

Winches for drones
Operation Manual

Ver.1.02

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1 Introduction

1.1 Content

One winch (with thread end weight)

One antenna for telemetry

1.2 Names of parts

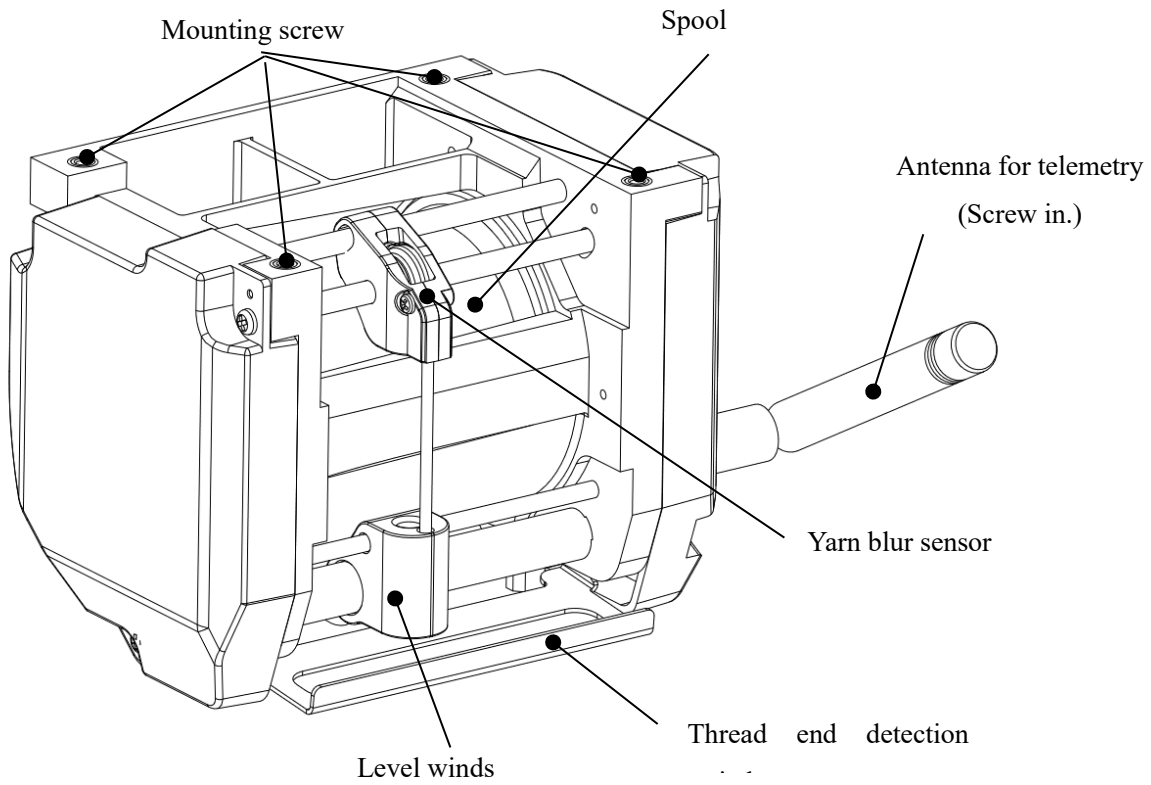


Figure 1-1 Part Names 1

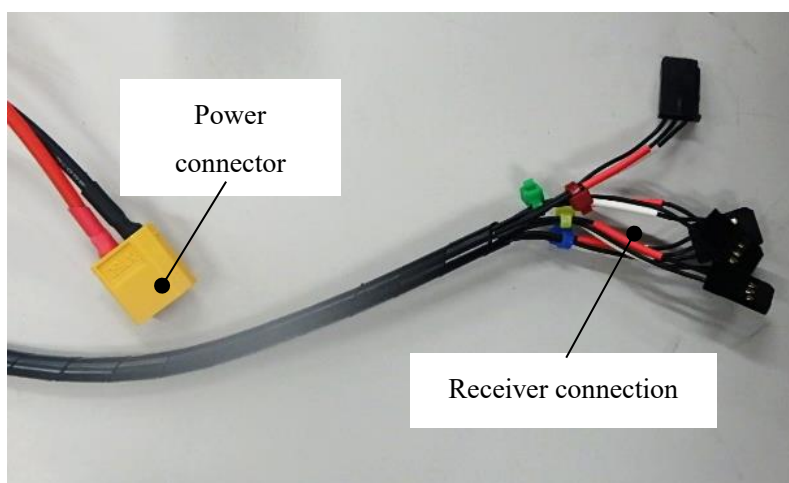


Fig. 1-2 Part Names 2

2 Operation check

When using the winch for the first time, check the operation according to the following procedure.

2.1 What to prepare

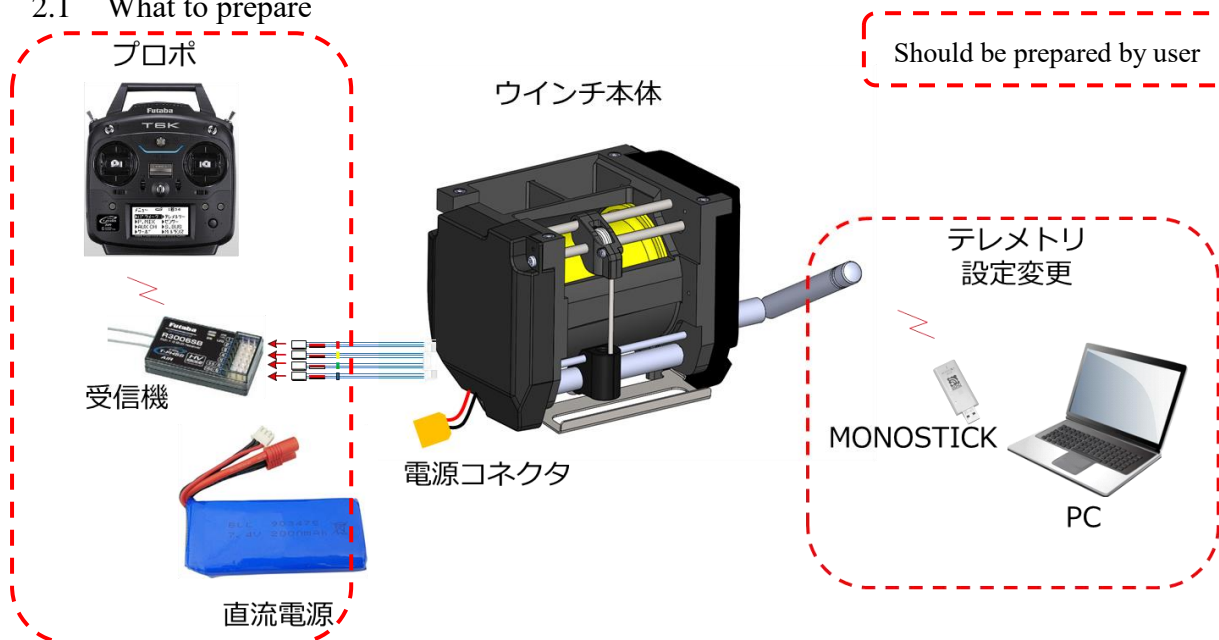


Figure 2-1. System Configuration Diagram21

Winch body	This product.
Radio and receiver	Connect to a commercially available receiver. The receiver must be powered by a 5V. (Prepare by customer)
Dc power supply	Please prepare a direct power supply of 7.2 to 22. 2V. (2 to 5 cell Li-Po batteries, etc.). Recommended range is 11.1 to 14. 8V. The winch-side terminals have a XT-60 male configuration. 14. The higher the supply voltage is below 8V, the higher the winch take-up speed is. However, an upper limit is provided to protect the equipment. If the supply voltage is 14. 8V or higher, the voltage applied to the motor is limited.
MONOSTICK	It is required to receive the radio data (telemetry information) transmitted by TWE-Lite from the main unit of the winch on the PC. (Prepare by customer) In many cases, the driver is installed automatically, but if it is not recognized, refer to the manufacturer's site below and install the driver. If installed, a COM port is added. https://mono-wireless.com/jp/products/MoNoStick/index.html
PC	PC for displaying telemetry information. (Prepare by customer) Install the dedicated viewer (for Windows only) that you want to send via e-mail.

※ The receiver connection cable of this winch does not supply power to the receiver. Prepare a separate power supply for the receiver, e.g. from the drone body.

※ Futaba Electronic Industry Co., Ltd. (hereinafter referred to as "Futaba") has been checked for operation with the radio (T6KA) and receiver (R3006SB). Operation with all equipments is not guaranteed.

※ 22. At power supply voltages higher than 2V, the operation is stopped to protect the winch control circuitry. Use a commercially available DC-DC converter or the like to set the supplied voltage to the winch control circuit to 2.2V or less.

With a 6-cell Li-Po battery, this voltage is exceeded depending on the charge status and ambient temperature. Therefore, the above measures are required.

2.2 Connection of signal cables

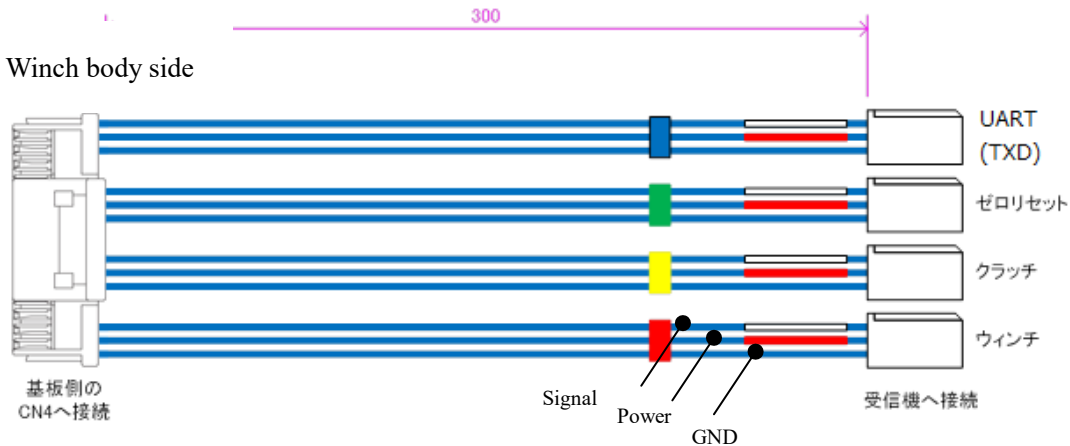


Figure 2-2 Receiver Connection Cable22

Connect each connection cable (red, yellow, green) to the corresponding channel on the receiver. To perform UART communication, connect UART cable (blue) to the device to which you are sending. (For more information, see About 5UART Communication)5About UART communication

The white tube in each cable is the signal wire, the red tube is the power supply, and the cable without the tube is GND. When connecting to the receiver, be careful not to reverse the connection. In addition, when the function is not used, the main unit can operate with zero reset (green) and clutch (yellow) and UART (blue) even when it is not connected. When connecting or disconnecting a cable, turn off the power to prevent malfunction. The following shows how to connect the transmitter (T6KA) and receiver (R3006SB).

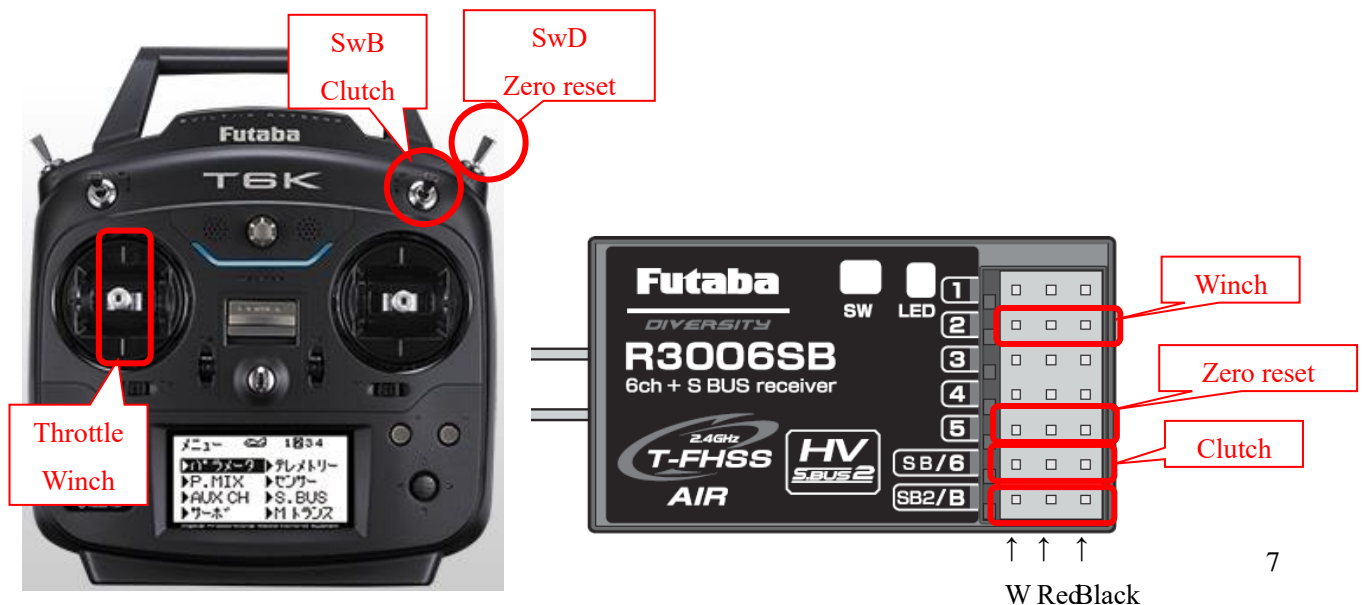


Fig. 2-3 Connection example23

2.3 Radio default settings

2.3.1 If you are using a cover T6KA

- Changing the Model Type

If the throttle is not fully lowered when the radio is turned on, a warning sound will be heard in the initial state immediately after the radio is purchased. To avoid this, change the model type.



Figure 2-4 Throttling the radio24

- Press and hold "+" to enter the menu.
- Select "M type".
- Press the "+" or "-" button with the cursor at "TYPE" to select "MULTI COPT", and then press and hold down the arrow pad.
- Press the arrow pad when you hear "sure?".
- Press the "END" button to exit the menu.

- Fail-safe function

Determine the operation of the receiver when the link with the transmitter is disconnected during operation in the prop.

- Press and hold "+" to enter the menu.
- Select "F/S".
- Set the target channels (2:ELE, 5:AU5, 6:MOD) as shown in Fig. 25. Fig. 2-5 Setting example (set as shown in red)25

MODE.POSI B-F/S	
1:	AIL NOR --- ---
2:	ELE F/S + 0% ACT
3:	THR F/S + 20% ACT
4:	RUD NOR --- ---

MODE.POSI B-F/S	
5:	AU5 NOR --- ---
6:	MOD NOR --- ---
7:	AU7 NOR --- ---
8:	AU8 NOR --- ---

Fig. 2-5 Setting example (set as shown in red)25

※ "NOR" in "MODE" means "retain the previous operation" when the link with the transmitter is broken, and the winch operation may be continued and the hoisting or lowering may not be stopped.

Set F/S to reduce emergency problems by setting desired for each channel.

Setting the Receiver Side

Set the channels required by this winch (assign SW-B to channel 6).

- Press and hold "+" to enter the menu.
- Select "AUX CH".
- Press the "+" or "-" button with the cursor at "CH5" to "SwD".
- Press the "+" or "-" button with the cursor at "CH6" to "SwB".
- Press the "END" button to exit the menu.

2.3.2 When using DJI-products (DJI Assistant2)

Use DJI Assistant2 to set up the receiver.

In the "Tool" → "Function Channel" of DJI Assistant2, set the "Spraying" of the channels to which the winch, zero-reset, and clutch are connected among the respective outputs (F1 to 8) as follows.

Spraying	1000μs □ 2000μs
Frequency Direct Output	Arbitrary setting
Channel Switch	Arbitrary setting
Frequency Reverse Settings	Arbitrary setting

2.4 Attaching the winch to a drone, etc.

Use four screws (M3). Refer to the attached drawing for the screw position.

2.5 Operation check

2.5.1 Warning tone

When the power is connected to the winch and successfully started, the following start-up sound is heard.

Always started: "Pipid limiter"

If the warning tone sounds as shown below, take the appropriate measures.

- When winch pulse is not received: "beep-beep-beep (repeat until pulse is received)"
→ Check the link between the receiver power supply, radio power supply and receiver.

- When the stored data is incorrect: "Peep (repeatedly until the power is turned OFF)"
 - Contact your dealer.
- Excessive current: "Pippy--"
 - The load is too high. Reduce the load before use.

2.5.2 Clutch operation (manual thread feeding function)

When the thread is pulled with SwB at the central or downward position, the feed-out drive is performed. When the tension of the thread is lost, feeding stops. The feedrate can be set in two steps according to the position of SwB. Refer to 3.3 Clutch Function for details.3.3

※ When the throttle is not in the neutral position, neither clutch operation nor zero reset operation is performed. When performing clutch operation or zero reset operation, return the throttle to the neutral position.

2.5.3 Zero reset operation

Check that the thread end weight stops with sufficient frictional force.

In this condition, if SwD is pushed down in the output direction, the take-up drive will be performed. When the yarn end weight hits the yarn end detecting sensor or when SwD is pushed down later, the zero-reset operation is stopped and the position is memorized as the yarn length 0m. Refer to 3.2 Zero reset for details.3.2

2.5.4 Throttle operation

The dummy weight can be raised and lowered by fixing the winch body and operating the throttle lever with the dummy weight (PET bottled beverage, etc.) of about 500g hung.

In this condition, the maximum speed is set to be output. In the above clutch operation or zero reset operation, the operation speed is limited.

※ Due to the action of the thread length sensor, it automatically decelerates and automatically stops prior to the thread length becoming 0m.

※ When sufficient tension is not applied to the thread, the yarn fuse sensor prevents or restricts the winding and pulling-out operations. Refer to section 3 Radio operation for details.3

2.5.5 Telemetry function

Follow the procedures below to check the winch data and make various settings via wireless communication with Windows PC. Refer to the 4-Winch Data Viewer app for more information.4

1. Launch the dedicated app "Winch Data Viewer". Dedicated apps will be sent from the distributor. It can be used in a decompressed state.
2. Insert MONOSTICK into the PC's USB port. If required, install MONOSTICK drivers.
 - For driver installation, refer to the following manufacturer's website.

<https://mono-wireless.com/jp/products/MoNoStick/index.html>

3. In the app window, specify the COM port to which MONOSTICK is assigned to "Port".
4. Initialize MONOSTICK using the "Initialize Option →MONOSTICK" procedure. If the initialisation fails, check the COM-port settings and install MONOSTICK again.

5. Enter the winch ID in "Target winch ID" in the app screen. The winch ID is the last four digits of the serial number stamped on the back of the winch as shown in Figure 2-6. In this example, "1003" is used.

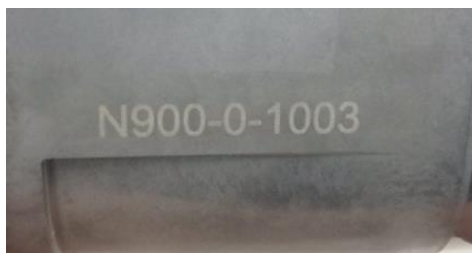


FIGURE 2-6 Rear Serial Number

6. Check that the telemetry antenna is attached to the winch body, that the winch is turned on, and that various instructions such as zero reset are not being executed.

7. When you press the "Start" button on the application screen, communication with the winch starts and various information is displayed on the application.

3 Radio operation

3.1 Hoisting/feeding

The thread can be wound or fed by using the radio control corresponding to the receiver connection cable (red). In the connection example of 2.3.1, when the stick is pushed up, the yarn is wound up with the output corresponding to the amount of knocking down, and when the stick is pushed down, the yarn is fed with the output corresponding to the amount of knocking down. The speed of the thread may vary depending on the power supply voltage and load. Operation is restricted under the following conditions in order to avoid troubles such as yarn entanglement and to protect the device.

3.1.1 Remaining distance reduction gear/stop

This winch constantly monitors the thread length and limits the winding speed when it detects that the thread has fallen below the specified length. Rotation stops at the specified position when it is further wound up. The deceleration/stop position and speed can be adjusted using the viewer application. For more information, refer to 4.2F/W Parameter Editing.4.2Editing F/W parameters

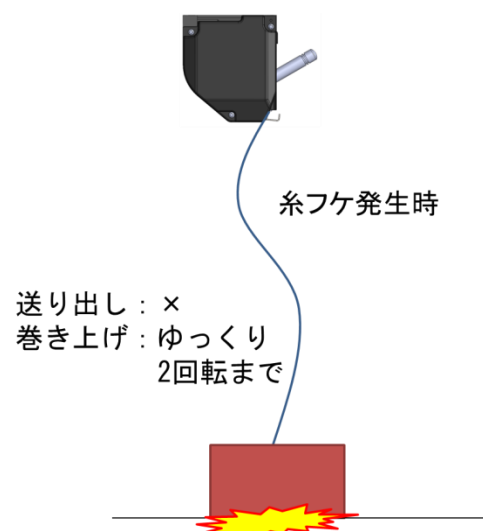
The position to be stopped performs an overrun from the above parameter setting position. The overrun amount moves back and forth depending on the conditions such as the hoisting speed and the lifting weight. Adjust the amount according to the operating conditions so that the thread ends do not collide with each other.

3.1.2 Stop/slowly wind up when dandruff occurs.

When the tension applied to the thread comes off and falls below the specified tension (70 to 350g), such as when the suspended load is grounded, feeding is prohibited. This function automatically stops unloading and prevents yarn entanglement when unloading in a place where the load cannot be seen. In this case, the speed limit and distance limit are applied to the winding in order to prevent the thread from becoming blurred.

If the motor can be wound up to the specified distance (initial condition approx. 90cm) at a low speed and the specified tension is recovered during that time, the speed limit of winding is released.

If the specified tension is not recovered even after the specified distance is taken up, winding stops. In this case, once the throttle is pushed down in the feeding direction, the differential winding of the specified distance can be performed again. Be careful not to continue winding without tension, as it may cause thread entanglement or thread biting.



3.1.3 Thread end detection stop

When the thread end detection switch is hit by the stopper, etc., winding up/feeding stops.

The purpose is to protect the device such as when the detection by the remaining distance in 3.1.1 does not work, for example, when the yarn is entangled.

If the yarn end is detected during the hoisting operation, the operation in the hoisting direction is stopped. When the feeding direction operation is performed, it is canceled.

If the thread end is detected during the feeding operation, the operation in the feeding direction is stopped. When the wind-up direction is operated, it is released.

3.1.4 Excessive current stop

The motor drive stops to protect the equipment when a load more than the specified is applied to the motor, such as lifting an excessive load.

In addition, in low-temperature environments, a large current tends to flow due to a decrease in electrical resistance, so that the excess current stop function becomes easy to work at large load and high acceleration. When the motor temperature rises above room temperature (25 degrees Celsius), it operates normally.

If an excessive current is detected, the winch will emit a beeping sound when an excessive current is detected. In this case, use the product with a reduced load. Note that telemetry data transmission is suspended while a warning sound is being generated.

3.1.5 High temperature detection stop

When the motor or drive circuit reaches a danger temperature (95°C), the drive stops to protect the equipment. When the temperature drops to the safe temperature (85°C), the drive limit is released.

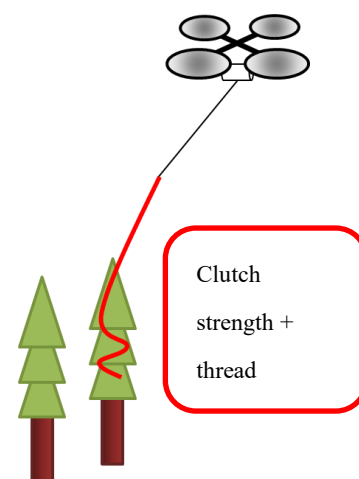
3.1.6 Remaining distance limit/cancel (escape mode)

To prevent all threads taken up by the spool from being released, feeding stops when the thread length becomes low. Also, this limit can be released by setting the clutch (strong).

The position where the limits are started can be adjusted using the winch Viewer app. For more information, refer to section 4 "Editing 2F and W Parameters."4.2Editing F/W parameters

This winch is shipped with a thin yarn (discarded yarn) which is weak in strength between the yarn and the spool, and can be easily broken by applying force to the thin yarn part after releasing all the yarn. Use this function when the thread is entangled. If all fine thread parts are exposed, they break with a force of 1.4kgf or less. Use the above-mentioned restriction function so that the thread remains at least

5m at all times so that force is not applied to this point except in emergencies. If the remaining thread length is less than or equal to 3m, the binding part with the fine thread part will be loaded, and there is a risk of unintentional breakage. The product is shipped with a PE line of 80m wound, and 75m is set to the stop position. If the thread is shortened, adjust the stop position.



3.2 Zero reset

The radio operation corresponding to the receiver connection cable (green) performs a zero reset. In the configuration example of 2.3.1, zero reset is executed when SwD is moved forward. Zero reset detects the end of the thread or winds up at a low speed until the switch is tilted backward, and then pulls out the thread for about a few centimeters to stop.2.3.1

The position when the thread end is detected or the switch is tilted backward is set as the thread length "0m". Use this function to set the zero position for thread length measurement again, such as when the thread is cut.

No other operation can be performed until the zero reset switch is pushed back. In addition, winding by zero reset operates even when there is no tension. Note that the motor stop function does not work due to the remaining distance or detection of the thread blur in the hoisting operation during zero reset. In situations where this function is not required, the other functions will operate even if the corresponding receiver connection cable (green) is disconnected. When connecting or disconnecting the cable, be sure to connect or disconnect the cable after turning off the power to the winch, as there is a risk of malfunction.

3.3 Clutch function

When the clutch is turned on by radio operation corresponding to the receiver connection cable (yellow), feed-out driving is performed when tension is applied to the thread. Use this function when you want a little thread when hanging the load.

The clutch is a three-stage switch.

When set up: Clutch operation OFF

When set to middle: Clutch operation (weak)

When set down: Clutch operation (strong)

Note that a knocking phenomenon may occur due to the balance between the weight of the suspended load and the speed setting during clutch operation. If the feedrate of the load caused by the clutch action exceeds the natural falling speed of the load, the tension of the yarn is temporarily eliminated, and the yarn feeding stops. Then, the load tensions again, activating the clutch action repeats spool feeding and stopping. This phenomenon is not a malfunction, but it can be avoided by reducing the set speed during clutch operation.

In addition, when the clutch operation (strong) is set, the drive limit based on the remaining distance in 3.1.6 is released (escape mode). Use this function when you want to release entangled thread, etc.3.1.6

In situations where this function is not required, such as during flight, other functions will operate even if the corresponding receiver connection cable (yellow) is disconnected. When connecting or disconnecting the cable, turn off the power to the winch once to prevent malfunction.

3.4 Brake function

This winch is equipped with a mechanical braking function to prevent the load from falling when the radio operation is stopped and the motor stops operating. The brake function is automatically released when the motor is wound up. When the motor is stopped, the brake function brakes even when there is no electric power. The braking force is 12 to 30kgf, and the yarn slips out when it is subjected to greater tension than that.

If the thread slips out when the power is turned off, it will not match the thread length information stored inside the winch, so the remaining distance reduction gear/stop function will not work properly. In this case, reset the thread end position again by the zero reset operation. (Refer to 3.2, "Zero Reset.")3.2Zero reset

4 Winch Data Viewer App

By using Viewer app, you can receive data in the winch, such as the thread length and battery voltage, wirelessly via TWE-Lite and check it by telemetry. You can also change settings such as the position at which the winding stop is performed.

4.1 DESCRIPTION OF PARTS

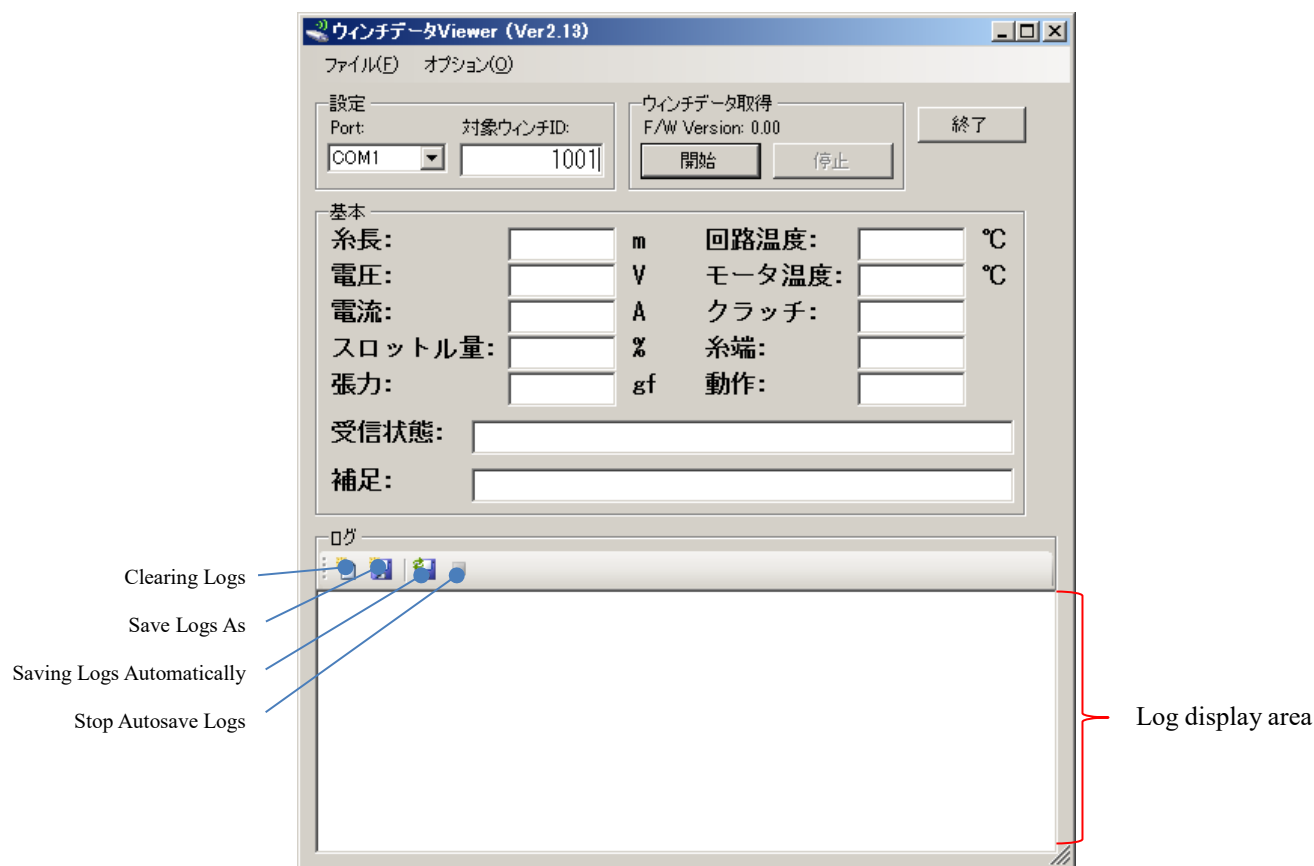


Fig. 4-1 Viewer app GUI-screen41

Port	: Specify the COM-port assigned to MONOSTICK.
Study winch ID	: Specify the winch ID to be received in decimal.
"Start" button	: Starts receiving winch data.
"stop" button	: Stops receiving winch data.
Exit button	: Exit this app.

※ Winch data reception cannot be started during winch operation. Stop the winch operation before pressing the start button.

Thread length Displays the length of the thread fed from the spool. The display is updated twice per second in good communication condition. A display error of about 3% may occur due to the winding state of the thread, etc.

Voltage Displays the power supply voltage supplied to the winch.

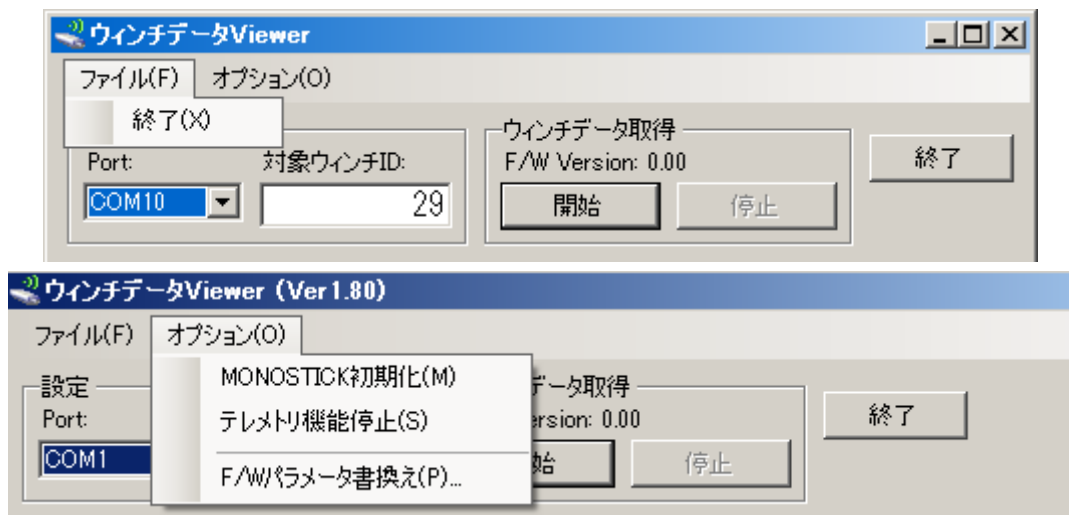
Current Displays the current flowing through the winch motor.

Throttle amount This is the output value (%) of the motor specified by operation with the radio.

Tension Displays the tension of the thread taken by the thread blur sensor. The detectable range is approximately 70 to 350g. When the weight is 80g or less, 0g is displayed. There is a measurement

error of about ± 50 g.

- Log display area : Displays information when each operation is performed. Information such as errors is also displayed here.
- Clear Log button : Clears the currently displayed log information.
- Save Log As button : Saves the currently displayed log as a name.
- Save Log Automatically button : After specifying the destination file, the newly received data is saved at any time.
- Stop Autosave Log button : Stop "Save log automatically" above.



- "Exit" : Exit this app.
- "Initialisation MONOSTICK" : Initializes MONOSTICK specified by "Port". Initialization is possible only once after purchasing MONOSTICK.
- "Telemetry function stop" : Turns off TWE-Lite's radio function and stops receiving telemetry data. To enable the wireless function again, turn the power of the winch to OFFOOBON.
- "F/W parameter rewrite" : Used to set the operation parameters of the winch main unit. For more information, refer to section 4 "Editing 2F and W Parameters."4.2Editing F/W parameters

※ MONOSTICK Initialisation and Telemetry Deactivation cannot be performed during winch data reception. Perform after stopping.

Various warning displays

When indicating a warning, it is displayed in red as shown in the figure below. The warning details are as follows.

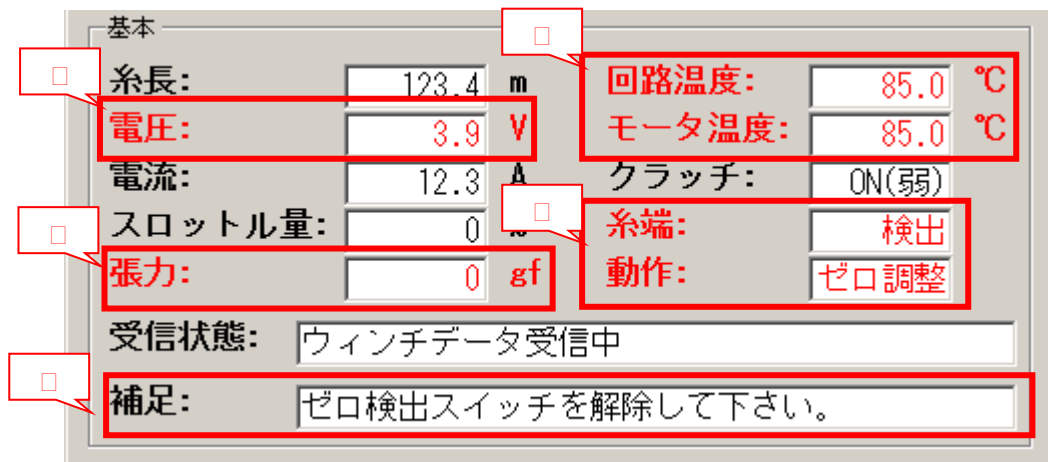


Fig. 43 Warning indications4-3

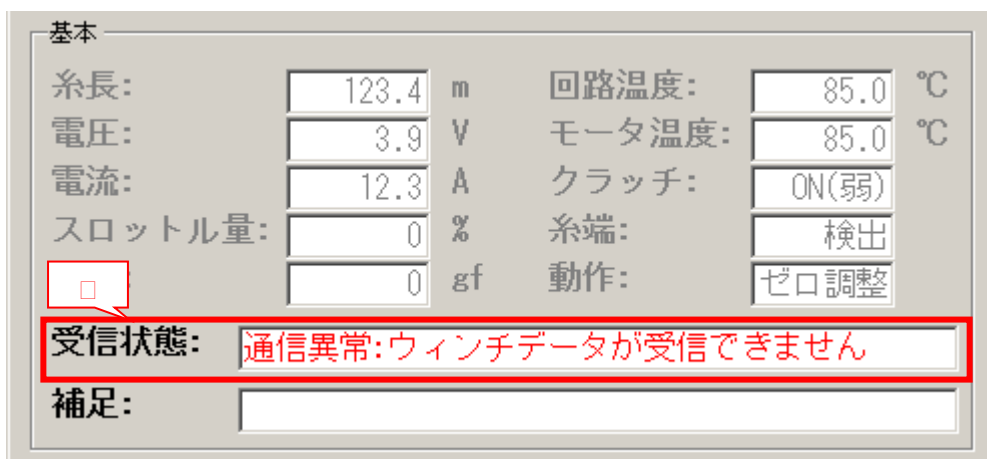


Fig. 4-4 Warning displays (when communication is abnormal)44

- ① Voltage drop : Voltage of the battery connected to the winch body is low (warning below 5.5V).
- ② Insufficient tension : Operate the winch with a constant tension (weight) applied to prevent the yarn from being wrapped in a turbulent manner.
- ③ Temperature warning : Heat generation of the circuit or motor is high (warning at 85.0°C or higher).
- ④ Thread end detection : When it is displayed at the time of thread edge detection, feed the thread a little.
If this message appears at zero reset, reset the transmitter to zero.
- ⑤ Supplement : Shows supplements when the function is restricted in □ to □ above.

- ⑥ Communication error : Displayed when winch data cannot be received (warning in 3 seconds or more). Note that the operation of the winch itself will not be affected if communication between the radio and receiver is established.

4.2 Editing F/W parameters

The following parameters can be set by editing the optional OOB/F/W parameter.

※ Values that are grayed out cannot be changed.

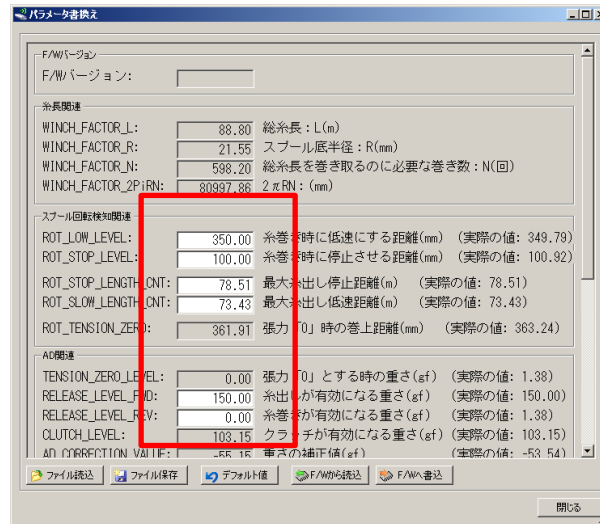


Figure 5-4 F/W Parameter Edit Window 1

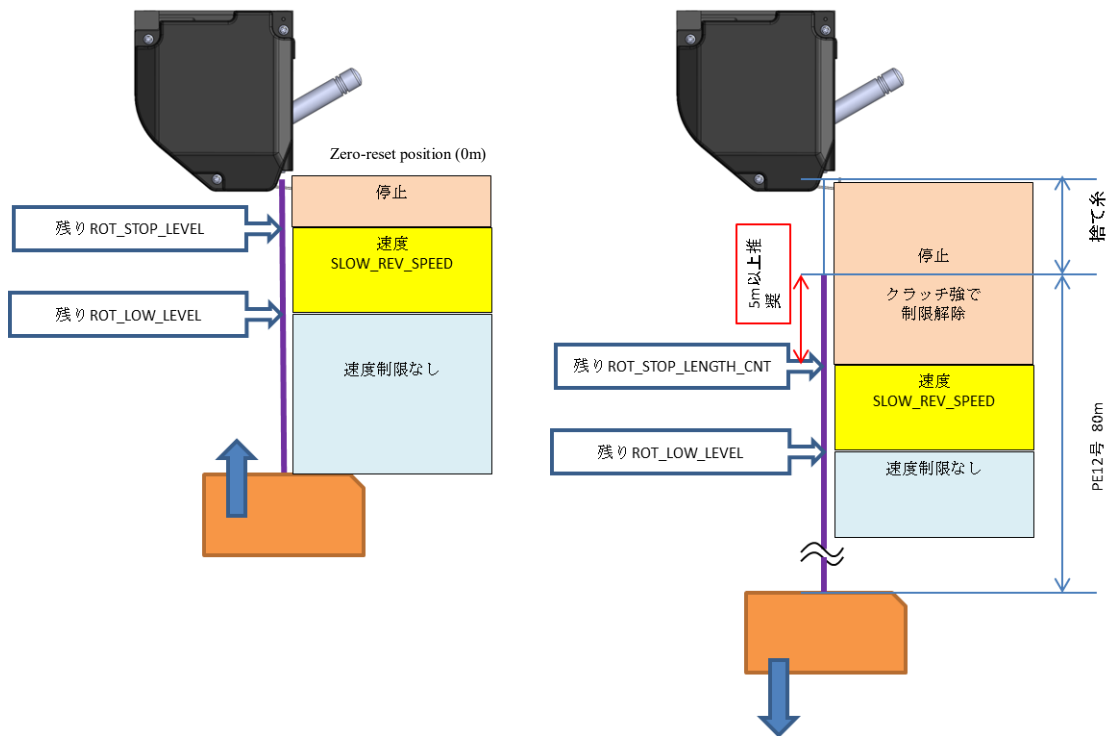


Figure 5-5 Spool Rotation Detection-Related Settings

4.2.1 Spool rotation detection related

ROT_LOW_LEVEL	This is the position where deceleration starts during bobbin winder winding.
ROT_STOP_LEVEL	This position stops winding of the thread.
ROT_LOW_LENGTH_CNT	This is the position where deceleration starts at the time of feeding.
ROT_STOP_LENGTH_CNT	This is the position to stop the thread feeding.

The above function is the distance to start limiting the throttle value and actually stops after overrunning. The amount of overrun varies depending on the speed and load. Adjust it according to the operating conditions.

4.2.2 AD-related

RELEASE_LEVEL_FWD	This is the lower tension limit of the thread bracket sensor for which thread ejection is enabled.
RELEASE_LEVEL_REV	This is the lower tension limit of the bobbin winder sensor for which bobbin winder is enabled.

Since the detection capability of this winch's thread blur sensor is in the range of approximately 70 to 350gf, the value during this period can be set. This limits the winch operation when the tension falls below the set value. If a value between 0 and 71gf is entered, the value is set to 71gf. By adjusting this parameter, you can adjust the automatic stop function for thread ejection in areas where the load grounding is difficult to see.

When the special hook "Karakuri-karavina" is used, the load can be stopped unloaded with the load grounded and the hook not grounded by making RELEASE_LEVEL_FWD larger than the hook's own weight.

By making RELEASE_LEVEL_REV smaller than the hook's own weight, you can also enable take-up even with the hook-only weight. The weight of the special hook "KARAKI KARABINA" combined with the yarn end weight is approximately 150g. When using this combination, it is recommended to set RELEASE_LEVEL_FWD to approximately 200g and RELEASE_LEVEL_REV to approximately 100g.

In addition, if it is set to a negative value, the restriction of winch operation by the thread blur sensor is stopped. In this case, be careful as there is an increased risk of thread entanglement.

Note that the detection accuracy of the thread blur sensor may differ due to individual differences, variations caused by the environment, fatigue caused by repeated use, etc. Therefore, confirm the detection accuracy with the actual device when using it.

4.2.3 Motor control related

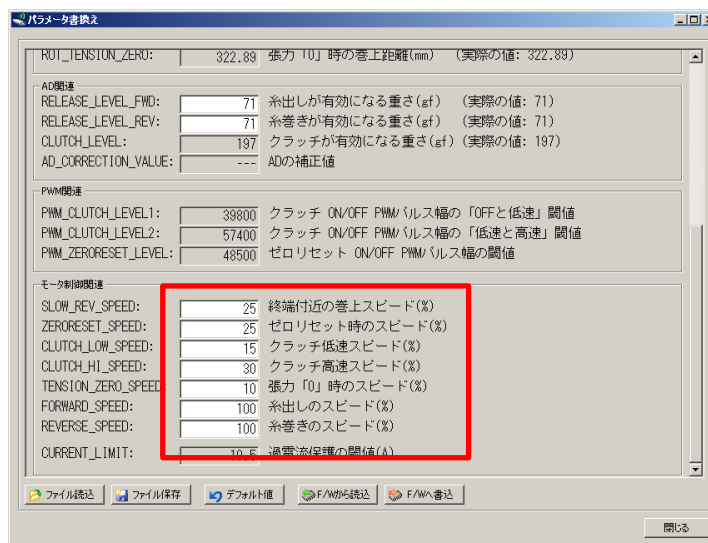


Figure 5-6 F/W Parameter Edit Window 2

- SLOW_REV_SPEED** Set the max. winding speed when the thread length becomes less than or equal to ROT_LOW_LEVEL during winding and when the thread length becomes more than or equal to ROT_STOP_LENGTH_CNT during feeding.
- ZERORESET_SPEED** Sets the winding speed for zero reset.
- CLUTCH_SLOW_SPEED** Set the feeding speed for clutch (weak).
- CLUTCH_SPEED** Set the feeding speed for clutch (strong).
- TENSION_ZERO_SPEED** Sets the winding speed when the tension is less than or equal to the specified value.
- FORWARD_SPEED** Set the maximum speed (throttle value) for thread ejection.
- REVERSE_SPEED** Set the maximum speed (throttle value) for bobbin winder winding.

- "Read file" : Reads the value of the F/W parameter saved in the file and displays it on the screen.
- "Save file" : Saves the value of the F/W parameter displayed on the screen to a file.
- "Default value" : Recalls the default settings.
- "Read from F/W" : Retrieves the parameter value from F/W and displays it on the screen.
- "Write to F/W" : Write the value of the parameter displayed on the screen to F/W.

5 About UART communication

Wired communication can be performed through the receiver connecting cable (blue) to the device that performs UART communication with the winch information. The information that can be communicated is the number of spool rotations, tension, yarn edge detection, operation, throttle amount, battery voltage, current, circuit temperature, and motor temperature, and it transmits hexadecimal numbers in text format.

To communicate with a PC, a commercially available USB-serial converter (such as FTDI) is required.

For details on the data format and connection method, contact your winch dealer.

6 Maintenance

6.1 Distance of the lower part of the thread end weight

This winch is equipped with a 3.1.1 Remaining Distance Reduction gear and Stop function to avoid yarn entrainment. However, if yarn entanglement occurs, etc., the yarn end may be caught. For this reason, it also has a 3.1.3 thread end detection stop function. When the thread end weight hits the thread end detection stopper, secure a distance of at least 10cm from the tube attached to the bottom of the thread end weight to the thread end (carabiner, etc.) to avoid thread breakage. If this distance is insufficient, excessive tension may be applied to the thread due to overrun as shown in Fig. 5-2 and the thread may break when the thread end weight hits the thread end detection stopper.

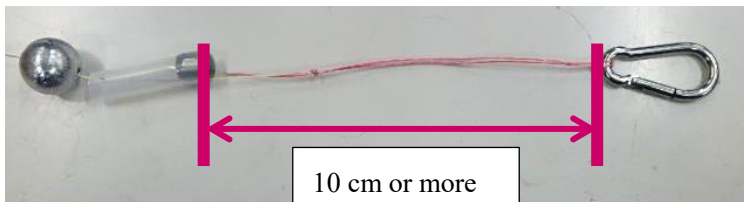


Fig. 5-2 Thread end weight colliding

6.2 Bobbin winder condition

If a heavy load such as hanging a heavy load is applied after a long-distance yarn is caught by a light load (for example, the weight of only the hook), the yarn may bite into the yarn winding part. If the thread bites hard, the thread may not be fed even when the feeding operation is performed, and the thread may be wound in the reverse direction to the spool based on the biting position.

To avoid this, once the thread is caught with a light load, unwind the thread and rewind it. When winding, apply

tension of about 1kgf. In this case, using a commercially available recycler for phishing reels makes it easier to carry out the operation.

6.3 Yarn fraying

The yarn has a limited life. Since the yarn used in this winch is a yarn made by knitting multiple polyethylene yarns, fuzzing occurs when it deteriorates. If the fuzz is severe, cut the point.

If disconnected, use the function described in 4. 2F/W Parameter Editing to shorten the stopping distance by the length of the cut.4.2Editing F/W parameters

If the yarn wound on the spool falls below 3m, there is an increased risk that the yarn will break.

In addition, if the yarn deteriorates as a whole, it is necessary to replace the yarn. When winding, apply tension of about 1kgf. In this case, using a commercially available recycler for phishing reels makes it easier to carry out the operation.



Fig. 5-3 A fluffed yarn

6.4 In the event of yarn

The risk of yarn entanglement increases when winch threading is performed under low load. When the thread is pulled out for a long distance without tension being applied to the thread, a phenomenon called backlash occurs, in which the loose thread is entangled inside the winch.

When backlash occurs, the yarn may be partially wound on the spool in the reverse rotation direction.

If such a phenomenon occurs, pull out the entangled part to the outside of the winch by using the forward and reverse operations properly while observing the direction of the spool thread with the thread overhanging in the direction.

It is possible to use it by reeling the thread again after pulling out all entangled parts, but carefully check for thread glasses and scratches.

If the backlash condition is severe, dismantling and repair may be required. Contact your dealer.

7 Performance and specifications

7.1 Mechanical specification

Standard dead weight : Approx. 630g (including thread)

Dimensions : Width 110 mm x height 82 mm x depth 72mm (excluding antenna section)

Load : Maximum. 8kgf

Hoisting speed: Approx. 0.7m/s (at 14.8V loading 5kgf)

Maximum output : Approx. 55W (14.8V)

Thread length : PE-line 80m (DAIWA UVF Mega-Sensor 12 Blade EX+Si 12)

Power supply voltage : DC 7.2 to 22.2V Recommended Voltage 11.1 to 14.8V

Load-Speed Diagram:

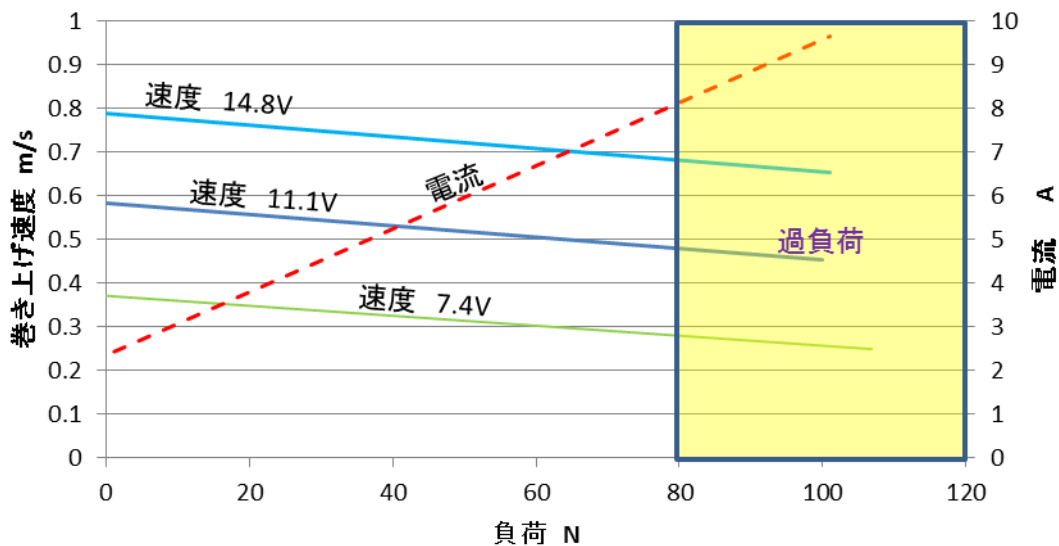


Figure 6-1 Load-Speed Diagram

※ The graphs above are typical measurements and are not guaranteed values. It varies depending on the bobbin winder winding radius and temperature.

7.2 Electrical Specifications

Table 6-1 Electrical Specifications1

Item	Specifications
Applicable Battery Voltage	7.2 ~ 22. 2V (recommended 11.1 to 14. 8V)
Motor output voltage	Max. 15V (depending on battery voltage)
Motor output current	Max. 15A
Receiver Power Supply Voltage	5.0V (4.5 □ 5.5V)
Receiver input signal	PWM method 3 channels (S.BUS is not currently supported) Pulse Width 1ms to 2ms (Center 1.5ms)
Wireless (for telemetry transmission/reception)	2.4GHz (with TWE-Lite radio module)

Table 6-2 Operation specifications for each channel2

Item	Specifications
Winch (Red)	The throttle amount varies from 0 to 100% according to the amount of change in the lever.
Clutch (Yellow)	0 to 27% of lever position : Clutch operation OFF 27 to 73% of lever position : Clutch operation (weak) 73 to 100% of lever position : Clutch operation (strong)
Zero reset (green)	0 to 50% of lever position : Zero reset OFF 50 to 100% of lever position : Zero reset ON

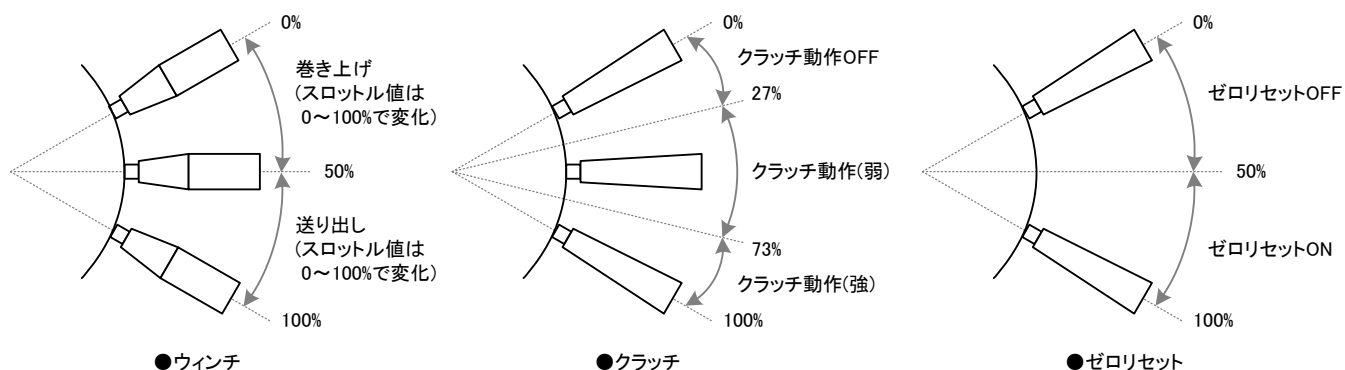


Fig. 6-2 Operation Specifications by Channel