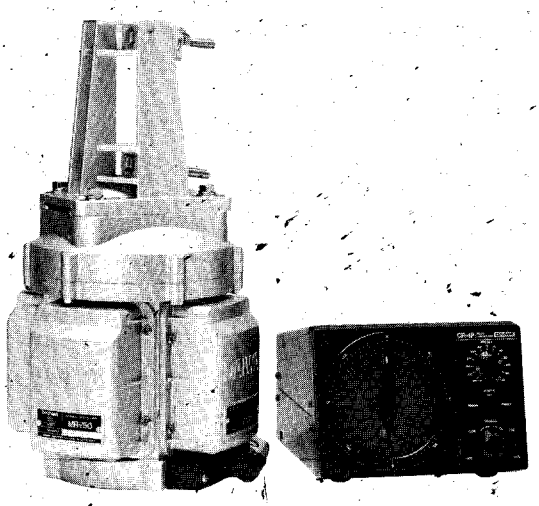


OWNER'S MANUAL

MULTI TORQUE ROTATOR

MODEL MR-750E MR-750PE MR-300E

MULTI TORQUE ROTATOR

Thank you for your selecting up our latest product, DAIWA MULTI TORQUE ROTATOR.
DAIWA MULTI TORQUE ROTATOR has been developed with the total new design concept in amateur radio to combine convenient installation and greatest dependability.
Your unit has been carefully engineered and manufactured under the quality control standards, and should give you satisfactory operation for many years.

THE ULTIMATE IN FLEXIBILITY

The MR-750/MR-300 series rotators offer maximum flexibility in selection and use. This new rotator system allows the user to match his rotator to the particular requirements, and to easily tailor the rotator at any time to suit changing circumstances.
The MR-750/MR-300 system is based upon a rotator head unit which has mounting for up to four drive motors, having its own gear train. Thus, by adding motor units, the user can select a range of turning and brake power to match the antenna system. The reference to the specification table will show the wide range of turning and brake power:
MR-750E/MR-750PE's turning power can be selected from 700kg/cm (608 lbs/inch) to 2,800kg/cm (2,433 lbs/inch) and brake power from 6,000kg/cm (5,215 lbs/inch) to 21,000kg/cm (18,251 lbs/inch)
As a further feature, two rotating speeds are available, the MR-750E/PE taking 70 seconds for full rotation, while the MR-300E takes only 39 seconds. The torque figures are of course reduced on the MR-300E thus making it ideally suited for rotating VHF/UHF antenna systems at high speed.

MAJOR FEATURES

1. **The major rotator frame can house up to 4 motors to increase the torque and load capacity according to the requirements of your antenna system at present and in the future. (PAT. PEND.)**
2. **Each motor unit has its own brake system "SUPER WEDGE & CLUTCH" which works independently from the main frame gear train. (PAT. PEND.)**
3. **The maximum brake power is 21,000kg/cm (18,251 lbs/inch) when 4 motors are installed. The main frame and reduction gear train have been designed to withstand this maximum requirement.**
4. **The motor unit can be easily dismantled for maintenance, if required.**
5. **Easy alignment of the mast and the rotator center without special tool. An antenna mast of 38-63mm diameter can be used. (PAT. PEND.)**
6. **Low voltage motor (24V AC) are used to ensure safety during installation work on the antenna tower.**
7. **Low cost 6-wire cable can be used thanks to the low voltage motor.**
8. **The direction panel of the controller unit can be easily removed to calibrate the direction pointer and change the great circle map. (PAT. PEND.)**
9. **The control knobs are of practical balanced type with lock mechanism on the both sides. (CW & CCW)**

NEW BRAKE SYSTEM "SUPER WEDGE & CLUTCH"

- **"SUPER WEDGE" assures the most stable holding power.**
- **"CLUTCH" guards the rotator unit against any excessive torque (Slip clutch type).**

INSTALLATION TO THE TOWER

Figure 1

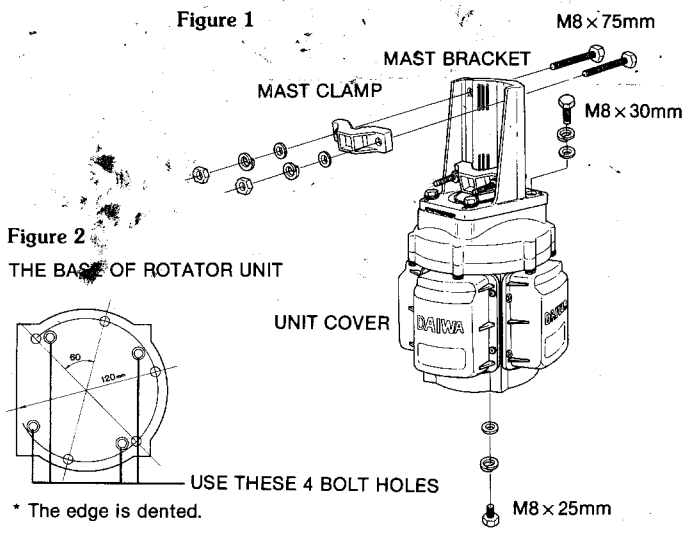


Figure 2

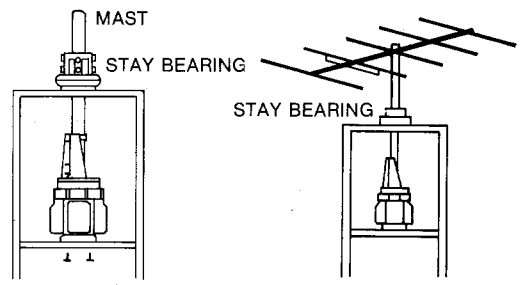
* The edge is dented.

1. See the Figure No. 1
   Attach the mast bracket to the rotator, and fix loosely (temporarily) by 4 pcs. M8×30mm bolts.
2. See Figure No. 2
   Use 4 bolt holes on the base of rotator unit.
   Put the set screw approx. 10mm deep into one of the 4 bolt holes. This makes it easier to adjust all the bolt holes of both rotator and tower to the correct position.
   (The 4 bolt holes just fits the template of CDE and Hy-Gain.)
3. Mount the rotator unit on the tower base plate.
   Insert the set screw-head of the rotator unit into one of the bolt holes on the base plate and turn the rotator unit slowly until all bolt holes are correctly aligned.
4. Fix both the rotator unit and the tower base plate by 4 pcs. M8×25mm bolts after removing the set screw.
5. Install the mast on the rotator unit through a stay-bearing, fix the mast clamp and the mast bracket by 4 pcs. M8×75mm bolts.
   Make sure that the mast bracket is loose at this stage.
6. Tighten 4 bolts M8×30mm on the mast bracket and the rotator firmly.

CAUTION OF INSTALLATION

1. Leave approx. 1mm gap between the mast and the fixing bolt-heads of stay bearing.
2. See the Figure No. 3 showing the typical installation of the antenna, stay bearing and rotator in such a way as to minimize excessive force on the rotator.
   The stay bearing and the upper antenna must be within 1,500mm distance when two or more antennas are stacked.
3. Leave enough slack to allow the antenna to rotate a full 375 degrees.
4. The antenna tower must be carefully and strongly constructed with guy wires if necessary.
5. To avoid lightening strike, it is essential that the tower is grounded.
   A ground wire should be a conductive one more than 3mm in diameter and kept at least 500mm away from the house. Do not use a gas/water pipe. It is recommended to install a lightening arrestor to the coaxial cable outside the house.

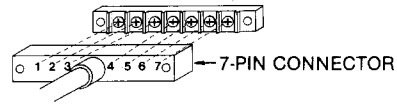
Figure 3



WIRING OF ROTATOR UNIT

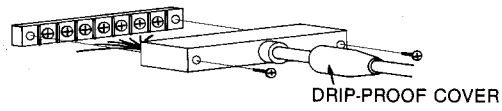
1. 7-pin connector is given descriptive number for each terminal on the cover.
   See the Figure No. 4.

Figure 4



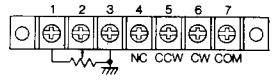
2. When connecting the 6-wire cable, remove the connector cover for easy wiring. Fit the cover firmly after all wiring has been completed.
   (Among 4 motor units, a name plate is attached to the one with motor installed.)
3. Before wiring, a drip-proof cover should be properly fitted to the cable.
   The drip-proof cover is designed to fit any size of cable commodity used. Cut the tip of the cover according to the size of your cable.
   See the Figure No. 5.

Figure 5



4. See the Figure No. 6 showing the function of each terminal.
5. After wiring, install the terminal cover and drip-proof cover fixed by insulating tape.

Figure 6



(Terminal 4 is not used.)

6. The coaxial cable from the rotator unit must be fixed to the tower by insulating tape so that the weight of the coaxial cable is not carried by the 7-pin connector directly.
7. The antenna cable and controller cable must be kept separately at least 300mm away from each other.
   Malfunction may occur in controller operation by RF interference if both cables are too close to each other.

7-PIN CONNECTOR ASSEMBLY

See the Figure No. 4.

WIRING OF CONTROLLER UNIT

It is important to supply the rotator unit with regulated voltage. Supply voltage should be varied according to the number of motors installed, and the size and length of the cable to be used.
Necessary information is given in the table attached to the rear panel of controller unit.

1. The 6-wire control cable from rotator unit should be connected to the terminal of controller unit.
2. Connect terminal 1/2/3/5/6 of rotator unit to the same number terminal 1/2/3/5/6 of controller unit.
   Terminal 4 is not used.
   Terminal 7 of rotator unit should be connected to one of the terminals 7/8/9 of controller unit by referring to the tables below:
   3 tables are provided according to the size of your control cable to be used.
   0.5sq cable — See the table 1.
   0.75sq cable — See the table 2.
   1.25sq cable — See the table 3.
   (If you are not sure of the size of your cable, you can identify it by counting the number of strands.)
   0.5sq = 20 strands
   0.75sq = 30 strands
   1.25sq = 50 strands

TABLE 1. For 0.5sq cable

Number of motor unit	Teminal number 9	8	7
4	11 ~ 18m	3 ~ 10m	
3	21 ~ 28m	11 ~ 20m	1 ~ 10m
2	35 ~ 50m	21 ~ 34m	6 ~ 20m
1	81 ~ 110m	46 ~ 80m	12 ~ 45m

TABLE 2. For 0.75sq cable

Number of motor unit	Teminal number 9	8	7
4	17 ~ 27m	5 ~ 16m	
3	28 ~ 42m	13 ~ 27m	1 ~ 12m
2	51 ~ 73m	28 ~ 50m	6 ~ 27m
1	121 ~ 160m	66 ~ 120m	18 ~ 65m

TABLE 3. For 1.25sq cable

Number of motor unit	Teminal number 9	8	7
4	27 ~ 44m	11 ~ 26m	1 ~ 10m
3	46 ~ 70m	21 ~ 45m	1 ~ 20m
2	85 ~ 120m	46 ~ 84m	10 ~ 45m
1	191 ~ 260m	111 ~ 190m	30 ~ 110m

= Example 1 =

In case you have already decided on the size and length of your cable. First, refer to the table 1 if you use a cable of 0.5sq and 25 meter long. Connect the cable to terminal 7 if only one motor unit is used. Terminal 8 is to be connected when 2 motor units are installed and terminal 9 for 3 motor units.

= Example 2 =

In case you have already decided on number of motor units to be used:

a. When one motor unit is used.
   Refer to the table 1 if you use a cable 0.5sq.
   If you connect to terminal 7, the cable can be a 45 meter long, and by using terminal 9, the cable is extendable up to 110 meter long.
b. When 4 motor units are used.
   Refer to the table 3 if you use a cable 1.25sq.
   If you connect to terminal 7, the cable can be maximum 10 meter long, and by using terminal 9, the cable is extendable up to 44 meter long.

CAUTION OF WIRING

1. Do not use the cable shorter than specified in the tables. For example, the cable of 0.5sq connected to terminal 7 must not be less than 12 meter long when one motor unit is fitted.
2. Wrong wiring can cause damage to the potentiometer and motor.
3. After wiring, the 6-wire cable must be fixed with clamps.

OPERATION

MR-750E/MR-300E

A. Direction plate
Pull it forward to remove from the controller unit when you need to calibrate the direction pointer or change the great circle map.

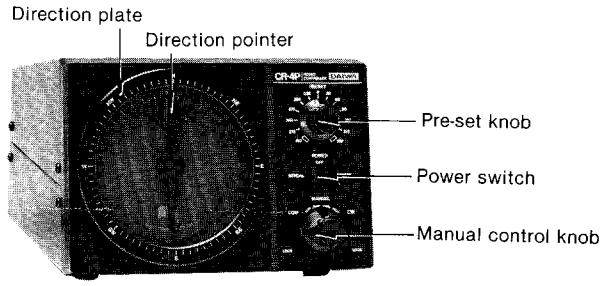
B. Direction pointer
You can freely move it to any position by fingertip.
Adjust it to the starting point you desire.

C. Power switch
Turn the knob to the left to switch on and to the right to switch off.

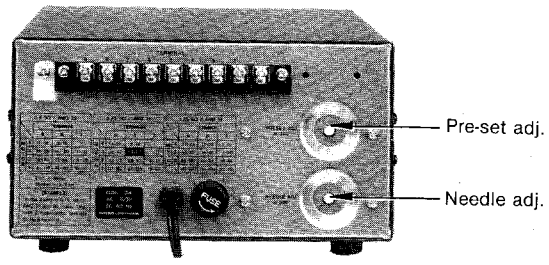
D. Manual control knob
Turn the knob either clockwise or counter-clockwise.
The rotator starts turning.
When released, the knob returns to the original position and the rotator stops turning.
The knob can be locked if fully turned.

Release the knob back to the original position when the rotator stops rotating.

E. Needle adjustment
Switch the manual knob to CW side and lock it until the needle stops rotating.
Turn the needle adj. knob (on the rear panel) until the needle points to 185 degree.



(Front)



(Rear)

MR-750PE

A. Direction plate
Pull it forward to remove from the controller unit when you need to calibrate the direction pointer or change the great circle map.

B. Direction pointer
You can freely move it to any position by fingertip.
Adjust it to the starting point you desire.

C. Power switch
Switch to the left for manual operation and to the right for pre-set operation.
Power will be off at the center position.

D. Manual control knob
Turn the knob either clockwise or counter-clockwise.
The rotator starts turning.
When released, the knob returns to the original position and the rotator stops turning.
The knob can be locked if fully turned, and the rotator remains turning.
Release the knob back to the original position when the rotator stops rotating.

E. Pre-set knob
You can pre-set the direction of your antenna by this knob.
If the power switch is turned for pre-set operation, the rotator turns and automatically stops at the direction the controller indicates.
The rotator will turn as the pre-set knob is turned manually.

F. Pre-set adjustment
Turn the pre-set adjustment knob (on the rear panel) fully clockwise and turn the AC power switch to the right (pre-set operation) until the direction pointer stops.
Turn the pre-set adjustment knob until the pointer indicates 180 degree.

G. Needle adjustment
Switch the manual knob to CW side and lock it until the needle stops rotating.
Turn the needle adj. knob (on the rear panel) until the needle points to 185 degree.

CAUTION ON OPERATION

Note that the maximum continuous operation time is 5 minutes under any circumstance.
However it can continuously run for as long as 10 minutes, provided the motor is brought to rest for no less than 10 minutes afterward.

IMPORTANT FUNCTION OF THE DIRECTION POINTER

1. When unpacked, the direction pointer is set approx. to 0 degree.
   After confirming the wiring, switch on the power
   The controller panel will be illuminated, and the direction pointer will turn and stop to show the direction of the rotator.
2. The rotator wil turn clockwise if the manual knob of controller is switched to CW side.
   Make sure that the rotator stops at 185 degree.
   The rotator will turn counter-clockwise and stops at the 180 degree if the manual knob is switched to CCW side.
3. After confirming the above functions are correct, set the rotator at 0 degree and tighten the mast firmly.
4. The direction pointer may move, following the antenna if it accidentally rotates by strong wind, etc.
5. The starting point of the direction pointer is set to 180 degree at the factory. This may be inconvenient for those who are using antennas mainly in the direction of South.
   It is possible to alter the starting point in the direction of North by simply turning the direction pointer to 180 degree.
   in this case of the CR-4P (MR-750PE), the direction pointer will come to 180 degree position if you turn the Pre-set knob to 0 degree.

AZIMUTHAL GREAT CIRCLE MAP FILM

The great circle map films are available.
If you need, please contact the dealer who supplied you the rotator.
(10 varieties of map film, available. Please select the most suitable one for you.)

= how to install the map film

1) Remove the direction plate.
2) Pick your map film.
3) Attach the map film with North pointing upward to the rear side of the direction panel with adhesive.

INSTALLATION OF ADDITIONAL MOTOR UNIT

Please read the following carefully before the installation of Motor unit, Model MR-750U/MR-300U.

NOTE: MR-750U is for Model MR-750E/MR-750PE.
(Do not use for any other model.)
MR-300U is for Model MR-300E.
(Do not use for any other model.)
Use correct motor unit for your MULTI TORQUE.

Warning
Serious damage can occur to the motor unit(s), if wrong motor unit(s) is/are installed.

SPECIFICATIONS

	MR-750U	MR-300U
Rotation time	70 seconds (50Hz)	39 seconds (50Hz)
	58 seconds (60Hz)	33 seconds (60Hz)
Output Torque	700kg/cm	400kg/cm
Brake power	5,000kg/cm	3,300kg/cm
Continuous running	5 minutes Max. permitted	
Running voltage	24V AC	
Power requirement	50W (per unit)	
Weight	1.5kg (per unit)	

INSTALLATION

1. Remove the empty motor can from the rotator unit.
   (A working motor unit has a mark on the can so you can identify the empty can from the working unit.)
   *The second motor unit should be installed to the opposite side of the first unit.
2. Connect the motor unit plug to the plug socket of rotator unit correctly.
3. Install the motor unit into the rotator unit correctly.
   Special care should be paid to this installation.
   No wires must be entrapped by any gear.
4. The motor unit gears should mesh with the main frame gears correctly. If the gears do not mesh correctly, give some rotation to the gears.
5. Tighten 4 fixing bolts just evenly.

TERMINAL RE-SETTING

It is important to supply the rotator unit with regulated voltage. Supply voltage should be varied according to the number of motors installed, and the size and length of the cable to be used.
Necessary information is given in the table attached to the rear panel of controller unit.

1. The 6-wire control cable from rotator unit should be connected to the terminal of controller unit.
2. Connect terminal 1/2/3/5/6 of rotator unit to the same number terminal 1/2/3/5/6 of controller unit, respectively.
   Terminal 4 is not used.
   Terminal 7 of rotator unit should be connected to one of the terminals 7/8/9 of controller unit by referring to the tables below:
   3 tables are provided according to the size of your control cable to be used.
   0.5sq cable — See the table 1.
   0.75sq cable — See the table 2.
   1.25sq cable — See the table 3.
   (If you are not sure of the size of your cable, you can identify it by counting the number of strands.)
   0.5sq = 20 strands
   0.75sq = 30 strands
   1.25sq = 50 strands

TABLE 1. For 0.5sq cable

Number of motor unit	Teminal number 9	8	7
4	11 ~ 18m	3 ~ 10m	
3	21 ~ 28m	11 ~ 20m	1 ~ 10m
2	35 ~ 50m	21 ~ 34m	6 ~ 20m
1	81 ~ 110m	46 ~ 80m	12 ~ 45m

TABLE 2. For 0.75sq cable

Number of motor unit	Teminal number 9	8	7
4	17 ~ 27m	5 ~ 16m	
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TABLE 3. For 1.25sq cable

Number of motor unit	Teminal number 9	8	7
4	27 ~ 44m	11 ~ 26m	1 ~ 10m
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1	191 ~ 260m	111 ~ 190m	30 ~ 110m

= Example 1 =
In case you have already decided on the size and length of your cable. First, refer to the table 1 if you use a cable of 0.5sq and 25 meter long. Connect the cable to terminal 7 if only one motor unit is used. Terminal 8 is to be connected when 2 motor units are installed and terminal 9 for 3 motor units.

= Example 2 =
In case you have already decided on number of motor units to be used.

a. When one motor unit is used.
   Refer to the table 1 if you use a cable 0.5sq.
   If you connect to terminal 7, the cable can be a 45 meter long, and by using terminal 9, the cable is extendable up to 110 meter long.
b. When 4 motor units are used.
   Refer to the table 3 if you use a cable 1.25sq.
   If you connect to terminal 7, the cable can be maximum 10 meter long and, by using terminal 9, the cable is extendable up to 44 meter long.

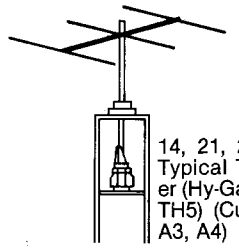
CAUTION OF WIRING

1. Do not use the cable shorter than specified in the tables. For example, the cable of 0.5sq connected to terminal 7 must not be less than 12 meter long when one motor unit is fitted.
2. Wrong wiring can cause damage to the potentiometer and motor.
3. After wiring, the 6-wire cable must be fixed with clamps.

ILLUSTRATION OF ANTENNA SYSTEM

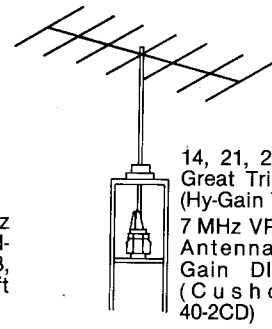
1. Illustrated below are the typical antenna systems any of which can be mounted on MR-750E/MR-750PE with one motor unit/three motor units installed.
   You can approximately double the load of your antenna system by adding one extra motor unit, triple by two extra motor units, and quadruple by three extra motor units.
2. The MR-300E has a reduced torque rating, compared with the MR-750E/PE, in order to attain high speed rotation.
   You can increase the load in the same theory as the MR-750E/PE described in the above 1.

MR-750E/PE
(1 drive motor)



14, 21, 28 MHz Typical Tribander (Hy-Gain TH3, TH5) (Cushcraft A3, A4)

MR-750E/PE
(3 drive motors)



14, 21, 28 MHz Great Tribander (Hy-Gain TH7)
7 MHz VP beam Antenna (Hy-Gain DISC7-3) (Cushcraft 40-2CD)

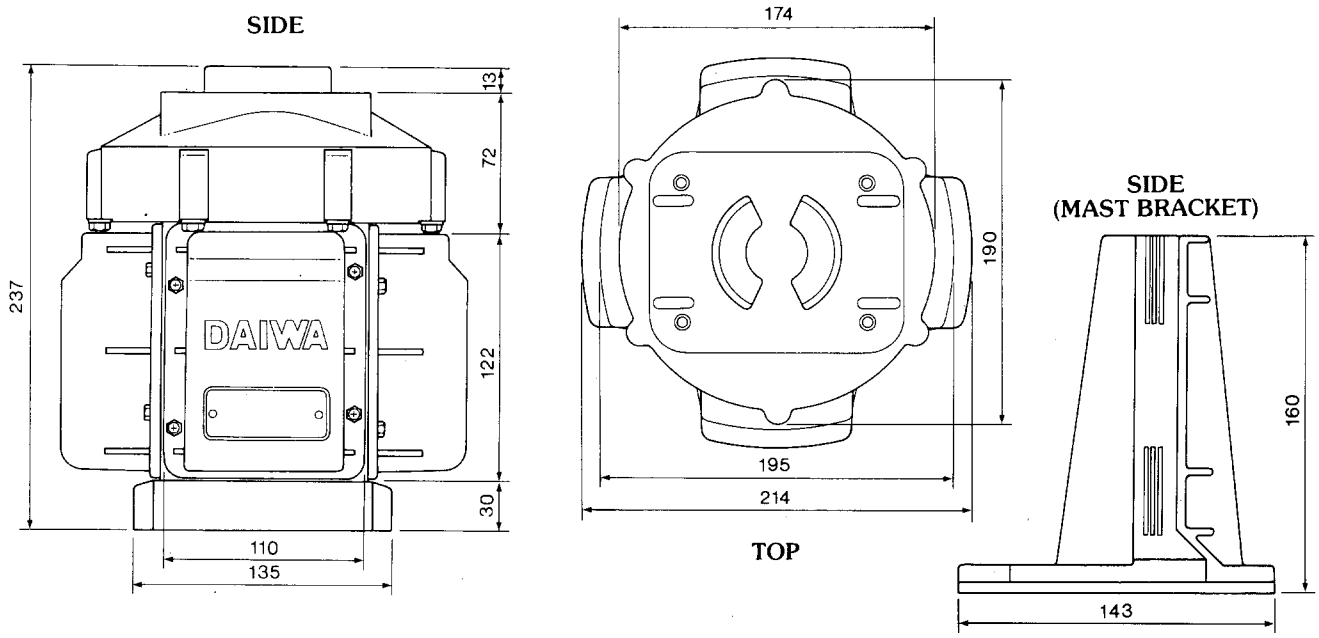
MR-300E 'HIGH SPEED TYPE'
39 sec./rotation (50 Hz input)

144 MHz 10 element × 2 parallel-with 1 drive motor
430 MHz 12 element × 4 parallel-with 1 drive motor
50 MHz 6 element × 2 stack-with 2 drive motors

MAINTENANCE

The rotator is lubricated with high durable all-weather molybdenum grease (−40°C ~ +120°C) at factory, and no further lubrication is required.

DIMENSIONS OF ROTATOR UNIT

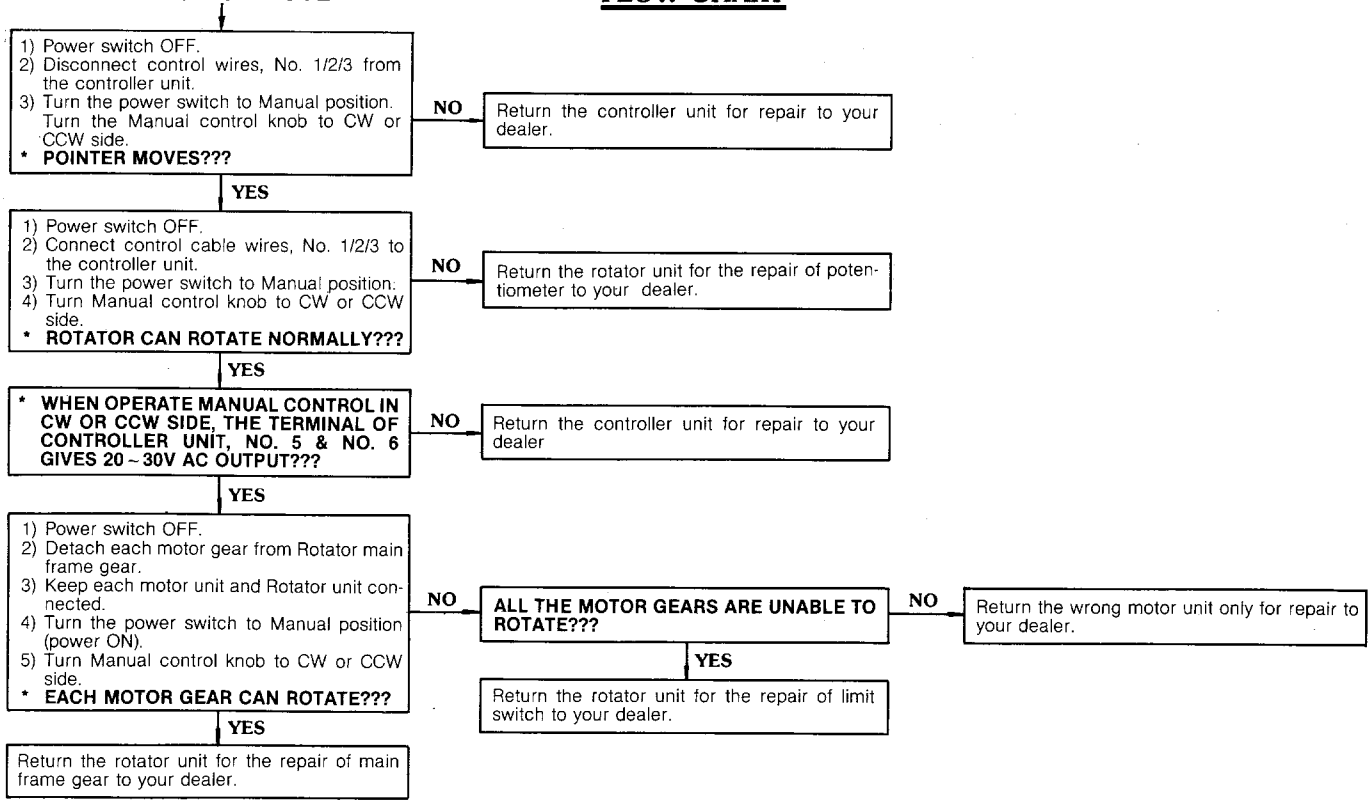


TROUBLE-SHOOTING

1) No power
   Check if the fuse in the controller unit is faulty.
   If the fuse has blown repeatedly after being replaced, check the unit carefully for a possible defect.
   Remove the 6-wire cable entirely and turn the power switch on to see if the defect is either on the rotator or the controller side.
   Suspect a faulty transformer in the controller unit, or faulty motor/capacitor or a connector short on the rotator side.
2) If the direction pointer moves abnormally out of control by manual operation, return the controller unit for repair to the dealer who supplied your rotator. Servo circuit of the controller or potention meter of rotor body would have problem.
3) Faulty pre-set operation
   Return the controller unit for repair to the dealer who supplied your rotator.
4) The direction pointer does not move.
   Check the unit carefully referring to the chart below.
   Whenever you have any break-down in the rotator, do not operate the rotator and switch off for the unit.

POINTER DOES NOT MOVE

FLOW CHART



SPECIFICATIONS

■CONTROLLER UNIT

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	230 V AC/117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	180 mm (W) × 125 mm (H) × 175 mm (D)	
Weight	4 kg	
Operation	Manual	Manual/Pre-set

■ROTATOR UNIT

		MR-750E/PE	MR-300E
Rotation time	50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)
	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)
Output torque Brake power	1 motor	700 kg/cm (608 lbs/inch) 6,000 kg/cm (5,215 lbs/inch)	250 kg/cm (217 lbs/inch) 2,000 kg/cm (1,738 lbs/inch)
	2 motors	1,400 kg/cm (1,217 lbs/inch) 11,000 kg/cm (9,560 lbs/inch)	500 kg/cm (435 lbs/inch) 4,000 kg/cm (3,476 lbs/inch)
	3 motors	2,100 kg/cm (1,825 lbs/inch) 16,000 kg/cm (13,906 lbs/inch)	750 kg/cm (652 lbs/inch) 6,000 kg/cm (5,215 lbs/inch)
	4 motors	2,800 kg/cm (2,433 lbs/inch) 21,000 kg/cm (18,251 lbs/inch)	1,000 kg/cm (869 lbs/inch) 8,000 kg/cm (6,953 lbs/inch)
Rotation angle		365 degrees	
Permissible mast size		38 mm – 63 mm (diameter)	
Control cable		6-wire cable 0.5sq – 1.25sq (AWG16/18/20 etc.)	
Continuous running		5 minutes Max. permissible	
Unit weight		7.5 kg (with 1 motor unit fitted)	

STANDARD ACCESSORIES

Please check the accessories supplied against this list.

- Controller unit ..... 1 unit
- Rotator unit ..... 1 unit
- Mast bracket ..... 1 pc.
- Mast clamp ..... 1 set
- Bolt M8 × 75mm ..... 4 pcs.
  M8 × 30mm ..... 4 pcs.
  M8 × 25mm ..... 4 pcs.
- Nut 8φ ..... 4 pcs.
- Spring washer 8φ ..... 13 pcs.
- Flat washer 8φ ..... 13 pcs.
- Set screw M8 × 16mm ..... 1 pc.
- Terminal cover ..... 1 pc.
- Cover fixing screw (M4 × 6mm) ..... 2 pcs.
- Drip-proof cover ..... 1 pc.
- Owner's manual ..... 1 copy

OPTIONAL ACCESSORIES

- Motor unit, model MR-750U (for MR-750E/PE)
- Motor unit, model MR-300U (for MR-300E)
- Lower mast support, model MS-1

HOBBY ELECTRONICS®

DAIWA INDUSTRY CO.,LTD. 株式会社 ダイワ インダストリ

DAIWA INDUSTRY CO., LTD.
No.12 2-Chome Kanda Tsukasa-Cho, Chiyoda-Ku, TOKYO 101 JAPAN
PHONE. 03-252-1234, TLX. J25608, FAX. 03-258-2332

Printed in Japan