ERDI LASER®

LDR40K1 Laser Rangefinder Target Designator

<mark>Model:LDR40K1</mark>

⪢ PRODUCT DESCRIPTION

The LDR40K1 Laser Ranging and Indication System is an advanced equipment specifically designed for high-precision target ranging and laser-coded indication. It not only achieves accurate long-distance measurements of ≥6000m but also has an effective range of ≥4000m for target indication. Renowned for its extreme lightweight design, the entire system weighs no more than 450g, making it compact and portable without compromising its stable and outstanding performance.

This system particularly offers customization services for the laser divergence angle, ranging from 0.3 to 1 mrad, flexibly meeting the needs of different operational scenarios. The LDR40K1 strictly adheres to internationally recognized standards, ensuring wide applicability and high reliability worldwide. With its exceptional durability, precise measurement capabilities, and compact, portable design, the LDR40K1 Laser Ranging and Indication System is undoubtedly the ideal choice for professionals pursuing efficient and accurate operations.

The laser ranging target indicator has the following functions:

➢ It responds to laser target indication commands and can indicate laser targets using prescribed internal and external synchronization encoding methods.
➢ If no stop command is received after initiating laser target indication, the indication will automatically stop after one cycle.
➢ Laser coding setting function.
➢ Laser ranging.
➢ If no ranging command is received, and no stop command is received after initiating continuous ranging, ranging will automatically stop after 5 minutes (1Hz) / 1 minute (5Hz) / 20 seconds (20Hz). These durations can also be modified according to user requirements through communication.
➢ Multi-target prompt function.
➢ Power supply reverse polarity protection function.
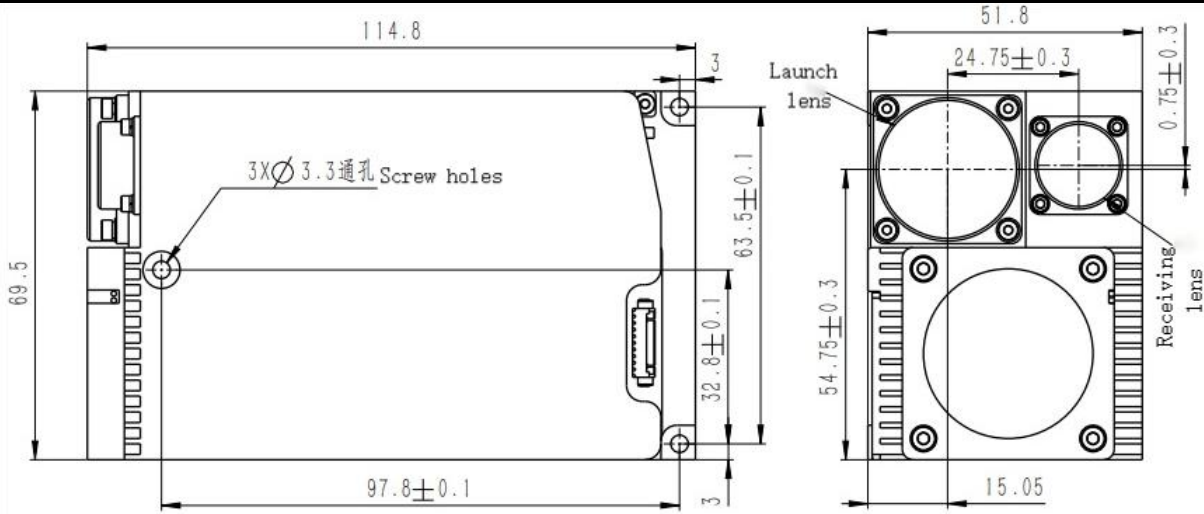➢ Statistics on the number of laser pulse emissions.

⪢ TECHNICAL SPECIFICATIONS

Range Finding/Target Indication Parameters	
Laser ranging and target designation operating mode	Ready to work instantly
Maximum ranging distance	≥6000m (visibility 10km, target reflectivity 0.2, target size 2.3m x 4.6m)
Minimum ranging distance	100m
Ranging accuracy	±2m
Ranging logic	3 goals
Laser target designation distance	≥4000m
Ranging frequency	1～20Hz
Target designation frequency	1～20Hz
Accuracy rate (or Measurement success rate)	98%
Continuous ranging time	5min(1Hz)/1min (5Hz)/20S（20hz）
Continuous laser target designation time	**Short-cycle Laser Target Designation:** ➢ Duration of a single illumination is not less than 18 seconds, with an interval of not more than 10 seconds, and continuous illumination for 8 cycles. **Long-cycle Laser Target Designation:**

	➢ The duration of a single laser target designation is not less than 60 seconds. When initiating laser target designation again, the interval is not more than 60 seconds, and it is capable of continuous laser target designation for 4 cycles. ➢ After a single long-duration or short-duration target designation, the interval for restarting is not more than 30 minutes.
Encoding	Complies with MIL-STD-810F requirements; possesses user-defined coding expansion capabilities.
Laser encoding pattern	Equipped with external synchronization signal reception capability. Precise frequency codes (eight sets of pre-stored periodic code encodings); Customizable code patterns, etc.
Encoding accuracy	≤2.5μs
Laser Parameters	
Laser Type	LD Pumped Nd:YAG Crystal
Cooling Method	Passive cooling, no temperature control
Wavelength	1064nm±3nm
Single Pulse Energy	≥40 mJ
Energy Fluctuation	＜10% (Energy Standard Deviation / Average Energy Value × 100%) - Less than 10% (Energy Standard Deviation / Average Energy Value × 100%)
Repetition Rate	0～20Hz adjustable - Adjustable from 0 to 20 Hz
Pulse Width	≥15ns±5ns
Beam Divergence Angle	≤0.4mrad [Customizable 0.3mrad～1mrad]
Laser Beam Axis Instability	≤0.05mrad
Laser Start-up Time	10s
Laser Safety Class	Class 4
Environmental adaptability	
Operating Temperature	-40°C~60°C
Storage Temperature	-55°C~70°C
Vibration and Shock Standards	Meets the vibration and shock requirements for airborne equipment as specified in MIL-STD-810F
Electrical Parameters	
Power Supply Voltage	20～28VDC(typical 24 V)
Total Power Consumption	Standby Power Consumption: ≤ 10 W Average Power Consumption: ≤ 50 W Peak Power Consumption: ≤ 100 W
Communication Interface	RS422 (Standard)
Baud Rate	115200bit/s
Mechanical Parameters	
Weight	≤445g
Overall Dimensions	≤116mm×71mm×53mm
Non-parallelism between Mounting Base and Optical Axis	0.5mrad

Ɽ STRUCTURAL DRAWING (mm)

⋑ ELECTRICAL INTERFACE

Baud Rate: 115200 bit/s

Communication Interface: RS422 Interface;

External Trigger Interface: Reserved for External Code Trigger Interface;

Connector Interface Definitions are provided in Table 1.

Table 1: Electrical Interface Definitions

Pin	Definition	Description
1	422-GND	RS422 Ground
2	24V	Power Supply +
3	24V	Power Supply +
4	24VGND	Power Supply -
5	24VGND	Power Supply -
6	422_Rx+	Upper Computer ->Laser Rangefinder Target Designator +
7	422_Rx-	Upper Computer ->Laser Rangefinder Target Designator -
8	422_Tx-	Laser Rangefinder Target Designator ->Upper Computer-
9	422_Tx+	Laser Rangefinder Target Designator ->Upper Computer+

⋑ COMMUNICATION PROTOCOL

1.Communication Standard

Asynchronous Serial Communication Standard: RS422 Serial Port

Baud Rate: 115200bps

Transmission Format: 8 data bits, 1 start bit, 1 stop bit, no parity bit

For each byte of information, the least significant bit (lsb) is transmitted first. For multi-byte information, the lower byte is transmitted first.

2.Output Information

Output information refers to commands sent by the host computer system to the Laser Rangefinder Target Designator module, including:

➢ Information header (0x55);

➢ Command word 1;

➢ Command word 2;

➢ Command word 3;

➢ "Information tail" is the checksum, which is the result of the XOR operation of bytes 1-4.

The relevant definitions of command word 1 are as follows:

Table 2 Command word 1 definition

BIT07	BIT06	BIT05	BIT04	BIT03	BIT02	BIT01	BIT00
0x00: Standby 0x01: Initiate self-test 0x02: Single distance measurement 0x03: Continuous distance measurement (1Hz) 0x04: Continuous distance measurement (5Hz) 0x05: Short target designation (duration 18s, interval 10s, 8 cycles of target designation) 0x06: Long target designation (duration 60s, interval 60s, 4 cycles of target designation) 0x08: Stop distance measurement/ target designation 0x09: Set gating value 0x0A: Report cumulative laser pulse count 0x19 ~ 0x20: Change laser encoding parameters 9 ~ 16 0x29 ~ 0x30: Read laser encoding parameters 9 ~ 16							

The relevant definitions of command word 2 are as follows:

Table 3 Command word 2 definition

BIT07	BIT06	BIT05	BIT04	BIT03	BIT02	BIT01	BIT00
When Laser target designation is active: Laser codes range from 1 ~ 16. When laser ranging is active: 1 - First target, 2 - Last target. When setting the gating value: Low byte of distance gating value. When modifying parameters for laser codes 9 to 16: Low byte of laser code, period × 100 (5000 represents 50ms, range of 46ms ~ 56ms).							

The relevant definitions of command word 3 are as follows:

Table 4 Command word 3 definition

BIT07	BIT06	BIT05	BIT04	BIT03	BIT02	BIT01	BIT00
When setting Laser Target Designation: Set Laser Target Designation time (1 ~ 25). When setting the gating value: High byte of distance gating value. When modifying parameters for laser codes 9 ~ 16: High byte of laser code, period × 100 (5000 represents 50ms, range of 46ms ~ 56ms).							

3.Input Information

Input information refers to the status information received by the Upper Computer from the Laser Target Designation module, including:
➢ Information header (0x55);
➢ Status word;
➢ Target distance/accumulated laser pulse count (2 bytes); low byte first, high byte second;
➢ For laser codes 9 to 16 parameters, period × 100 (5000 represents 50ms, range of 46ms to 56ms); low byte first, high byte second;
➢ Current temperature of the Laser Target Designation module;
➢ "Information tail" is the checksum, which is the XOR result of bytes 1 to 5.
The relevant definitions of the status word information are shown in Table 5:

Table 5: Definitions of Status Word Information

BIT07	BIT06	BIT05	BIT04	BIT03	BIT02	BIT01	BIT00

0: No laser 1: Laser present	0: Ranging effective 1: Ranging ineffective	Laser marker alternating between 1 / 0	1: Over-temperature alarm 0: Temperature normal		0: None 1: External trigger	00: Standby 01: Ranging 02: Indicating

Definition of target distance information: The distance value is represented by 2 bytes (16 BIT) as an integer, which can be directly converted to a decimal number.

In standby mode, a self-check status is returned every 10S cycle. In ranging and Target Designator modes, the status is returned based on the laser frequency.

Definition of cumulative laser pulse count: Since a 16-bit binary number represents a range of $0 \sim 65535$, and the service life of the laser rangefinder is 1 million times, it is agreed that the laser emission count is a multiple of 20, with a range of $0 \sim 1310700$.

Current temperature of the Laser Rangefinder Target Designator module: d7-d0: represented in two's complement, with a range of $-128 \sim +127$, in units of °C (degrees Celsius).

Notes:

➢ A status feedback frame is automatically returned every 10 seconds, meaning that a status frame is fed back every 10s during power-on, standby, stop ranging, and stop Target Designator states.

➢ The device automatically stops ranging after 5 minutes of ranging at 1Hz and 1 minute of ranging at 5Hz (both are 300 rangings).

➢ After changing the encoding settings, the parameters are saved in the flash memory and will not be lost when the power is turned off and back on.

➢ BIT05 in Table 5 indicates 1/O alternating, which means that the feedback data has been updated.

➢ Each activation of Target Designator involves a continuous Target Designator cycle, which stops automatically upon completion. Therefore, the encoding only involves the laser pulse interval, and the Target Designator time parameter ($1 \sim 60s$) is included when initiating Target Designator .

➢ When sending short/long Target Designator commands, the Target Designator cycle is selected from encodings $1 \sim 16$, with the Target Designator period set by encodings $9 \sim 16$.