

## *RangePRO Model L5LGH* Laser Rangefinder Module



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$$P_R =$$

$$\frac{P_L \times \lambda^2 \times \delta \times D^2 \times A_1 \times \cos\beta}{4 \times R^2 \times A_L}$$

## ***RangePRO Model L5LGH*** Laser Rangefinder Module

### 1 DESCRIPTION

The RangePRO Model L5LGH is an OEM laser rangefinder module providing an advanced digital rangefinding capability for military, paramilitary and commercial applications.

It can be used as a form-fit-function replacement for the Denel LP16 rangefinder but with better ranging performance.

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 L5LGH ranges at low repetition rates over distances to 12km depending on target size, target reflectivity, atmospheric conditions and customer supplied external optics (typically greater than 6km for vehicle type targets).

The system is fitted with a red (635nm) pointer laser beam to facilitate alignment and pointing.

The transmitter is a collimated eye-safe laser system. It can provide ranging rates from single shot up to 12 per minute.

The unit is fully sealed, purged and backfilled with dry air.

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.


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

## *RangePRO Model L5LGH* Laser Rangefinder Module

### 2 SYSTEM SPECIFICATIONS

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

#### 2.1 System Performance

PARAMETER		SPECIFICATION
<b>Control</b>		
<b>Control Functions</b>		all control functions and range data via comms port
<b>Ranging</b>		
<b>Laser Type</b>		Nd:YAG/OPO
<b>Wavelength (nm)</b>		1,565 to 1,575 [1,570 nominal]
<b>Output Energy [per pulse] (mJ)</b>		nominally 8 [up to max. allowable for Class 1M]
<b>Beam Diameter [at exit] (mm)</b>		20
<b>Receiver Aperture (mm)</b>		38
<b>Detector</b>		InGaAs with time variant gain
<b>Range Read-out Limits (m)</b>	<b>minimum</b>	50
<b>[factory selectable]</b>	<b>maximum</b>	20,000
<b>Ranging Performance<sup>1</sup></b>	<b>vehicle [2.3x2.3m]</b>	> 6,200
<b>[Std. Clear <sup>2</sup>; max.] (m)</b>	<b>building [8x8m]</b>	> 12,500
<b>Range Accuracy [typical] (m)</b>		± 3
<b>Target Discrimination (m)</b>	<b>Lateral [1m<sup>2</sup> targets @ 5,000m]</b>	≤ 20
	<b>Axial [between 100 &amp; 5,000m]</b>	≤ 100
<b>Ranging Rate [ave.]</b>	<b>single shot (per minute)</b>	12 [single shot]
	<b>repeat shot (Hz)</b>	1 [for 6 shots, then 31s pause]
<b>Laser Pointer</b>		
<b>Laser Type</b>		laser diode
<b>Wavelength [nominal] (nm)</b>		635
<b>Output Power (mW)</b>		≤ 0.5
<b>Alignment to Transmitter Axis (μrad)</b>		< 200

<sup>1</sup> Target albedo 0.10 for vehicle and 0.25 for building @ 1,570nm.

<sup>2</sup> Standard Clear atmosphere; Extinction Coefficient 0.0448 @ 1,570nm (NINOX); sea level visibility = 23.5km.

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

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PARAMETER		SPECIFICATION
<b>Laser Pointer (cont'd)</b>		
Beam Diameter [at exit] (mm)		3.5
Beam Divergence [full angle; typical] (mrad)		1
<b>Safety &amp; Protection</b>		
Laser Classification <sup>3</sup>	LRF transmitter	Class 1M
	pointer	Class 1
Visible Emission Filter		blocking
Visible Emission [@ ≥ 5m]		nil
Audible Emission [@ ≥ 5m]		nil
<b>Support</b>		
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 (Baud)	9,600 [others on request]

### 2.3 Physical Characteristics

PARAMETER		SPECIFICATION
Mass (g)		1030
Dimensions [approx.] (mm) <sup>4</sup>	Length	122.5
	Length (body only)	120.5
	Width	104
	Height	65.5
Specific Gravity		> 1 [non-floatation]
Mounting		3-point mount (rear) and 2-point mount (front)

<sup>3</sup> Australian/New Zealand Standard AS/NZS IEC 60825.1:2011 *Safety of Laser Products - Equipment classification and requirements.*

<sup>4</sup> Excluding connector.

$$P_R = \frac{P_L \times X^2 \times \delta \times D_L^2 \times A_1 \times \cos\beta}{4 \times R^2 \times A_L}$$

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### 2.4 Electrical Requirements

PARAMETER		SPECIFICATION
Supply Voltage [external] (Vdc)		9 to 33
Power Consumption (W)	typical [standby]	< 1
	peak [while charging]	< 10

### 2.5 Environmental

PARAMETER		SPECIFICATION																			
Temperature (°C)	Operate [full spec.]	min. <sup>5, 6</sup>	-20																		
		max. <sup>6, 7</sup>	+50																		
	[reduced spec.]	min. <sup>5, 8</sup>	-32 to -20																		
		max. <sup>7, 8</sup>	+50 to +65																		
	Survive	min. <sup>5</sup>	-46																		
		max. <sup>7</sup>	+71																		
Vibration [3 axes] <sup>9</sup>		MIL-STD-810F, ground mobile; including: Random Vibration <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Frequency (Hz)</th> <th>Level (g<sup>2</sup>/Hz)</th> </tr> </thead> <tbody> <tr><td>10</td><td>0.02</td></tr> <tr><td>200</td><td>0.02</td></tr> <tr><td>400</td><td>0.02</td></tr> <tr><td>500</td><td>0.02</td></tr> <tr><td>2000</td><td>0.0005</td></tr> </tbody> </table> Superimposed narrow bandwidth [5Hz bandwidth "sine wave"] <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Frequency (Hz)</th> <th>Level (g<sup>2</sup>/Hz)</th> </tr> </thead> <tbody> <tr><td>17.5</td><td>0.14</td></tr> <tr><td>35</td><td>0.03</td></tr> </tbody> </table>		Frequency (Hz)	Level (g <sup>2</sup> /Hz)	10	0.02	200	0.02	400	0.02	500	0.02	2000	0.0005	Frequency (Hz)	Level (g <sup>2</sup> /Hz)	17.5	0.14	35	0.03
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Frequency (Hz)	Level (g <sup>2</sup> /Hz)																				
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Shock [± 3 axes] (g) <sup>9</sup>		MIL-STD-810F, ground mobile; including: 100 [@ 6 to 8 ms]																			
Sealing <sup>10</sup>		immersion proof																			
EMI/EMC <sup>9, 10</sup>		MIL-STD-461D																			

<sup>5</sup> Without wind chill.

<sup>6</sup> Full ranging performance.

<sup>7</sup> Without solar radiation.

<sup>8</sup> At degraded ranging performance, to be an extinction ratio of no less than 26dB.

<sup>9</sup> Refer to manufacturer for details.

<sup>10</sup> With compliant line connectors attached.

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### 2.6 Connector/Pin Details

PARAMETER		SPECIFICATION
<b>Power Input &amp; Comms Port Connection:</b> Connector, Panel, Plug, 9 Way, DB9		
<b>Purpose</b>		dc power input and RS-422 Serial Comms
<b>Pins</b>	<b>1</b>	RS-422 Rx+ (LRF input)
	<b>2</b>	RS-422 Rx- (LRF input)
	<b>3</b>	not used
	<b>4</b>	RS-422 Tx+ (LRF output)
	<b>5</b>	RS-422 Tx- (LRF output)
	<b>6</b>	not used
	<b>7</b>	V in (+) (DC power)
	<b>8</b>	V in (-) (GND / 0V)
	<b>9</b>	not used

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

## *RangePRO Model L5LGH* Laser Rangefinder Module

### 3 SET-UP

#### 3.1 Mounts

The RangePRO has two mounting arrangements:

3 tapped M4 holes, 6mm deep, in the rear face and 2 tapped M3 holes, 5mm deep in the front face.

Ensure that mounting surface and threads are clean and free from debris to ensure alignment accuracy and repeatability.

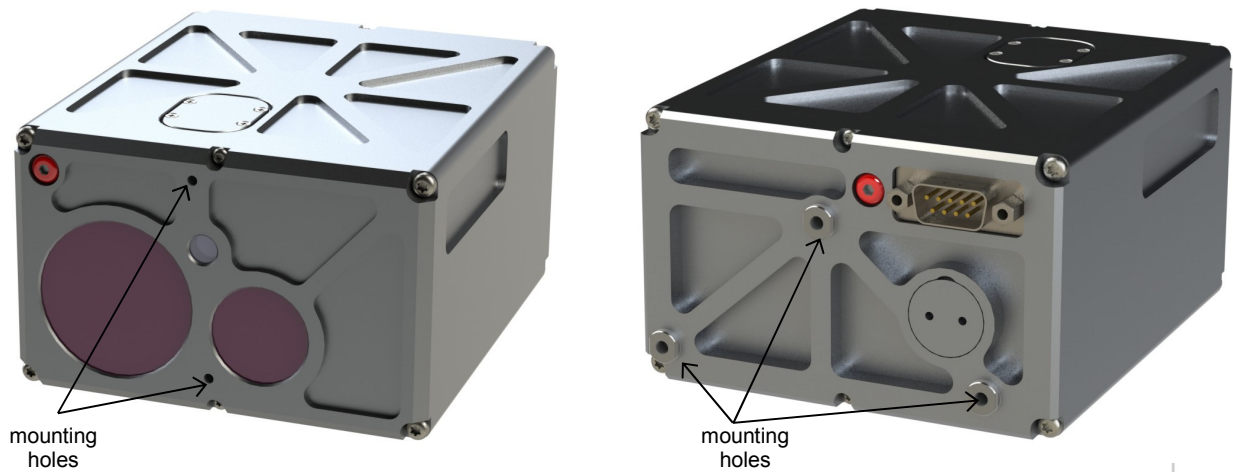


Figure 3-1: Front and Rear Mounts

#### 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 9 Way panel plug (DB9) with two M3 stand-offs, located on the rear of the unit. Refer to specifications for connection details.



Figure 3-2: Connections

## RangePRO Model L5LGH Laser Rangefinder Module

### 4 OUTLINE DRAWING

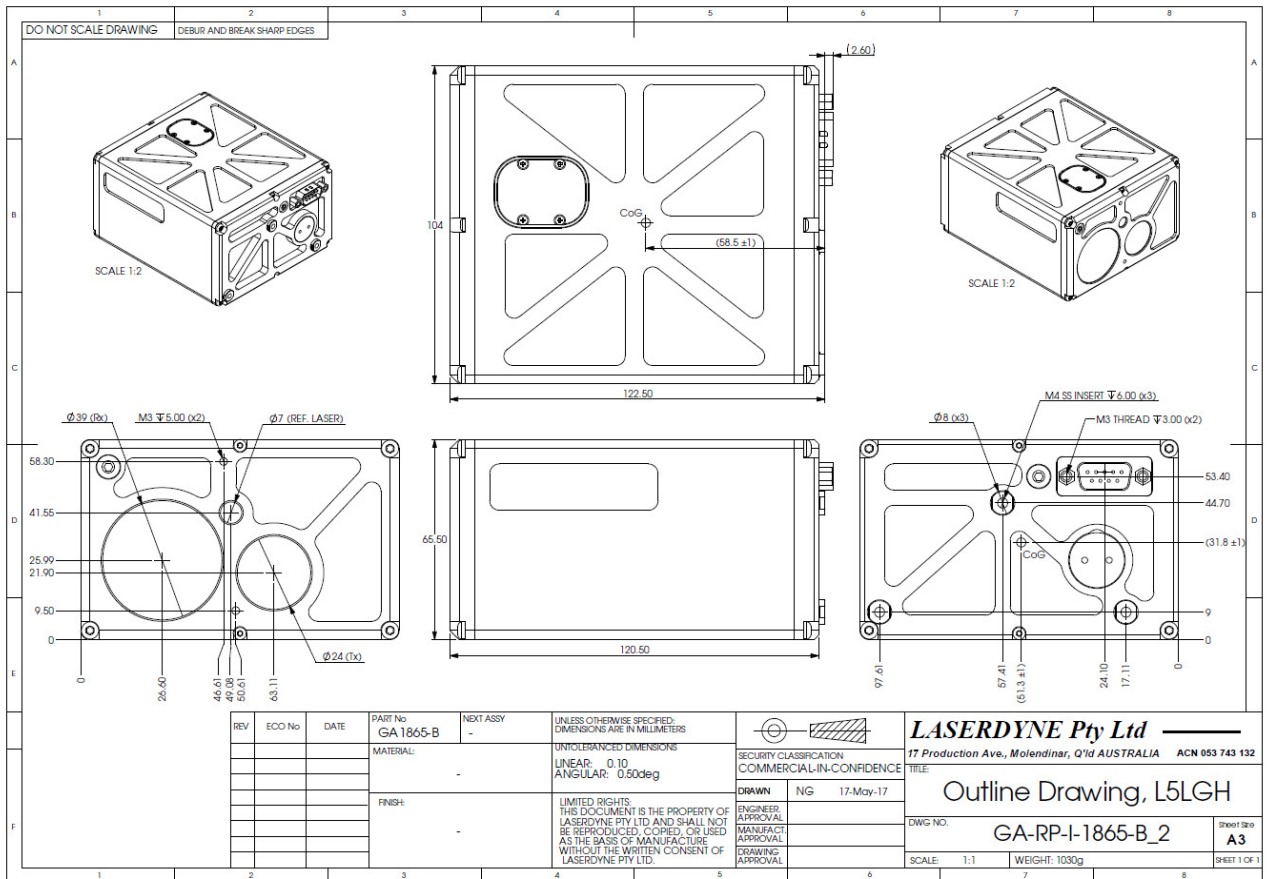


Figure 4-1: Outline Drawing



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