2.4 Electrical Requirements

PARAMETER			SPECIFICATION
Supply Voltage [external] (Vdc)			9 to 33
Current Drain @ 12VDc (A) [average]	**standby mode**		< 0.05
	firing	**at 0.2Hz**	< 0.6
		at 1Hz	< 1
	low power mode		< 0.05

2.5 Environmental

PARAMETER			SPECIFICATION
Temperature (°C)	**Operate**[8]	**min.**[9]	-32
		max.[10]	+55
	Survive	**min.**[9]	-40
		max.[10]	+71
Vibration and Shock[11]			MIL-STD-810F, ground mobile
Sealing[11, 12]			immersion proof
EMI/EMC[11, 12]			MIL-STD-461E

2.6 Connector/Pin Details

PARAMETER		SPECIFICATION
Power Input & Comms Port Connection: Glenair Series 80 - Receptacle, Jam Nut, Aluminium (Nickel-PTFE), 10 Contacts, Pin (801-011-07MT7-10PA)		
Pins	**1**	RS-422 Rx+ (LRF input)
	2	RS-422 Rx- (LRF input)
	3	[not used]
	4	RS-422 Tx+ (LRF output)
	5	RS-422 Tx- (LRF output)
	6	[not used]
	7	V in (+) (DC power)
	8	V in (-) (GND / 0V)
	9	nRange Signal[13]
	10	[not used]

[8] With some performance degradation at temperature extremes (TBD).
[9] Without wind chill.
[10] Without solar radiation.
[11] Refer to manufacturer for details.
[12] With compliant line connectors attached.
[13] Optional laser status/control. Refer to manufacturer for details.

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3 SET-UP

3.1 Mounts

The RangePRO mounting arrangement is located on the bottom face:
three clearance M4 holes;
hole and slot for 3mm dia. dowel guide pins, 5mm deep;
thermal interface pad.

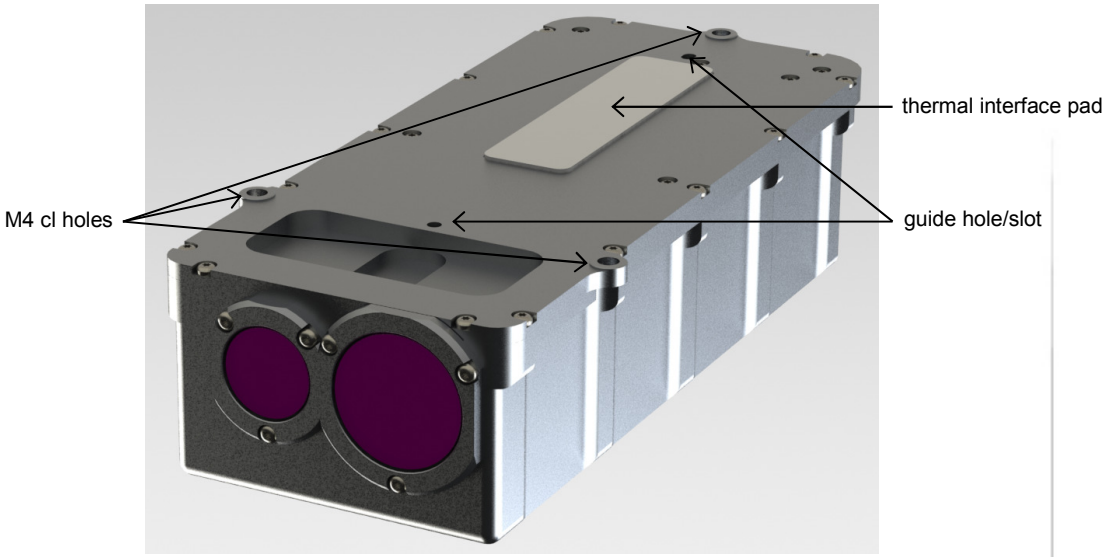

Figure 3-1: Mounts

3.2 Connections

CAUTION: do not connect or disconnect when external power is applied;
user-supplied connections must be correctly wired (see Connector/Pin Details).

The RangePRO has one connection point, being a 10 way Glenair Series 80 Mighty Mouse connector, located at the rear of the unit. Refer to specifications for connection details.

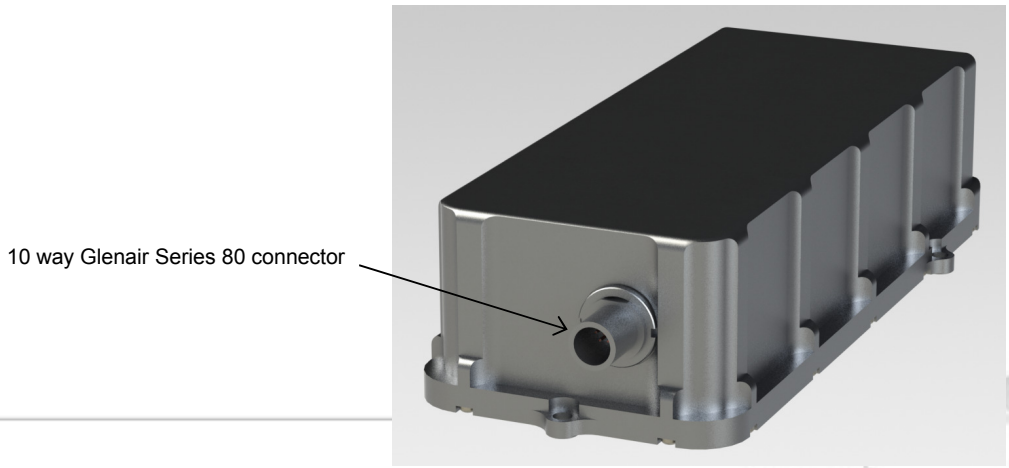

Figure 3-2: Connections

4 OUTLINE DRAWING

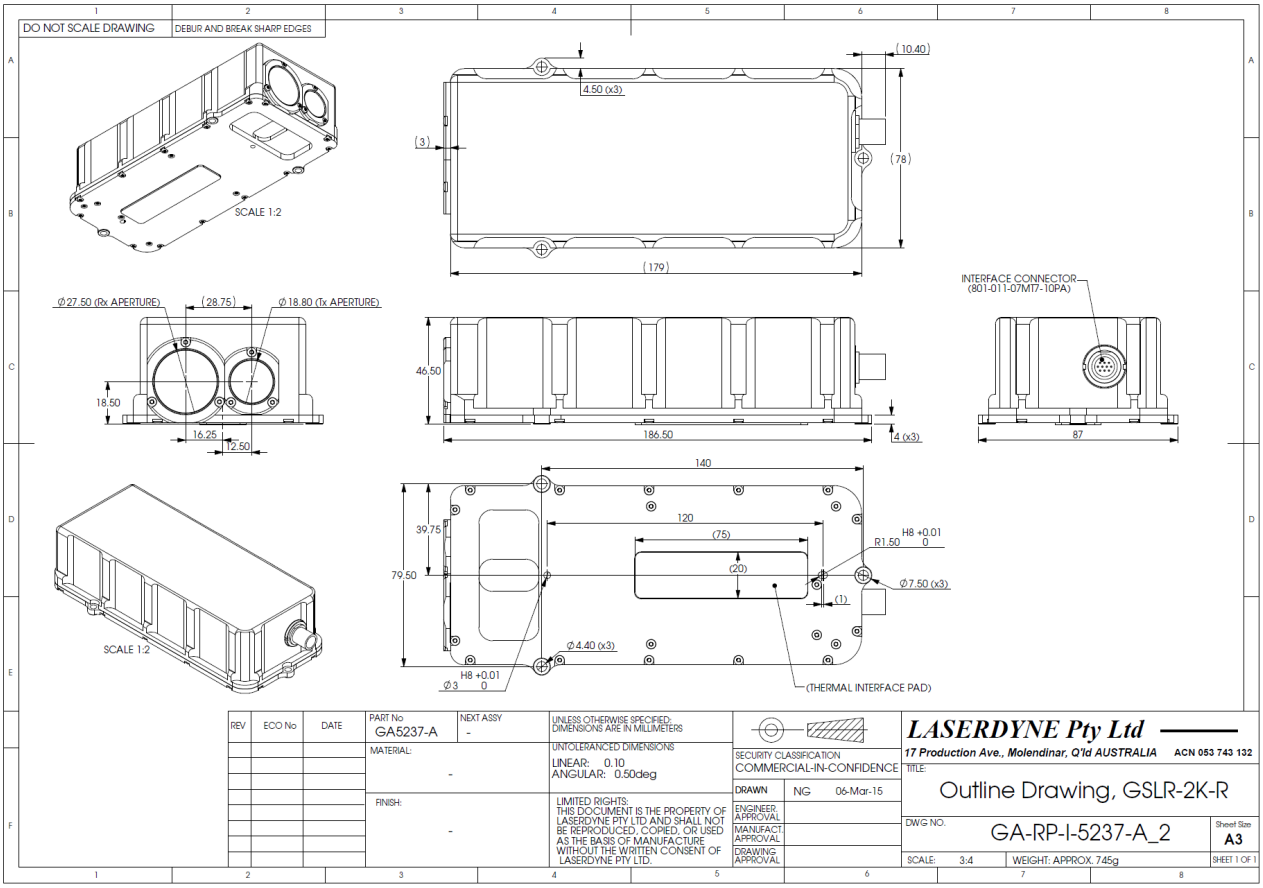

Figure 4-1: Outline Drawing

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