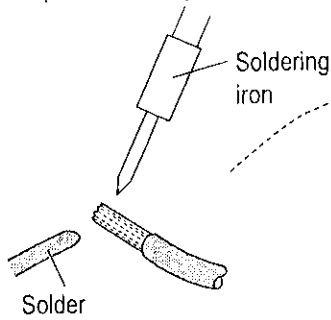


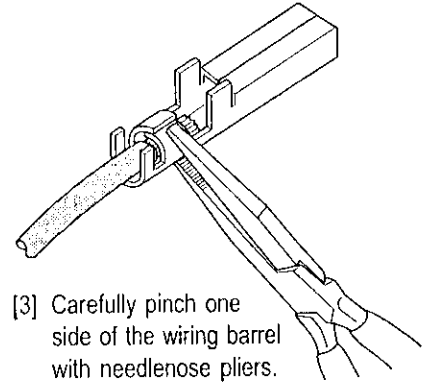
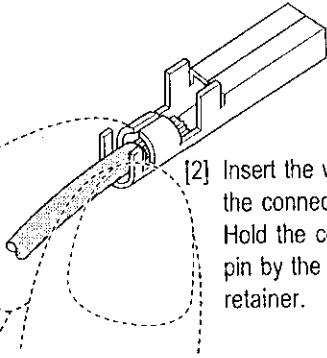
5-2. Wiring to Connector Pins

When crimping I/O connectors around wires, use a purpose-specific tool (919602-1 or 914596-3 by AMP) or crimp the connectors as shown below. Select wiring that provides sufficient capacity. (Applicable wiring: AWG#16 ~ #20)

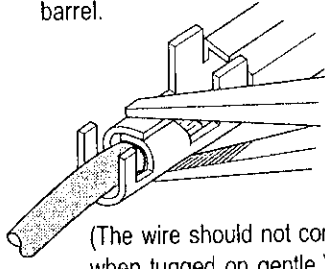
- [1] Cover the wire end in spare solder.
(Peel sheathing back 3.5 mm.)



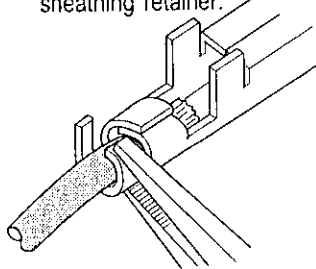
- [2] Insert the wire into the connector pin. Hold the connector pin by the sheathing retainer.



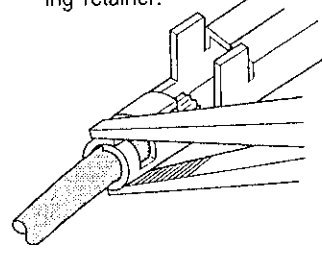
- [4] Pinch the other side of the wiring barrel.



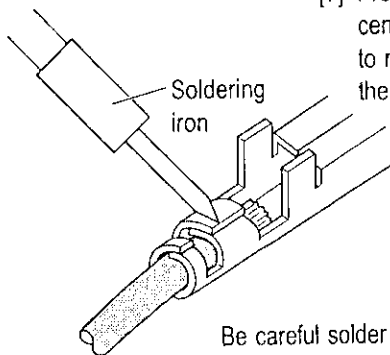
- [5] Similarly, pinch one side of the sheathing retainer.



- [6] Pinch the other side of the sheathing retainer.

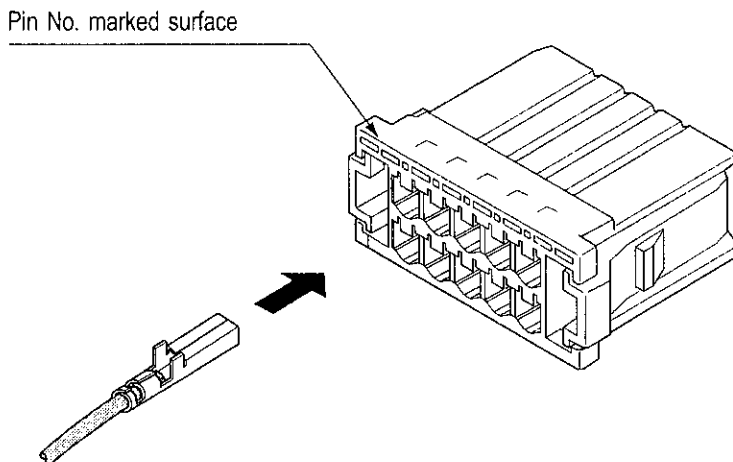


- [7] Press the soldering iron against the center of the spare solder on the wire to melt it. Adding more solder improves the hold.

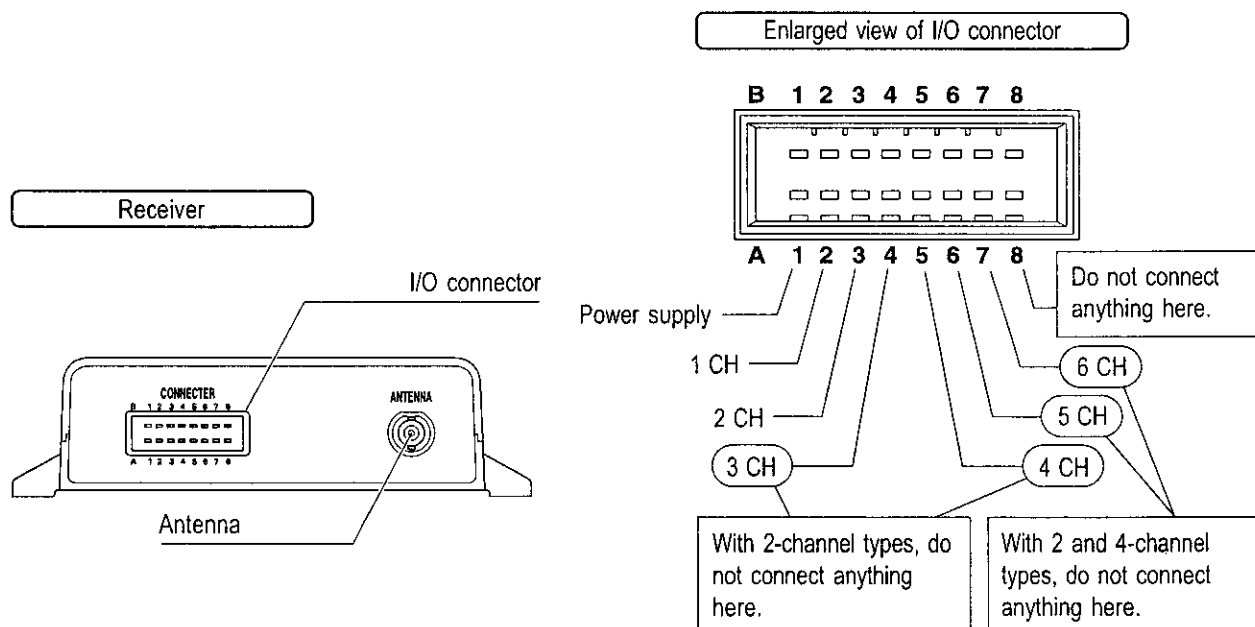


Be careful solder does not run to the contact point.

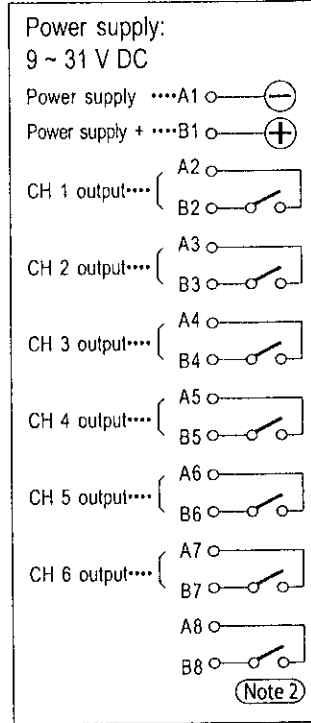
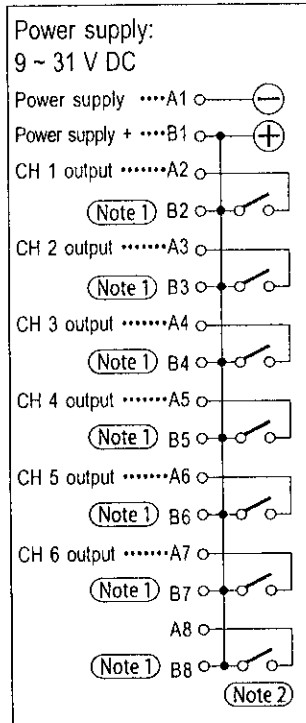
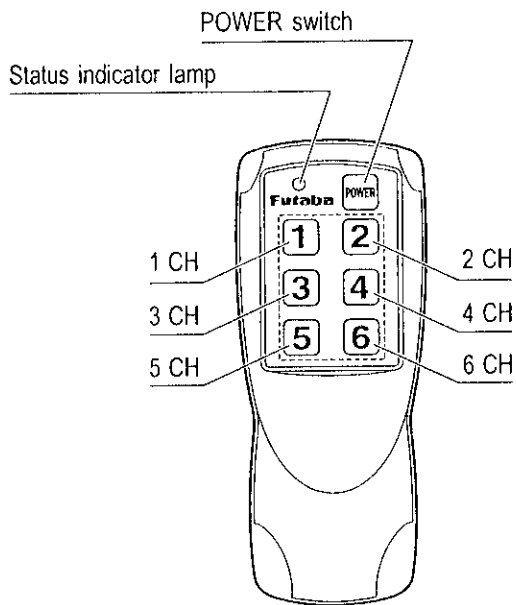
5-3. Inserting Connector Pins into the Connector Housing



5-4. Receiver I/O Connector Map



5-5. Correspondence between Transmitter Switch and Receiver Channel Output



+ power supply voltage type

Independent relay contact output type

Note 1:

- Though a + power supply is connected to the receiver, do not connect a load.

Note 2:

- The relay connected to B8 is normally not used.
- The above figures show 6-channel type receivers.
- On a 4-channel type, the relays connected to B6 ~ B8 are normally not provided.
- On a 2-channel type, the relays connected to B4 ~ B8 are normally not provided.

6. Operation

6-1. Precautions in Operation

⚠ CAUTION

- ❑ Check the transmitter is not being operated before activating power to the receiver.
 - * Starting up the receiver while the transmitter is ON may result in accident as equipment controlled by the radio control system may move unexpectedly.
- ❑ Check the area around equipment controlled by the radio control system is safe before activating power.
 - * Careless operation may result in personal injury and property damage.

Wiring the Receiver

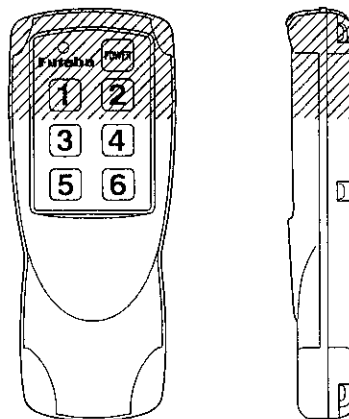
5

NOTE

- ❑ To conserve transmitter battery power, shut power OFF whenever not using the transmitter.
- ❑ Electrical interference such as strong noise and interfering radio waves can interrupt operation. In such case, eliminate the interference or wait until the interference subsides.
- ❑ The receiver does not have a power switch. If necessary, install an external switch. The power lamp is lit while power to the receiver is ON.
- ❑ The transmitter has an internal antenna. Covering the antenna area with metal or locating it near to metal may greatly shorten transmission range.

Operation

6



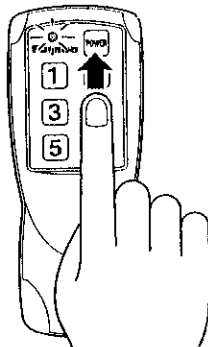
* The shaded area shows where the internal antenna is located.

6-2. Operating Procedure

Once the transmitter and receiver have been set up, check operation as explained below and begin use.

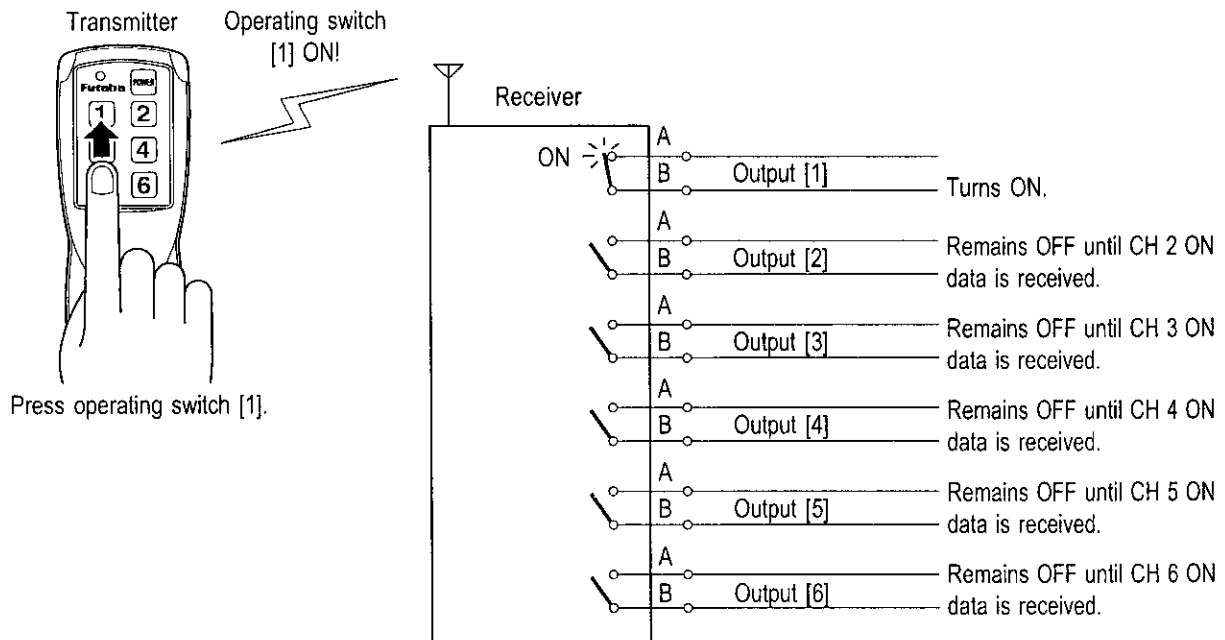
The transmitter user must operate the transmitter from a location where he/she can see the receiver's antenna.

- 1 Activate power to the equipment connected to the receiver.
- 2 Activate power to the receiver.
- 3 Press the POWER switch on the transmitter for 0.2 sec or more to activate it. When the transmitter's status indicator lamp changes from lighting to flashing solidly, the transmitter is on standby.



- * When the transmitter's POWER switch is pressed and the receiver starts receiving a signal from the transmitter, the reception confirmed lamp lights up.
- * If the transmitter's status indicator lamp starts flashing red, the battery is low. Promptly replace the batteries with fresh ones. (See "3. Loading/Replacing Transmitter Batteries" on pg. 10 ~ 12.)
- * When the receiver is not receiving a signal from the transmitter, the output relay turns OFF (opens) and the receiver goes on standby.

- 4 Press the operating switches of the transmitter to operate the equipment. The radio control system enables all channels to be operated simultaneously. While the receiver receives a signal from the transmitter, the reception confirmed lamp stays on.
- * If the reception confirmed lamp does not light up in response to transmitter operation, check that the ID code and frequency of the transmitter and receiver match.



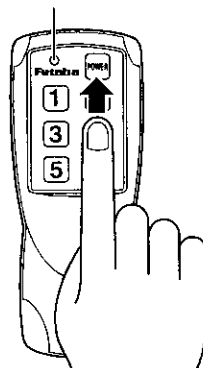
Operation

6

- * If the equipment on the receiver side does not react to the transmitter operating switches, if the transmitter's status indicator lamp starts flashing red or if the receiver often stops operating, see "8. Troubleshooting" on pg. 29 ~ 30.

- 5 Once finished work, hold down the transmitter's POWER switch to shut OFF power to the transmitter. The transmitter's status indicator lamp goes out.

Status indicator lamp



- 6 Shut OFF power to the receiver.
- 7 Shut OFF power to the equipment connected to the receiver.

[Features Available During Operation]

- If the POWER switch is pressed while an operating switch is ON (signal is ON), the transmitter stops sending the operating switch's signal (**power on failsafe**). The status indicator lamp flashes rapidly to avert the user. To resume normal operation, turn the operating switch OFF, then retry the operation.
- About 4 sec after releasing an operating switch, the transmitter automatically stops sending the signal and goes on standby (**periodic operation feature**).
- If none of the operating switches are pressed for about 3 min, power to the transmitter is automatically shut OFF (**automatic power off feature**). To reuse the transmitter, press the POWER switch again and reactivate power.
 - * The FRN604T010 does not come with the automatic power off feature.
- If the transmitter's status indicator lamp starts flashing red during use, the battery is low. Promptly replace the batteries with fresh ones. (See "3. Loading/Replacing Transmitter Batteries" on pg. 10 ~ 12.)

7. How to Use the Transparent Sheet for Transmitter

CAUTION

- ☐ If you attach other text or numbers to operating switches, check operation before beginning actual work.
 - * Wrongly attaching labels may result in misoperation.

NOTE

- ☐ Do not peel off the original number label attached to the transmitter when shipped from the factory.
 - * Peeling off the number label breaks the waterproof seal.

The number label is printed with numbers that correspond to the respective channels. If you want to use other text or numbers, use the included transparent sheet.

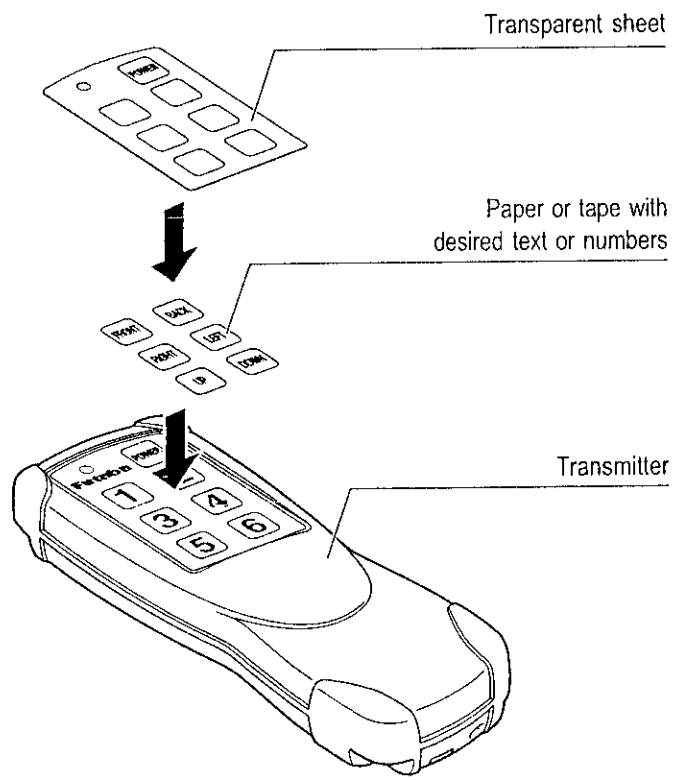
Operation

6

How to Use the Transparent Sheet for Transmitter

7

- 1 Write the text or numbers you want to use on 10 mm² paper or tape.
- 2 Attach the labels to the operating switches with double-sided adhesive tape.
- 3 Attach the transparent sheet.



8. Troubleshooting

If the radio control system does not operate properly or at all during installation or use, check the following.

If that does not resolve the problem, contact Futaba. (See the back cover for Futaba locations.)



8-1. The connected equipment does not respond to transmitter operating switches.

Situation	What to check	What to do	See page
Transmitter status indicator lamp is not lit.	Does transmitter have batteries?	Load batteries.	pg. 10
	Are batteries loaded in proper direction?	Correct battery (+, -) polarity.	pg. 10
	Are batteries low or dead?	Replace batteries with fresh ones.	pg. 10
	Did 3 or more min pass without any operating switches being pressed?	Automatic power off feature shut OFF power. Press POWER switch to reactivate power.	pg. 26
Power is supplied to the receiver, but power lamp does not light.	Is power properly supplied to receiver?	Check power supply voltage and wiring. Supply proper power supply.	pg. 19
Receiver's reception confirmed lamp is lit, but equipment connected to receiver does not move.	Is equipment properly connected?	Rewire equipment correctly.	pg. 19
Transmitter's status indicator lamp is flashing rapidly.	Was POWER switch pressed while operating switch signal was ON?	Power on failsafe tripped. Shut OFF operating switch signal, then retry operation.	pg. 26
Other than the above.	Voltage applied to the receiver is greater than working power supply voltage.	In all cases, circuitry may be damaged. Shut OFF power and contact Futaba.	pg. 31
	Transmitter suffered strong impact (i.e., was dropped, etc.).		
	Water penetrated inside receiver.		

How to Use the Transparent Sheet for Transmitter Troubleshooting

7

8

8-2. Operation is unstable.

Situation	What to check	What to do	See page
Operating range is short and equipment sometimes stops.	Is status indicator lamp red during use?	Batteries are low. Replace with fresh ones.	pg. 10
	Is there a problem with receiver (antenna) installation?	If metal, wall or other obstruction is located in vicinity of antenna, relocate antenna.	pg. 13
	Is there anything in-between transmitter and receiver (antenna)?	Remove obstruction or have transmitter user move to location where he/she can see antenna.	pg. 13
	Is receiver (antenna) located near noise-generating source?	Remove noise-generating source. Some sources of noise are wireless devices of same frequency, motor brushes and computers (sequencers, etc.).	pg. 13
	Is metal or something else covering transmitter's internal antenna area?	Do not cover transmitter's internal antenna area or keep away from metal.	pg. 13
Some channels are operable, others not.	Wiring to the receiver may be disconnected.	Shut power OFF and check circuit wiring.	pg. 18

9. Product Specifications

9-1. Transmitter/Receiver Common Specifications

Carrier wave frequency	Frequency (MHz)	Indication	Frequency (MHz)	Indication		
	1	317.350	735	11	317.900	790
	2	317.400	740	12	317.950	795
	3	317.450	745	13	318.000	800
	4	317.500	750	14	318.050	805
	5	317.550	755	15	318.100	810
	6	317.600	760	16	318.150	815
	7	317.650	765	17	318.200	820
	8	317.700	770	18	318.250	825
	9	317.800	780	19	318.300	830
	10	317.850	785	20	318.350	835

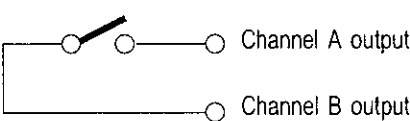
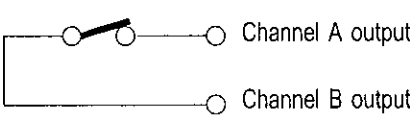
Communication mode	Simplex
Oscillation	Synthesizing controlled by liquid crystal oscillator
Transmission mode	Correlated decoding
Transmission range	Min. 30 m *1 (May be shorter depending on radio wave environment in surrounding area.)
Modulation	FSK FM (Radio waveform F1D)
Response time	Approx. 200 msec (When on standby) *1 Approx. 150 msec (When operation retried within approx. 3 sec) *1
Security	16-bit ID code (65,536 unique codes)
Working temperature and humidity range	Working temperature range: -20 ~ +60 °C (Excluding battery) Working humidity range: 90%RH and below (No dewing)
Storage temperature and humidity range	Storage temperature range: -20 ~ +70 °C (Excluding battery) Storage humidity range: 90%RH and below (No dewing)
Shock resistance	Peak acceleration of 500 m/s ² and action time of 11 ms when not communicating (JIS C 0041-1995)

*1 Measured according to Futaba method.

9-2. Transmitter Specifications

Power supply	AAA dry cell battery x 3 (Alkali dry cell batteries recommended)								
Battery life	Approx. 30 hr in continued transmission (Fresh alkali dry cell batteries measured at ambient temperature according to Futaba method)								
Power on failsafe	Prevents signal transmission from transmitter if POWER switch is pressed while operating switch is ON (signal is ON). To resume normal operation, turn operating switch OFF, then retry operation.								
Periodic operation feature	Power-saving feature designed to conserve battery power. Approx. 3 min after releasing operating switch, transmitter automatically stops sending signal and goes on standby.								
Automatic power off feature	Automatically shuts OFF power if operating switches not pressed for approx. 3 consecutive min.								
Status Indicator lamp	2-color LED x 1 Green: Normal operating voltage Red : Battery replacement needed When the AAA alkaline dry cell batteries are used, transmitter can be used for about 1 hr, but promptly replace batteries because battery power is low.								
	<table border="1"> <tr> <td>Lit</td> <td>Operating switch is in ON position</td> </tr> <tr> <td>Flashing</td> <td>Standby (1 flash per sec)</td> </tr> <tr> <td>Rapid flashing</td> <td>Power on failsafe tripped (2 flashes per sec)</td> </tr> </table>	Lit	Operating switch is in ON position	Flashing	Standby (1 flash per sec)	Rapid flashing	Power on failsafe tripped (2 flashes per sec)		
Lit	Operating switch is in ON position								
Flashing	Standby (1 flash per sec)								
Rapid flashing	Power on failsafe tripped (2 flashes per sec)								
	* If status indicator lamp does not flash when power is ON, replace batteries.								
Switches	<p>POWER switch: Push-button momentary switch x 1</p> <ul style="list-style-type: none"> • When pressed for approx. 0.2 sec while power is OFF → Power turns ON. (Status indicator lamp: Out → Lit) • When held down while power is OFF → Power turns OFF immediately. (Status indicator lamp: Lit → Out) <p>Operating switches: Push-button momentary switch</p> <table border="1"> <thead> <tr> <th>Number of channels</th> <th>Number of operating switches</th> </tr> </thead> <tbody> <tr> <td>2 ch</td> <td>2</td> </tr> <tr> <td>4 ch</td> <td>4</td> </tr> <tr> <td>6 ch</td> <td>6</td> </tr> </tbody> </table>	Number of channels	Number of operating switches	2 ch	2	4 ch	4	6 ch	6
Number of channels	Number of operating switches								
2 ch	2								
4 ch	4								
6 ch	6								
Antenna	Internal								
Waterproof construction	R1 (JIS D 0203-1994)								
Vibration resistance	Class 3, Type B, Level 45 when not communicating (Vibration frequency category 100, JIS D 1601-1995)								
Casing	Resin (black), Elastomer (gray)								
Dimensions	Approx. 147 x 59 x 24 mm (Excluding projections)								
Weight	Approx. 130 g (Including approx. 30 g for batteries)								

9-3. Receiver Specifications

Reception sensitivity Reception mode Error prevention I/O connectors	0.7 μ V or less at ambient temperature (-110 dBm or less) Double-conversion super heterodyning CRC error detection, authentication between devices using ID code AMP connector (16-pin) [1] Header model code : 178307-2 [2] Matching device housing model code : 178289-7 [3] Matching device contact model code : 175218-2 (Receptacle Contact) * Applicable wiring: AWG#16 ~ #20												
Operating switch output	[1] ON/OFF operation <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Number of channels</th> <th>Number of operating switches</th> </tr> </thead> <tbody> <tr> <td>2 ch</td> <td>2</td> </tr> <tr> <td>4 ch</td> <td>4</td> </tr> <tr> <td>6 ch</td> <td>6</td> </tr> </tbody> </table>	Number of channels	Number of operating switches	2 ch	2	4 ch	4	6 ch	6				
Number of channels	Number of operating switches												
2 ch	2												
4 ch	4												
6 ch	6												
Output specifications	[2] Relay opening/closing (a contact) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Output specifications</th> <th>+power supply voltage output</th> <th>Independent relay contact output</th> </tr> </thead> <tbody> <tr> <td>Applicable receiver</td> <td>FRN201R060 FRN401R040 FRN601R010</td> <td>FRN202R070 FRN402R050 FRN602R020</td> </tr> <tr> <td>Max. control capacity</td> <td>Resistance load 5 A Inductive load (L/R = 7 mS) 2 A *Total current on all channels 8 A</td> <td>Resistance load 120 V AC, 5 A 31 V DC, 5 A Inductive load (cosϕ = 0.4) 120 V AC, 2 A (L/R = 7 mS) 31 V DC, 2 A</td> </tr> <tr> <td>Min. applicable load</td> <td>10 mA</td> <td>10 V DC, 10 mA</td> </tr> </tbody> </table>	Output specifications	+power supply voltage output	Independent relay contact output	Applicable receiver	FRN201R060 FRN401R040 FRN601R010	FRN202R070 FRN402R050 FRN602R020	Max. control capacity	Resistance load 5 A Inductive load (L/R = 7 mS) 2 A *Total current on all channels 8 A	Resistance load 120 V AC, 5 A 31 V DC, 5 A Inductive load (cos ϕ = 0.4) 120 V AC, 2 A (L/R = 7 mS) 31 V DC, 2 A	Min. applicable load	10 mA	10 V DC, 10 mA
Output specifications	+power supply voltage output	Independent relay contact output											
Applicable receiver	FRN201R060 FRN401R040 FRN601R010	FRN202R070 FRN402R050 FRN602R020											
Max. control capacity	Resistance load 5 A Inductive load (L/R = 7 mS) 2 A *Total current on all channels 8 A	Resistance load 120 V AC, 5 A 31 V DC, 5 A Inductive load (cos ϕ = 0.4) 120 V AC, 2 A (L/R = 7 mS) 31 V DC, 2 A											
Min. applicable load	10 mA	10 V DC, 10 mA											
Operation example	[Relay OFF]  <p>* With + power supply voltage output, "channel B output" is connected to + power side of receiver.</p> [Relay ON]  <p>* With + power supply voltage output, "channel B output" is connected to + power side of receiver.</p>												

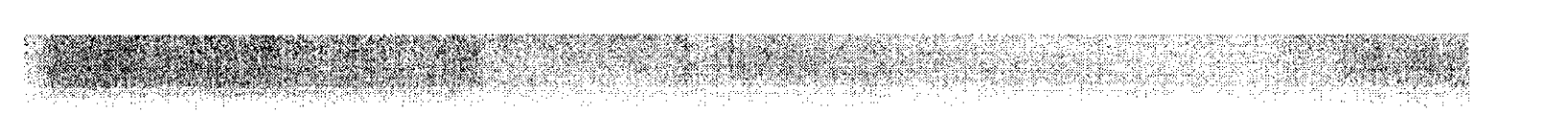
Operating channel output operating mode	Momentary operating mode • All channels can be output simultaneously. • Receiver channel output relay is ON while transmitter operating switch is ON.
Operating power supply voltage	9 ~ 31 V DC
Current consumption	Max.: 0.8 A (Excluding load supply) When idle: 60 mA or less
Antenna	1/4 λ whip antenna (Stainless steel rod, Approx. length: 260 mm)
Dust resistance	F2 (JIS D 0207-1977)
Vibration resistance	Class 3, Type B, Level 70 (Frequency category 100, JIS D 1601-1995)
Casing	Resin (black)
Dimensions	Approx. 117 x 172 x 46 mm (Excluding projections)
Weight	Approx. 370 g

10. If Requesting Servicing

- Attach your warranty slip to the radio control system when requesting servicing for trouble caused after extensive use by worn parts or trouble caused by unexpected accident or natural phenomena.
 - Also, explain the situation surrounding the trouble in as much detail as possible. This information can help us pinpoint the trouble spot and determine what servicing is necessary more quickly, so your radio control system may take less time to repair.
- * Specification and appearance are subject to change without notice because of product improvements.
 * Futaba assumes no responsibility for trouble in the event of unauthorized remodeling.

Memo

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Futaba

If you have any question, please contact us.

Futaba Corporation

URL:<http://www.futaba.co.jp>

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