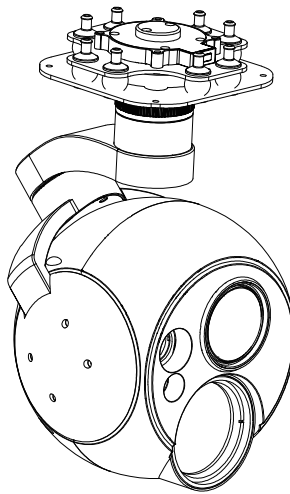
Q40TIRM-HD
40x EO Triple Sensors High Resolution Thermal Object Tracking Gimbal Camera

User Manual



For more details please scan the QR code or visit our website:
www.viewprotech.com

Disclaimer and Warning

Congratulations on purchasing your new Viewpro product. Please read this entire document carefully. Failure to read or follow instructions and warnings in this document may result in damage to your Viewpro product. Disassemble the gimbal camera by user is not permitted, as which may cause the camera does not work normally.

Viewpro accepts no liability for damage, injury or any legal responsibility incurred directly or indirectly from the use of this project. The user shall observe safe and lawful practices including, but no limited to, those set forth in the manual.

Legends



Warning



Important Note

Precautions

1. After using the camera, please store the device in a dry environment to avoid fogging the lens due to excessive ambient humidity. If the lens fogs up, turn on the camera for a while and wait for the fog to dissipate.
2. The camera uses an infrared thermal imaging lens. Do not point it at strong energy sources, such as the sun, laser beams, lava, etc. The temperature of the object observed by the lens must be less than 800°C, otherwise it will burn the camera and cause irreversible damage to it.
3. When cleaning the camera lens, be sure to wipe the lens with a soft and dry cleaning cloth.
4. Do not directly touch or scratch the coating on the surface of the infrared lens with your hands or hard objects, otherwise the coating will be damaged and the image will be blurred.
5. Do not insert or remove the TF card while the power is on; after inserting or removing the TF card, please make sure that the TF rubber plug is tightly covered to prevent the power-on self-test from failing.
6. Never look directly into the laser rangefinder!

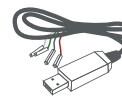
1.Product Introduction

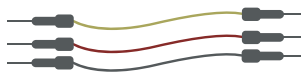
1.1 Introduction

Q40TIRM-HD is integrated with a 40x optical zoom camera which adopts a 2.13MP high resolution EO sensor, a resolution of 1280*1024 50mm lens uncooled long wave IR thermal imager sensor and a range up to 5000 meters laser rangefinder. It supports optical zoom, picture in picture mode switch,thermal color pallette switch, photographing and video, target tracking, thermal digital zoom, laser range, and AI auto recognition of vehicle and human.

It features with aluminum alloy housing and anti-interference. The 3-axis gimbal can achieve stabilization in yaw and pitch. Integrated with damping system, gimbal can greatly reduce mechanical vibration to stabilize image. Image quality is still stable even under 30x optical zoom. Through heat source detection, 50mm thermal cameras can reveal the damage of equipment or buildings, fire spark in forest, the location of people or animals and more. And it also features with AI auto reconigze multiple targets of human and vehicles, and tracking function. Q40TIRM-HD is widely used in UxS industries of public security, electric power, fire fighting, zoom aerial photography and other industrial applications.

1.2 In the Box

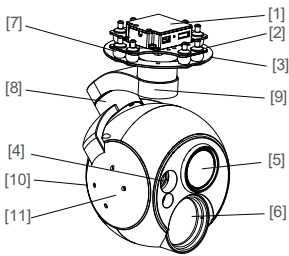
Gimbal (Standard Version) ×1		Gimbal (Viewport Version) ×1	
Aluminum Cylinder ×4		USB to TTL line ×1	
M3 screw ×8			

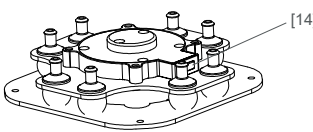
Power Line ×1	
PWM Control line ×1	
Serial port/S.bus Control lin ×1	
Connect serial port line ×3	
Ethernet line ×1	

TTL / S.BUS Control Cable x 1 pc	
TTL Connect Cable x 3 pcs	
Ethernet Cable x 1 pc	

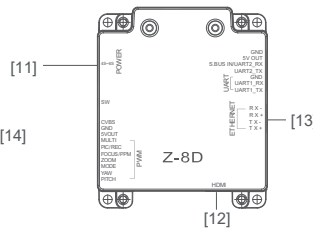
2. Installation Instruction

2.1 Overview





Viewport



Control Box

[1] Control box
[2] Upper damping board
[3] Lower damping board
[4] laser rangefinder
[5] FHD zoom camera
[6] Infrared thermal camera
[7] Damping ball
[8] Roll axis motor
[9] Yaw axis motor
[10] TF card slot
[11] Pitch axis motor
[12] 4-6S power interface
[13] Ethernet interface
[14] Viewport unlock button



- Please ensure that there isn't any obstacle while the motor rotating.
- Please remove the obstacle immediately if gimbal camera is blocked during rotation.



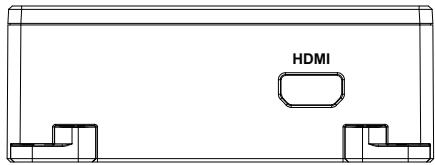
- Don't put the infrared thermal camera towards the sun in case any burn to the camera



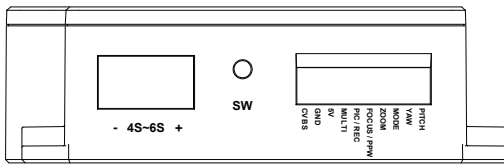
- The input voltage cannot be higher than 6S.
- The pin insertion interface cannot be connected with power supply.

2.2.2 Control Box Printing (Viewport Version)

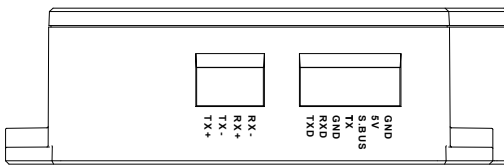
Front Side



Left Side

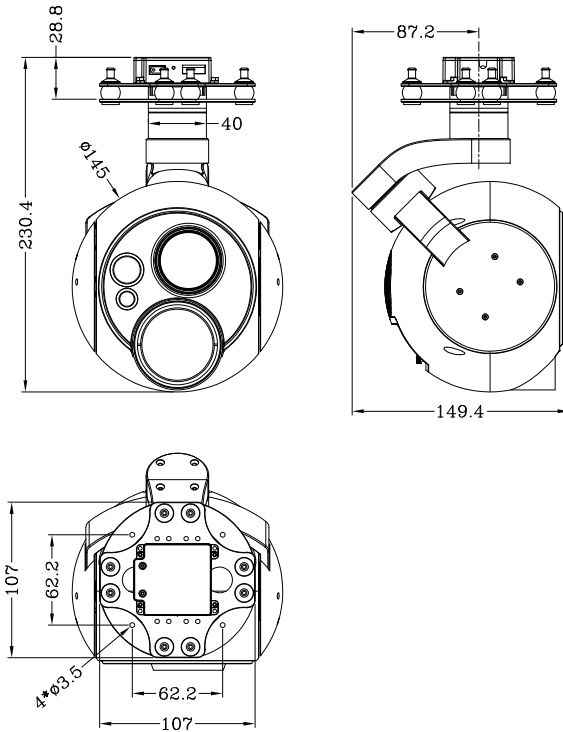


Right Side



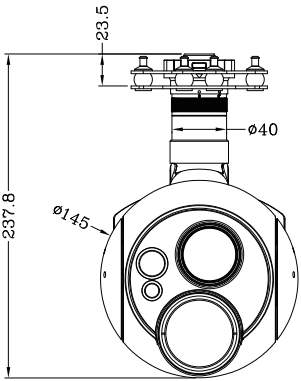
2.3 Device Dimensions (Standard Version)

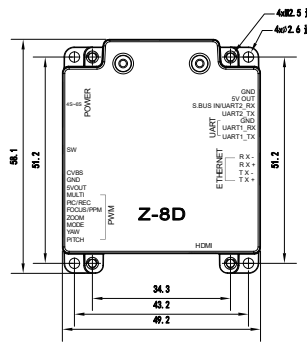
Unit: mm



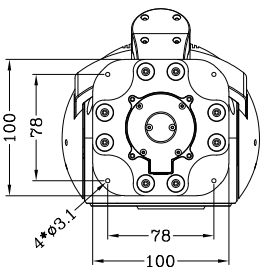
2.3 Device Dimensions (Viewport Version)

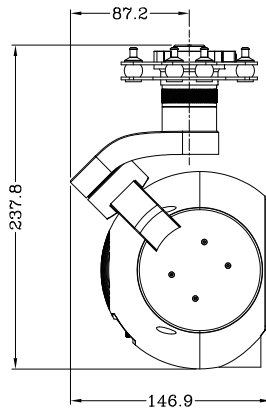
Unit: mm





Control box



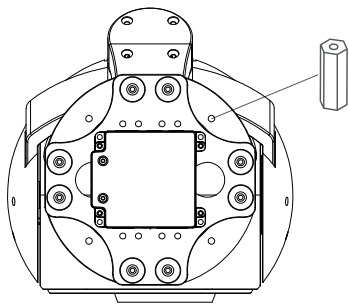


2.4 Install Mounting Part

(1) Find out the arrow on the gimbal which indicating the yaw heading of the payload (i.e. the lens direction when the camera power on), and synchronize with the direction specified by the UxS.

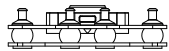
(2) Fix one end of the Aluminum Cylinder on the screw hole of lower damping board, and use M3 screw to fasten it.

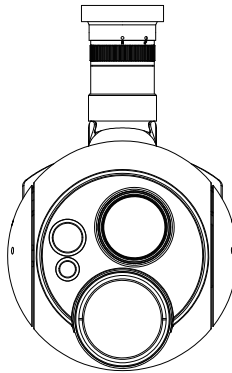
(3) According to the provided screw hole dimension you can make suitable mounting holes on the UxS mounting board, and fixes the other end of the Aluminum Cylinder on the mounting board of the UxS (Viewport version is the same).

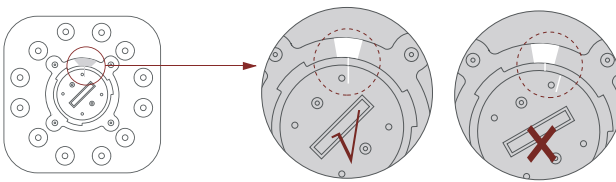


Front

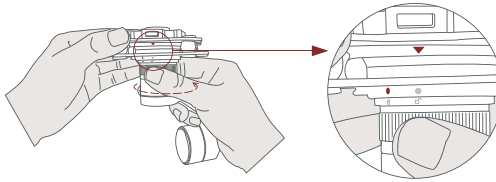
2.5 Viewport Release Instruction



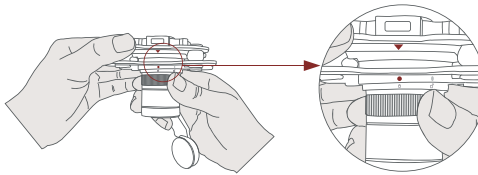




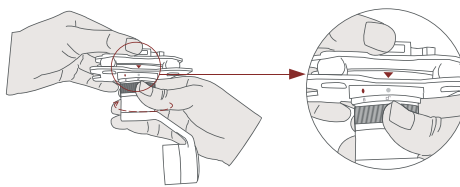
1. Make sure the two white stripes indicated in above picture are aligned with each other. (If the stripes are not aligned to each other, please pinch the connector part and turn it to left manually)



2. Align the white dot (unlock icon) to the red triangle (below unlock button), push the gimbal into the Viewport completely and then rotate the gimbal camera anticlockwise.



3. When you hear "click" sound (when red dot is aligned to the red triangle) means the gimbal camera and Viewport has been locked.



4. To unlock the Viewport, you need to press on unlock button and rotate the gimbal camera clockwise till the white dot align to the red triangle. Then pull the gimbal out from the Viewport.

2.6 Install TF Card

TF (Micro SD card): Install the TF card to the card slot (Re. 2.1 Overview). Support max 512GB. Request Class 10 (10m/s) transmission speed or higher and FAT32.



- Make sure device is power off when inserting the TF card, hot plugging is not supported.

2.7 Image Output Interface

Network output: Standard RJ45 port, supports RTSP/UDP/RTMP. Default: RTSP, stream at rtsp://192.168.2.119:554, 720P@30fps, 2Mbps bitrate . All parameters user-adjustable.

SDI output: It's equipped with an SMA outer screw inner hole interface, which supports SDI video output with 1080P resolution and 30fps frame rate.

Analog output: not supported.



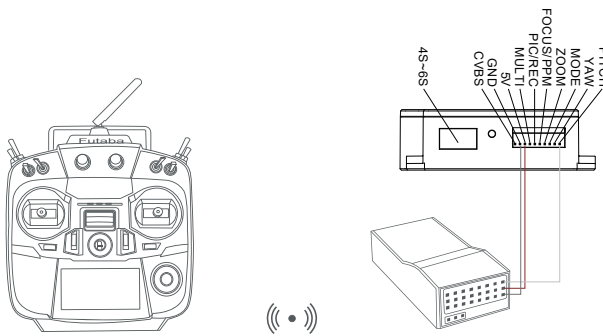
- When using user interface software Viewlink for network connection, the network of external device (computer) should be the IP address: 192.168.2.2 (choose the last byte among 2~254, can not be 119 same as the gimbal), subnet mask: 255.255.255.0,
  Default gateway: 192.168.2.1, and all firewalls of the computer must be closed. Then enter the IP address of the gimbal camera, Open Video, the video stream can be outputted.

3. Signal Control

3.1 PWM Control

Control the gimbal camera functions by the multiplex pulse width modulation signal outputted by PWM channel of the remote control receiver. The camera needs up to 6 control channels of PWM. You can choose needed functions according to actual usage to reduce the required number of PWM channels.

3.1.1 PWM Connection Diagram (Connect pitch channel as example)



Remote Controller

Receiver

Connection Diagram

3.1.2 PWM Control Operation Instruction

1) Pitch (PWM Pitch channel in to control Pitch. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear
Pitch Up



Position 2

Middle Gear
Pitch Stop



Position 3

High Gear
Pitch Down

2) Yaw (PWM Yaw channel in to control Yaw. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear
Yaw Left



Position 2

Middle Gear
Yaw Stop



Position 3

High Gear
Yaw Right

3) Mode (PWM Mode channel in to adjust speed control/one key to Home position etc functions. Rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Position 1: Low speed mode, control pitch / yaw with this mode at lowest speed
Position 2: Middle speed mode, control pitch / yaw with this mode at middle speed
Position 3: High speed mode, control pitch / yaw with this mode at highest speed
(If it is controlled by rotary knob, the speed will change according to switch position)

Function of continuous switching:

1.Switch one time from position 2 - 3 quickly, to Home position.
2.Switch twice from position 2 - 3 - 2 - 3 continuously and quickly, the camera lens is positioned vertically downward.
3.Switch 3 times from position 2 - 3 - 2 - 3 - 2 - 3 continuously and quickly, to close Follow Yaw Mode.
4.Switch 4 times from position 2 - 3 - 2 - 3 - 2 - 3 - 2 - 3 continuously and quickly, to start Follow Yaw Mode.

4) Zoom (PWM Zoom channel in to control Zoom. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear
Zoom Out



Position 2

Middle Gear
Stop Zoom



Position 3

High Gear
Zoom In

5) Focus (PWM Focus channel is to control PIP / IR color palette switch. 3-gear switch as example.)



Position 1

Low Gear
PIP switch



Position 2

Middle Gear
No control



Position 3

High Gear
IR color palette switch

Switch from Position 2 to 1: Picture in Picture. EO+IR , IR+EO, EO only, IR only.
Switch from Position 2 to 3: IR color switching: white hot, black hot, pseudo color.

6) Pic/Rec (PWM Pic/Rec channel in to control take picture and record. Joystick, rotary knob or 3-gear switch on remote control are optional. 3-gear switch as example.)



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Switch from Position 2 to 1 to take a picture.
OSD display “REC IMG” at the left top corner and the picture is stored in TF card.

Switch from Position 2 to 3 to start “ Record ” , and repeat the operation to stop recording.
During recording, OSD display information of “REC 00 00 00”, as current recording time, and the remaining capacity of TF card. It will show the “STBY xxx mins left” when stop recording. When the storage capacity of TF card is full , “SD card is full” is shown on
screen. If no TF card is inserted, “NO SD CARD” is shown on screen. Please insert the TF card before using.

7) Multi: IR digital zoom / tracking control



Position 1

Low Gear



Position 2

Middle Gear



Position 3

High Gear

Switch from Position 2 to 1: IR digital zoom, 1x~4x

Switch from Position 2 to 3:

- Exit the tracking, display the cross cursor. Adjust the cross cursor to lock target object and start tracking

Switch from Position 3 to 2:

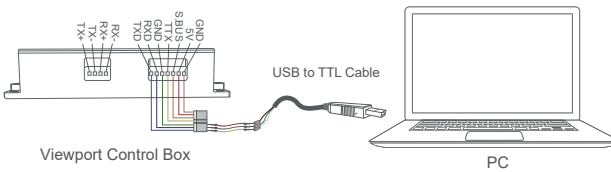
- Cancel tracking

3.2 Serial Port / TTL Control

TTL communication requirements: TTL signal is 3.3V, baud rate: 115200, data bit 8, stop bit 1, no parity, HEX send and receive.

Connection Diagram (PC - USB to TTL Cable- Gimbal Camera as example):

Gimbal Camera		Cable
TX	⟷	RX (White)
RX	⟷	TX (Green)
GND	⟷	GND (Black)



Connection Diagram

Diagram of USB to TTL Cable:

Connect the camera to the upper computer by USB to TTL cable (Adopt connection method of TX to RX, RX to TX, GNG to GND at Dupont ends of the provided USB to TTL cable, connect to the specified TTL of the gimbal, and the USB end of the cable connect to computer).

Install Viewlink control software to test the functions directly. Users may choose to develop their own software, please contact technical support for TTL control protocol file.

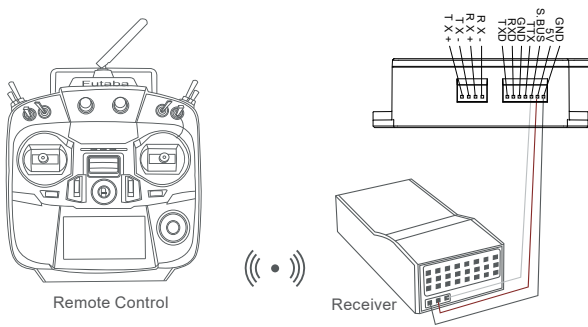
ViewLink is a user interface developed by Viewpro for Viewpro gimbal cameras, you can download it from Viewpro website (www.viewprotech.com) or ask distributors for installation package.

- Connect serial port of gimbal to pins, DO NOT connect with power supply.
- The default baud rate of serial port is 115200, which can be changed according to the docking equipment.

3.3 S.BUS Control

Control the gimbal camera functions by one combining signals. Connect the external S.Bus to S.Bus port on the control box, and the external S.bus signal GND connect to the GND interface of the control box.

Wiring Diagram (Take Futaba remote control for example):



Wiring Diagram

S.Bus control mode: default S.Bus signal channel 7-13 to control gimbal camera functions (the function of channel is consistent with corresponding channel in PWM function description)

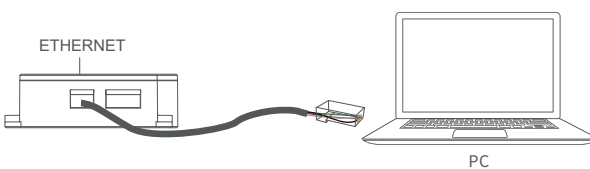
Channel 7: Yaw Control
Channel 8: Pitch Control
Channel 9: Mode Control
Channel 10: Zoom Control
Channel 11: Focus Control
Channel 12: Pic/Rec Control
Channel 13: Multi Backup

- User can set the channels by setting serial command according to the actual requirement. The S.Bus channel position can be arranged in any sequence within channel 7-13 to connect with the flight controller or remote control.

- TTL control and S.bus control cannot coexist at the same time for standard version. The defualt control is TTL if no requirement. The user can set to S.bus control if needed (please contact with our technical support for the setting instruction.)

3.4 TCP control

For Viewpro gimbal cameras with Ethernet output, the default IP address is: 192.168.2.119, control port: 2000. You can send the corresponding protocol to realize TCP control after connecting.The TCP control protocol is [Frame header: EB + command ID: 90 + data body (serial port protocol) + Checksum (CS = body checksum, checksum is calculated as a sum of all bytes of data body modulo 256)]. Or directly use UI Viewlink to control after TCP connection.



Ethernet wiring diagram

4. Specification

Overall Specifications	
N.W.	1512g
Product meas.	146.9*145*228.2mm
Input voltage	14.8V~25.2V
Dynamic current	800~1500mA @16V
Power consumption	Average 12.8W, Max 24W
Working environment temp.	-20℃ ~ +50℃
IP rate	IP4X
Output (optional)	IP (RTSP/UDP 720p/1080p 25fps/30fps H264/H265) / SDI (1080P 30fps)
Storage	TF card (Up to 512G,class 10, FAT32 format)
Picture in TF Card	JPG(1920*1080)
Video in TF Card	MP4(1080P@30fps)
Control method	PWM / S.BUS / UART (TTL) / TCP / UDP
Gimbal Spec	
Mechanical Range	Pitch/Tilt: -60°(Up)～130°(Down), Roll: ±70°, Yaw/Pan: ±360°*N
Controllable Range	Pitch/Tilt: -45°～125°, Yaw/Pan: ±360°*N
Vibration angle	Pitch/Roll/Yaw: ±0.02°
One-key to center	√
EO Camera spec	
Imager Sensor	1/2.8" Sony CMOS Sensor
Picture quality	Full HD 1080 (1920*1080)
Effective pixel	2.13MP
Lens optical zoom	40x, F=4.25~170mm

Digital zoom	x32
Field of View (D, H, V)	Wide: 73.80° / 66.35° / 39.98° Tele: 2.16° / 1.90° / 1.11°
Min object distance	0.1 / 1.5 / 3.0 / 5.0 / 10.0 m
Min illumination	Color(1/30s, 79.5dB) : 0.01 lux , BW(1/30s, 79.5dB) : 0.002 lux Color DSS(1/1s, 79.5dB) : 0.001 lux , BW DSS(1/1s, 79.5dB) : 0.0002 lux
S/N ratio	more than 50dB
Focus	Auto / One Push / Manual
White balance	Auto
Shutter speed	1/1 ~ 1/30,000 sec
Exposure control	Auto / Iris. Priority / Shut. Priority / Manual
Backlight compensation	Yes
Auto ICR	Yes
Image Stabilizer	Yes
Defog	Yes
IR Thermal Imager Spec	
Focus Length	50mm
Horizontal FOV	17.5°
Vertical FOV	14.0°
Detective Distance (Man: 1.8x0.5m)	2083 meters
Recognize Distance (Man: 1.8x0.5m)	521 meters

Identification Distance (Man: 1.8x0.5m)	260 meters
Detective Distance (Car: 4.2x1.8m)	6389 meters
Recognize Distance (Car: 4.2x1.8m)	1597 meters
Identification Distance (Car: 4.2x1.8m)	799 meters
Working mode	Uncooled long wave (8μm~14μm) thermal imager
Detector pixel	1280*1024
Pixel pitch	12μm
Focusing method	Athermal prime lens
NETD	≤40mK@25℃,F #1.0
MRTD	≤400mK@25℃,F #1.0
Shutter	Bistable Shutter
Color palette	White hot, Black hot, Iron Red
Digital zoom	1x ~ 4x
Thermometry type	Not supported
Camera Object Tracking	
Update rate of deviation pixel	50Hz
Output delay of deviation pixel	5ms
Minimum object contrast	5%
SNR	4
Minimum object size	32*32 pixel
Maximum object size	128*128 pixel

Tracking speed	±48 pixel/frame
Object memory time	100 frames (4s)
Laser Rangefinder	
Measure ability	≥5km for big target (eg. building) ≥3km for car（2.3m×2.3m ） ≥1.5km for people （1.75m×0.75m ） (Based on typical value: LOS visibility: ≥8km Diffuse reflection rate: ≥0.3 Humility: ≤80%)
Accuracy (Typical value)	≤ ±1m (RMS)
Wave length	1535nm pulse laser
Divergent Angle	≤ 0.5mrad
Measurement frequency	1~10HZ
Min measuring range	≤20m
Ranefinder	Measure the distance between the object at the center of screen and the laser rangefinder

5. FAQ

1. How to deal with whitening visible image of Q40TIRM-HD in foggy weather?

A: Enable defogging mode.

2. Does Q40TIRM-HD support taking photos during recording?

A: Yes.

3. How to set the storage format of Q40TIRM-HD ?

A: The format of photos saved in the TF card are JPG 1920*1080, and the videos are MP4 1080P30fps.

4. Does Q40TIRM-HD support simultaneous TCP control for multiple devices?

A: Yes.