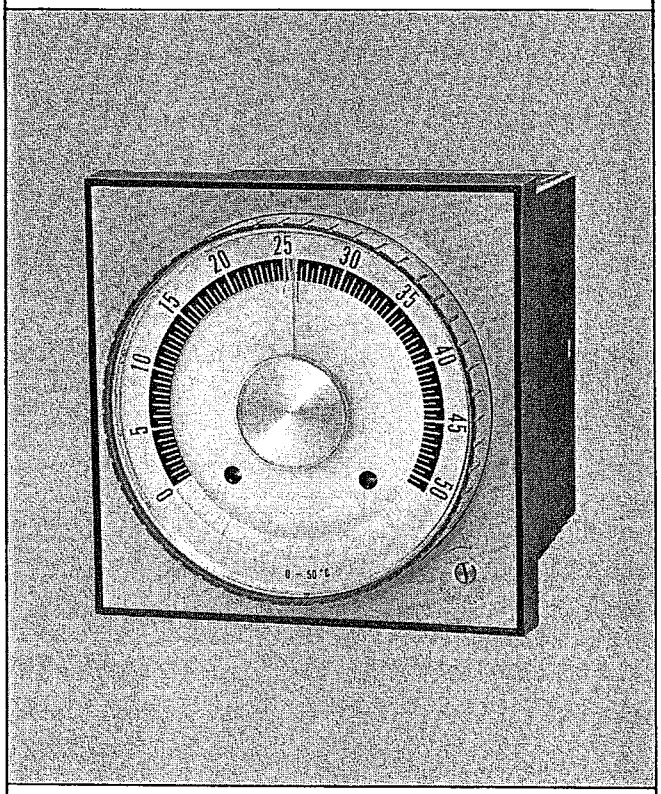
廃番 YAMATAKE

No. AI-2204E

DialaTrol®

INDICATING CONTROLLERS POSITION-PROPORTIONAL OUTPUT SERIES



RN765 (non-indicating)
R7372 (with indicator)
R7377 (with indicator)

Dialatrols are zero balance-type indicating controllers which operate by directly inputting signals from a thermocouple or RTD, or by inputting mV or mA.

- High indicating and setting accuracy of ±0.5% F.S.
- Wide scale of 210 mm with large deflection angle of ±120°.
- 12 o'clock setpoint enables operator to easily monitor control conditions.
- Control circuit is independent of temperature indication circuit. Consequently, the control section is unaffected in the event that the indication section breaks down.
- Plug-in printed circuit boards are provided separately for each function, enabling easy maintenance.
- Vibration-proof construction due to large ampere-turns indicator and all solid-state circuitry.
- Withstands shocks of up to 490m/s², enabling it to be transported while installed on panel.
- Short depth and lightweight. Also, instrument can be mounted in close proximity to other units of Dialatrols.
- Instrument can be operated with high impedance-type recorder or alarm device, using a single thermocouple.

CONTENTS

廃番

SPECIFICATIONS

1. GENERAL SPECIFICATIONS

INDICATION: ±50% F.S. (excluding RN765)

INDICATING ACCURACY:
±0.5% F.S. (excluding RN765) at center of scale, under standard conditions

SETTING ACCURACY:
±0.5% FS for constant value control
±1.0% for cascade control under standard conditions

INPUTS: Thermocouple, mV, mA or RTD
Input span:
Thermocouple 10 mV minimum RTD 20Ω minimum
Input impedance:
300 kΩ minimum
Allowable signal source resistance:
0 to 250Ω thermocouple mV
100Ω maximum 4 to 20 mA
Allowable wiring resistance:
0 to 4Ω RTD

CASCADE INPUT: ±4 VDC (no input isolation)

CONTROL OPERATION: See individual specifications.

CONTROL OUTPUTS:

RELAY OUTPUT: SPDT
Contact ratings: 5.0A 250 VAC resistive load
1.5A 250 VAC inductive load
3.0A 30 VDC resistive load

OPERATION LAMPS: Red LED, green LED

WIRING DISTANCE: 500m maximum, ϕ1.6 conductor

BURNOUT: Upper limit, thermocouple type

COLD JUNCTION COMPENSATION:
Incorporated for thermocouple type

STRAY REJECTION:
CMR 120 dB 250 VAC maximum
NMR 60 dB voltage equal to 2 x span

INSULATION RESISTANCE:
50 MΩ 500 VDC (between each terminal and case)

DIELECTRIC STRENGTH:
1500 VAC for one minute, or 1800 VAC for one second (between power terminals and case)

RATED SUPPLY VOLTAGE:
100/110, 200/220, or 120/240 VAC 50 or 60 Hz

ALLOWABLE VOLTAGE FLUCTUATION:
90 to 121 V for 100/110V rating
190 to 242 V for 200/220 V rating
102 to 132 V for 120 V rating
204 to 264 V for 240 V rating

POWER CONSUMPTION:
8 W maximum at rated voltage

ALLOWABLE AMBIENT TEMPERATURE: –20 to +55°C

ALLOWABLE HUMIDITY:
90% R.H. maximum at 40°C

VIBRATION RESISTANCE:
4.9m/s² maximum (10 to 60 Hz)

MASK MATERIAL: Heat resistant ABS plastic

REAR CASE MATERIAL: Plastic

MASK STANDARD COLOR:
Munsell 4Y7.2/1.3 10YR4.7/0.5

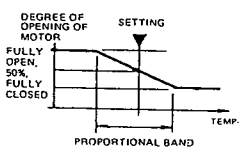
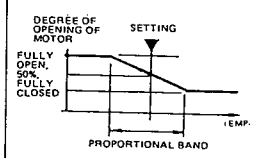
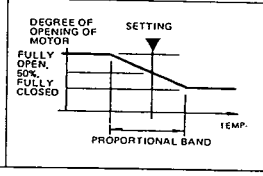
MASS: Approx. 1.9 kg

INSTALLATION: Flush panel mounting

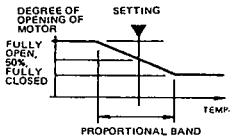
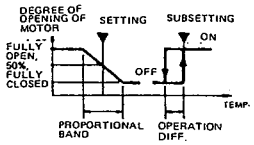
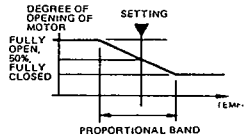
ACCESSORIES:
One set of mounting brackets (Part No. N3050)

AUXILIARY PARTS:
Dustproof terminal cover (Part No. 187519)
(must be ordered separately)

2. INDIVIDUAL SPECIFICATIONS

I Basic model No.	Control operation	II Type of input: Constant value – Thermocouple	II Type of input: Constant value – RTD	II Type of input: Cascade – Thermocouple	II Type of input: Cascade – RTD	Output	Composition model No. / Individual specifications	
							I Basic model No.	II Kind of input / III Range code
Non-indicating RN765	Position proportion P	A	B	N	P	M/M drive relay		**Indicating range:** Non-indicating **Setting range:** Entire scale range **Proportional band:** 1 to 50% FS (adj.) **Dead zone:** 0.2 to 2% FS (adj.) **Manual reset:** Within ±50% proportional band (adj.)
Full indication R7372	Position proportion P	A	B	N	P	M/M drive relay		**Indicating range:** ±50% FS **Setting range:** Entire scale range **Proportional band:** 1 to 50% FS (adj.) **Dead zone:** 0.2 to 2% FS (adj.) **Manual reset:** Within ±50% proportional band (adj.)
	Position proportion PI	C	D	Q	R	M/M drive relay		**Indicating range:** ±50% **Setting range:** Entire scale range **Proportional band:** 1 to 50% FS (adj.) **Dead zone:** 0.2 to 2% FS (adj.) **Reset time:** 30 s to 20 min (adj.) Provided with reset wind-up prevention circuit

INDIVIDUAL SPECIFICATIONS (Continued)

I Basic model No.	Control operation	II Type of input: Constant value: Thermo-couple	Constant value: RTD	Cascade: Thermo-couple	Cascade: RTD	Output	Individual specifications	
Full indication R7372	Position proportion PID	E	F	S	T	M/M drive relay		**Indicating range:** ±50% FS **Setting range:** Entire scale range **Proportional band:** 0.2 to 2% FS (adj.) **Dead zone:** 0.2 to 2% FS (adj.) **Reset time:** 30 s to 20 min (adj.) **Rate time:** 2 s to 6 min (adj.) Provided with reset wind-up prevention circuit
	Position proportion P + Upper limit, ON-OFF	G	H	U	V	M/M drive relay + SPDT		**Indicating range:** ±50% FS **Main setting range:** Entire scale range **Proportional band:** 1 to 50% FS (adj.) **Dead zone:** 0.2 to 2% FS (adj.) **Manual reset:** Within ±50% proportional band (adj.) **Subsetting range:** Main setting +3 to +50% FS **Subsetting operation diff.:** 1.5% FS (Fixed)
Full indication R7377	Position proportion PID + auto-manual	E	F	S	T	M/M drive relay		**Indicating range:** ±50% FS **Setting range:** Entire scale range **Proportional band:** 4 to 16% FS (adj.) **Dead zone:** 0.2 to 2% FS (adj.) **Reset time:** 1 to 4 min (adj.) **Rate time:** 15 to 60 s (adj.) Provided with reset wind-up prevention circuit Provided with automatic-manual selector switch and output meter

3. RANGE CODE TABLE (Code No. III)

The table shows the codes for 100/110 and 200/220 V models. For 120/240 V models, change the codes as follows:

XXXO → XXX4Z (Ex. J020 → J024Z)
XXXOZ → XXX4Z (Ex. J050Z → J054Z)
XXXOP → XXX4P (Ex. C910P → C914P)

Range	Type of input	Direct input Code	4 to 20 mA converted input Code
0~ 200°C	J (IC)	J 020	J 520 Z
0~ 300°C	"	J 030	J 530 Z
0~ 400°C	"	J 040	J 540 Z
0~ 500°C	"	J 050 Z	J 550 Z
0~ 600°C	"	J 060 Z	J 560 Z
-100~+ 50°C	E (CRC)	E 440 Z	–
-50~+100°C	"	E 410 Z	E 910 Z
0~ 200°C	"	E 020 Z	E 520 Z
0~ 400°C	"	E 040 Z	E 540 Z
0~ 200°C	K (CA)	K 020 Z	K 520 Z
0~ 250°C	"	K 120 Z	K 620 Z
0~ 300°C	"	K 030	K 530 Z
0~ 400°C	"	K 040	K 540 Z
0~ 500°C	"	K 050 Z	K 550 Z
0~ 600°C	"	K 060 Z	K 560 Z
0~ 800°C	"	K 080	K 580 Z
0~1000°C	"	K 100	K 600 Z
0~1200°C	"	K 090	K 590 Z
300~ 600°C	"	K 230 Z	K 730 Z
400~ 800°C	"	K 240 Z	K 740 Z
600~1200°C	"	K 260 Z	K 760 Z
0~1200°C	R (PR13%)	R 320 Z	R 820 Z
0~1400°C	"	R 340	R 840 Z
0~1600°C	"	R 360	R 860 Z
700~1400°C	"	R 370 Z	R 870 Z
800~1600°C	"	R 380 Z	R 880 Z

Range	Type of input	Direct input Code	4 to 20 mA converted input Code
0~1600°C	B (PR6-30)	R 170 Z	R 670 Z
0~1800°C	"	R 180 Z	R 680 Z
800~1800°C	"	R 290 Z	R 790 Z
0~2000°C	W (W Re5-26)	R 400 Z	R 900 Z
0~2300°C	"	R 410 Z	R 910 Z
-50~+100°C	Ni	N 410 Z	N 910 Z
-40~+ 80°C	"	N 330 Z	N 830 Z
-20~+ 40°C	"	N 300 Z	N 800 Z
-25~+ 25°C	"	N 320 Z	N 820 Z
0~ 50°C	"	N 100	N 600 Z
0~ 100°C	"	N 010 Z	N 510 Z
-45~+ 70°C	" (SSP129)	N 390	N 890 Z
-25~+ 25°C	" (Temperature difference)	Y 500 Z	–
-200~ 0°C	JIS Pt100 Ω	P 470 Z	P 970 Z
-200~+ 50°C	"	P 480 Z	P 980 Z
-100~+ 50°C	"	P 440 Z	P 940 Z
-100~+200°C	"	P 460 Z	P 950 Z
-50~+ 50°C	"	P 340 Z	P 840 Z
-50~+100°C	"	P 410 Z	P 910 Z
-50~+150°C	"	P 350 Z	P 850 Z
-50~+200°C	"	P 420 Z	P 920 Z
-20~+ 25°C	"	P 320 Z	P 820 Z
-20~+ 85°C	"	P 310 Z	P 810 Z
0~ 50°C	"	P 100	P 600 Z
0~ 100°C	"	P 010	P 510 Z
0~ 150°C	"	P 110	P 610 Z

Range	Type of input	Direct input Code	4 to 20 mA converted input Code
0~200°C	JIS Pt100 Ω	P 020	P 520 Z
0~250°C	"	P 120	P 620 Z
0~300°C	"	P 030	P 530 Z
0~400°C	"	P 040	P 540 Z
0~500°C	"	P 050	P 550 Z
50~150°C	"	P 240 Z	P 740 Z
100~200°C	"	P 210 Z	P 710 Z
100~300°C	"	P 270 Z	P 770 Z
-20~+25°C	" (Temperature difference)	Y 320 Z	Y 820 Z
0~ 50°C	JIS Pt50 Ω	Q 100 Z	Q 600 Z
0~100°C	"	Q 010 Z	Q 510 Z
0~200°C	"	Q 020 Z	Q 520 Z
0~100%	0~10mV	M 101	C 010
Note)			
0~ 1kg/cm²	4 -20mA	–	C 910 P
0~ 2kg/cm²	"	–	C 920 P
0~ 4kg/cm²	"	–	C 940 P
0~ 6kg/cm²	"	–	C 960 P
0~10kg/cm²	"	–	C 100 P
0~20kg/cm²	"	–	C 200 P
0~35kg/cm²	"	–	C 350 P
0~14PH	0~10mV	M 140	C 140
2~12PH	0~10mA	M 120 Z	C 120 Z
0~50°C Linear	4~20mA (JIS Pt100 Ω)	–	C 500

Note:
The proportional band for the pressure model is 200%.

DIMENSIONS AND INSTALLATION

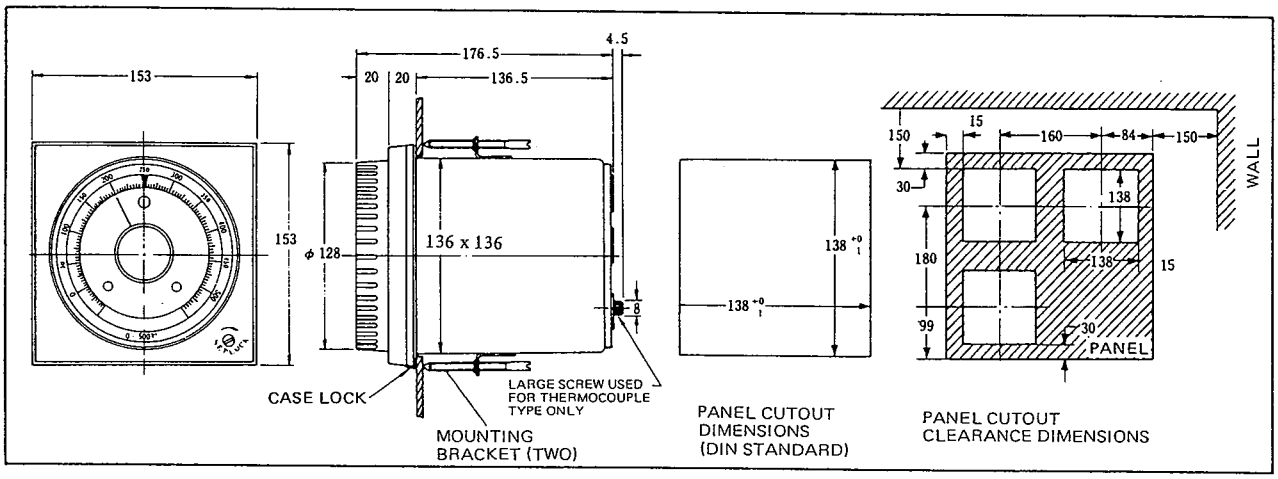


Fig. 1 External dimensions, panel cutout and panel cutout clearance dimensions

Precautions for Installation

1. Location

(1) When installing the instrument, avoid places where there is a large amount of heat, high humidity, dust, or a corrosive atmosphere, just as for any general electrical instrument.
It is recommended that the instrument be installed indoors in a place where there is little temperature fluctuation and where the air is clean and dry.
If it is necessary to install the instrument in a place where there is a lot of dust or oil mist, use a dustproof terminal cover (part No. 187519).

(2) Avoid installing the instrument in a place which is subject to vibrations or shock.

(3) Avoid installing the instrument in the vicinity of electrical noise sources, electric motors, compressors, welding machines, and so on. In particular, keep it at least 50 cm away from any SCR unit.

2. Installation Method (see Fig. 1)

A Dialatrol instrument is used recessed in the panel cutout provided.
Install the instrument by firmly fixing it at above and below the case with the mounting brackets provided.

WIRING

1. Precautions for Wiring

(1) Use shielded wire for the input signal lines.
Recommended wire: JCS 364 Hitachi KPEV-SB
Fujikura IPEV-SB
Keep the signal wire at least 50 cm away from the power wires.

(2) When wiring to the + and − input terminals of the instrument from thermocouple, be sure to use the compensation wire specified in Table 1.Connect three wires of equal diameter from RTD to terminal A, B and C.

(3) Do not run the wiring between the instrument and thermocouple, or RTD, in the same conduit with power lines. This also applies to the wiring in the instrument panel.

(4) Treat the output signal wire for 4 to 20 mA DC and voltage pulses in the same way as the above (1) and (3). Use JIS C3307 600 V vinyl-insulated wire for relay output lines.

(5) Use JIS C3307 600 V vinyl-insulated wire for power lines. If there are frequent surges from the power line, the use of an isolating line filter is recommended.
Recommended filter: TDK ZAC2205-00

(6) Also, if necessary, install an RC attenuator or surge absorber on the electromagnetic relay of motor which constitutes a source of electrical noise, which will eliminate sparking and noise. An RC attenuator is effective for fast rise surges, and a varistor is effective against pulse surges with high peak values.

(7) Carry out wiring using press-fit terminals, in accordance with the symbols on the external wiring terminals.

(8) For a supply voltage of 100V, 110V, or 120V, connect the wiring from power main to terminals ⓪ and ⑩⓪, and for a supply voltage of 200V, 220V, or 240V, connect it to terminals ⓪ and ②⓪.

(9) The instrument is not provided with either a power switch or fuse. If necessary, install one separately.

Table 1 Compensation wire specifications

廃番

Type	Type of thermocouple used in combination with compensation wire (conforming to JIS-C1610-1981)	Symbol	Operating classification	Operating temperature range (°C)	Color coding of surface covering
R-type compensation wire	R (PR)	RX–G	General purpose	0 to 90	Black
		RX–H	High temperature applications	0 to 150	
K-type compensation wire	K (CA)	KX–G	General purpose	-20 to +90	Blue
		KX–GS			
		KX–H	High temperature applications	0 to 150	
		KX–HS			
E-type compensation wire	E (CRC)	EX–G	General purpose	-20 to +90	Purple
		EX–H	High temperature applications	0 to 150	
J-type compensation wire	J (IC)	JX –G	General purpose	-20 to +90	Yellow
		JX –H	High temperature applications	0 to 150	
T-type compensation wire	T (CC)	TX–G	General purpose	-20 to +90	Brown
		TX–H	High temperature applications	0 to 150	

Notes:

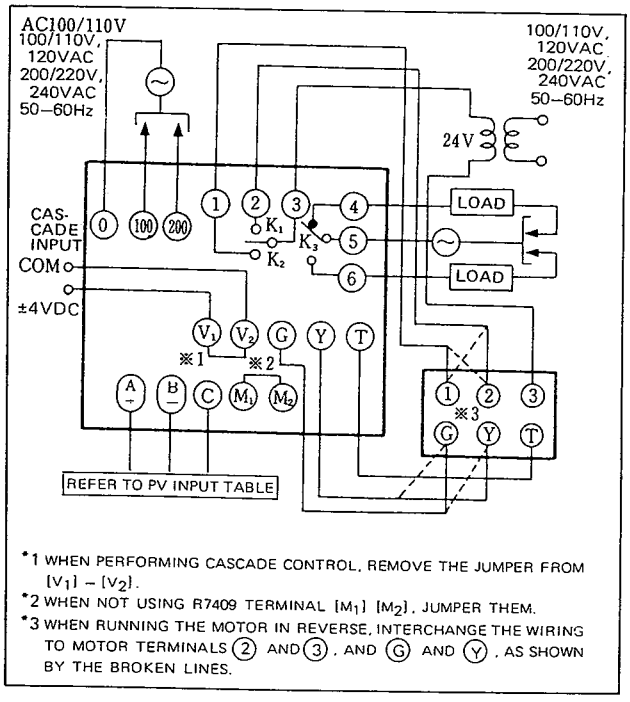
(1) General purpose compensation wire can withstand an ambient temperature of 90°C, and its insulation does not deteriorate by immersion in water.

(2) Compensation wire for high temperature applications can withstand an ambient temperature of 150°C, and its insulation also does not deteriorate.

2. Wiring

After first checking the model number, carry out wiring in accordance with the input terminal table (page 5) and also the PV input tables, while referring to the overall terminal layout.

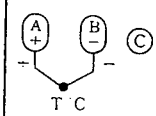
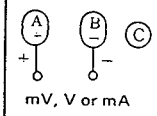
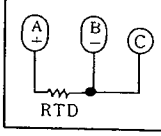
Overall Terminal Layout Model

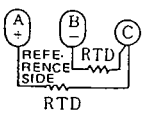


*1 WHEN PERFORMING CASCADE CONTROL, REMOVE THE JUMPER FROM [V1] – [V2].
*2 WHEN NOT USING R7409 TERMINAL [M1] [M2], JUMPER THEM.
*3 WHEN RUNNING THE MOTOR IN REVERSE, INTERCHANGE THE WIRING TO MOTOR TERMINALS ② AND ③, AND Ⓖ AND Ⓨ, AS SHOWN BY THE BROKEN LINES.

Fig. 2

PV Input Table

Input terminals	Type of input
	T/C
	DCmV, V DCmA
	RTD

Input terminals	Type of input
	Temperature difference control RTD
Temperature difference control range: -25 to +25°C JISPt100Ω -25 to +25°C Ni508Ω	

廃番

Input/Output Terminal Table

Terminal: O yes — no

		A	B	C	D	E	F	G	H	N	P	Q	R	S	T	U	V
R7372	Next model No.																
Upper limit output terminals	④ ⑤ ⑥	–	–	–	–	–	–	O	O	–	–	–	–	–	–	O	O
Cascade input terminals	V1 V2	–	–	–	–	–	–	–	–	O	O	O	O	O	O	O	O
R7409 output terminals	M2 M2	–	–	O	O	O	O	–	–	–	–	O	O	O	O	–	–
R7377	Next model No.	–	–	–	–	E	F	–	–	–	–	–	–	S	T	–	–
Cascade input terminals	V1 V2	–	–	–	–	–	–	–	–	–	–	–	–	O	O	–	–
R7409 output terminals	M2 M2	–	–	–	–	O	O	–	–	–	–	–	–	O	O	–	–
RN765	Next model No.	A	B	–	–	–	–	–	–	N	P	–	–	–	–	–	–
Cascade input terminals	V1 V2	–	–	–	–	–	–	–	–	O	O	–	–	–	–	–	–
R7409 output terminals	M2 M2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Relay Operation: Upper limit setting possible for R7372G, H, U and V only

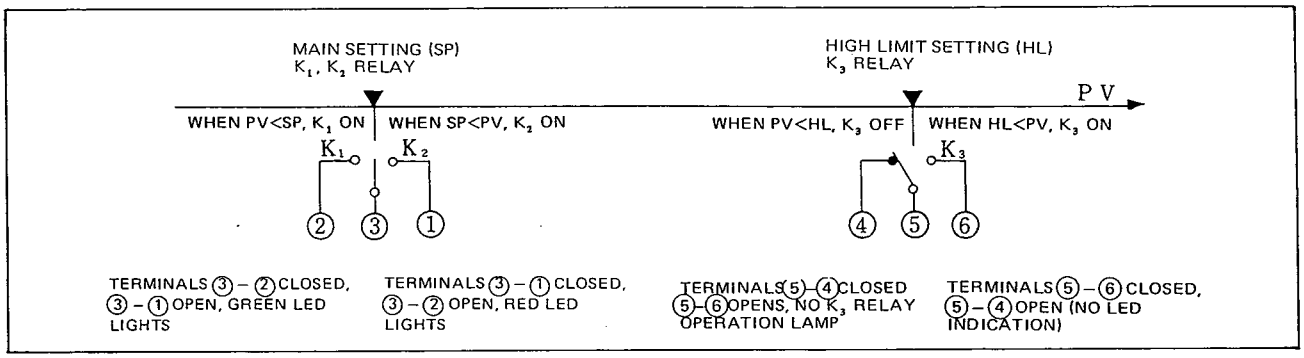


Fig. 3

PRE-STARTUP

1. Pre-operation Check

(1) Check the power supply voltage, and ensure that the wiring to terminals is correct.
(2) Check the ⊕ and ⊖ polarity of the wiring between the thermocouple (or converter) and the instrument. Check also the wiring to terminals Ⓐ, Ⓑ and Ⓒ from RTD.
(3) After checking items (1) and (2), supply the power to the instrument.

2. Main Setting (Photos 1 and 2)

(1) Constant value control
Perform main setting by turning the setting dial on the front of the instrument right or left until the desired graduation is in line with the center of the red ▼ at the top. To fix the setting, turn the SET LOCK screw clockwise using a screwdriver. When changing the setting, turn the SET LOCK screw counterclockwise to loosen it.

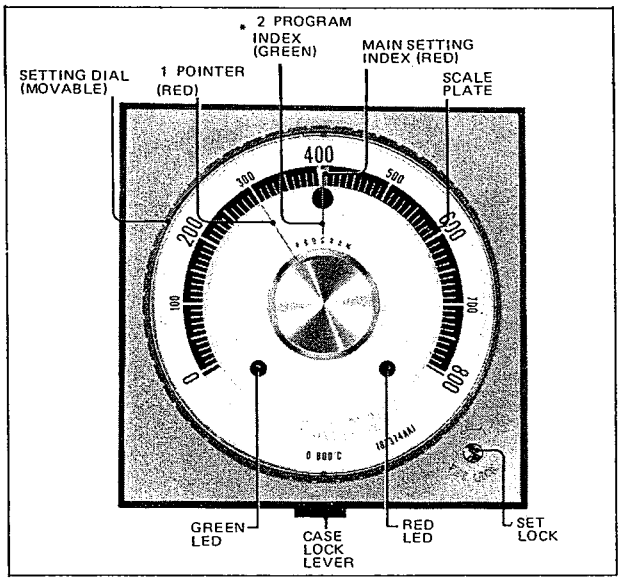


Photo 1 Front of RN765 and 7372

* Pointer 1 is not provided on RN765.
2 is provided on cascade control type only.

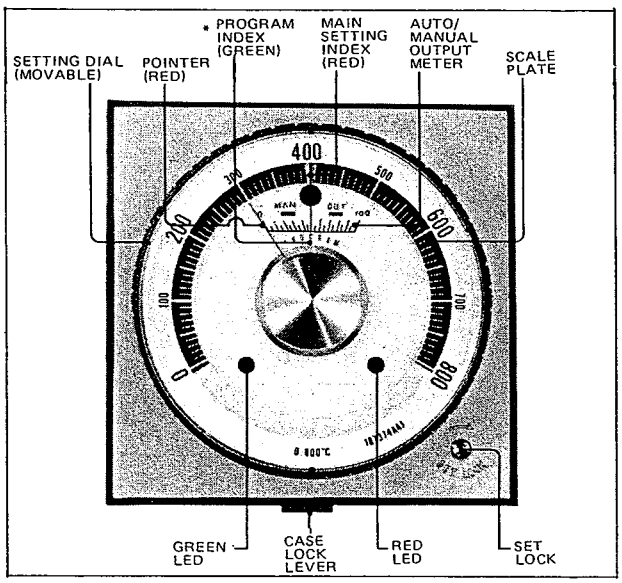


Photo 2 Front of R7377

* Provided on cascade control type only.

廃 番

(2) Cascade control (photo 2)
A cascade model is used to perform cascade or program control by moving the set point within the total span using a ±4 VDC remote signal input (characteristics or linear). After accurately aligning the thick PROGRAM green line on the main setting dial with the red index▼, tighten the SET LOCK screw to fix the setting index dial.

3. Control Constant Setting Section

Set the various control constants using a blade screwdriver after withdrawing the chassis from inside of the instrument. First push up the case lock lever at the bottom of the instrument mask to release the lock, then pull back the chassis to a position which permits the various setting potentiometers to be easily adjusted.

4. High Limit Setting

Applicable models: R7372G, H, U, V
High limit setting range HL: SP +3 to +50% FS

Before the instrument leaves the factory, HL is temporarily set to the (+) 50% FS position and the HL relay is arranged so that it does not operate for several seconds after the power it switched on, thereby facilitating interlocking.

(1) Caution
During high limit setting, there is a possibility of a breakdown occurring as a result of an erroneous operation signal being applied to the equipment. Accordingly, perform high limit setting according to the following procedure, after first disconnecting the external wiring going to the main setting output terminals ① – ② – ③, subsetting output terminals ④ – ⑤ – ⑥, and input terminals Ⓐ(+) – Ⓑ(–) – Ⓒ.

(2) Equipment to be provided
ⓐ If the PV input is a resistive input, prepare a 6-dial precision variable resistor.
ⓑ If the PV input is a voltage or current input, prepare a precision DC standard voltage/current generator.
ⓒ Prepare a PV input characteristic table.

(3) Setting method (continued on page 8)
Perform high limit setting after confirming the main setting value (SP)
① Because no high limit indicator lamp is provided on this instrument, connect high limit output terminals ⑤ – ⑥ to an operation checking tester or lamp.
② Using the procedures in ⓐ, ⓑ and ⓒ under (2), apply an input equivalent to the desired high limit value and check the value indicated by the pointer.
③ Leaving the instrument in the input condition of ②, turn the Hi LIMIT potentiometer at top left of the instrument between +3 and +50% FS, and stop it at a point immediately before the tester operates or the lamp lights up. (This ompletes SP<HL setting.)

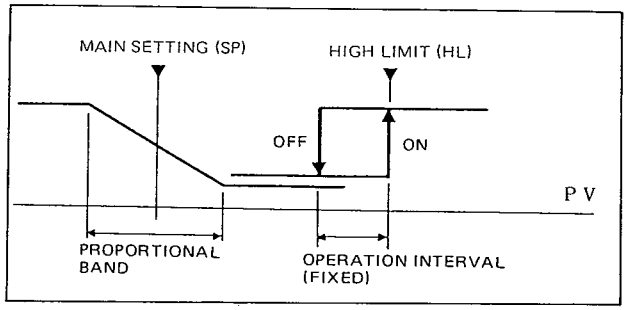


Fig. 4 High limit setting

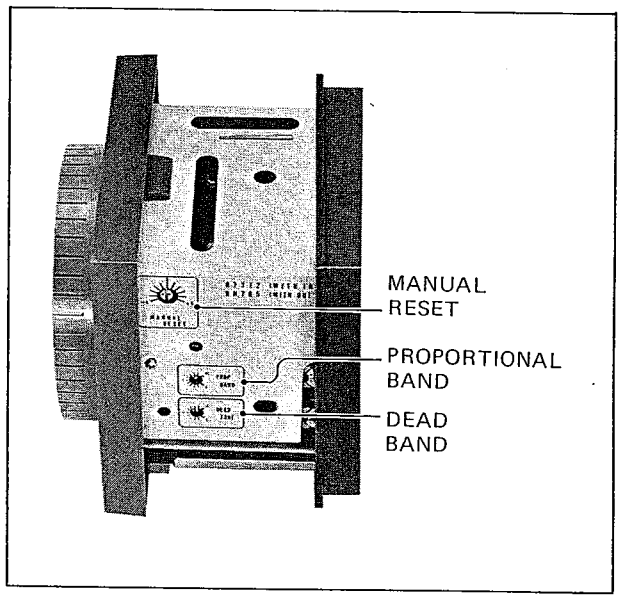


Photo 3 RN765 control constant setting section

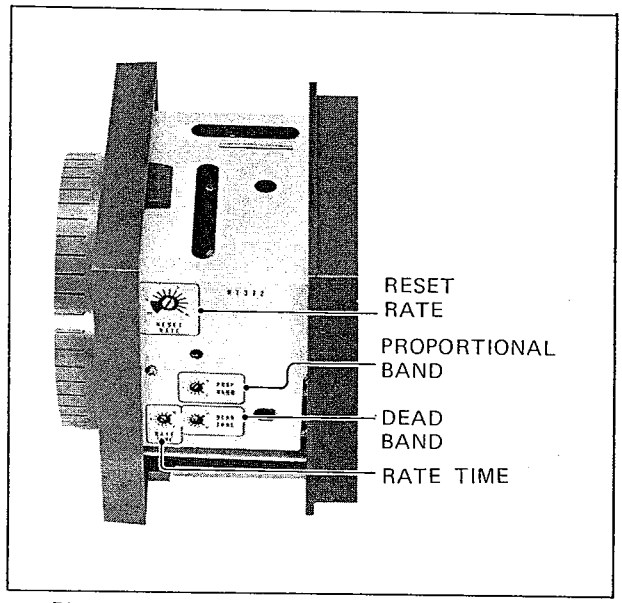


Photo 4 R7372 control constant setting section

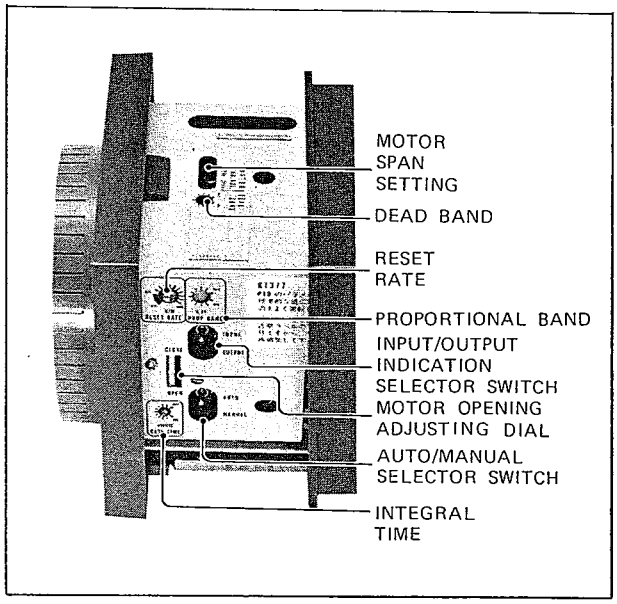


Photo 5 R7377 control constant setting section

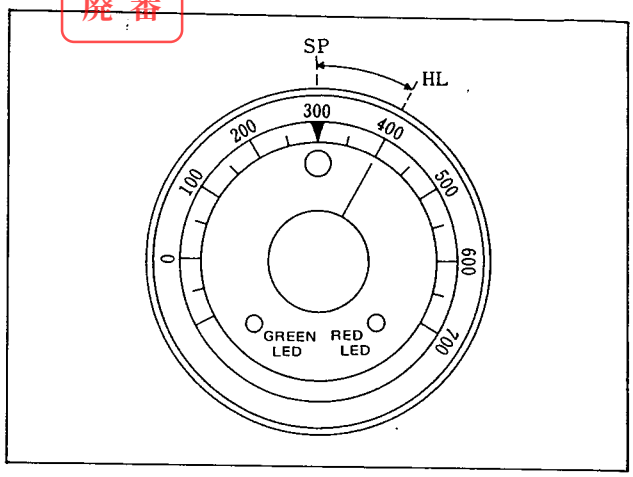


Fig. 5 Example of high limit setting

5. Setting Proportional Band (PROPORTIONAL BAND)

The proportional band is set using the PROP-BAND potentiometer. To increase the width of the proportional band, turn the potentiometer clockwise; to decrease, it, turn it counterclockwise until it is set to a suitable value.

Generally, if the width of the proportional band is increased, the motion of the operator will not be very large, even for a large change in the process PV, and control will become stable.

However, if the proportional band is made too wide, offset will be more likely to occur. Conversely, if the proportional band is made too narrow, the operator will undergo a large motion for even a very small change in PV, and hunting will be liable to occur.

6. Setting Dead Zone (DEAD ZONE)

The dead zone is set using the DEAD ZONE setting potentiometer.

To increase the width of the dead zone, turn the potentiometer clockwise; to reduce it, turn it counterclockwise. If the dead band is made too wide, control accuracy will fall off.

7. Setting Manual Reset (MANUAL RESET)

Applicable models: RN765A, B, N, P
R7372A, B, G, H, N, P, U, V

Manual reset range: Variable within ±50% proportional band. Offset appears as a result of load fluctuations and the particular characteristics of process during time-proportional or position-proportional control, and remains permanently.

When offset appears, it can be eliminated by manual reset. Perform manual reset using the MANUAL RESET potentiometer. If the offset occurs on the upper side of the SP, turn the potentiometer in the (–) or counterclockwise direction from the zero (0) position, and if it occurs on the lower side, turn the potentiometer in the (+) or clockwise direction. Perform manual reset slowly and carefully because it takes a certain amount of time to get the better results of manual reset.

[Example]

Setting range:	0 to 1,000°C
Setting point (SP):	500°C
Proportional band (PB):	5% (50°C)
Offset:	-10°C

In this case, turn the MANUAL RESET potentiometer clockwise from the 0 position to the (+) side. The set position will remain when the offset disappears.

[Example] Example of setting high limit

Setting range:	0 to 800°C (K)
Main setting (SP):	300°C
High limit setting (HL):	400°C

(1) The thermoelectromotive force which is equivalent to the high limit setting value of 400°C (K) is 16395 μV from the thermoelectromotive force table.

(2) Apply 16395 μV to the input terminals Ⓐ(+) – Ⓑ(–) and confirm that the pointer moves to the 400°C graduation mark.

(3) Leaving the 16395 μV input applied, turn the Hi LIMIT potentiometer at top left of the instrument chassis between +3 and +50% FS, and stop it at a point immediately before the red LED lights up. This completes SP<HL setting.

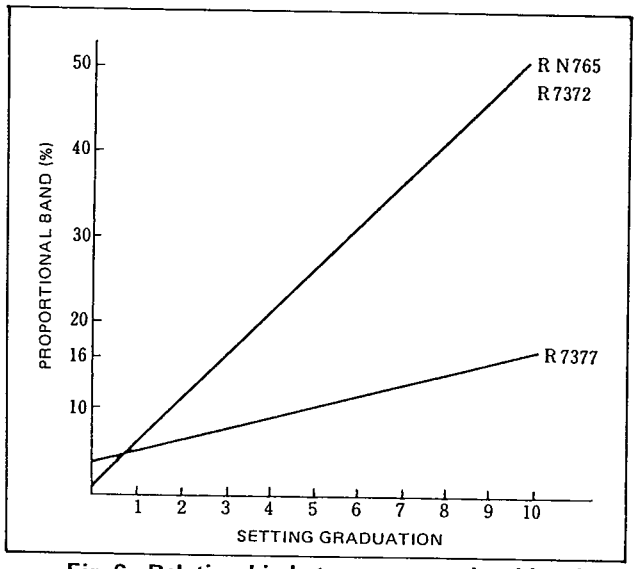


Fig. 6 Relationship between proportional band and setting graduations

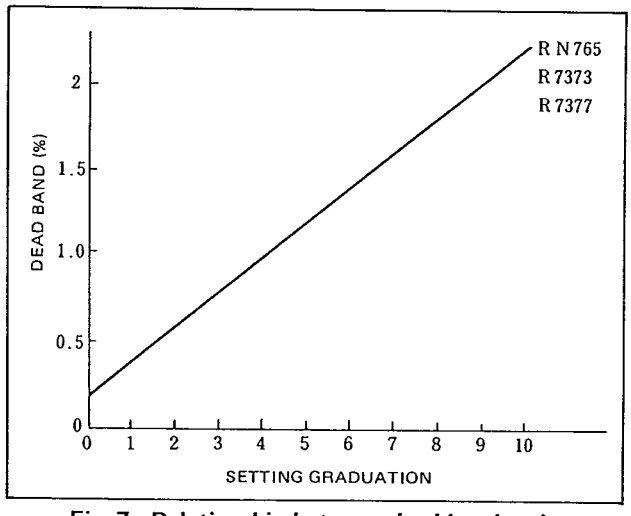


Fig. 7 Relationship between dead band and setting graduations

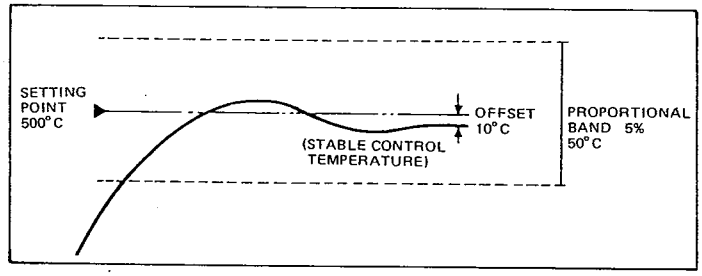


Fig. 8 Example of offset

廃番

8. Setting Automatic Reset
(Integral Operation: AUTO RESET)
Applicable models: R7372C, D, E, F, Q, R, S, T
R7377E, F, S, T

When the instrument leaves the factory, the integral time is temporarily set to OFF.

Integral operation is used to automatically eliminate any offset which arises during operation owing to load fluctuations. The integral time can be set using the RESET RATE potentiometer. To reduce the integral time, turn the potentiometer clockwise, and to increase it, turn the potentiometer counterclockwise. When the integral time is made short, integral operation will become strong, hence if the integral time is made too short, control will become unstable. Accordingly, first make the integral time long, then gradually shorten it to the optimum value while observing the control operation.

9. Setting Differential Time (RATE TIME)
Applicable models: R7372E, F, S, T
R7377E, F, S, T

When the instrument leaves the factory, differential operation is temporarily set to OFF.

Differential operation is used to apply a large amount of corrective operations and prevent large fluctuations in the controlled quantity while the deviation remains small, in cases where a large overshoot occurs due to external disturbances in a process involving a significant amount of waste time and transmission delay.

The differential time is set by means of the RATE TIME potentiometer. To increase the differential time, turn the potentiometer clockwise; to decrease it, turn coounterclockwise. When the potentiometer is turned fully counterclockwise, differential operation will be OFF. When the differential time is made long, differential operation will become strong, hence if the differential time is made too long, the differential mode will be over-emphasized, even for a small change in PV, resulting in cycling or hunting. Accordingly, first make the differential time short, then gradually lengthen it to the optimum value while observing the control operation.

10. Selecting Automatic/Manual Operation
Applicable models: R7377E, F, S, T

(1) Indicating PV input and output values
When the selector switch is set to INPUT, the PV indication appears, and when it is set to OUTPUT, the motor opening indication (0 to 100%) appears. The PV and motor opening indications can be obtained for both automatic and manual operations.

(2) Selecting automatic/manual operations
When the auto/manual selector switch is set to AUTO, automatic operation will take place, and when it is set to MANUAL, manual operation will take place.

(3) Manual operation
Set the auto/manual selector switch to the MANUAL side and adjust the degree of opening of the motor (0 to 100%) using the manual operation knob. When the adjusting dial is turned to OPEN, the motor will move in the opening direction, and when it is turned to CLOSE, the motor will move in the closing direction.

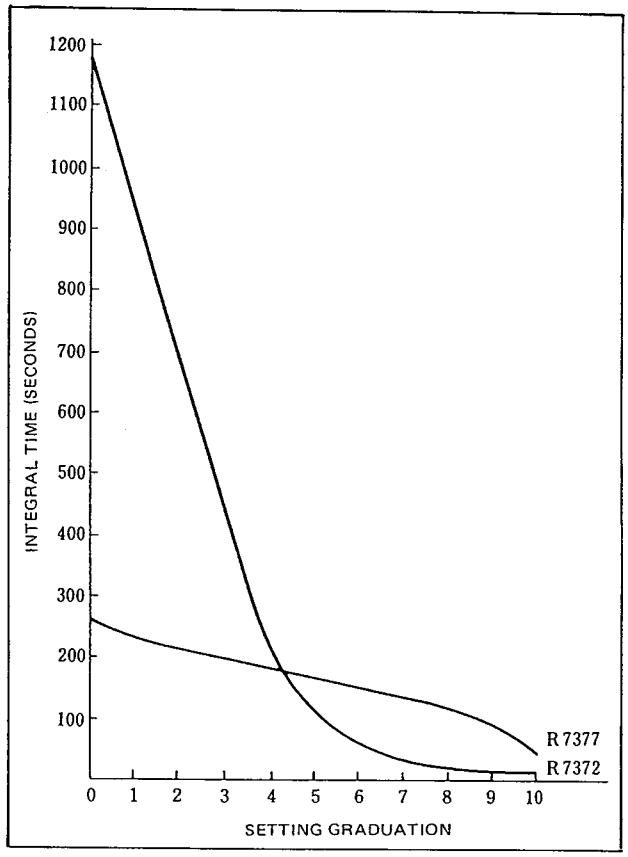


Fig. 9 Relationship between integral time and setting graduations

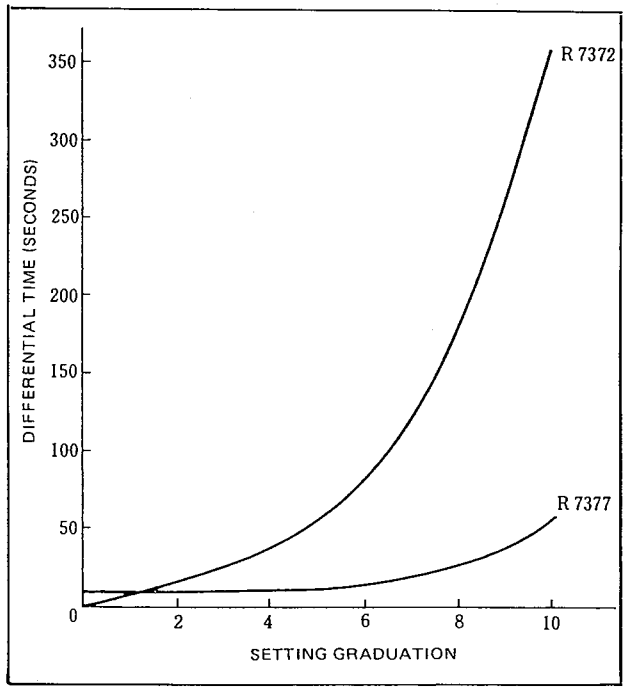


Fig. 10 Relationship between differential time and setting graduations

廃 番

TROUBLESHOOTING

Normal operating conditions:

When a Dialatrol is performing control normally, the pointer is in the vicinity of the setpoint (red▼), and the red and green LEDs flash along with the operation of the control relay. However, during cascade control, the setpoint moves with the span between 0 and 100% in a 1:1 proportion according to the ±4 VDC remote input signal. Consequently, the pointer is in the vicinity of the setpoint, and the red and green LEDs flash with reference to the setpoint.

Abnormality during test run:

Symptom	Check point
Green LED remains lit, and red LED fails to go ON even when temperature of equipment exceeds set temperature.	• Check polarity of thermocouple. (Note 1) ⊕ side: Red, ⊖ side: White • Check wiring connections between terminals ⒶⒷⒸ of RTD.
Setpoint and process variable do not agree with each other.	Check the combination of Dialatrol, thermocouple and compensation wires, and also check to see if type of RTD is correct. See page 4(2).
Cascade operation is reversed.	Check to see if signals V_1 and V_2 are reversed.

Abnormality during normal operation:

Symptom	Check point
Green LED lights up but process variable does not increase.	• Check to see whether or not relay contacts are defective. • Check to see if thermocouple is open-circuited.
Process variable exceeds setpoint and continues to increase despite red LED being on.	Check to see if relay contacts have fused.
Modutrol motor cycles (continually opens and closes to large degree).	• Is proportional band too narrow? Widen it. • Check to see if there is incorrect wiring between instrument and Modutrol motor.
When control temperature is equal to set temperature, Modutrol motor will completely close, and proportional operation will take place only when control temperature is on low side of set temperature.	Check wiring between instrument and Modutrol motor. (Note 2)
When control temperature is equal to set temperature, Modutrol motor fully closes, and proportional operation will take place only when control temperature is on high side of set temperature.	Check wiring between instrument and Modutrol motor. (in particular, Ⓣ and Ⓖ)
Modutrol motor goes either fully open or fully closed, regardless of whether the control temperature is high or low.	Check feedback potentiometer of Modutrol motor. Refer to method of checking potentiometer below (Note 3).

Note 1: Checking thermocouple

Short-circuit the ⊕ and ⊖ input terminals of the instrument, cut off the power from the Modutrol motor, and set the temperature setting to room temperature: The red and green control LEDs should both flash. If control is taking place normally, the thermocouple is open-circuited. Replace it.

Note 2: Checking wiring of Modutrol motor

Swap the wiring connection to terminals Ⓨ and Ⓖ of the Modutrol motor, and observe the control operation. If cycling of the Modutrol motor stops, and correct control takes place, continue operation with the swapped wiring between the instrument and the Modutrol motor.

If, as a result of swapping the wiring with terminals Ⓨ and Ⓖ of the Modutrol motor, cycling of the Modutrol motor stops, but the operation of the Modutrol motor is reversed (Modutrol motor operates in closing direction when the controlled temperature falls during heating control, or in opening direction when the controlled temperature rises during cooling control), once again swap over the wirng to terminals Ⓨ and Ⓖ, and ① and ②, of the Modutrol motor.

Note 3: Checking feedback potentiometer.

Remove the wiring from terminals Ⓣ, Ⓨ and Ⓖ of the Modutrol motor, then measure the resistance between terminals Ⓣ and Ⓨ or Ⓣ and Ⓖ using a tester. If the measured value is between several ohms and about 150Ω (will vary depending on angle of rotation of motor), the Modutrol is normal. If the measured value is high or there is no conductivity (infinite resistance), clean or replace the potentiometer in accordance with the instruction manual.

MAINTENANCE AND CONSTRUCTION

1. Meter (Photos 1 and 2)

The meter of the Dialatrol is installed on the front mask together with the scale plate and lamps. The effective scale length is 210 mm. Also, the front mask is dustproof.

2. Chassis (Photos 6, 7 and 8)

The chassis consists of five printer circuit boards in addition to the meter, and also a case lock mechanism is provided at the bottom of the chassis.

The printed boards are as follows:

① mother board
② bridge board
③ preamp board
④ No.1 control board
⑤ No.2 control board

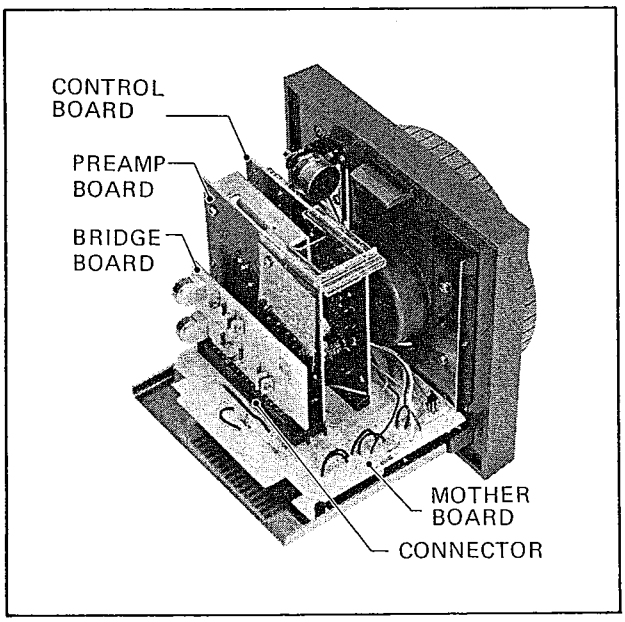


Photo 6 RN765 Chassis

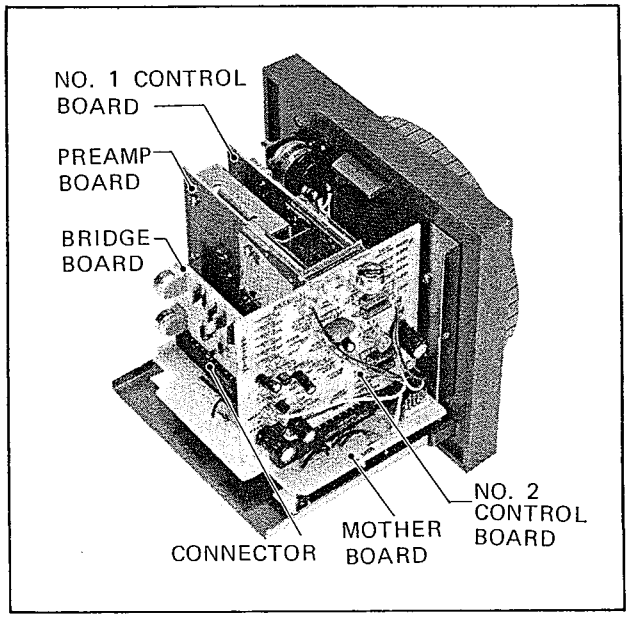


Photo 7 R7372 Chassis

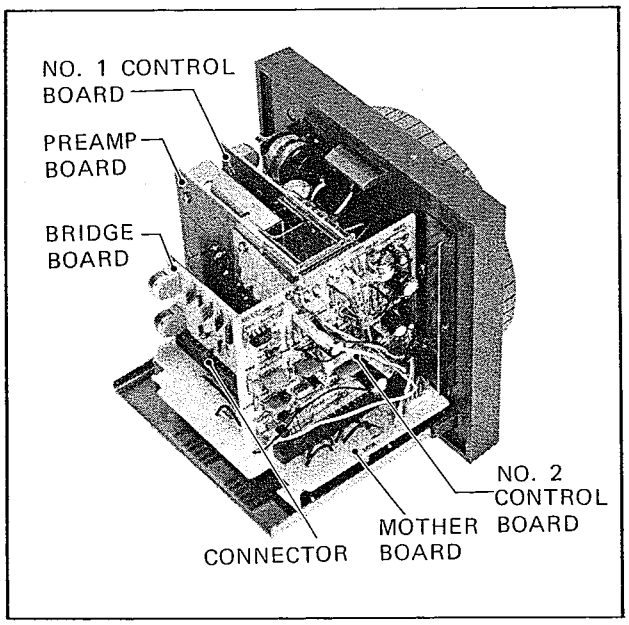


Photo 8 R7377 Chassis

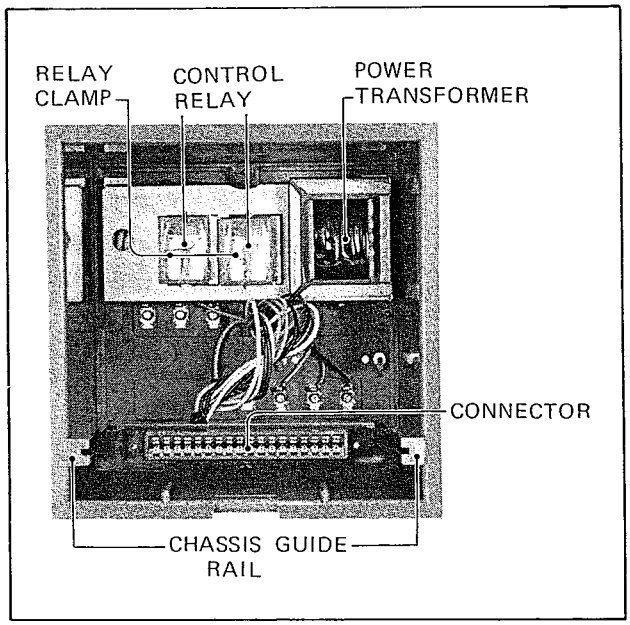


Photo 9 Inside of Case (Common)

3. Case (Photo 9)

The case contains the connectors into which the chassis is inserted, the transformer, control relays, and external wiring terminals.

廃 番

4. Replacing High and Low Limit Relays

If a relay breaks down during operation, replace it according to the following procedure.

① Obtain a new relay

② Turn off the power to both the instrument and the load, and push up the case lock at the bottom of the instrument mask, enabling the lock to be removed and the instrument chassis to be withdrawn.

③ Move the clamp retaining the relay (see photo 9), installed at the rear of the case, in the transverse direction.

④ Withdraw the defective control relay by pulling it back at the bottom.

⑤ Insert the new relay into the socket, with the threaded legs at the bottom.

⑥ Fix the clamp in the recessed portion at the top of the relay.

YAMATAKE

Yamatake Corporation
Control Product Division
Sales contact: Yamatake Corporation,
IBD Sensing and Control Department
Totate International Building
2-12-19 Shibuya Shibuya-ku Tokyo 150-8316 Japan
Phone: 81-3-3486-2380
Fax: 81-3-3486-2300

This has been printed on recycled paper.

Printed in Japan.
1st Edition: Issued in Apr., 1985
2nd Edition: Issued in June, 2001(B)