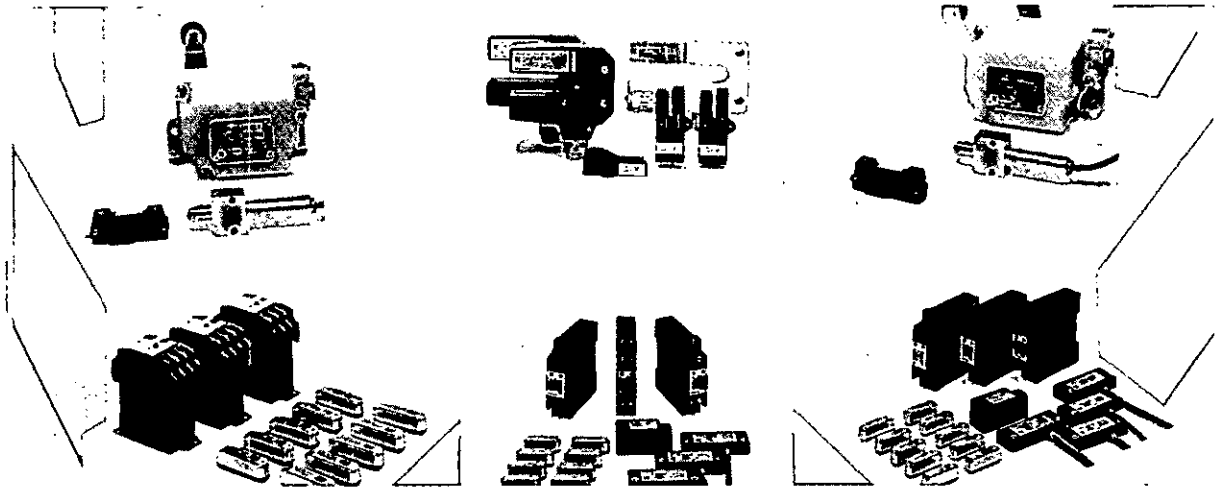


Bestact

YASKAWA HERMETICALLY SEALED CONTACT



YASKAWA
CONTROL



JQA-0792
ISO 9001
Certified

KAE-C542-0M

Maximum Contacting Reliability, Minimized Size and Maintenance Free of Power Control Systems

Get them from Bestact

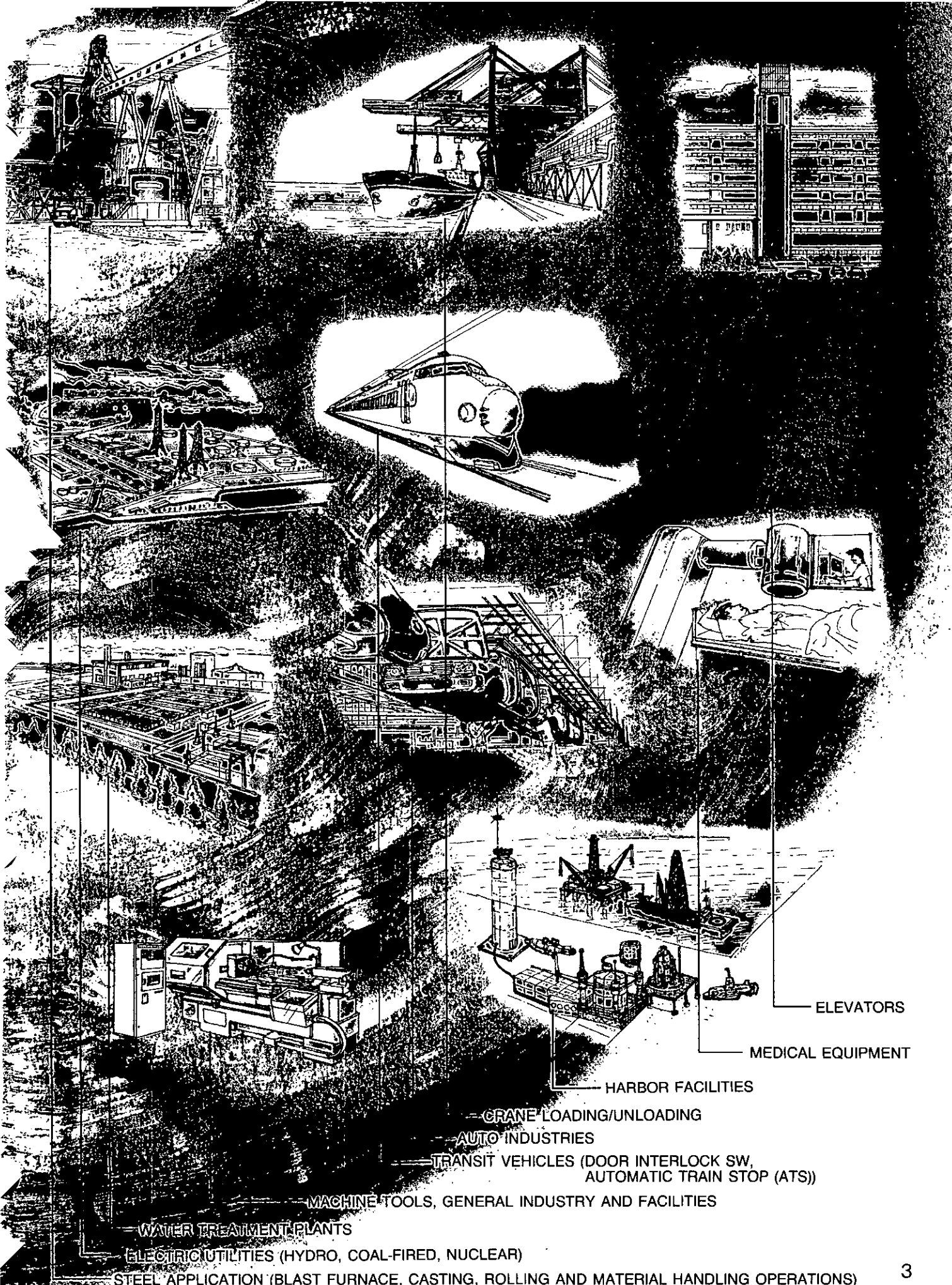
Bestact is a hermetically sealed power switching contact unit having an excellent reputation in great number of actual applications as an interface element for control systems. Customer-proven features of Bestact include maximum reliability as well as unsurpassed environmental immunity and durability under adverse conditions such as high temperature, high humidity, existence of gas or vapor, vibration and surge.

Large- and medium-capacity types are available depending upon customer's applications. 5 series of modification products are applicable : I/O Relay Series, Multipole Relay Series, Limit Switch Series, Push button Switch PBR Series and Magnetic Proximity Switch Series are available for off-the-shelf delivery, realizing maximum reliability and maintenance-free operation of various control systems in many different industrial fields from heavy to general industries.

Realizing small machine/peripheral equipment requirements, Yaskawa has expanded the line-up of application products, particularly medium-capacity Bestact products. We are ready to provide customers the engineering assistance for new applications.

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— WATER TREATMENT PLANTS
 — ELECTRIC UTILITIES (HYDRO, COAL-FIRED, NUCLEAR)

— STEEL APPLICATION (BLAST FURNACE, CASTING, ROLLING AND MATERIAL HANDLING OPERATIONS)

— MACHINE TOOLS, GENERAL INDUSTRY AND FACILITIES

— TRANSIT VEHICLES (DOOR INTERLOCK SW, AUTOMATIC TRAIN STOP (ATS))

— AUTO INDUSTRIES

— CRANE LOADING/UNLOADING

— HARBOR FACILITIES

— MEDICAL EQUIPMENT

— ELEVATORS

BESTACT PRODUCTS · IMPROVES RELIABILITY.....

○ FEATURES OF THE BESTACT SERIES OF PRODUCTS

Bestact = Conventional Reed Switches + Mechanical Power Relays

Bestact can perform the jobs of both conventional reed switches and power relays. Because a single Bestact replaces both, circuitry is simplified and entire circuit reliability rises significantly. A substantial cost savings can be achieved in that no contact protection (snubbers/diodes) is needed, minimal connections and reduced wiring circuitry is realized in actual circuit design.

Vibration and Impact (Shock) Resistance

In its weakest axis (when the direction of contact movement and the applied vibration/impact coincide), the vibration/impact resistance is 20G/40G (for large capacity type), respectively. The movable contact is small compared with conventional switches, and leaf spring armature holds it (through the use of a specially designed backstop mechanism) against the glass tube wall making it especially strong against vibration and impact, even when not energized.

Bestact can switch both AC and DC loads from logic to electromagnetic

Universal relay switching applicability from logic level loads 1V 1mA up to 240VAC 10A (inductive), making it ideal as the contact of an input/output module for programmable controllers. Consideration of voltage and current within this range need not be done. Furthermore, 50W DC solenoid valves can be switched directly without the use of an interposing relay.

Outstanding operational characteristics under the most punishing environmental conditions

Because Bestact is hermetically sealed contact in a glass tube, it remains entirely unaffected by external factors such as gas, humidity, water, oil, dust, high/low temperature, vibration, shock, high inrush current, voltage surge and noise. This is especially ideal for infrequent use applications where the contact absolutely must operate and not fail.

**High Reliability of
Equipment/Devices
and
Total Cost Reduction**

**Bestact Series of products
for Severe Duty and
Application Reliability.**

(I/O Relays, Multi-pole
Relays, Detection Switches,
Command Switches)

Universal Control Load Applicability allows Standardization around One Contact for all your Switching Needs

It's wide range switching capability from 240V AC 1A (10A inductive load inrush) to 1V 1mA allows you to standardize around one switch, thus reducing the inventory stock for different loads without sacrificing performance.

Absolutely no Protective Circuitry (R-C Snubbers, Varistors or Diodes) and separate Power Supply (for photo-electric, inductive/capacitive proximity switches) is needed

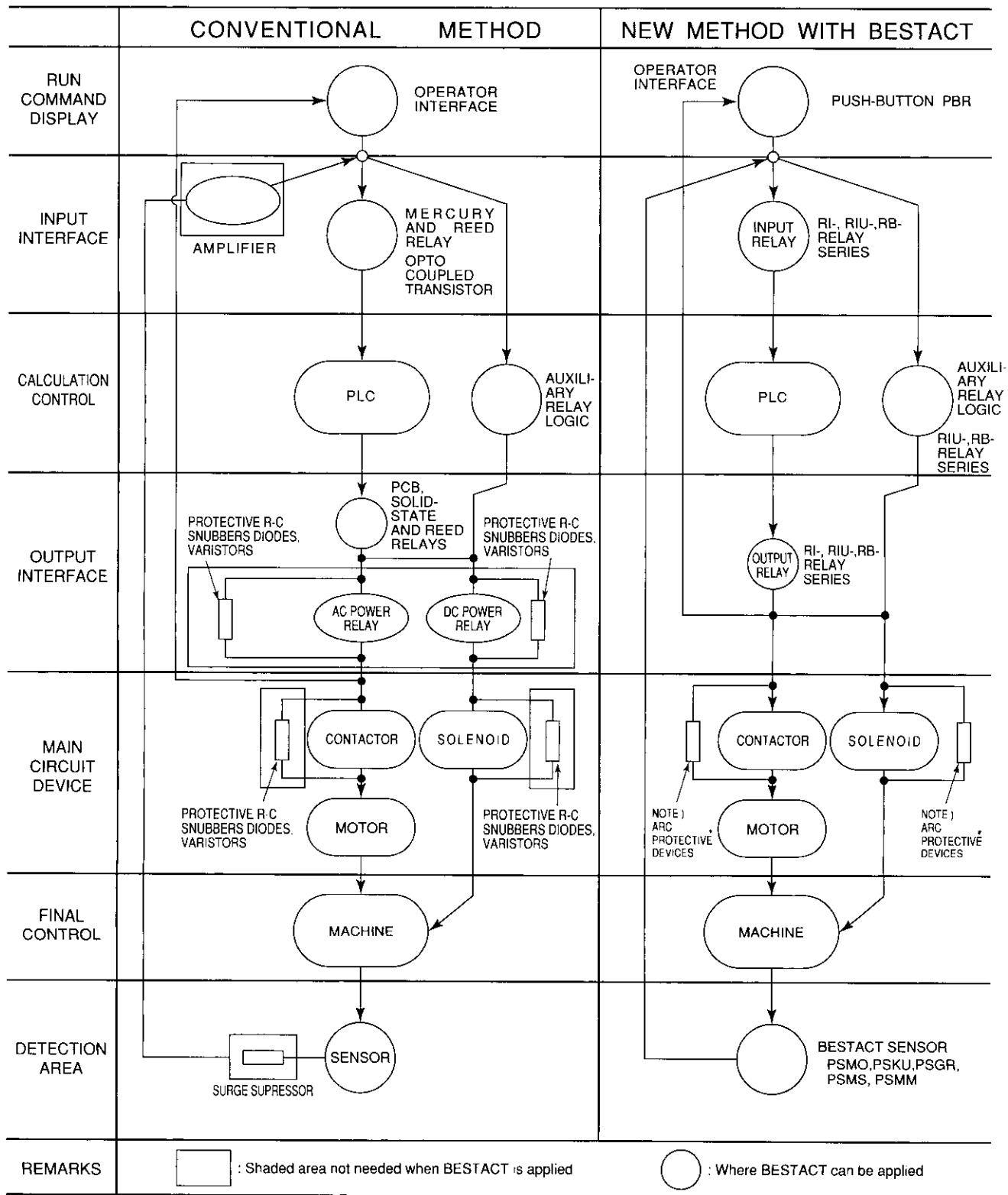
Decreases Control Panel Area

No amplifying circuitry is needed.

Simplifies Protective Enclosure

Maintenance Free

○ SIMPLIFICATION OF CONTROL SYSTEM WHEN UTILIZING BESTACT



Note: * Normally, arc protective circuitry need not be applied. However, if applied, extremely long life can be obtained.

Hermetically Sealed Contact

Bestact™

Medium-Capacity (Element)
 Type R24U (For general purpose)
 Type R25U (For heavy duty)
 Large-Capacity (Element)
 Type R14U (For general purpose)
 Type R15U (For heavy duty)

Highly Reliable Contact Employing New Materials and Innovative Designs such as Wiping and Hammering Action, Bifurcated Contact and Back-Stop Mechanism

FEATURES

1. Sealed with an inert gas, ensuring freedom from aging and influences exerted by external environment.
2. The twin contact and wiping effect assures outstanding contact reliability, probability of failure is extremely low.
 $\lambda_{60}^* = 9.2 \times 10^{-10}$ (5V 1mA)
3. Quick action permits a larger make and break capacity and longer service life.
4. Can switch both AC and DC, permitting direct control over a wide range from low level load to electromagnetic

power load.

Medium-capacity type : 5V 1mA to 240VAC 0.5A
 (5A making)

NEMA Contact Ratings : C300 (AC) and Q150 (DC)

NEMA HP Ratings : 1/10HP (120Vac), 1/8HP (240Vac)

Large-capacity type : 1V 1mA to 240VAC 1A
 (10A making)

230VDC 40W (Solenoid valve)

NEMA Contact Ratings : C600, B300 (AC), Q300 (DC)

NEMA HP Ratings : 1/6HP (120Vac), 1/2HP (240Vac)

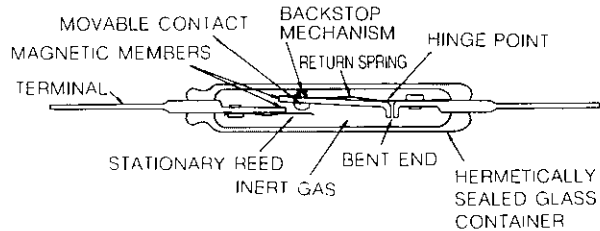
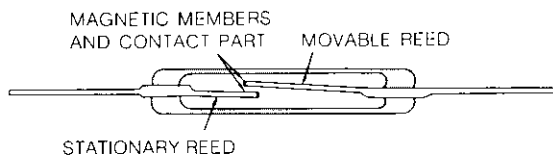
5. Small surge/noise during switching of inductive load.

Note: *Refer to page 8

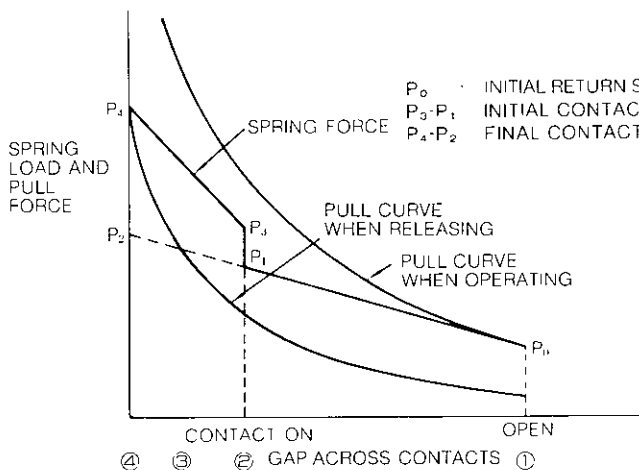
CONSTRUCTION AND OPERATION MECHANISM

Conventional reed switches are constructed simply The contact for disconnecting current also serves as a magnetic member which constitutes part of a magnetic circuit

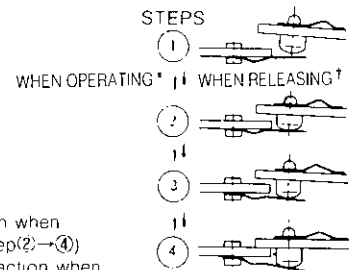
Bestact uses a separate magnetic member and contact unit (carrying current arcing section), each using different materials and designs suited for their functions.



<General Reed Switch>



<Bestact (Large-capacity type) >



Note * Wiping action when operating (Step(2)→④)
 † Hammering action when releasing (Step(2))

☐ RATINGS AND SPECIFICATIONS

Application		Medium-Capacity Type		Large Capacity Type		Remarks	
		General Purpose	Heavy Duty	General Purpose	Heavy Duty		
Type		R24U	R25U	R14U	R15U		
Contact Arrangement		1NO		1NO			
Rated Continuous Current		3A		5A			
Contact Performance	Rated Operational Current **1 (NEMA Pilot Duty)	AC	240V 0.5A (180W)		240V 1A (360W)		Inductive load
		DC	115V 0.3A (69VA)		115V 0.5A, 230V 0.2A (69VA)		Inductive load time constant (40ms for Medium-capacity 100ms for Large-capacity)
	Maximum Making Current *2	240VAC 15A		240VAC 30A		Power factor 0.7	
	Maximum Breaking Current *3	240VAC 15A		240VAC 30A		Power factor 0.4	
		115VDC 0.5A		115VDC 0.6A 230VDC 0.4A	115VDC 0.6A 230VDC 0.4A		Time constant 40ms (Medium-capacity type) 100ms (Large-capacity type)
	Minimum Operational Power Ratings		5V 1mA	24V 1mA *5	1V 1mA	24V 1mA *5	
Withstand Voltage across Contacts		500VAC 1 minute		800VAC 1 minute			
Insulation Resistance		10 ⁹ Ω or greater		10 ⁹ Ω greater		with 500VDC megger	
Initial Contact Resistance		250mΩ or less	500mΩ or less	100mΩ or less	500mΩ or less	6VDC 1A	
Capacitance		0.5PF or less		0.45PF or less			
Operating Characteristics	Pick-up Magnetomotive Force	100 to 130A [AT]		180 to 230A [AT]		Standard coil is of 3000 turns, 33.5mm long, 10.5mm I.D. with 0.2mm dia wire.	
	Drop-out Magnetomotive Force	50A [AT] or greater		60A [AT] or greater			
	Operating Time	4ms or less (Bounce not included)		5ms or less (Bounce not included)		at 150% of pick-up ampere turn using standard coil	
	Releasing Time *4	2ms or less		3ms or less			
	Maximum Bounce Time	2ms		2ms			
Mechanical Performance	Mechanical Life	50,000,000 operations	Over 100,000,000 operations	50,000,000 operations	Over 100,000,000 operations		
	Vibration Resistance	147.0m/s ² {15G} or greater		196.0m/s ² {20G} or greater		20 to 1000Hz	
	Impact Resistance	196.0m/s ² {20G} or greater (980.0m/s ² {100G} or greater)		392.0m/s ² {40G} or greater (980.0m/s ² {100G} or greater)		Value in parenthesis indicates breakdown G.	
	Terminal Drawing Force	98.0N {10kgf}		98.0N {10kgf}			
Ambient Temperature	Operating Temperature	- 50 to + 150°C		- 50 to + 150°C			
	Storage	- 60 to + 180°C		- 60 to + 160°C			

Note: *1 Where 240VAC, the rated operational current is set at 10 times this value upon making (PF: 0.6 to 0.7) and 1 times this value upon breaking (PF: 0.3 to 0.4). Rated operational current 1A means 10A making and 1A breaking. Where 115V DC is indicated, the current is set at 1 times making and 1 times breaking.

*2. The maximum making current complies with JIS C 4531, and enables 100 times making at a power factor of PF: 0.7.

*3. The maximum breaking current, by referring to JIS C 4531, is based on switching 25 times at PF: 0.4 (AC), time constant $\tau = 100\text{ms}$ (DC) for either 115/230VDC cases for the large capacity element. For the medium capacity element, switching 25 times at PF: 0.4 (AC), time constant $\tau = 40\text{ms}$ for 115VDC case only.

*4. The breaking time indicates the value when the coil is equipped with a flywheel diode.

*5. In circuit with optocoupler, 5V 10mA can be used.

☐ PRODUCT TYPES LOAD CONTROL ☐: Applicable scope

• Medium-Capacity Type

Type	Application	AC Power Control	DC Power Control	AC Relay Control	DC Relay Control	Electronic Circuit Control
		240VAC 120VA 300,000 operations or greater	115VDC 30W 200,000 operations or greater	24 to 240VAC 10,000,000 operations or greater	24 to 230VDC 5,000,000 operations or greater	5V 1mA or greater
R24U	General Purpose					
R25U	Heavy Duty					24V 1mA or greater*

Note: *In circuit with optocoupler, maximum 5V 10mA can be used.

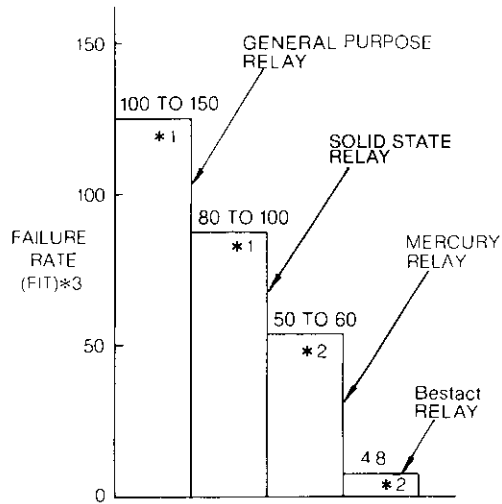
• Large-Capacity Type

Type	Application	AC Power Control	DC Power Control	AC Relay Control	DC Relay Control	Electronic Circuit Control
		240VAC 240VA 500,000 operations or greater	115VDC 50W 230VDC 40W 300,000 operations or greater	24 to 240VAC 10,000,000 operations or greater	24 to 230VDC 5,000,000 operations or greater	1V 1mA or greater
R14U	General Purpose					
R15U	Heavy Duty					24V 1mA or greater*

Note: *In circuit with optocoupler, maximum 5V 10mA can be used.

RELIABILITY AND TYPICAL APPLICATIONS

<Field Failure Rate of Relays>



Problems on reliability which have not been solved even by semi-conductor or photo-electric switch can be solved with Bestact.

Note : * 1 Excerpt from "Reliability Data" issued by public agency.

* 2 Actual results of field failure rate

* 3. When no. of failures is zero apply following formula

$$\lambda_{90} = \frac{\text{No. of failures} \times \text{Constant}^{**}}{\text{No. of tested contacts} \times \text{tested hour (H)} \times 10^{-9}} \text{ [FIT]}$$

** Applying JIS (Japanese Industrial Standard)
60% reliability level, 0.917 for zero failure

<Typical Applications>

- Industrial automatic control systems
- Computer and peripheral devices
- Transportation equipment and devices
- Waterworks and sewage equipment
- Electric power equipment, nuclear power facilities, extra-high voltage electric power facilities
- Shinkansen railway application
- Elevators
- Continuous casting machines
- Marine development application
- Various limit switches
- Thermal switches
- Cylinder position detection switches
- Low-level command and control switches
- Overcurrent and overvoltage detection switches
- Motor vehicle electrical instruments

UL RECOGNIZED IN ACCORDANCE WITH USA AND CANADIAN STANDARDS File No. E159361

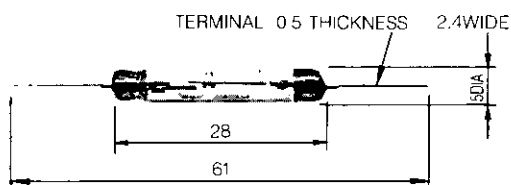
For Class I, Division 2
Groups A, B, C, D Hazardous Locations



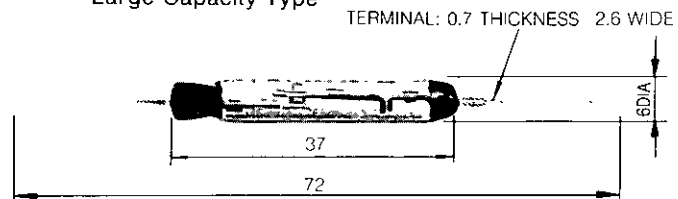
Note Refer to page 60

DIMENSIONS in mm

• Medium-Capacity Type



• Large-Capacity Type



□ ELECTRICAL LIFE

Voltage	Making		Breaking		Life(Thousand Operations)			
	Current (A)	Power Factor or Time Constant	Current (A)	Power Factor or Time Constant	R24U	R25U	R14U	R15U
240VAC (Inductive Load)	10	PF=0.7	1	PF=0.4	—	—	500	800
	5		0.5		300	1000	1000	1500
	2.5		0.25		600	2000	2000	3000
110VAC (Inductive Load)	10	PF=0.7	1	PF=0.4	—	—	500	800
	5		0.5		300	1000	1000	2000
	2.5		0.25		600	2000	2000	4000
110VAC (Resistive Load)	3	PF=1.0	3	PF=1.0	—	—	—	200
	2		2		50	200	200	1000
	1		1		300	500	1000	2000
115VDC (Inductive Load)	0.5	L/R = 100ms ^{*4} (L/R = 40ms)	0.5	L/R = 100ms ^{*4} (L/R = 40ms)	—	—	300(1000)	300(1000)
	0.3		0.3		200	300	900	900
115VAC (Inductive Load)	0.02	Relay coil	0.012	Relay coil	15000	30000	35000	60000
24VDC (Inductive Load)	0.037	Relay coil	0.037	Relay coil	10000	15000	15000	30000

Note : 1. Values of DC inductive loads tabulated above are the ones where stationary contact side is of positive polarity. However, where used at values more than rated operational current, opposite polarity can extend life. For details, contact Yaskawa.
2. Values in parenthesis are where opposite polarity is implemented

3. Where DC light load such as relay is utilized, opposite polarity may reduce the life expectancy
*4 Life in R24U and R25U is based on a time constant of 40ms

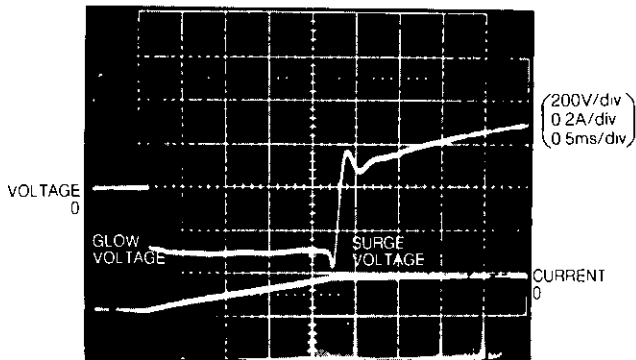
□ SURGE VOLTAGE AT BREAKING OF INDUCTIVE LOADS

• Breaking AC inductive load

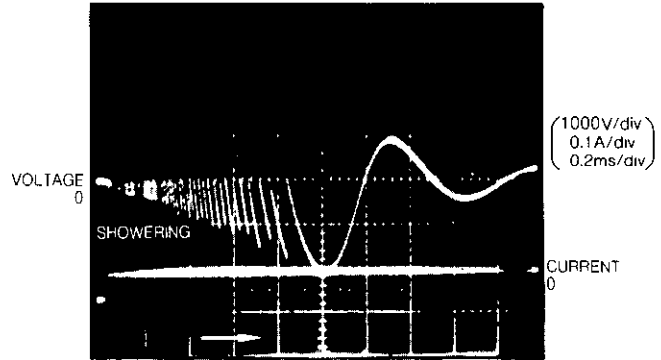
Load:240VAC, 60Hz		Surge Voltage (V)		
Contactor Type		NEMA Size0	NEMA Size2	NEMA Size4
Sample	Bestact	500	450	500
	Conventional Relays	1700 to 2000	1000 to 1500	800 to 1200

• Breaking DC inductive load

Load:115 VDC		Surge Voltage (V)	
		Valve Loads I=0.2A τ=130ms	Yaskawa's Relay Type RAP-6G I=27mA τ=25ms
Sample	Bestact	400 to 500	500 to 600
	Conventional Relays	Unstable breaking	1500 to 1700



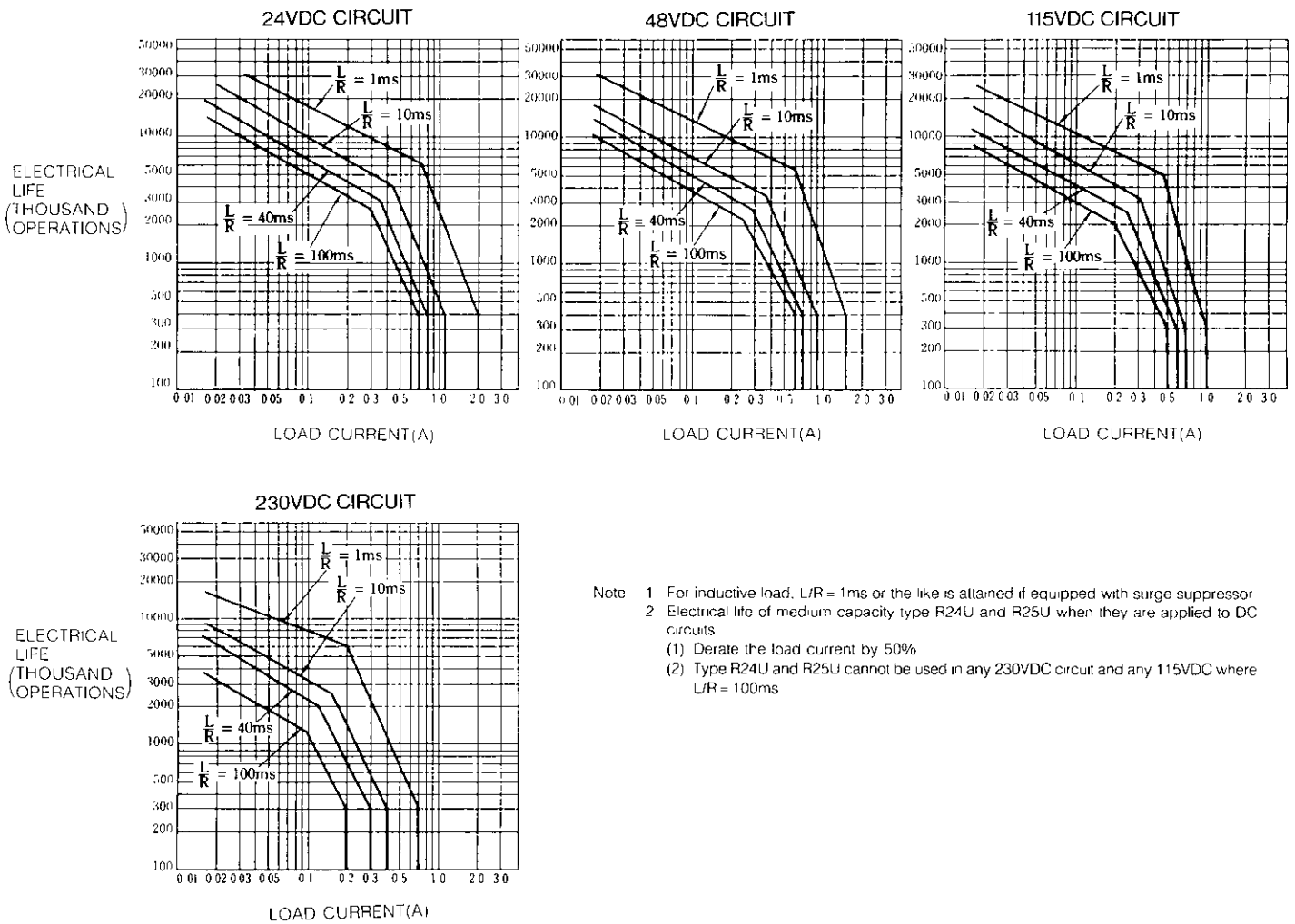
Breaking Waveform of Bestact



Breaking Waveform of Conventional Relay

Typical Waveforms at Breaking AC Inductive Loads

ELECTRICAL LIFE WHEN APPLYING DC CIRCUIT (Type R14U, R15U)



- Note
- 1 For inductive load, $L/R = 1\text{ms}$ or the like is attained if equipped with surge suppressor
 - 2 Electrical life of medium capacity type R24U and R25U when they are applied to DC circuits
 - (1) Derate the load current by 50%
 - (2) Type R24U and R25U cannot be used in any 230VDC circuit and any 115VDC where $L/R = 100\text{ms}$

RELIABILITY FOR APPLYING DRY CIRCUIT

Type	Voltage and Current	No. of Testing Samples	Failure Criterion	Result	Failure Rate (λ_{60}) *2
R14U	1V 1mA	40	Opening Failure Contact resistance 50 Ω	No failure	4.6×10^{-9}
	5V 1mA	200	Opening Failure Contact resistance 50 Ω	No failure	9.2×10^{-10}

- Note
- 1 Operating Conditions
 - 10Hz of make/break frequency
 - 5,000,000 operations
 - Resistance between contacts (opening and closing) is checked per operation
 - *2 Refer to page 8

Bestact INPUT/OUTPUT RELAYS

Medium-Capacity Type RI-D□□MU, -E25MU
(Standard type)
Large-Capacity Type RI-B□□MU, -C□□MU
(Standard type)
Type RI-B□□MHU, -C□□MHU
(High insulation type)

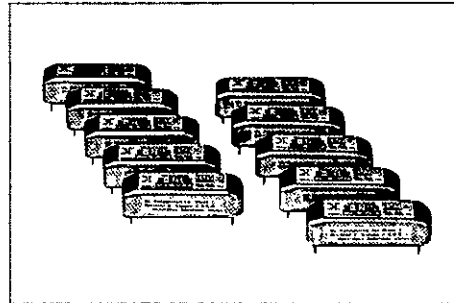
Highly Reliable Interface Relays for Programmable Controllers, Microcomputer Control Systems

□ FEATURES

1. Assures outstanding reliability in circuits of 100VAC/DC or greater as well as in electronic component circuits.
2. Universal output relay capability. Enables direct control over a wide range from TTL electronic level to large magnetic contactors or DC solenoid valves.
3. Requires no output relay board
4. Quick action in 5ms or less
5. Excellent insulation characteristics. Withstand voltage across coil and contact: 2000VAC or greater. (Medium-capacity type: 1500VAC or greater)
6. Automatic wave-soldering and cleaning possible.
7. Small energizing power (Medium-capacity type: 0.4W, Large-capacity type: 0.6W)
8. Recognized in accordance with USA and Canadian standards File No. E154773. For Class I, Division 2 Groups A, B, C, D Hazardous Locations.



Type RI-D□□MU (only) Recognized in accordance with TÜV standard.



□ TYPICAL APPLICATIONS

- I/O relays for industrial programmable controllers
- I/O relays for microcomputer modification equipment
- Trip relays for circuit breakers
- Recording and transmitting relays for electric power facilities
- I/O relays for NC/MC controllers

□ RATINGS AND SPECIFICATIONS

Type	Capacity		Medium-Capacity Type			Large-Capacity Type			
	Standard Type	High Insulation Type	RI-D24MU	RI-D25MU	RI-E25MU	RI-B14MU	RI-B15MU	RI-C14MU	RI-C15MU
Contact Ratings	Contact Arrangement		1NO		1NC	1NO		1NC	
	Incorporated Bestact Type		R24U	R25U		R14U	R15U	R14U	R15U
	Operational Power Ratings (Inductive Load)	AC	200 V 0.5A			240A 1A			
		DC	100 V 0.3A			230V 0.2A, 115V 0.5A			
Minimum Operational Power Ratings		5V 1mA	24V 1mA*3		1V 1mA	24V 1mA*3	1V 1mA	24V 1mA*3	
Characteristics	Vibration Resistance		98.0m/s ² {10G} or greater (20 to 1000Hz)			98.0m/s ² {10G} or greater (20G to 1000Hz)			
	Shock Resistance	Erroneous Operation	147.0m/s ² {15G}			147.0m/s ² {15G}			
		Breakdown	980.0m/s ² {100G} or greater			980.0m/s ² {100G} or greater			
	Withstand Voltage (Across Input and Output)		1500VAC for 1minute (across contacts: 500VAC)			2000VAC for 1minute (across contacts: 800VAC)			
	Ambient Temperature	Operating Temperature	- 40 to +60°C			- 40 to +60°C			
		Storage	- 60 to +80°C			- 60 to +80°C			
Approx. Weight		15g	20g		35g		40g		

Note 1. For details of the contact ratings, service life, characteristics, etc., refer to the Ratings and Specifications, and Electrical Life on page 7, 9 and 10
2. Large-capacity can be used at ratings of 115VDC 0.5A or greater. For more information, contact Yaskawa
*3. In circuit with optocoupler, 5V 10mA can be used.

☐ COIL SPECIFICATIONS (With polarity)

Type	Medium-Capacity						Large-Capacity					
	RI-D			RI-E			RI-B			RI-C		
Rated Voltage (E) V	12	24	48	12	24	48	12	24	48	12	24	48
Coil Resistance Ω	405	1520	5530	295	1160	4060	250	1020	3980	285	1080	3640
Rated Power Consumption W	0.4		0.5	0.45		0.55	0.6			0.6		0.7
Continuous Allowable Rated Voltage	170%E Approx. 1.2W			150%E Approx. 1.1W			220%E Approx. 3W			150%E Approx. 1.3W		
Operating Voltage	75%E or less						75%E or less					
Releasing Voltage	8.5%E or greater						8.5%E or greater					

Note 1 Values tabulated indicate operations at ambient temperature of 20°C

2 Coil resistance values can vary by $\pm 10\%$

3 Type RI-E and -C may erroneously operate if the maximum allowable power or voltage ratings are exceeded for a short period of time

☐ Bestact AUXILIARY RELAYS FOR ELECTRICAL POWER FACILITIES Type RI-B14T1U Type RI-C14T1U

☐ FEATURES

1 High contact reliability

Bestact products exceeding 2 million units have been employed under severe environmental conditions, and their ultra-high reliability of 4.8 FIT has been obtained from actual field results.

2 Large contact capacity

Since the maximum switching capacity is as large as 30A,

trip coil of power circuit breakers can be directly energized. Quick operating times of 3ms or less enables high-speed breaker actuation.

3. Incomparable use for PCB applications

A reduction in overall system cost can be realized due to compactness of relays and elimination of wiring/protective devices

☐ RATINGS AND SPECIFICATIONS

Type	RI-B14T2U	RI-B14T1U	RI-C14T1U
Contact Arrangement	1NO	1NO	1NC
Continuous Carrying Current Capacity	115VDC, 5A		
Closed-Circuit Capacity	115VDC 20A (L/R ≥ 5 ms), time duration 0.5sec 240VAC 30A (PF=0.7)		
Open-Circuit Capacity	115 VDC 0.5A (L/R=100ms) 240 VAC 1A (PF=0.4)		
Minimum Operational Power Ratings	1V 1mA ($\lambda_{\text{ON}} = 1 \times 10^{-4}$)		
Insulation Resistance	100M Ω or greater (500 VDC megger)		
Withstand Voltage	2200 VAC for 1 minute (across contacts) 1000 VAC for 1 minute)		
Thunder Surge Voltage Resistance	5000V 1.2 \times 50 μ s (excluding across contacts)		
Operating Time	3ms (-20 to +60°C)	5ms or less (20°C)	5ms or less (20°C)
Releasing Time	3ms or less		7ms or less

☐ COIL SPECIFICATIONS (With polarity)

Type	RI-B14T2U		RI-B14T1U			RI-C14T1U		
Coil Voltage	12VDC	24VDC	12 VDC	24 VDC	48 VDC	12 VDC	24 VDC	48 VDC
Coil Resistance	130 Ω	465 Ω	250 Ω	1020 Ω	3980 Ω	285 Ω	1080 Ω	3640 Ω
Operational Voltage	75%E or less (-20 to +60°C)		75%E or less (20°C)					
Rated Power Consumption	1.1W		0.6W					
Continuous Allowable Voltage	1.5W (117%E)		1.5W (160%E)			1.3W (150%E)		
Short Time Allowable Voltage	6W, 2 sec						1.3W (150%E)	

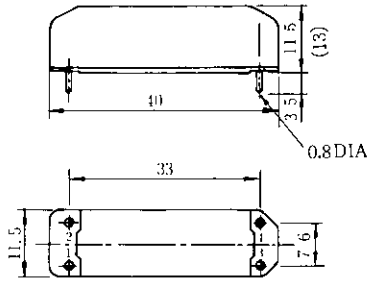
Note 1 Values shown above indicate operation at ambient temperature of 20°C

2 Coil resistance values can vary by $\pm 10\%$.

3 Type RI-C may erroneously operate if the continuous allowable voltage are exceeded for a short period of time

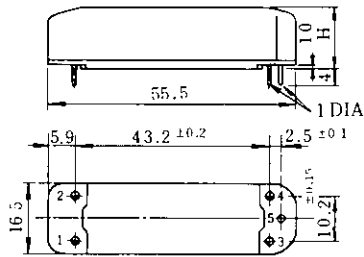
□ DIMENSIONS in mm

● Medium-Capacity Type



• Value in parenthesis is where Type RI-E indicates.

● Large-Capacity Type



• Only TYPE RI-B□MU and RI-C□MU have terminal number 5, refer of the connections

Dim	Type	RI-B	RI-C
H		14.5	17

(Dimensions above also applied) to the Auxiliary Relays

□ NOTE FOR INSTALLATION

● Connections

Bestact coils have a polarity. Connect for proper operation, terminal 3 to ⊕, and 4 to ⊖ as shown below.*

(PIN CONFIGURATION (Bottom View))

RI-D24MU RI-D25MU	
RI-E25MU	
RI-B14MU RI-B15MU	
RI-B14MHU RI-B15MHU	
RI-B14T1U RI-B14T2U	
RI-C14MU RI-C15MU	
RI-C14MHU RI-C15MHU	
RI-C14T1U	

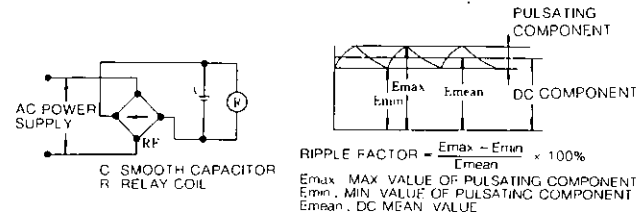
Note. * Incorporating permanent biasing/helper magnet

● Terminal connections for DC loads

Type	Terminal No.		
	2	5	1
RI-D24MU, D25MU	+	—	—
RI-E25MU	+	—	—
RI-14MU, B15MU	+	—	—
RI-B14MHU, B15MHU	+	—	—
RI-B14T1U, B14T2U	+	—	—
RI-C14MU, C15MU	+	—	—
RI-C14MHU, C15MHU	+	—	—
RI-C14T1U	+	—	—

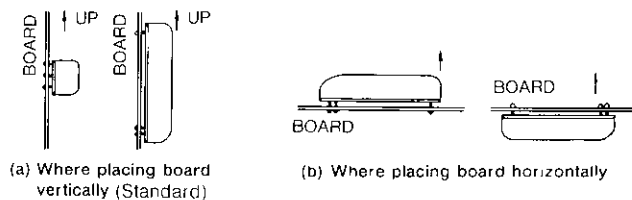
● Coil energizing sources

For proper coil excitation, use a genuine DC power supply such as battery or three-phase full-wave rectified source whose ripple factor is 5% or less. If single-phase full-wave rectified source is used, a smoothing capacitor is needed to control the ripple to 5% or less.



● Direction of mounting

The standard mounting direction is shown in figure (a) below. Where placing the relay mounting board horizontally as shown in figure (b), the operational voltage and releasing voltage may change as much as 5% compared with the standard mounting direction.



● Handling

Bestact is a hermetically sealed contact in a glass cartridge and it should be handled with special care as per the following :

- (1) To maintain their performance, do not drop or subject to impact shock.
- (2) Do not apply excessive force (3kg or greater tensile force) to the relay terminals.

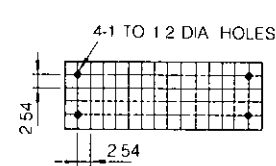
● External magnetic field

Since RI relays are magnetically sealed, abutting them does not cause any trouble. However, avoid using them in the strong external magnetic field or erroneous operations may occur.

● Mounting on printed circuit board

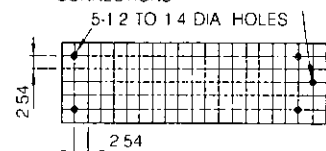
● Medium-Capacity Type

Unit: mm



● Large-Capacity Type

THIS HOLE IS UNNECESSARY FOR TYPE RI-C□H. REFER TO THE CONNECTIONS



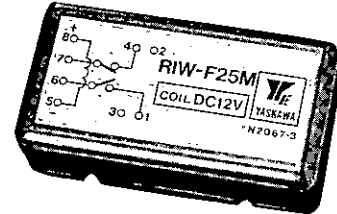
● Using without mounting on printed circuit boards

Where not mounted on the printed circuit board, mount and place wiring so as not to apply any force to the relay terminals. Avoid bending the terminal at its neck.

TWO POLE TYPE INPUT/OUTPUT RELAYS Type RIW-M

Highly Reliable Relays Solving Contact Problems of Mercury Relays

Two pole type I/O relays can supersede mercury relays that are widely used for vehicles and signals. In addition, these highly reliable relays have solved many contact problems that may occur using mercury relays.



RATINGS AND SPECIFICATIONS

Type		RIW-F25M	RIW-G25M
Contact Arrangement		1NO1NC	2NO
Incorporated Bestact		R25U	R25U
Rated Operational Current	AC	240V 0.5A (inductive load)	
	DC	115V 0.3A (inductive load)	
Minimum Operational Power Ratings		24V 1mA*	
Vibration Resistance		98.0m/s ² {10G} (20 to 1000HZ)	
Shock Resistance	Erroneous Operation	147.0m/s ² {15G}	
	Breakdown	980.0m/s ² {100G} or greater	
Withstand Voltage	Across Input and Output	1500VAC for 1 minute	
	Across Contacts	500VAC for 1 minute	
Ambient Temperature	Operating Temperature	-20 to +60°C	
	Storage	-25 to +80°C	

Note *In circuit with optocoupler, maximum 5V 10mA can be used

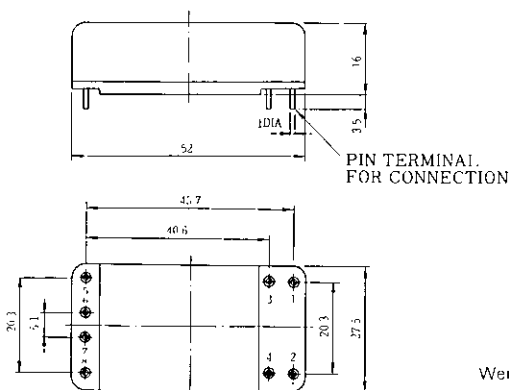
COIL SPECIFICATIONS (With polarity)

Type	RIW-F		RIW-G	
Rated Voltage (E)	12V	24V	12V	24V
Rated Power Consumption	1W			
Continuous Allowable Voltage and Power	130%E 1.7W			
Operating Voltage	75%E or less			
Releasing Voltage	5%E or less			

Note 1 Values tabulated indicate operations at ambient temperature of 20°C

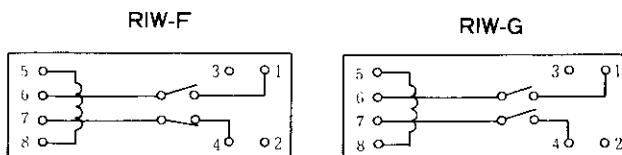
2 Each of NO and NC contact is independent. Therefore, the operating time of NO contact and NC contact may overlap

DIMENSIONS in mm



Weight: 60g

• Symbols and terminal markings (bottom view)



Note 1 For connection to coil terminals, connect terminal number 5 to ⊖ and terminal number 8 to ⊕

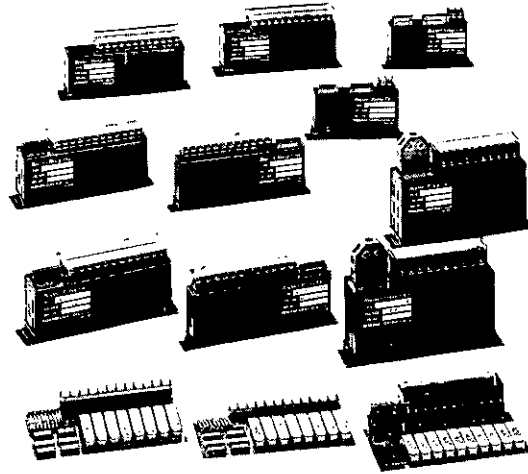
2 For application to DC circuit, connect terminal number 1 and 4 to ⊕ and terminal number 6 and 7 to ⊖

RELAY UNIT RIU SERIES

High Density Mounting Design Incorporating Ultra-High Reliability Relays Ideally Used as I/O Relay Units for Micromputer Boards, PC and NC Control Boards

FEATURES

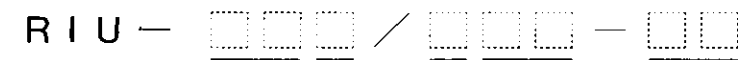
1. 4, 8, 10 and 16 contacts per unit, high density mounting design.
2. Can be energized using TTL electronic level signals or open collector input
3. Also available in a photocoupler isolation type.
4. Minimum space needed due to compact size
5. Provided with operational display (LED)
6. Incorporated features of the relay units:
 - Hermetically sealed contacts assure high long-term reliability even in adverse environments.
 - Large-capacity switching permits direct switching of large magnetic contactors, DC solenoid valves, etc
 - Surgeless switching
The unique breaking mechanism minimizes surge when magnetic coil is opened.



COMMON SPECIFICATIONS

- Operating voltage: 24VDC or 12VDC
- Voltage fluctuation range: Rated voltage -15% to +10%
- Operating temperature range: -10 to +60°C
- Operating humidity range: 85%RH or less
- Storage temperature range: -25 to +80°C
- Vibration resistance: 19.6m/s² {2G} (10 to 55Hz)
- Impact resistance: 98.0m/s² {10G}

TYPE DESIGNATION



FIGURE

- A B...Encased-type; connector input
- CEncased-type; screw terminal input
- EOpen-type; screw terminal input
- F G...Open-type; connector input

NUMBER OF CIRCUITS

- 0 4... 4 circuits
- 0 8... 8 circuits
- 1 0... 10 circuits
- 1 6... 16 circuits

SUPPLY VOLTAGE

- 1 2... 12VDC
- 2 4... 24VDC

INPUT SPECIFICATIONS

- ETTL input (non-isolated)
- FTTL input (isolated)
- GOpen collector input (non-isolated)
- HOpen collector input (isolated)

CONTACT SPECIFICATIONS

- None...All circuits use NO contact relays
- 2 2...2NO contact relays 2NC contact relays
- 4 4...4NO contact relays 4NC contact relays
- 6 2...6NO contact relays 2NC contact relays

□ MODEL LIST

Appearance	Figure	Supply Voltage	Contact Configuration	Input Circuit Configuration	Input Signal	Weight (g)
 RIU-04E	Open	12VDC 24VDC	• 4NO • 2NO2NC	2 circuits common × 2	• Open collector type (or contact)	200
 RIU-08A	Encased	12VDC 24VDC	• 8NO • 4NO4NC • 6NO2NC	8 circuits common × 1	• TTL type • Open collector type (or contact)	600
 RIU-08B	Encased	12VDC 24VDC	• 8NO	8 circuits common × 1	• TTL type • Open collector type (or contact)	500
 RIU-08C	Encased	12VDC 24VDC	• 8NO • 4NO4NC • 6NO2NC	8 circuits common × 1	• TTL type • Open collector type (or contact)	600
 RIU-08E	Open	12VDC 24VDC	• 8NO • 4NO4NC • 6NO2NC	2 circuits common × 4	• Open collector type (or contact)	300
 RIU-08F	Open	12VDC 24VDC	• 8NO • 4NO4NC • 6NO2NC	8 circuits common × 1	• Open collector type (or contact)	300
 RIU-08G	Open	12VDC 24VDC	• 8NO • 4NO4NC • 6NO2NC	8 circuits common × 1	• TTL type • Open collector type (or contact)	300
 RIU-10A	Encased	12VDC 24VDC	• 10NO	10 circuits common × 1	• Open collector type (or contact)	800
 RIU-16A	Encased	24VDC	• 16NO	16 circuits common × 1	• Open collector type (or contact)	950

□ RATINGS AND SPECIFICATIONS

• ENCASED TYPE

Specifications		Type	RIU-08A/□□	RIU-08B/□□	RIU-08C/□□	RIU-10A/□□	RIU-16A/□□
Number of Circuits			8	8	8	10	16
Output Specifications	Rated Carrying Current Capacity		2.5A per circuit	2A per circuit 4A for common line		2.5A per circuit	
	Contact Capacity		240VAC 0.5A 115VDC 0.3A				
	Terminal Style		Screw terminal				
	Power Supply		24VDC or 12VDC				24VDC
Input Specifications	Circuit Configuration		8 circuits common × 1			10 circuits common × 1	16 circuits common × 1
	Input Signal		• TTL type • Open collector type (or contact)			Open collector type (or contact)	
	Terminal Style		Connector		Screw terminal	Connector	
	Operation Display		With operational display (LED)				

• OPEN TYPE

Specifications		Type	RIU-04E/□□	RIU-08E/□□	RIU-08F/□□	RIU-08G/□□
Number of Circuits			4	8		
Output Specifications	Rated Carrying Current Capacity		2.5A per circuit		2A per circuit 4A for common line	
	Contact Capacity		240VAC 0.5A 115VDC 0.3A			
	Terminal Style		Screw terminal			
	Power Supply		24VDC or 12VDC			
Input Specifications	Circuit Configuration		2 circuits common × 2	2 circuits common × 4	8 circuits common × 1	
	Input Signal		Open collector type (or contact)			• Open collector type (or contact) • TTL type
	Terminal Style		Screw terminal		Connector	Connector
	Operation Display		With operational display (LED)			

□ INPUT SPECIFICATIONS

Input Specifications		CMOS, TTL Drive Type		Open Collector, Contact Drive Type	
		Non-isolated	Isolated	Non-isolated	Isolated
Type	For 4 circuits	—	—	RIU-04□□/G□□	—
	For 8 circuits	RIU-08□□/E□□	RIU-08□□/F□□	RIU-08□□/G□□	RIU-08□□/H□□
	For 10 circuits	—	—	RIU-10□□/G□□	—
	For 16 circuits	—	—	RIU-16□□/G□□	—
Isolation		—	Photocoupler isolated	—	Photocoupler isolated
Input Level		H - 2.5V or greater L - 1.0V or less		24VDC 25mA (per circuit) 12VDC 50mA (per circuit)	24VDC 10mA 12VDC 5mA
Input Impedance		10.5kΩ			
Input Power Supply		—	12 to 24VDC	—	12 to 24VDC
Relay Power Supply		24VDC or 12VDC*			
1 circuit Diagram					

Note : * Relay power supply of type RIU-16□□/G□□ is only 24VDC.

OUTPUT SPECIFICATIONS (RELAY RATING)

Contact Arrangement	Specifications		
	NO contact		NC contact
Type of Relay	RI-D24MU*1	RI-D25MU	RI-E25MU
Rated Insulation Voltage	250VAC		
Rated Carrying Current Capacity	3A		
Minimum Operational Power Ratings	5V 1mA	24V 1mA*2	24V 1mA*2
Contact Ratings	240VAC 0.5A (Inductive load) 115VDC 0.3A (Inductive load)		
Electrical Life	240VAC 0.5A(Inductive load) 1 million operations or greater Load: magnetic contactor 240VAC 0.1A(Inductive load) 10 million operations or greater Load: magnetic relay 115VDC 0.3A(Inductive load) 0.3 million operations or greater Load: solenoid valve 24VDC 0.1A (Inductive load) 5 million operations or greater Load: magnetic relay		
Mechanical Life	50 million operations	Over 100 million operations	100 million operations
Operating Time	OFF → ON time : 5ms or less ON → OFF time : 5ms or less		

Note *1 Standard products use RI-D25MU RI-D24MU-incorporated units are only available as a custom-order product
*2 In circuit with optocoupler, maximum 5V 10mA can be used

FIGURE SPECIFICATIONS

The relay unit is available either in open type as a printed circuit board, or as an enclosed type in which a printed circuit board is supplied enclosed. Select either type according to the mounting area and operational environment.

Figure Specification No. of Circuits	Encased Type			Open Type		
	Connector Input	Connector Input	Screw Terminal Input	Screw Terminal Input	Connector Input	Connector Input
4 circuits	—	—	—	RIU-04E	—	—
8 circuits	RIU-08A	RIU-08B	RIU-08C	RIU-08E	RIU-08F	RIU-08G
10 circuits	RIU-10A	—	—	—	—	—
16 circuits	RIU-16A	—	—	—	—	—

CONTACT SPECIFICATIONS

The unit is available in 4, 8, 10 and 16 circuit types. The Bestact relay incorporated in the unit exists as a NO contact or NC contact. Select the unit best suited for your application.

Relay Type	Relay Configuration	Relay No. in Circuit Diagram	
		Relay No. of NO	Relay No. of NC
RIU-04E	4NO	RY1 to RY4	—
	2NO 2NC	RY1 to RY2	RY3 to RY4
RIU-08A RIU-08C RIU-08E RIU-08F RIU-08G	8NO	RY1 to RY8	—
	6NO 2NC	RY1 to RY4	RY5 to RY8
	4NO 4NC	RY1 to RY6	RY7 to RY8
	8NO	RY1 to RY8	—
RIU-10A	10NO	RY1 to RY10	—
RIU-16A	16NO	RY1 to RY16	—

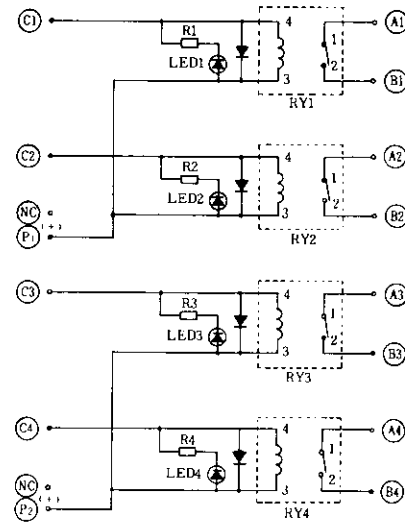
Note : 1. Of the 8 circuit series, Type RIU-08B does not accommodate NC relays. In that case, specify the Type RIU-08A or RIU-08C.
2. Type RIU-08A, -10A, -16A, -04E and -08E have independent output contacts. All other series have common output contacts. For specifics, see particular circuit diagram.

CONTACT CONFIGURATION DIAGRAM

When combined with NC contacts, all circuit configuration diagrams will have NC relays inside dashed boxes().

Type	Relay Specification	NO Contact Relays	NC Contact Relays
RIU-04E/		All circuits	—
RIU-04E/22		RY1 to RY2	RY3 to RY4
RIU-04E/44		RY1 to RY4	RY5 to RY8
RIU-04E/62		RY1 to RY6	RY7 to RY8

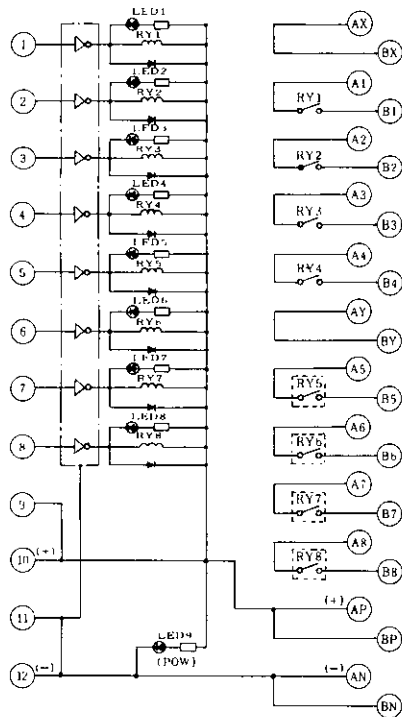
• Type RIU-04E/



• Type RIU-08A/E

INPUT(CONNECTOR)12P

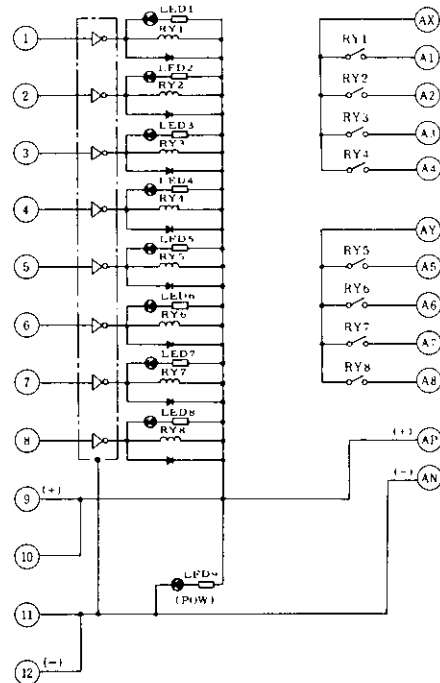
OUTPUT(TERMINAL)12P×2



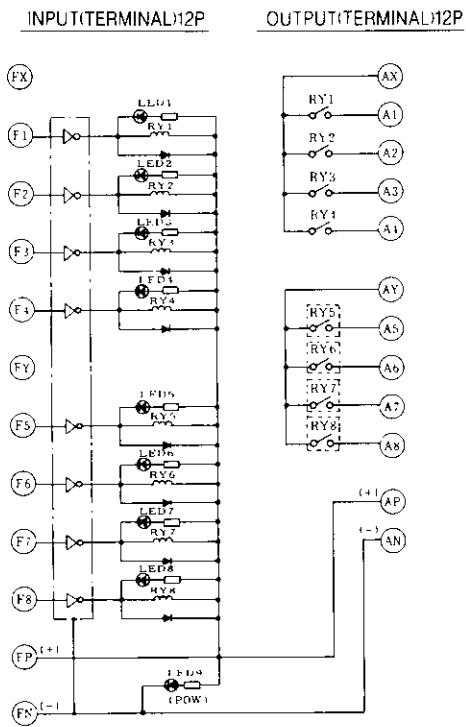
• Type RIU-08B/E

INPUT(CONNECTOR)12P

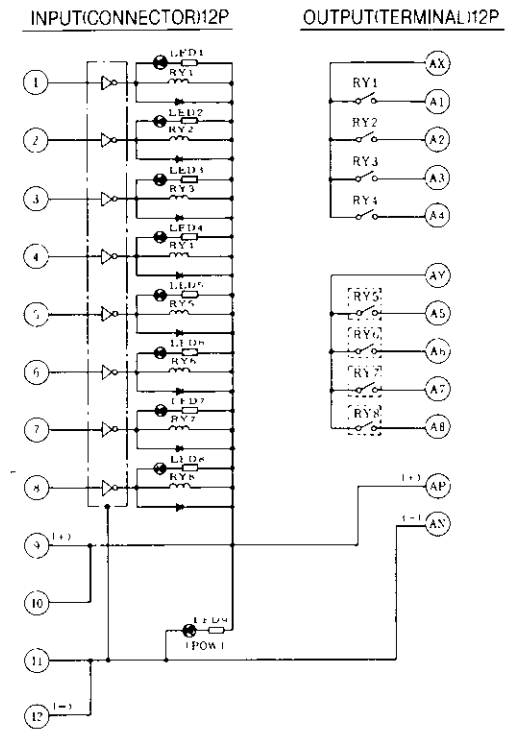
OUTPUT(TERMINAL)12P



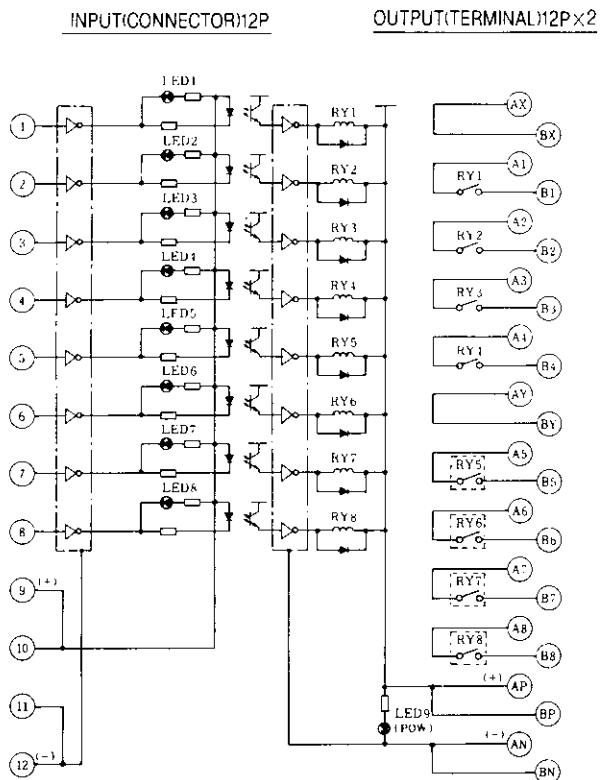
• Type RIU-08C/E



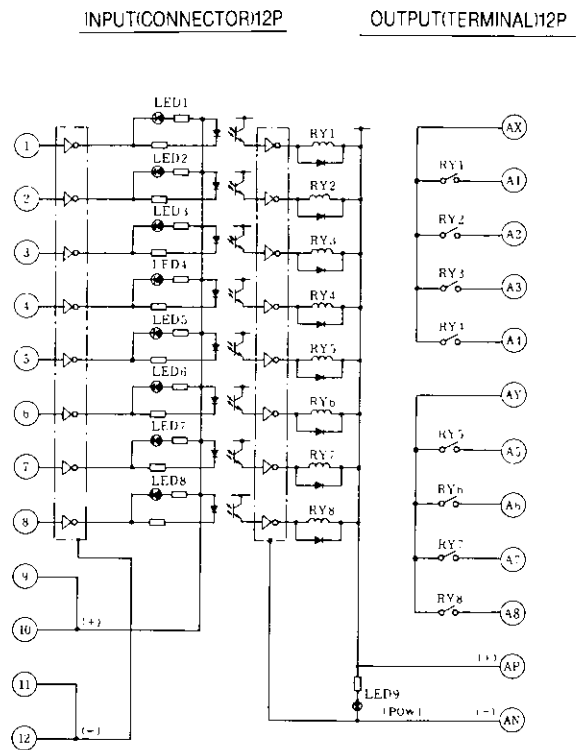
• Type RIU-08G/E



• Type RIU-08A/F



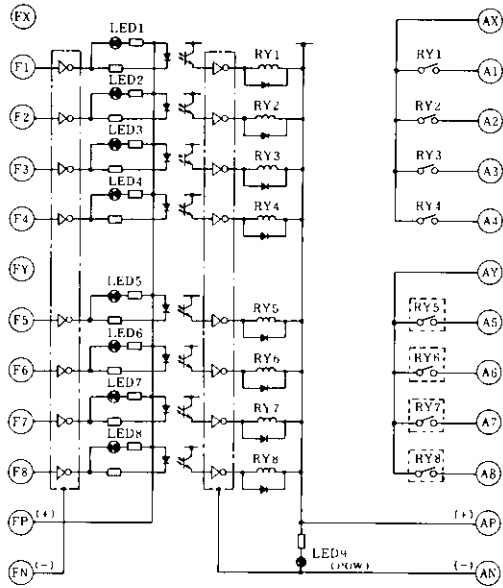
• Type RIU-08B/F



• Type RIU-08C/F

INPUT (TERMINAL) 12P

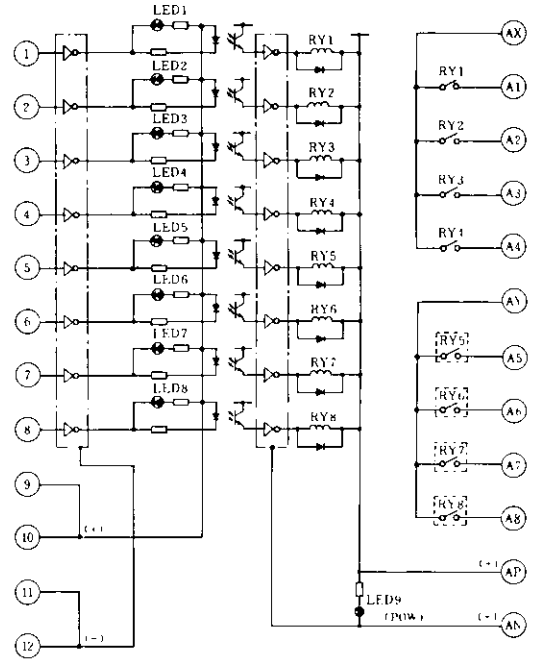
OUTPUT (TERMINAL) 12P



• Type RIU-08G/F

INPUT (CONNECTOR) 12P

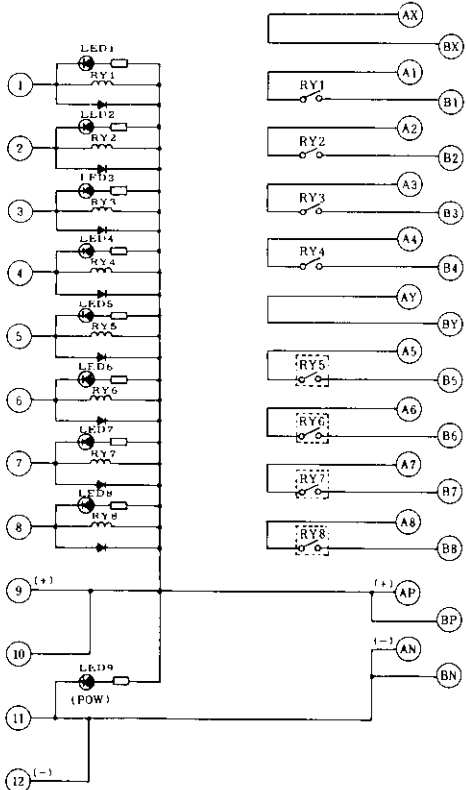
OUTPUT (TERMINAL) 12P



• Type RIU-08A/G

INPUT (CONNECTOR) 12P

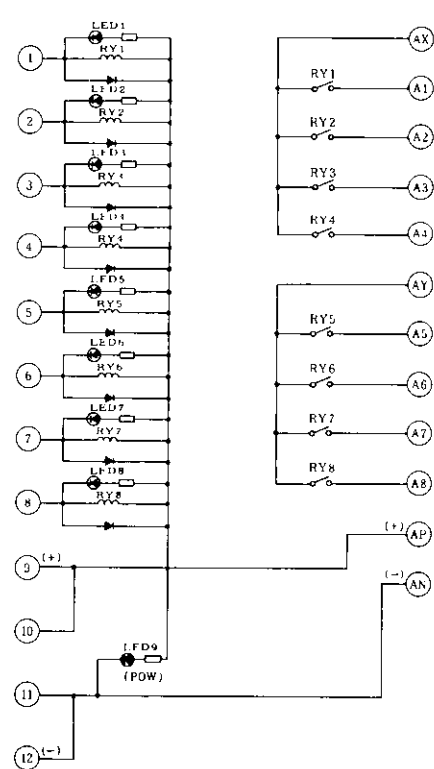
OUTPUT (TERMINAL) 12P x 2



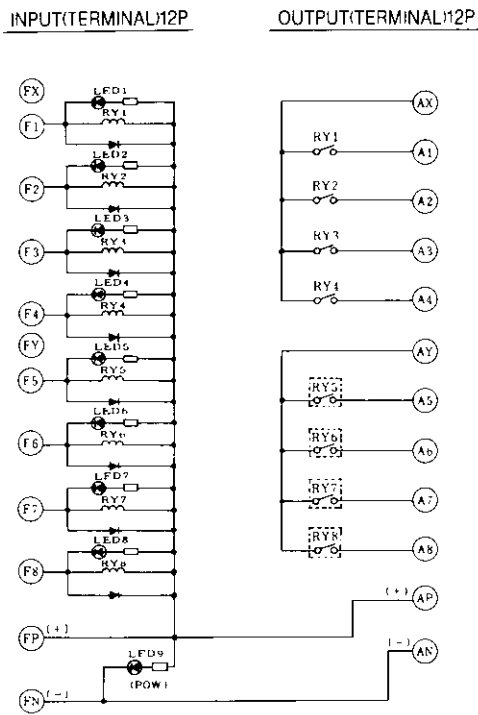
• Type RIU-08B/G

INPUT (CONNECTOR) 12P

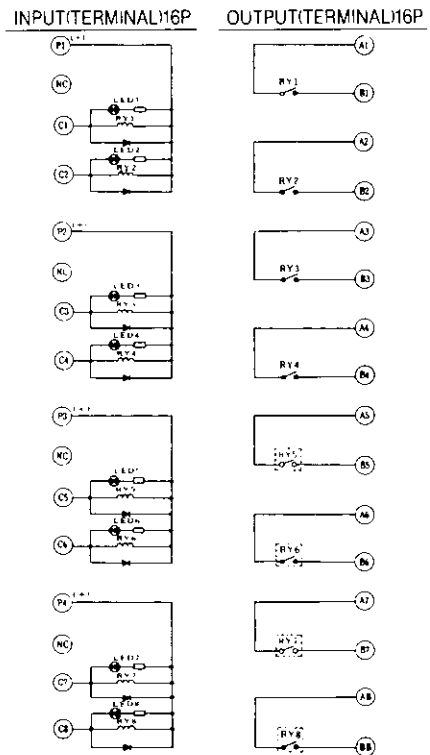
OUTPUT (TERMINAL) 12P



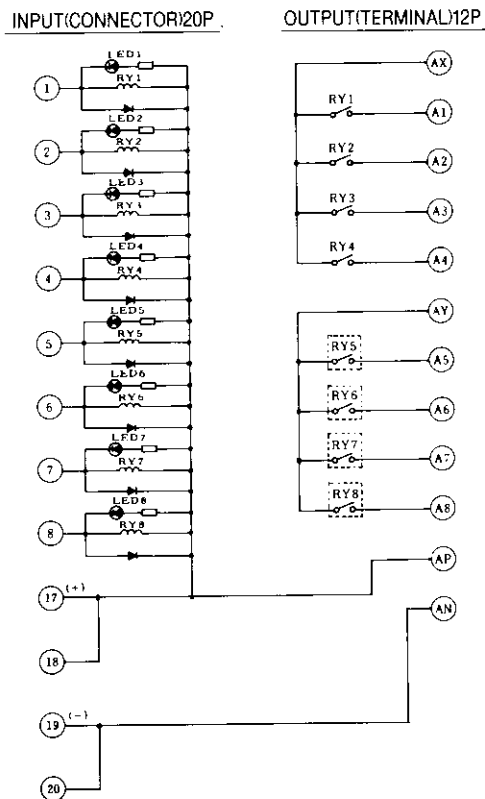
• Type RIU-08C/G



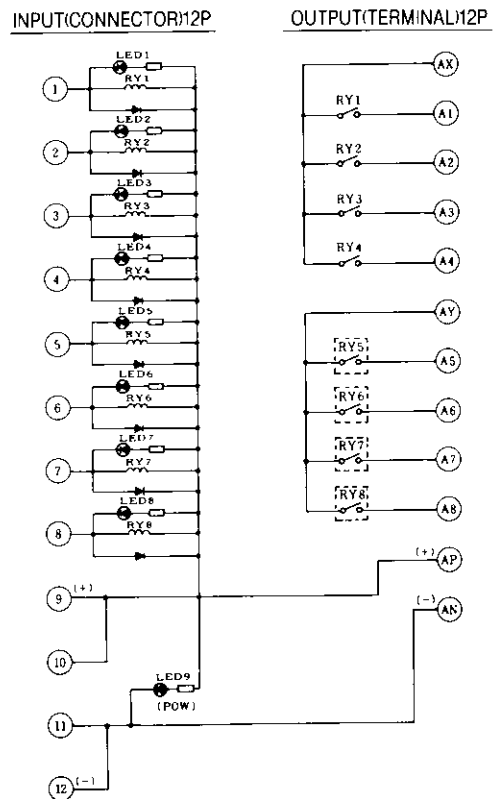
• Type RIU-08E/G



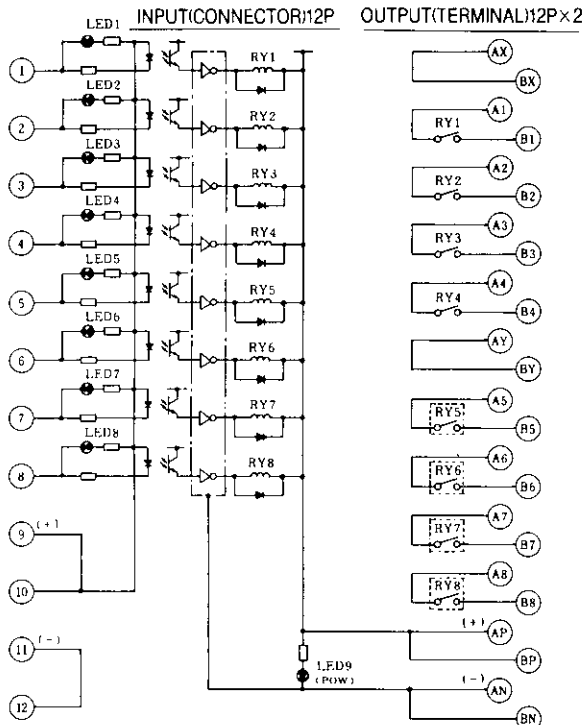
• Type RIU-08F/G



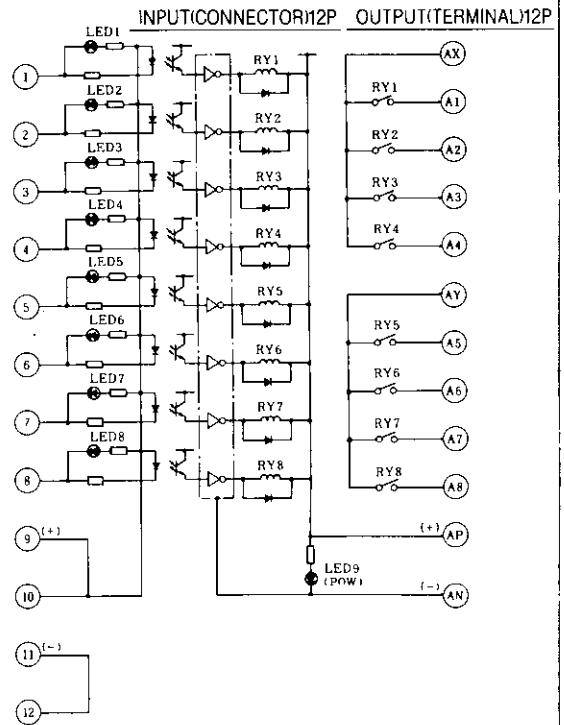
• Type RIU-08G/G



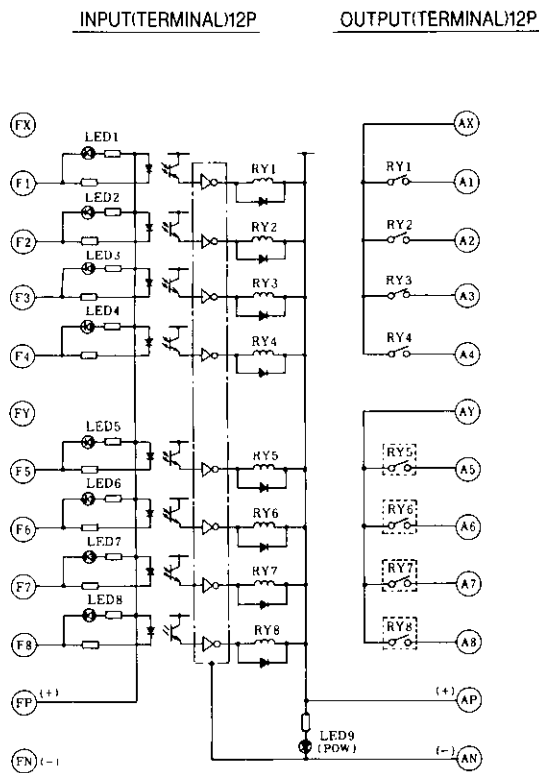
• Type RIU-08A/H



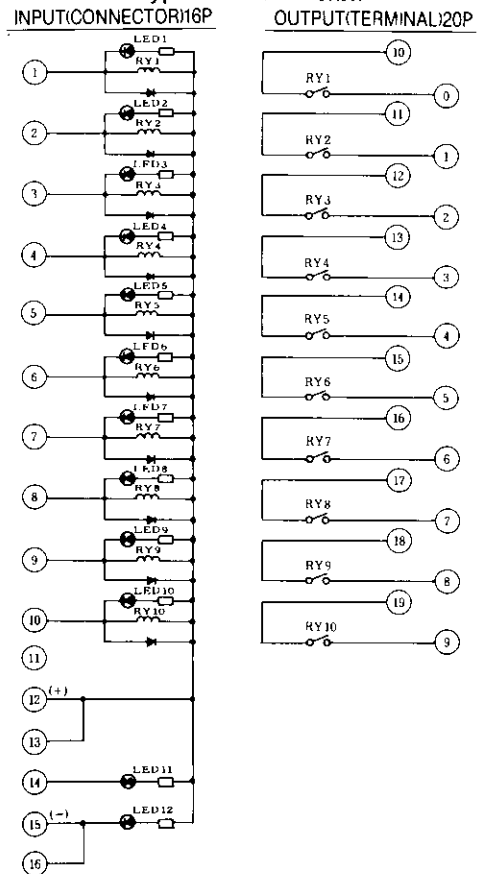
• Type RIU-08B/H



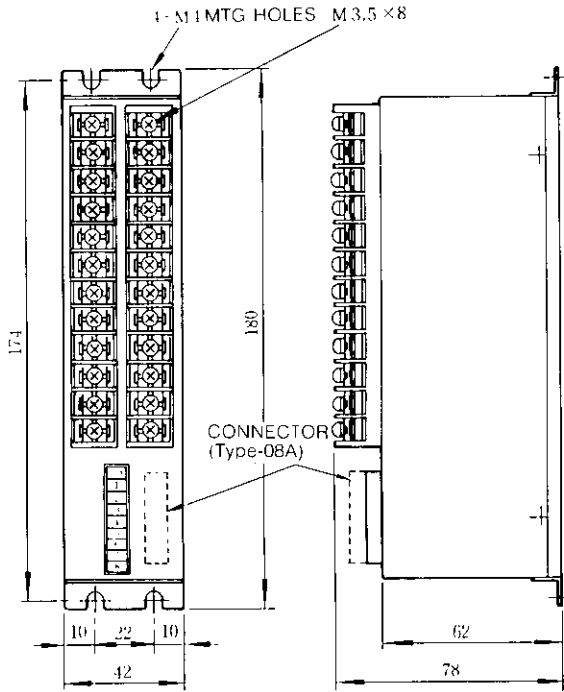
• Type RIU-08C/H



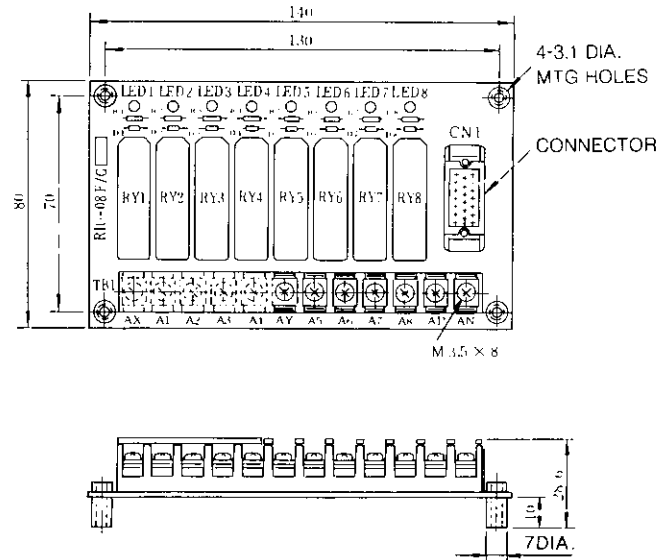
• Type RIU-10A/G



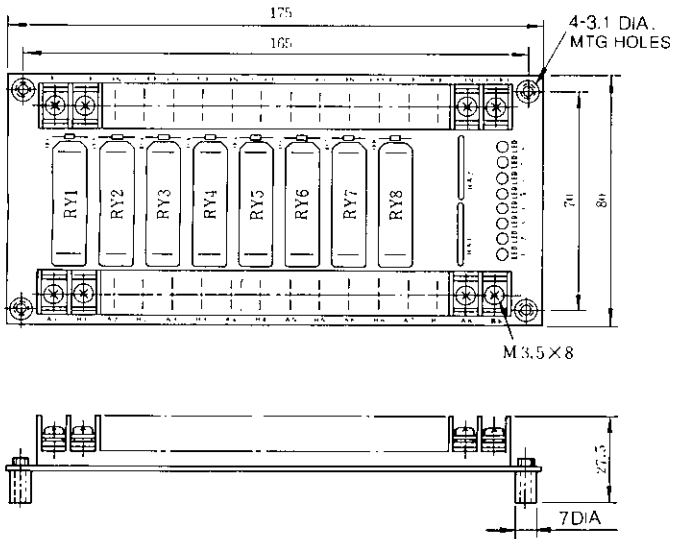
• Type RIU-08A/□□, -08C/□□ (For 8 circuits)



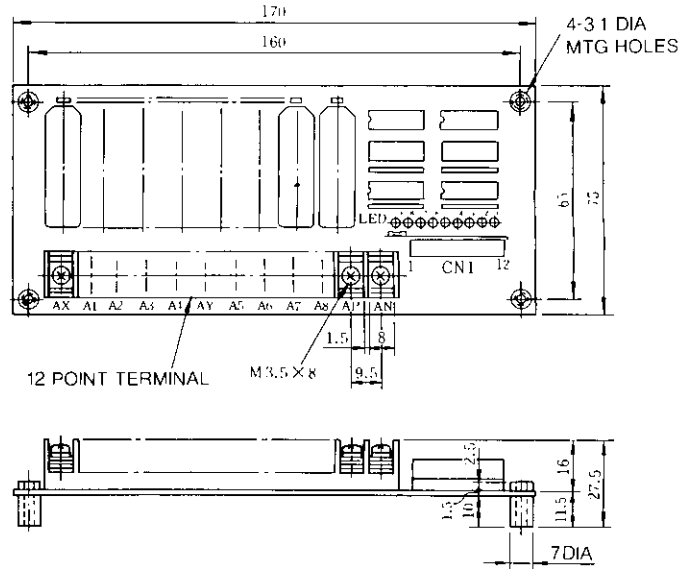
• Type RIU-08F/□□ (For 8 circuits)



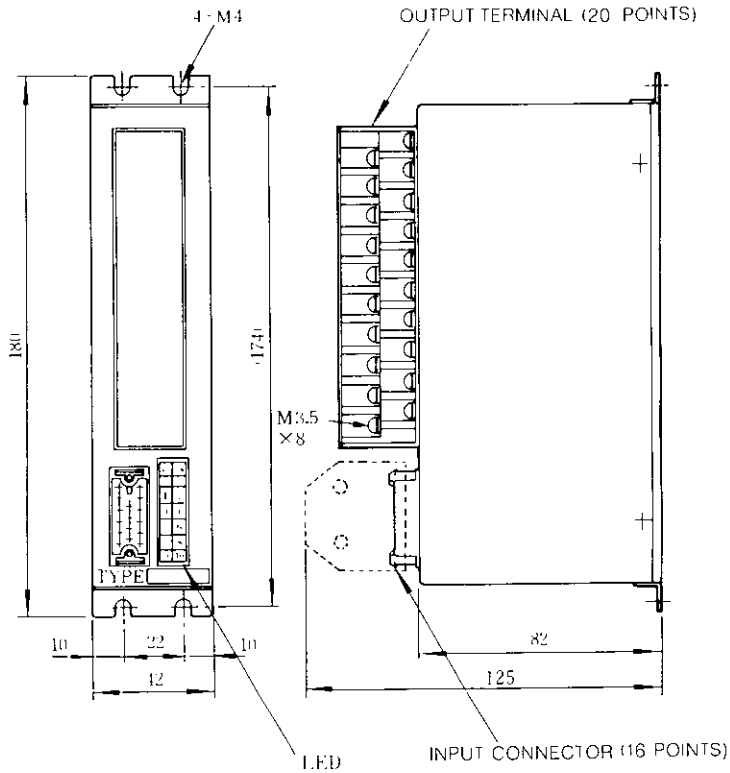
• Type RIU-08E/□□ (For 8 circuits)



• Type RIU-08G/□□ (For 8 circuits)



• Type RIU-10A/□ (For 10 circuits)

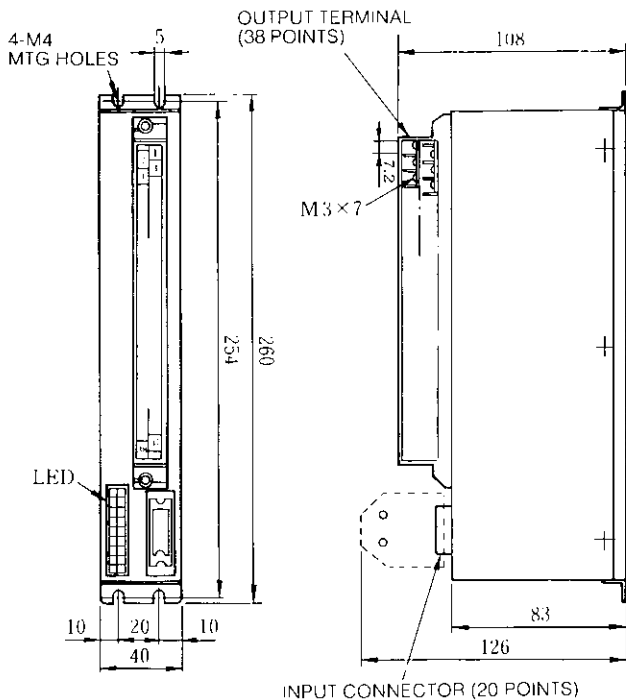


<NOTE>

When using DC circuits on the output (terminal) side, refer to the polarity table below for correct wiring. Reverse polarity wiring will cause significant reductions in contact lifetime.

Relay No.	Polarity on Output (terminal) Side																Signal
	Type																
	-04E/□		-08B/□ -08C/□ -08F/□ -08G/□		-08A/□		-08E/□		-10A/□		-16A/□		-16F/□				
	+	-	+	-	+	-	+	-	+	-	+	-	+	-			
1	B1	A1	A1	AX	B1	A1	B1	A1	0	10	2	1	A1	AW			
2	B2	A2	A2	AX	B2	A2	B2	A2	1	11	4	3	A2	AW			
3	B3	A3	A3	AX	B3	A3	B3	A3	2	12	6	5	A3	AW			
4	B4	A4	A4	AX	B4	A4	B4	A4	3	13	8	7	A4	AW			
5	-	-	A5	AY	B5	A5	B5	A5	4	14	10	9	A5	AX			
6	-	-	A6	AY	B6	A6	B6	A6	5	15	12	11	A6	AX			
7	-	-	A7	AY	B7	A7	B7	A7	6	16	14	13	A7	AX			
8	-	-	A8	AY	B8	A8	B8	A8	7	17	16	15	A8	AX			
9	-	-	-	-	-	-	-	-	8	18	18	17	A9	AY			
10	-	-	-	-	-	-	-	-	9	19	20	19	A10	AY			
11	-	-	-	-	-	-	-	-	-	22	21	A11	AY				
12	-	-	-	-	-	-	-	-	-	24	23	A12	AY				
13	-	-	-	-	-	-	-	-	-	26	25	A13	AZ				
14	-	-	-	-	-	-	-	-	-	28	27	A14	AZ				
15	-	-	-	-	-	-	-	-	-	30	29	A15	AZ				
16	-	-	-	-	-	-	-	-	-	32	31	A16	AZ				
	-	-	AP	-	AP	-	-	-	-	35	-	AP	-	+ com			
	-	-	-	-	BP	-	-	-	-	-	-	-	-	-			
	-	-	-	-	AN	-	-	-	-	-	-	-	-	-			
	-	-	-	-	-	BN	-	-	-	-	-	-	-	-	- com		

• Type RIU-16A/□ (For 16 circuits)



Note:

Type RIU-08F, -16A and -10A use a connector that is to be soldered. The connector is supplied with the main unit.

Bestact

MULTIPOLE RELAYS

I/O Helper

Medium-Capacity Type RB-2D2□20U

Large-Capacity Type RB-2D□20U

Plug-in (3-poles)

Medium-Capacity Type RB3P-G□□DU

Large-Capacity Type RB-3P□U

Stationary Type RB-5AB (5-poles)

I/O HELPER

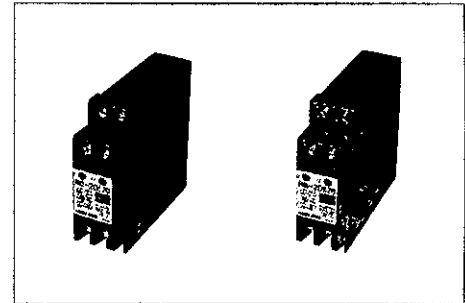
Medium-Capacity Type RB-2D2□20U

Large-Capacity Type RB-2D□20U

**Cover a Wide Range of Applications from Low Level to Power Loads
Ideal as Additional Relays for PC and Microcomputer Equipment**

FEATURES

1. Can energize with small-capacity transistor output since flywheel diode is integrated. LED is provided and power consumption is as low as 0.7 W per circuit.
2. Enables direct control of a wide range of loads, thus it is possible to fully compensate for insufficient output capacity of a general purpose PC relay.
3. Incorporate hermetically sealed contacts to prevent aging, making them ideal for infrequent use applications. They permit high frequency switching which is impossible with conventional contact relays.
4. Can reduce manufacturing time due to fast operational speed of 5ms or less.
5. Recognized in accordance with USA and Canadian standards File No. E154773. For Class I, Division 2 Groups A, B, C, D Hazardous Locations.



PRODUCT TYPES AND LOAD CONTROL (: Applicable scope)

• **Medium-Capacity Type**

Type	AC Power Control	DC Power Control	AC Relay Control	DC Relay Control	Electronic Circuit Control
RB-2D2420U	240 VAC 110 VA, over 300,000 operations	115 VDC 30 W, over 200,000 operations	24 to 240 VAC, over 10,000,000 operations	24 to 230 VDC, over 5,000,000 operations	24V 1mA to 5V 1mA
RB-2D2520U					24V 1mA or greater*

• **Large-Capacity Type**

Type	AC Power Control	DC Power Control	AC Relay Control	DC Relay Control	Electronic Circuit Control
RB-2D420U	240 VAC 240 VA, over 500,000 operations	115 VDC 50 W, 230 VDC 40 W, over 300,000 operations	24 to 240 VAC, over 10,000,000 operations	24 to 230 VDC, over 5,000,000 operations	24V 1mA to 1V 1mA
RB-2D520U					24V 1mA or greater*

*In circuit with photocoupler, 5V 10mA can be used.

TYPICAL APPLICATIONS

- Addition relays for programmable controllers
- For dry contact input of servo amplifiers, measuring instruments, etc.
- I/O interfaces of microcomputer logic
- Output relays of photoelectric switches, proximity switches, etc.

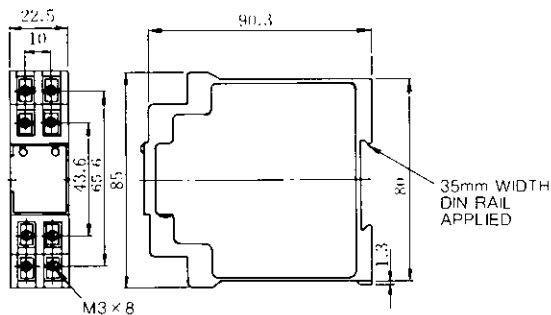
COIL SPECIFICATIONS (With polarity)

Coil Voltage	12, 24, 48 VDC
Coil Power Consumption	0.7 W × 2circuits (Large-capacity type) 0.6 W × 2circuits (Medium-capacity type)
Operating Time	5ms or less
Releasing Time	5ms or less
Ambient Temperature	-10 to +60 °C

☐ RATINGS AND SPECIFICATIONS

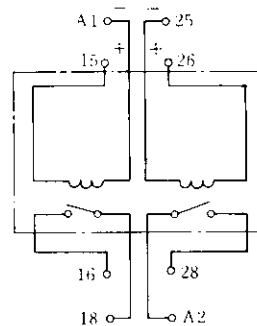
Type		Medium-Capacity Type		Large-Capacity Type			
		RB-2D2420U	RB-2D2520U	RB-2D420U	RB-2D520U		
Contact Ratings	Incorporated Bestact Type	R24U	R25U	R14U	R15U		
	Rated Continuous Current	3A		5A			
	Maximum Making Current	240 VAC 15 A (PF: 0.7)		240 VAC 30 A (PF: 0.7)			
	Maximum Breaking Current	240 VAC 15 A (PF: 0.4)		240 VAC 30 A (PF: 0.4)			
		115 VDC 0.5 A (L/R = 40 ms)		115 VDC 0.6 A, 230 VDC 0.4 A (L/R = 100 ms)			
	Operational Power Ratings (Inductive Load)	240 VAC 5 A ON 0.5 A OFF		240 VAC 10 A ON 1 A OFF			
115 VDC 0.3 A (L/R = 40 ms)		115 VDC 0.5 A, 230 VDC 0.2 A (L/R = 100 ms)					
Minimum Operational Power Ratings		5 V 1 mA	24 V 1 mA	1 V 1 mA	24V 1mA		
Characteristics	Operating Time		5ms or less		5ms or less		
	Releasing Time		5ms or less		5ms or less		
	Vibration Resistance Erroneous Operation		98.0m/s ² {10G} or greater (20 to 1000Hz)		98.0m/s ² {10G} or greater (20 to 1000Hz)		
	Shock Resistance	Erroneous Operation	147.0m/s ² {15G}		147.0m/s ² {15G}		
		Breakdown	980.0m/s ² {100G}		980.0m/s ² {100G}		
	Mechanical Life		50,000,000 operations	100,000,000 operations	50,000,000 operations	100,000,000 operations	
	Electrical Life (Inductive Load)	240 VAC 110 VA		240 VAC 240 VA (10 A making, 1 A breaking)			
		300,000 operations	1,000,000 operations	500,000 operations	800,000 operations		
		115 VDC 30 W (L/R = 40 ms)		115 VDC 50 W 300,000 operations (L/R = 100 ms)			
		200,000 operations	300,000 operations				
			24 VDC 40 mA 10,000,000 operations	24 VDC 40 mA 15,000,000 operations	24 VDC 40 mA 15,000,000 operations	24 VDC 40 mA 30,000,000 operations	
Withstand Voltage		1500VAC for 1 minute (across contacts: 500VAC for 1 minute)		2000VAC for 1 minute (across contacts: 800VAC for 1 minute)			
Ambient Temperature	Operating Temperature	- 10 to + 60°C		- 10 to + 60°C			
	Storage	- 25 to + 80°C		- 25 to + 80°C			
Approx. Weight		110 g		150 g			

DIMENSIONS in mm



(Same dimensions for both medium- and large-capacity types)

CONNECTIONS



- Bestact coils have a polarity. Connect terminal number 15 and 26 to ⊕
- For DC load, connect terminals 16 and 28 to ⊕

MULTIPOLE RELAYS

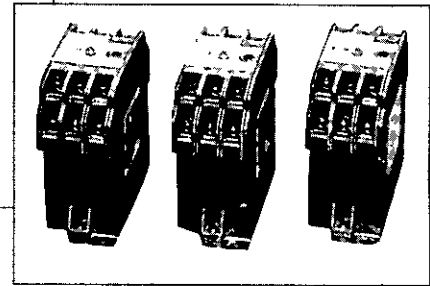
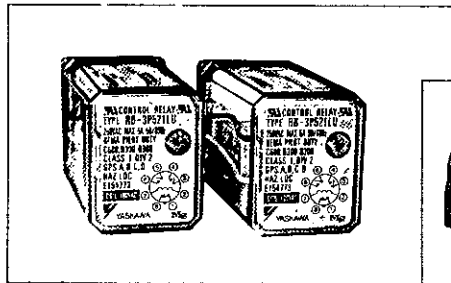
Plug-in Type RB-3PU (3-poles)
Stationary Type RB-5AB (5-poles)

Best Suited as Control Relays where High Reliability is Required

For Steel Plant Equipment, Electric Utilities, Transit Vehicles and Low Level Signals under Severe Operating Conditions.

FEATURES

1. Excellent performance provided when used for DC solenoid valves and solenoid loads. Without protective circuit components, 1,000,000 operations at 50W load can be ensured.
2. Maximum reliability can be assured in non-frequent operation.
3. Direct DC control from 1V 1mA on up to 230VAC.
4. The hermetically sealed contact design prevents the contacts from deteriorating even in a corrosive environment.
5. Mechanical failure should not occur since no moving parts such as an armature are included.
6. Applicable at different voltage levels.
7. AC actuated types available on order.
8. Type RB-3P(Only) Recognized in accordance with USA and Canadian standards File No. E154773. For Class 1, Division 2 Groups A,B,C,D Hazardous Locations.



TYPICAL APPLICATIONS

- Auxiliary sequence
- Emergency interlock
- For DC solenoid load controlling (Especially 100VDC or greater)
- For adverse atmosphere
- For vehicles
- For signals
- For elevators



RATINGS AND SPECIFICATIONS

Type	Contact Arrangement		Plug-in Type		Stationary Type
	Incorporated	R14U	2NO1NC	3NO	5NO, 3NO2NC, 2NO3NC
	Bestact Type	R15U	RB-3P421LU	RB-3P430LU	RB-5AB
			RB-3P521LU	RB-3P530LU	—
Operational Power Ratings*1 (Inductive Load)			240 VAC 1 A, 230 VDC 0.2 A, 115 VDC 0.5 A		240 VAC 1 A, 230 VDC 0.2 A, 115 VDC 0.5 A
Minimum Operational Power Ratings			1 V 1 mA (for R14), 24 V 1 mA (for R15)		1 V 1 mA
Characteristics	Operating Time*2		40 ms or less (with overlap)*3		40 ms or less (with overlap)*3
	Releasing Time *2		40 ms or less (with overlap)*3		40 ms or less (with overlap)*3
	Vibration Resistance		44 1m/s ² {4.5G} or greater (0 to 55Hz)*4		49.0m/s ² {5G}
	Shock Resistance	Erroneous Operation	147.0m/s ² {15G} **4		147 0m/s ² {15G}
		Breakdown	490 0m/s ² {50G} or greater		490.0m/s ² {50G} or greater
	Withstand Voltage		2000 VAC for 1 minute (across contacts: 800 VAC)		2500 VAC for 1 minute (across contacts: 800 VAC)
	Ambient Temperature	Operating Temperature	- 10 to +60°C		- 10 to +60°C
Storage		- 25 to +70°C		- 25 to +70°C	
Approx. Weight			120g		430g

Note *1 For details of contact ratings, life, characteristics, etc., refer to the Ratings, Specifications, and Electrical Life on pages 7,9 and 10

*2 Operating and releasing time are the values at rated voltage (20°C)

*3 Each of NO and NC contact operates independently. Therefore, the operating time of NO contact and NC contact may overlap

*4 Values of vibration/shock resistance are obtained when Bestact is equipped with relay retaining band. (Plug-in type).

□ COIL SPECIFICATIONS

• Plug-in Type RB-3P (Ambient temperature 20 °C)

Rated Voltage(E) V	Coil Resistance Ω	Rated Power Consumption	Maximum Continuous Allowable Voltage	Operating Characteristics	
				Minimum Operating Voltage	Release Voltage
100 (AC)	—	Approx 2 VA	130%E	NO contact 68%E or less NC contact 82%E or less	15 % E or greater
200 (AC)		Approx 2.8 VA			
24 (DC)	225 ± 10%	Approx. 1.9 W	130%E	NO contact 72%E or less NC contact 82%E or less	10 % E or greater
48 (DC)	1080 ± 10%				
100 (DC)	5120 ± 10%				
200 (DC)	—				

Note : All products of this type available on order

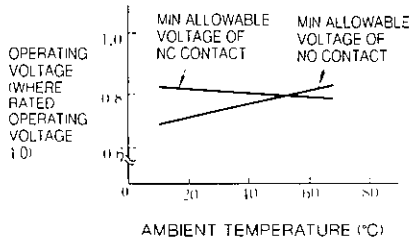
• Stationary Type RB-5AB (Ambient temperature 20 °C)

Rated Voltage(E) V	Coil Resistance Ω	Rated Power Consumption	Maximum Continuous Allowable Voltage	Operating Characteristics	
				Minimum Operating Voltage	Release Voltage
100 AC	—	2.2 to 2.7 VA	130%E	NO contact 75%E or less NC contact 78%E or less	8%E or greater
200					
24 DC	228 ± 10%	2.2 W	130%E	NO contact 76%E or less NC contact 78%E or less	8%E or greater
48	1100 ± 10%				
100	3920 ± 10%				
200	16000 ± 10%				

Note All products of this type available on order

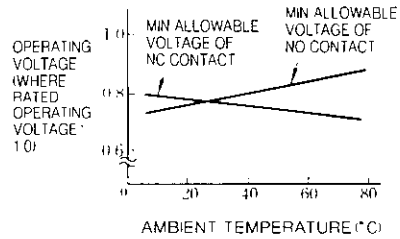
□ AMBIENT TEMPERATURE AND OPERATING VOLTAGE (DC Coil)

• Plug-in Type RB-3P



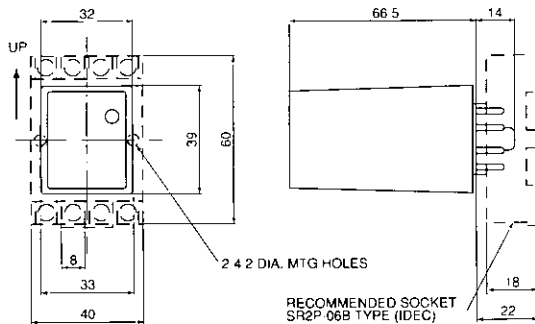
Note:
Minimum allowable voltage under no load

• Stationary Type RB-5AB

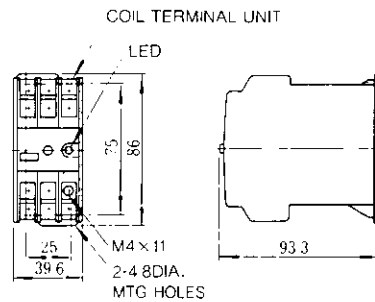


□ DIMENSIONS in mm

• Plug-in Type RB-3PU

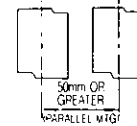


• Stationary Type RB-5AB

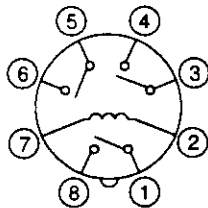


Note

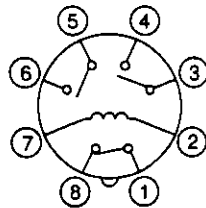
- Avoid changing the contact arrangement, otherwise, the operating characteristics may change
- The unit is color-coded as follows
Grey NO contact unit, coil terminal units and idle unit
Yellow: NC contact unit
- Where mounting the relays in parallel, provide a mounting interval of at least 50mm



Type RB-3P430LU
Type RB-3P530LU



Type RB-3P421LU
Type RB-3P521LU



Symbols and Terminal Codes

- Note: 1 Where Type RB 3P and RB 5AB are used in DC circuit, connect the even numbered terminals to ⊕ and odd-numbered terminals to ⊖
- 2 When mounting relays in parallel, provide a mounting interval of 42mm or greater

MULTIPOLE RELAYS

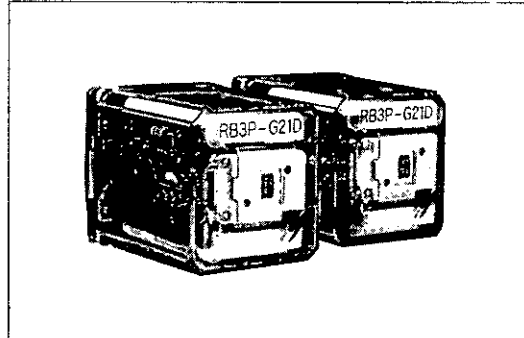
Plug-in Type RB3P-GU (3-poles)

Best Suited as Control Relays where High Reliability is Required

For Steel Plant Equipment, Electric Utilities, Transit Vehicles and Low Level Signals under Severe Operating Conditions.

□ FEATURES

1. Excellent performance provided when used for DC solenoid valves and solenoid loads. Without protective circuit components, 500,000 operations at 50W load can be ensured.
2. Maximum reliability can be assured in non-frequent operation.
3. Direct DC control from 24V 1mA on up to 230VAC.
4. The hermetically sealed contact design prevents the contacts from deteriorating even in a corrosive environment.
5. Mechanical failure should not occur since no moving parts such as an armature are included.
6. Applicable at different voltage levels.
7. AC actuated types available on order.
8. Recognized in accordance with USA and Canadian standards File No. E154773. For Class I, Division 2 Groups A, B, C, D Hazardous Locations.



□ TYPICAL APPLICATIONS

- Auxiliary sequence
- Emergency interlock
- For DC solenoid load controlling
- For adverse atmosphere
- For vehicles
- For signals
- For elevators



□ RATING AND SPECIFICATIONS

Type		RB3P-G21DU	RB3P-G30DU	
Contact Arrangement		2NO1NC	3NO	
Incorporated Bestact Type		R25U		
Operational Power Ratings (Inductive Load)	AC	240V 0.5A		
	DC	115V 0.3A		
Minimum Operational Power Ratings		24V 1mA		
Characteristics	Operating Time	40ms or less (with overlap)		
	Releasing Time	40ms or less (with overlap)		
	Vibration Resistance		44.1m/s ² (4.5G) or greater (0 to 55Hz)	
	Shock Resistance	Erroneous Operation	147.0m/s ² (15G) or greater	
		Breakdown	490.0m/s ² (50G) or greater	
	Withstand Voltage		1500VAC for 1 minute (across contacts : 500VAC)	
	Ambient Temperature	Operating Temperature	-10 to +60°C	
Storage		-25 to +70°C		
Approx. Weight		110g		

- Note : 1. For details of contact ratings, life, characteristics, etc., refer to the Ratings, Specifications, and Electrical Life on pages 7.9 and 10
2. Operating and releasing time are the values at rated voltage (20°C)
3. Each of NO and NC contact operates independently. Therefore, the operating time of NO contact and NC contact may overlap.
4. Values of vibration/shock resistance are obtained when Bestact is equipped with relay retaining band. (Plug-in type)

COIL SPECIFICATIONS

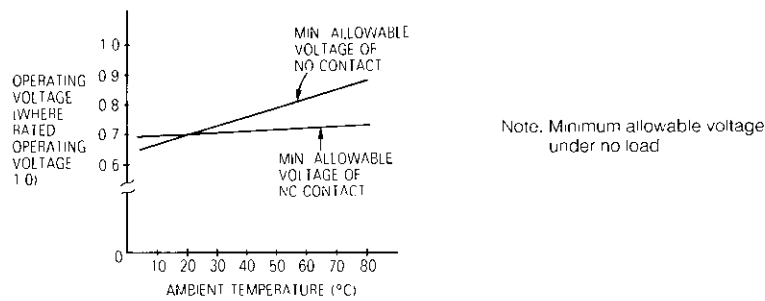
- Plug-in Type RB3P-GU (Ambient temperature 20°C)

Rated Voltage(E) V	Coil Resistance Ω	Rated Power Consumption	Maximum Continuous Allowable Voltage	Operating Characteristics	
				Maximum Operating Voltage	Release Voltage
110V (AC)	—	Approx. 2 VA	120%E	70%E or less	10%E or greater
220V (AC)	—	Approx 2.8 VA			
24V (DC)	225 \pm 10%E	Approx 1.9 VA	120%E	70%E or less	10%E or greater
48V (DC)	1080 \pm 10%E	Approx 1.9 VA			
100V (DC)	5120 \pm 10%E	Approx. 3 VA			

Note · All products of this type available on order

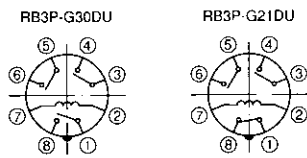
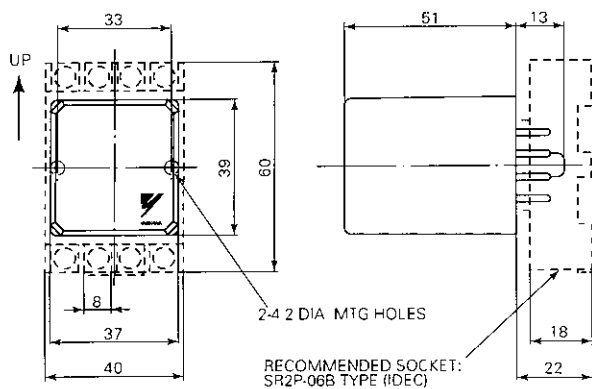
AMBIENT TEMPERATURE AND OPERATING VOLTAGE (DC Coil)

- Plug-in Type RB3P-GU



DIMENSIONS in mm

- Plug-in Type RB3P-GU



Symbols and Terminal Codes (Top View)

Notes: 1 Where Type RB3P-GU is used in DC circuit connect the even-numbered terminals to \oplus and odd-numbered terminals to \ominus .

2 When mounting relays in parallel, provide a mounting interval of 50mm or greater.

Bestact HEAVY DUTY LIMIT SWITCHES

Spring Return Type PSKU-□R25□

(Medium-capacity type)

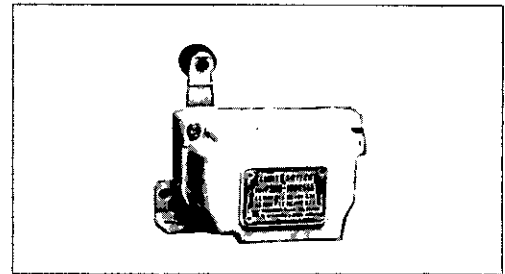
Maintained Type PIKU-□R25□

(Medium-capacity type)

High Reliability Superior to That of Non-Contact Type by Employing Double and Triple Barriers. Best Suited for Heavy Duty Application due to Outstanding Environmental Immunity

□ FEATURES

1. Complete floodtight and gas resistance:
Outstanding environmental immunity is assured by employing floodtight, corrosion-resistant construction and through use of hermetically sealed contact.
2. Long-term maintenance free :
This is achieved through the combination of the actuator exhibiting high mechanical strength as well as internal vane-action magnetic proximity switch featuring high electrical reliability, assuring long-term maintenance-free operation.
3. Powerful contact :
Inductive load of 115VDC 0.3A can be directly controlled without using an amplifying relay or protective circuit.
4. No contact chattering :
Since large actuator movement is considered in design, the switch is not ill-affected by operational shock or vibration. Therefore, electrical circuit can be simplified.



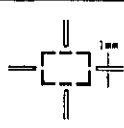
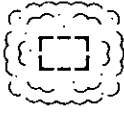

□ TYPICAL APPLICATIONS

- Steel plant equipment
- Large-size transportation machinery
- Material handling equipment
- Cement producing equipment

□ DEGREES OF PROTECTION (International Electrotechnical Commission Standard 529)






IP □ □

• Classification of Protection for Persons and Foreign Matter

Degree	Definition
4	 <p>Wires or strips of thickness greater than 1.0mm. Solid objects exceeding 1.0mm in diameter.</p>
5	 <p>Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.</p>
6	 <p>No ingress of dust</p>

International Protection

• Classification of Protection for Ingress of Water

Degree	Definition
0	Non-protected No special protection
2	 <p>Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position</p>
3	 <p>Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect</p>
6	 <p>Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.</p>
7	 <p>Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time.</p>
8	 <p>The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer. Normally, this will mean that the equipment is hermetically sealed. However with certain types of equipment it can mean that water can enter but only in such a manner that it produces no harmful effects.</p>

□ RATINGS AND SPECIFICATIONS

Type of Actuation	Roller Lever	Cylindrical Roller Lever (Horizontal Mounting)	Cylindrical Roller Lever (Vertical Mounting)	Pull Lever	Pull Lever (Crane Drum Over-Winding Protection)	Fork Lever	Pull Lever (One Direction Pull)
Type*1	PSKU- * R25A	PSKU- * R25AB	PSKU- * R25AV	PSKU- * R25AE	PSKU- * R25AO	PIKU- * R25A	PIKU- * R25AE
Switch Action	Spring return					Maintained	
Contact Arrangement Available*2	1NO (2-way operations) 1NC (1-way operation) 2NO (2-way operations) 1NO1NC (1-way operation) 2NC (1-way operation)	1NO, 1NC, 2NO, 1NO1NC, 2NC (1-way operation)			1NO 2NO 1NO1NC*5	1NO, 1NC, 2NO, 1NO1NC, 2NC (1-way operation)	
Common Specifications	<ul style="list-style-type: none"> • Enclosure: Floodtight type (IP 56*6) • Rated insulation voltage: 250V • Rated continuous current: 3A • Operational power ratings: 240VAC 0.5A, 115VDC 0.3A, 48VDC 0.5A • Withstand voltage: 500VAC for 1 minute across contact, 1500VAC for 1 minute across contact to ground • Operating temperature: -10 to +80°C • Storage temperature: -25 to +90°C • Maximum recommended speed of actuation: 100m/min*7 • Operating frequency: 3600 times/hour • Mechanical life: 5,000,000 operations or greater • Electrical life: 240VAC 5A making 0.5A breaking 1,000,000 operations or greater (inductive load) 115VDC 50mA 5,000,000 operations or greater (inductive load) • Lead-in method: PF 1/2 (13 diameter hole) 						

Note *1 Types with ***** such as PSKU-*****R25A can vary depending upon the contact arrangement 1NO [100], 1NC [010], 2NO [200], 2NC [020], 1NO1NC [110].

*2 Change of NO contact to NC contact cannot be done at user

*3 For DC circuit, connect the terminal number 1 to ⊕ and 2 to ⊖

*4 The lever movement is limited to either clockwise or counterclockwise operation. Where ordering, specify the lever moving direction. For the 1-way operation of 1NO, 1NO1NC or 2NC, specify "R" in the square if CW is required, or "L" for CCW.

*5 Where contact arrangement is 1NO and 2NO, specify the operating direction required. If it should turn on in clockwise operation, specify "R" in the square, in counterclockwise operation, specify "L".

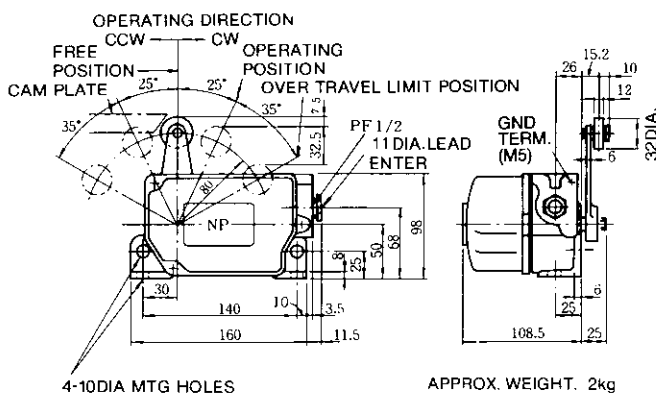
*6 Refer to page 33 and 37

*7 Type PSKU-*****R25AO for crane drum over-winding protection will not restrict. However, after the contact has turned off, effective measures should be taken to lessen the effect of accidental turn on due to shock or vibration.

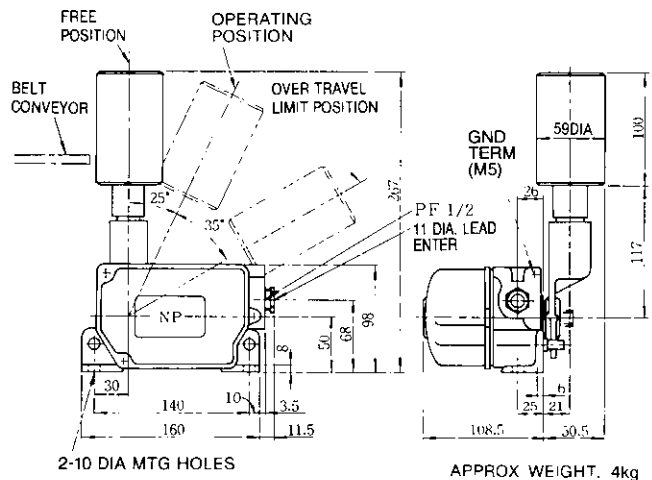
*8 Heat-resistant, corrosion-resistant type PSKH is available on order

□ DIMENSIONS in mm

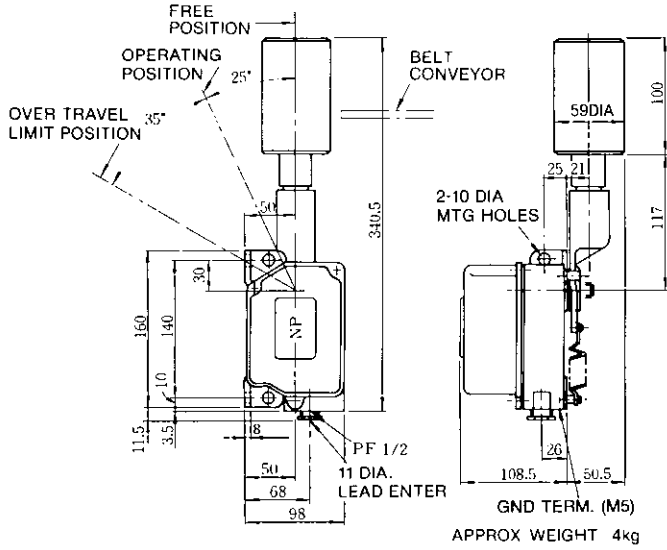
● Roller Lever Type PSKU-□R25A (Spring return)



● Cylindrical Roller Lever (Horizontal mounting) Type PSKU-□R25AB (Spring return)

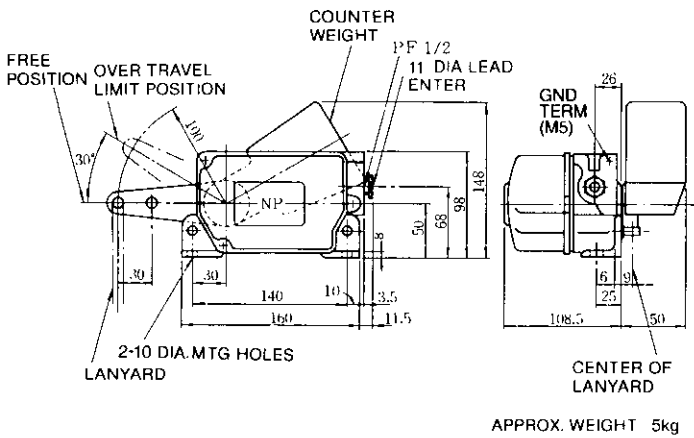


- Cylindrical Roller Lever (Vertical mounting)
Type PSKU-□R25AV (Spring return)



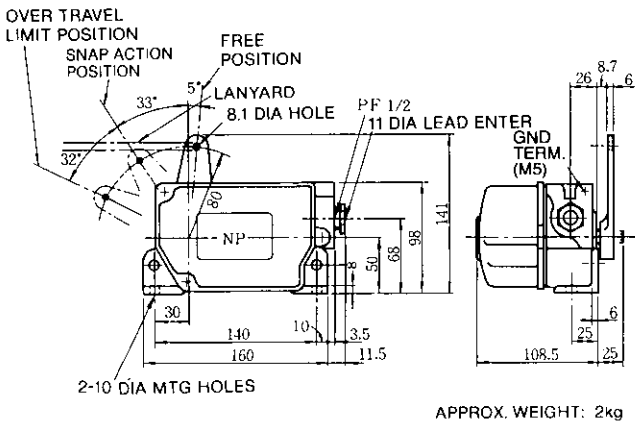
APPROX WEIGHT 4kg

- Pull Lever (Crane drum over-winding protection)
Type PSKU-□R25AO (Spring return)



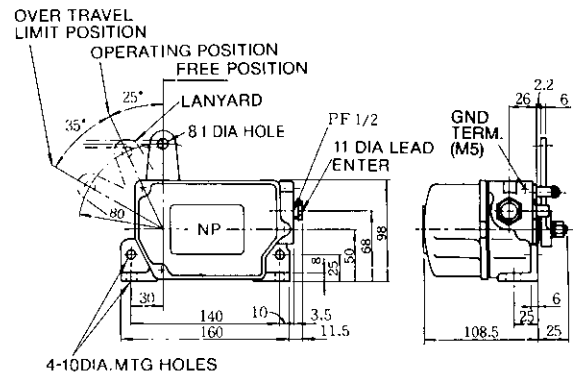
APPROX. WEIGHT 5kg

- Pull Lever (One direction pull)
Type PIKU-□R25AE (Maintained)



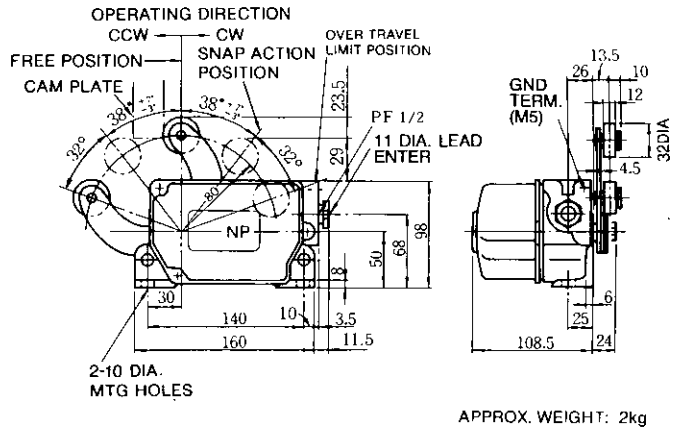
APPROX. WEIGHT: 2kg

- Pull Lever Type PSKU-□R25AE (Spring return)



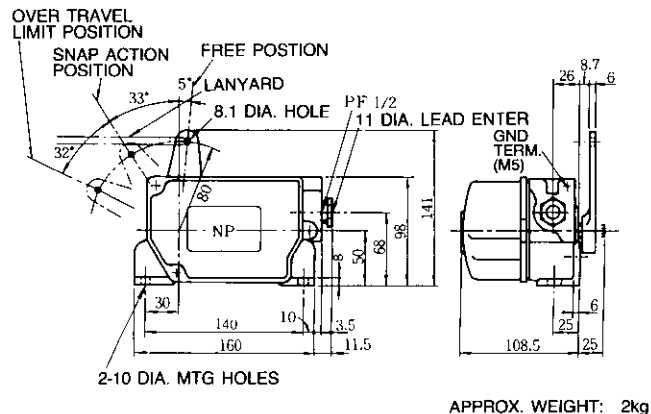
APPROX WEIGHT: 2kg

- Roller Fork Lever Type PIKU-□R25A (Maintained)



APPROX. WEIGHT: 2kg

- Pull Level (One direction pull)
Type PIKU-□R25AE (Maintained)



APPROX. WEIGHT: 2kg

Bestact

LIMIT SWITCHES

Spring Return Type PSGR-□□□□-□

Promising Stable Operation even in Adverse Environments

FEATURES

1. Contact is medium-capacity Bestact, virtually eliminating the effects of the external environmental conditions and assuring stable and continuous operation.
2. No charged components are exposed to the environment on the inside or outside of the case or the connecting portions of the leads, thus eliminating the effects of internal condensation due to high ambient temperatures.
3. Operational characteristics are identical to the general-use (incorporated snap switch) Yaskawa PSG limit switch, and are fully interchangeable.

TYPICAL APPLICATIONS

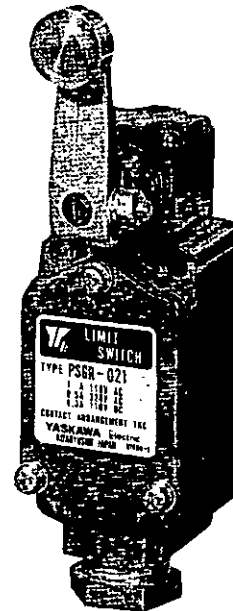
- Steel plant equipment
- Large-size transportation machinery
- Machine tools

RATINGS AND SPECIFICATIONS

Name		Floodtight type limit switch
Switch Unit		Incorporated medium-capacity Bestact R24U or R25U Contact Arrangement: 1NO or 1NC
Rated Insulation Voltage		250V
Rated Continuous Current		3A
Rated Operational Current	AC	240V 0.5A (Inductive load)
	DC	115V 0.3A 48V 0.5A (L/R = 40ms)
Minimum Operational Power Ratings		24V 1mA
Electrical Life*1	AC	240V 0.5A 1 million operations (inductive load)
	DC	115V 50mA 5 million operations (inductive load)
Mechanical Life		5 million operations (Speed of actuation 12m / min) (Contact Angle 45-degree)
Operating Frequency		1,200times / hour
Switch Action		Spring return
Enclosure		Cast zinc case
Power Cable		2m cable is included
Ambient Temperature	Operating Temperature	- 10 to +80°C
	Storage	- 25 to +90°C
Enclosure*2		IP56

Note. *1 For application to DC circuit, connect the black lead to ⊕ and white lead to ⊖.

*2. Refer to page 33 and 37.



MODEL LIST

	Actuator	Type
Plunger Type	Top Roller Plunger	PSGR-005-□□
	Top Roller Plunger with Bellows	PSGR-005B-□□
	Top Ball Plunger	PSGR-006B-□□
90-Degree Travel Type	Roller Lever	PSGR-021-□□
	Adjustable Roller Lever	PSGR-022-□□
	Adjustable Rod Lever	PSGR-023-□□
	50 Diameter Nylon Roller Lever	PSGR-024-□□
	Rod Lever	PSGR-025-□□
	50 Diameter Hardened Steel Roller Lever	PSGR-026-□□
	50 Diameter Nylon Adjustable Roller Lever	PSGR-028-□□

Note Specify contact arrangements as follows

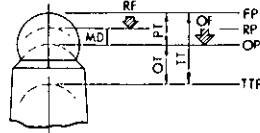
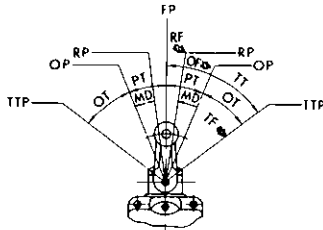
(Example) NO contact PSGR-005-A
NC contact PSGR-005-B

□ OPERATING CHARACTERISTICS

Type	Plunger Type			90-Degree Travel Type						
	PSGR-005 (Top Roller) (Plunger)	PSGR-005B (Top Roller) (Plunger with Bellows)	PSGR-006B (Top Ball) (Plunger)	PSGR-021 (Roller Lever)	PSGR-022 (Adjustable) (Roller Lever)	PSGR-023 (Adjustable) (Rod Lever)	PSGR-024 (Nylon Roller) (Lever)	PSGR-025 (Rod Lever)	PSGR-026 (Hardened Steel) (Roller Lever)	PSGR-028 (Nylon Adjustable) (Roller Lever)
Definitions of Operating Characteristics										
Operating Force	27.4N max (2800gf max.)	27.4N max (2800gf max.)	27.4N max (2800gf max.)	8.8N max (900gf max.)	8.8N max *1 (900gf max.)	2.4N*2 (245gf)	8.8N max. (900gf max.)	1.7N*3 (170gf)	4.9N max (500gf max.)	8.8N max *1 (900gf max.)
Releasing Force	8.8N min. (900gf min.)	8.8N min. (900gf min.)	8.8N min. (900gf min.)	0.5N min. (50gf min.)	0.5N min. (50gf min.)	0.1N min. (14gf min.)	0.5N min. (50gf min.)	0.1N min. (10gf min.)	0.5N min. (50gf min.)	0.5N min. (50gf min.)
Pretravel	2.5 ± 0.5mm	2.5 ± 0.5mm	2.5 ± 0.5mm	27 ± 3°	27 ± 3°	27 ± 3°	27 ± 3°	27 ± 3°	27 ± 3°	27 ± 3°
Overtravel	4.6mm min.	2.5mm min.	2.5mm min.	60° min.	60° min.	60° min.	60° min.	60° min.	60° min.	60° min.
Movement Differential	1.5mm max.	1.5mm max.	1.5mm max.	18° max.	18° max.	18° max.	18° max.	18° max.	18° max.	18° max.
Total Force	—	—	—	10N max. (1020gf max.)	10N*1 (1020gf)	2.6N max *2 (270gf max.)	—	—	—	—
Total Travel	—	—	—	90°	90°	90°	90°	90°	90°	90°

Note *1 Lever length: 38mm *2 Lever length: 140mm *3 Lever length: 200mm
Lever length of the other: 38mm

□ DEFINITIONS



Operating Position (OP):

The position of the actuator at which the contacts snap to the operated contact position.

Releasing Position (RP):

The position of the actuator at which the contacts snap from the operated contact position to their normal position.

Operating Force (OF):

The force applied to the actuator required to operate the switch contact.

Releasing Force (RF):

The value to which the force on the actuator must be reduced to allow the contacts to return to the normal position.

Total Force (TF):

The force applied to the actuator required to reach the stopper from the free position.

Free Position (FP):

The initial position of the actuator when no external force is applied.

Total Travel Position (TTP):

The position of the actuator when it reaches the stopper.

Pretravel (PT):

The distance or angle through which the actuator moves from the free position to the operating position.

Overtravel (OT):

The distance or angle of the actuator movement beyond the operating position.

Movement Differential (MD):

The distance or angle from the operating position to the releasing position.

Total Travel (TT):

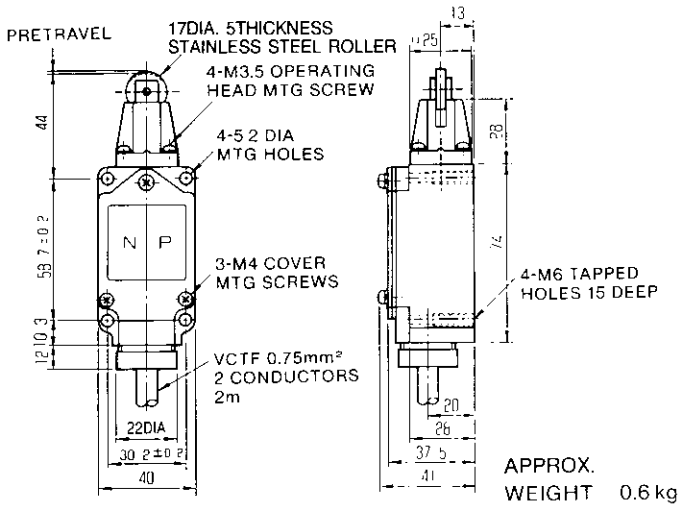
The sum of the pretravel and total overtravel expressed as a distance or angle.

□ ENCLOSURE

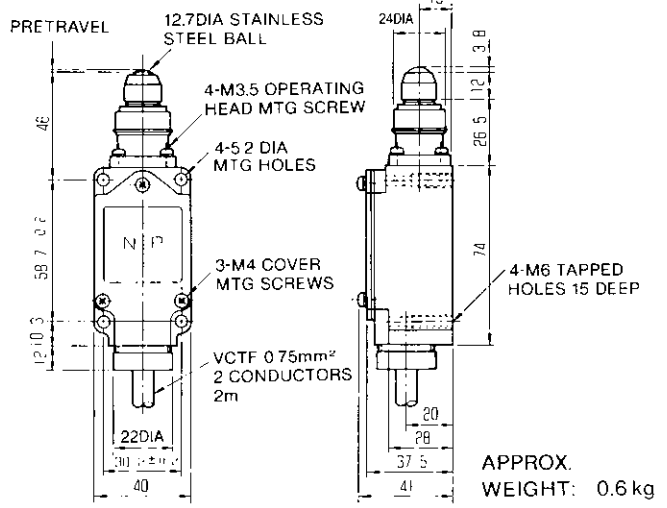
IEC (JEM)	Description	NEMA	IEC (JEM)	Description	NEMA
IP40	Enclosed	1	IP56	Dust-Proof & Water-Tight	4
IP50	Dust-Proof	1	IP57	Dust-Proof & Flood-Tight	4
IP52	Dust-Proof & Drip-Proof	2	IP67	Dust-Proof & Flood-Tight	4
IP53	Dust-Proof & Rain-Proof	3	IP68	Submersible	6

□ DIMENSIONS in mm

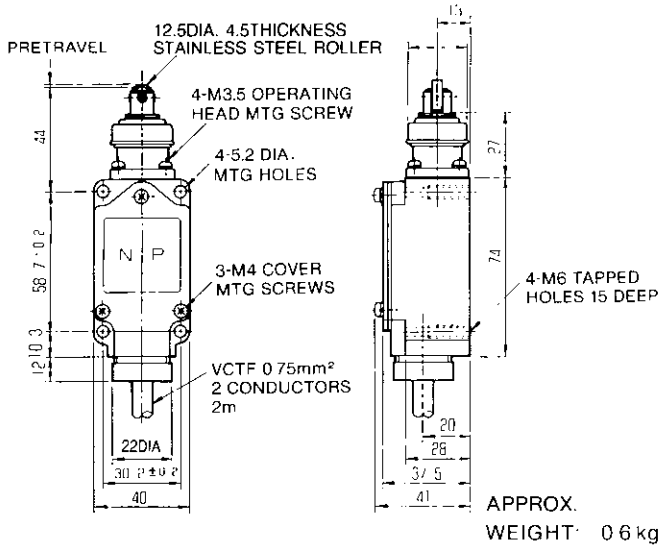
• Type PSGR-005



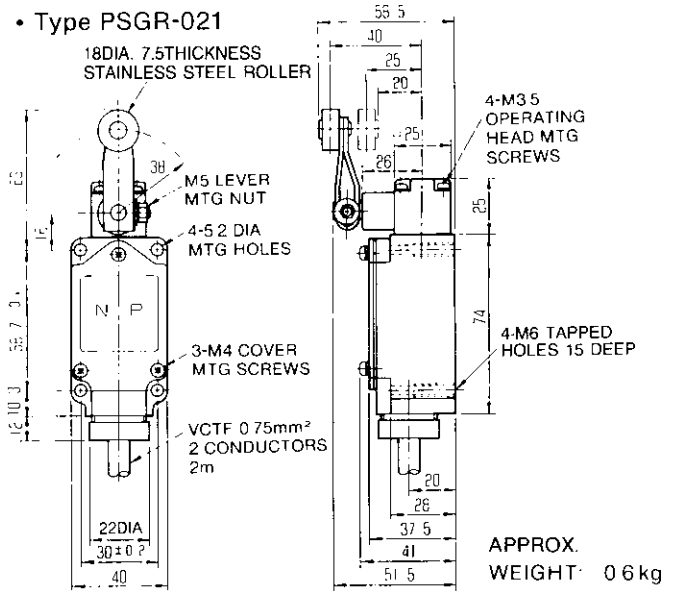
• Type PSGR-006B



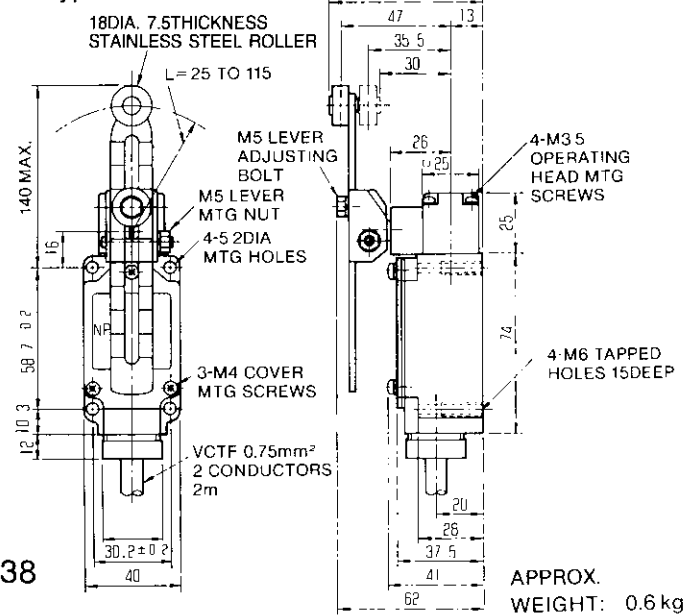
• Type PSGR-005B



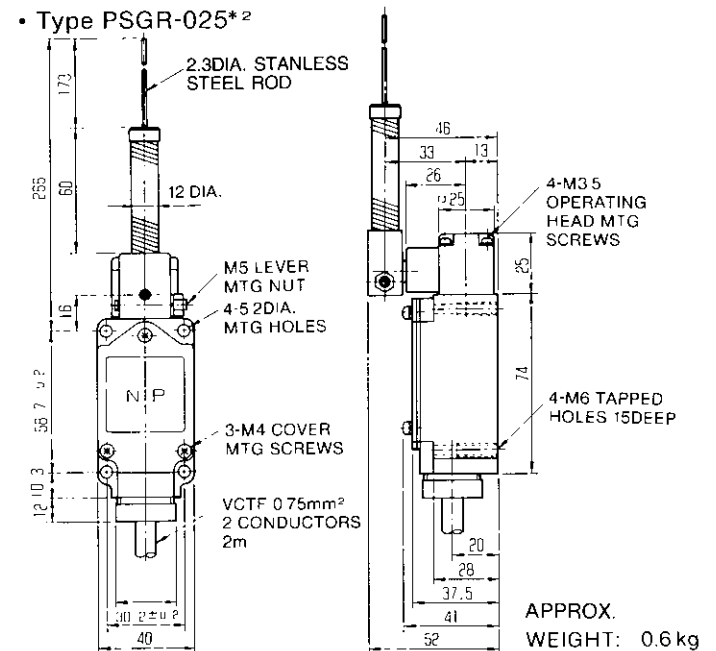
• Type PSGR-021



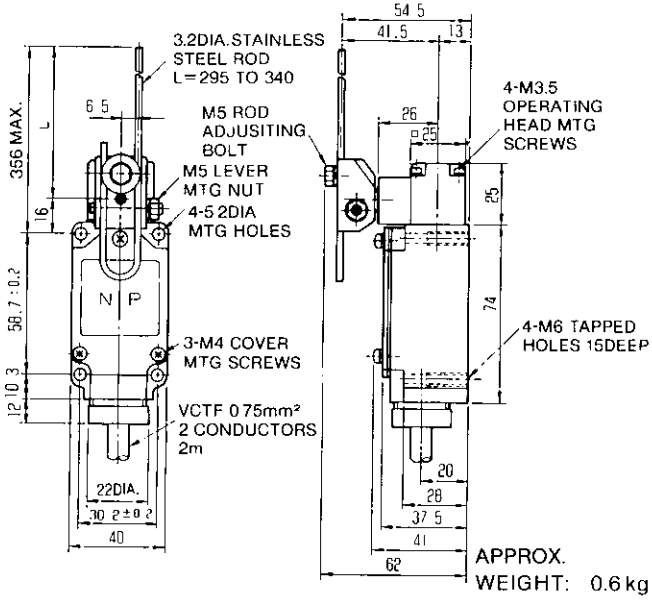
• Type PSGR-022*1



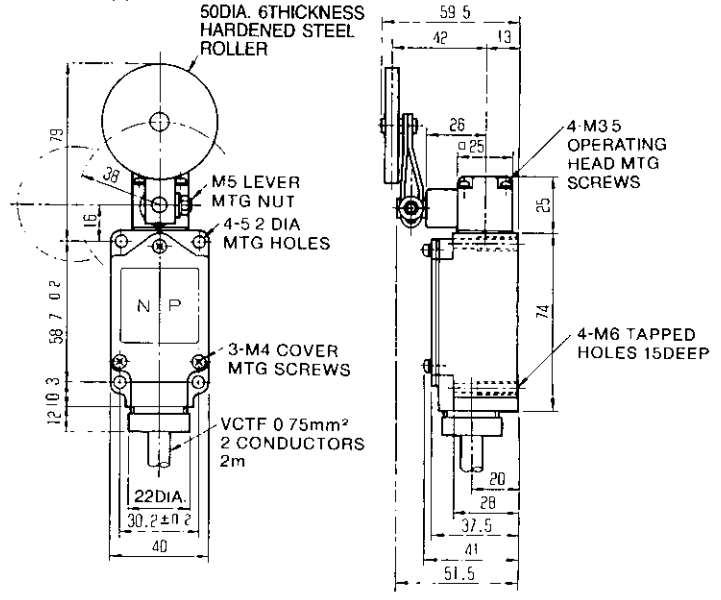
• Type PSGR-025*2



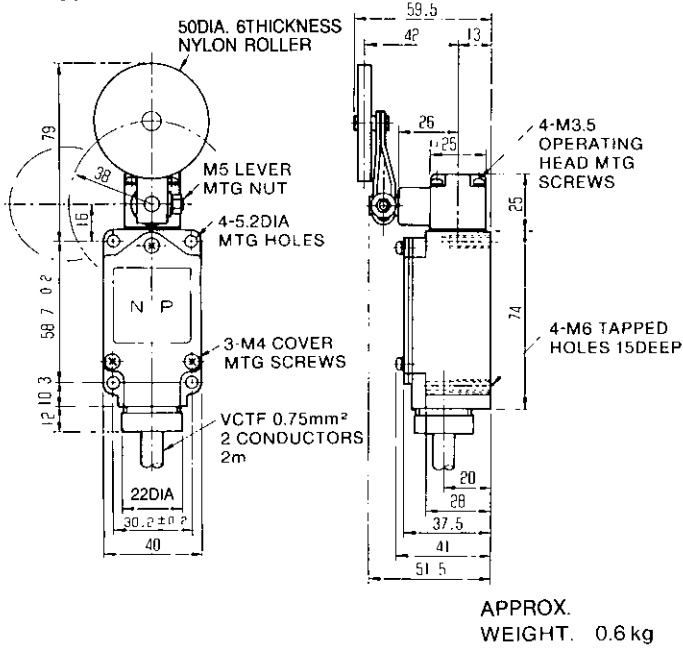
• Type PSGR-023*1,2



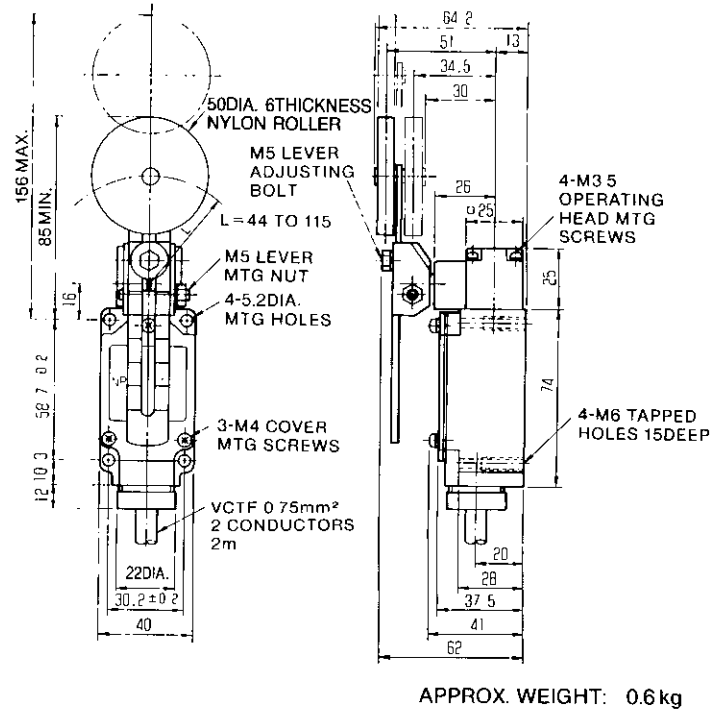
• Type PSGR-026



• Type PSGR-024



• Type PSGR-028*1



Note: *1 For adjustable roller lever and adjustable rod lever types, the length of roller lever and rod can be changed by loosening the adjusting screws

*2 If necessary, shorten or bend the rod for proper operation

Bestact

FLOODTIGHT TYPE LIMIT SWITCHES

Type PSPE

For Adverse Environments where there is Possible Exposure to Mud Splash, Steam or Oil

FEATURES

1. Excellent environmental immunity due to application of triple seal. Switch is not ill affected by oil or water immersion into the actuator.
Hermetically sealed contact and terminal sections are completely protected by resin mold. Equipped with scraper for prevention of solid-object invasion.
2. Contact reliability is superior to that of non-contact type. Ultra-high application reliability protects against surge, noise, temperature/voltage fluctuation which eludes that of non-contact type.

TYPICAL APPLICATIONS

Vehicle equipment and devices, steel plant equipment, paper making equipment, accident prevention equipment.

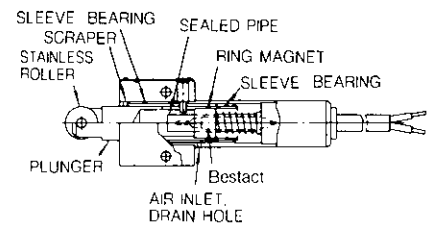
RATINGS AND SPECIFICATIONS

Type	PSPE-05E1	PSPE-05E2
Contact Arrangement	1NO	1NC
Incorporated Bestact Type	R15U	
Operation Characteristics	Pretravel	3.5 mm or less
	Overtravel	6.0 mm or greater
	Total Travel	9.0 mm or greater
	Release Position	1.5 mm or greater
	Operating Force	2.1 kgf or less
Operating Frequency	3600 times/hour	
Rated Insulation Voltage	250 VAC	
Rated Continuous Current	5 A	
Operational Power Ratings	240 VAC 1.0 A, 115 VDC 0.5 A	
Maximum Making Current	240 VAC 30 A (PF : 0.7)	
Insulation Resistance	100 MΩ or greater (with 500 V megger)	
Withstand Voltage	Across Contacts	800 VAC for 1 minute
	To Ground	1500 VAC for 1 minute
Service Life	Mechanical	5,000,000 operations
	Electrical *1	240 VAC 5 A making 0.5 A breaking (PF : 0.4) over 1,000,000 operations
		115 VAC, relay coil load (36 mA) over 5,000,000 operations
		230 VDC, relay coil load (14 mA) over 5,000,000 operations
115 VDC, relay coil load (50 mA) over 5,000,000 operations		
Shock Resistance	294.0m/s ² [30G] or greater	
Vibration Resistance	49.0m/s ² [5G] or greater (15 to 200Hz)	
Ambient Temperature	Operating Temperature	-10 to +60°C (excluding icing)
	Storage	-25 to +70°C
Enclosure *2	Floodtight/Oiltight IP57	

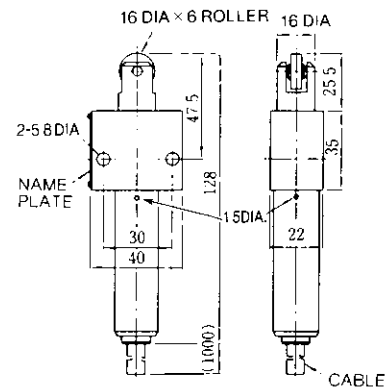
Note : * 1. For application to DC circuit, connect the black lead to ⊕ and white lead to ⊖.
* 2 Refer to page 33 and 37.



CONSTRUCTION



DIMENSIONS in mm



Weight: 0.37kg

Bestact

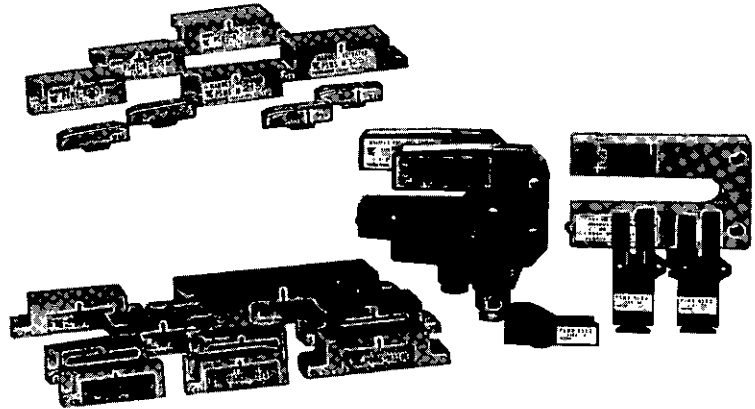
MAGNETIC PROXIMITY SWITCHES

Vane Type PSMO
Separate Type PSMS
Memory Type PSMM

**A Wide Variety of Types Available to Meet Applications/Specifications:
General Purpose, High Temperature, etc.
Two-Wire Systems, Offering a Wide Power Range (1V 1mA to 240VAC 1A)**

□ FEATURES

1. Completely sealed construction makes this switch best suited for adverse environments.
2. Direct control of loads of even 100VDC or greater, requiring no power supply or amplifying relay.
3. No protective R-C snubber/surge circuitry is required for long wiring distances or inductive load.
4. Eliminates the possibility of erroneous operation and breakdown due to noise or surge.
5. The contactless design assures a long service life and maintenance free operation.
6. Economical proximity switches.



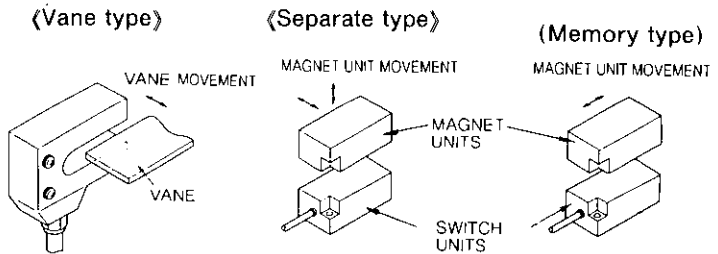
Magnet characteristics for Bestact Operation

In various detecting devices with Bestact incorporated, and to maintain high operation accuracy for a long period of time, sufficient investigation and consideration has been applied to the material selection and design of the contact energizing magnet.

- Permanent magnets used for Yaskawa's detecting devices are rare earth magnet and anisotropic ferrite magnet which are characterized by high coercive force and large energy product, thus optimum design has been achieved. Featuring excellent stable performance without demagnetization due to fluctuation in temperature.
- Demagnetization due to aging is 2% or less for a 10 year period.

□ TYPES AND HOW TO USE

Magnetic proximity switches are usually classified into two types: an integrated type such as vane type and a separate type. Switch operation principle is described below.



Vane type

- Detection of substance can be made without any physical contact. It enters into or passes by the groove of U-shaped structure. In general, the detected substance is of flat shape and ferromagnetic material such as iron plate.
- Featuring high detecting accuracy even if the detected substance exhibits play, the switch exhibits less constraint conditions and greater ease-of-handling.

Separate type

- The switch unit is fixed, and the magnet unit is mounted to the moving object to be detected. Approach or passage of the magnet unit will be detected without contacting.
- In this type, no separately-mounted detecting unit is required. Furthermore, one magnet unit can energize several switch units. Various detecting methods are available to match your specifications.

□ TYPICAL APPLICATIONS

Steel plant machinery and equipment (for raw material handling, iron making, rolling mills), plating line, large-size material handling machines, automobile manufacturing lines, elevators, cement and related equipment, power station facilities, dam equipment, pollution prevention equipment and devices, mine machinery, chemical industry machinery and equipment, marine product processing machines.

VANE TYPE MAGNETIC PROXIMITY SWITCHES

Type PSMO-25G□ (Medium-capacity)
 Type PSMO-□□D□ (Large-capacity)

High Detecting Accuracy against Unstable Moving Substances, and Easy to Use

- Can operate in circuits of 100VDC or greater without any power supply unit or amplifying relay
- No erroneous operations or circuit failure due to noise and/or surge
- Contactless design assures long service life and maintenance free operation

□ RATINGS AND SPECIFICATIONS

• Medium-Capacity Type

Type	PSMO-25G1	PSMO-25G1T	PSMO-25G2	PSMO-25G2T
Groove Width mm	24	24	24	24
Groove Depth mm	52	52	52	52
Contact Arrangement	1NO	1NO	1NC	1NC
Enclosure**	IP 50	IP 67	IP 50	IP 67
*1 Common Ratings and Specifications	<ul style="list-style-type: none"> • Operating temperature: -10 to +50°C • Storage temperature: -25 to +70°C • Rated continuous current: 3A • Operational power ratings: 240VAC 0.5A 115VDC 0.3A • Maximum making current: 240VAC 15A (PF 0.7) • Withstand voltage: 500 VAC for 1 minute across contacts 1500 VAC for 1 minute to ground 		<ul style="list-style-type: none"> • Mechanical life: over 100,000,000 operations • Electrical life: 30VDC 20mA (relay load) 15,000,000 operations** • With indicating lamp, available on order *3 (For 100 or 200V only) • Cable: 0.75mm² 2 conductors 1m long (Dustproof type IP 50 without lamp: 2.5m long) • Standard size of vane detected mm: 11.6 × 60 × 100 (t 1.2 or greater) 	

Note *1 Incorporated Bestact is R25U. For details of contact ratings other than those tabulated above, refer to pages 7 to 10.

*2. The electrical life indicates the value where the black cable is connected to ⊕

*3 Model with indicating lamp has the following symbol
 PSMO-25G1T/L

└─ 4: For 100V
 5: For 200V

*4 Refer to page 33 and 37.

• Large-Capacity Type

Type	PSMO-05D2	PSMO-25D1	PSMO-25D2	PSMO-25D1T	PSMO-25D2T
Groove Width mm	5	25	25	25	25
Groove Depth mm	36	90	90	120	120
Contact Arrangement	1NC	1NO	1NC	1NO	1NC
Connecting Method	Screw terminals*1 or cable*5 (1m)	Screw terminals or cable*5 (1m)	Screw terminals or cable*5 (1m)	Cable (2m)	Cable (2m)
Standard Vane Detected *2 mm	t 1.6 × 15 × 45	t 2.3 × 50 × 100	t 2.3 × 50 × 100	t 2.3 × 50 × 135	t 2.3 × 50 × 135
*3 Common Ratings and Specifications	<ul style="list-style-type: none"> • Enclosure: Waterproof type IP 67** (only with cable) • operating temperature: -10 to +80°C (with cable: -10 to +60°C) • Storage temperature: -25 to +70°C • Rated continuous current: 5A • Operational power ratings: 240VAC 1A 115VDC 0.5A • Maximum making current: 240VAC 30A (PF: 0.7) • Withstand voltage: 800VAC for 1 minute across contacts 1500VAC for 1 minute to ground 		<ul style="list-style-type: none"> • Switching frequency: 3600 times/hour (7200 times/hour**) • Mechanical life: over 50,000,000 operations • Electrical life: 240VAC 20mA (relay load) 30,000,000 operations 115VDC 20mA (relay load) 15,000,000 operations • With indicating lamp, available on order. (For type PSMO-25, 100 or 200V only)*6 • Cable: 1.25mm² 2 conductors. 		

Note *1 Screw terminal of type PSMO-05D2 is not used as floodlight type since the screw terminal is exposed

*2 Vane size of ferromagnetic structural iron plate

*3 Incorporated Bestact is R14U. For details of contact ratings other than those tabulated above, refer to pages 7 to 10

*4. Only applicable for light load such as power relay.

*5 If the model with cable is selected, add suffix "P" to type name (excluding type PSMO-05D2)

<Example> PSMO 25D2/P

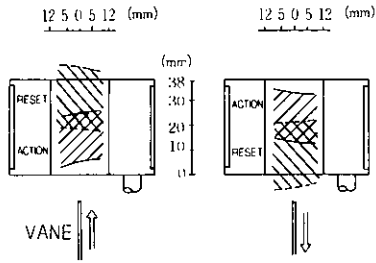
*6 Model with indicating lamp has the following symbol.

PSMO-25D1/□P/L

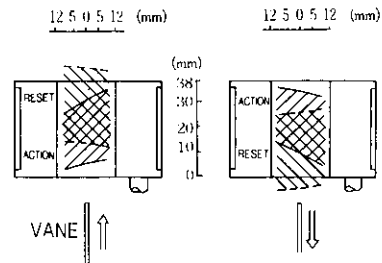
└─ 4: For 100V
 5: For 200V

*7. Screw terminal type IP 50 Refer to page 33 and 37.

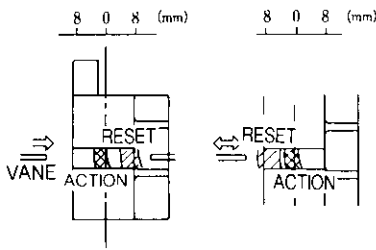
□ OPERATING CHARACTERISTICS



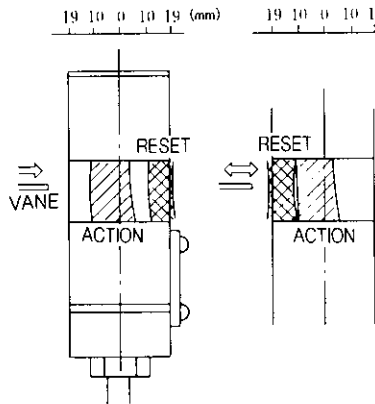
Type PSMO-25G1



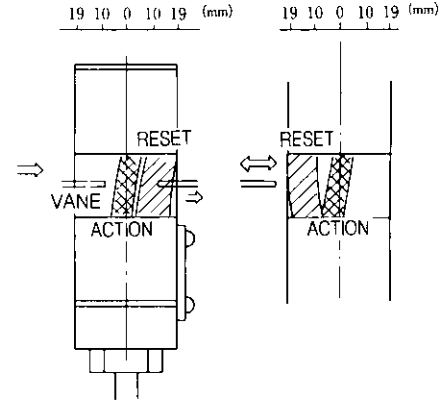
Type PSMO-25G2



Type PSMO-05D2



Type PSMO-25D1, -25D1T,
and -25D1TH



Type PSMO-25D2, -25D2T
and -25D2TH

Note: 1. \Rightarrow : Pass-through detection type
 \Leftrightarrow : Where returning to the original position after operation.

2. Where vane moves from the right, the operating characteristics are symmetrical on axis to the above characteristics.

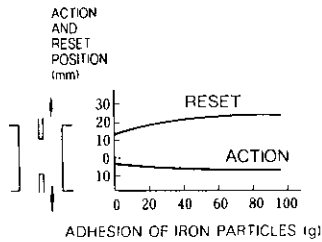
3. Action and reset range shown above indicates the difference of each switch, but not the difference of each operation at repetitive detections. Repetitive detecting accuracy is ± 0.2 mm.

□ INFLUENCE BY ENVIRONMENTAL CONDITIONS

• Operation characteristics where iron particles adhered

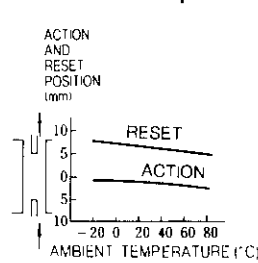


Adhesion of iron Particles (60g)
 (If adhered to as in this photo,
 negligible influence is found)

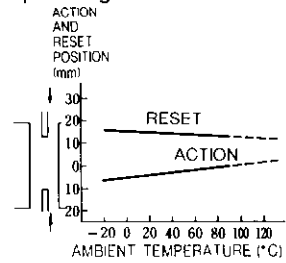


Example of Type
 PSMO-25D1

• Ambient temperature and operating characteristics



Type PSMO-05D2



Type PSMO-25D1,
 -25D1T (-25D1TH)

HIGH-PRECISION VANE TYPE MAGNETIC PROXIMITY SWITCHES

Type PSMO-15G□
(Medium-capacity)

**Hydraulic Low-Speed Elevator Stop Level Adjustment is a Thing of the Past:
with This High-Precision Product You can Enjoy Adjustment-Free Operation.**

□ RATINGS AND SPECIFICATIONS

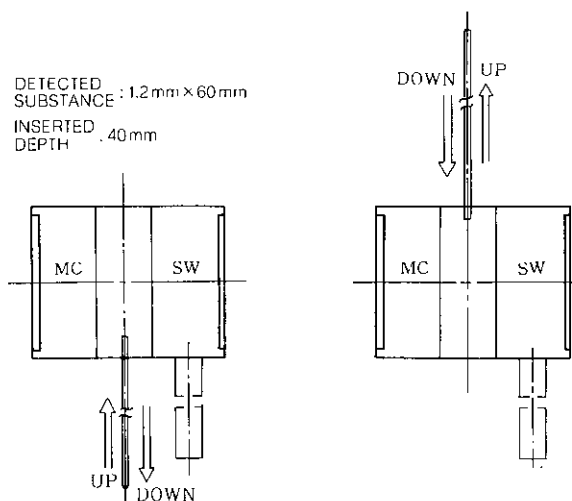
Type	PSMO-15G1	PSMO-15G2	PSMO-15G2S	PSMO-15G1T	PSMO-15G2T
Contact Arrangement	1NO	1NC	1NC	1NO	1NC
Operating Characteristics*1 (mm)	UP-ON	9 to 20	20 to 29	9 to 20	20 to 29
	UP-OFF	26 to 35	14 to 24	—	26 to 35
	DOWN-ON	18 to 29	9 to 18	9 to 18	18 to 29
	DOWN-OFF	3 to 12	14 to 24	—	3 to 12
	Response*2	12 or less	12 or less	6 or less	12 or less
Enclosure	Dust-proof type IP 50*3			Floodtight type IP 67*3	
Common Ratings and Specifications*4	<ul style="list-style-type: none"> Operating temperature: -10 to +50°C Storage temperature: -25 to +70°C Rated continuous current: 3A Operational power ratings: 240VAC 0.5A 115VDC 0.3A Maximum making current: 240VAC 15A (PF: 0.7) Withstand voltage: 500 VAC for 1 minute across contacts 1500 VAC for 1 minute to ground Mechanical life: over 100 million operations Electrical life: 24VDC 40mA (relay load) 15 million operations** Cable: 0.75mm² 2 conductors 1m long. 				

Note *1 Operating characteristics are essentially symmetric to vane passage direction (vertical).
Values indicated represent a vane inserted to a depth of 40mm

*2 Response means the difference between the operating point and releasing point (absolute value) as shown in figure below

(1) After the switch has been made to operate in UP direction, it is made to release in DOWN direction

(2) After the switch has been made to operate in DOWN direction, it is made to release in UP direction.



*3 Refer to page 33 and 37

*4 Incorporated Bestant is R25U. For details of contact ratings other than those tabulated above, refer to pages 7 to 10

*5 Electrical life is measured with black cable connected to positive terminal.

*6 Super-high precision products with even narrower operational range are also available

□ TYPICAL APPLICATIONS

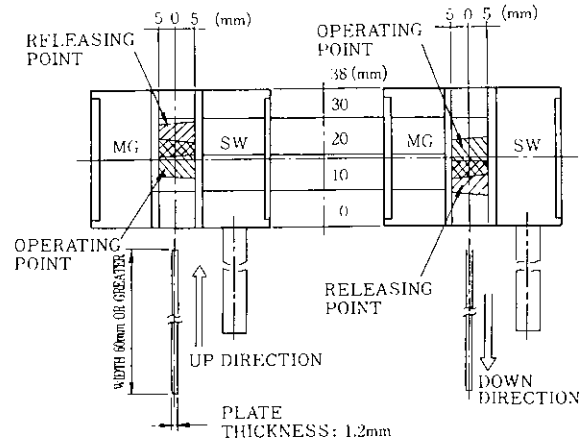
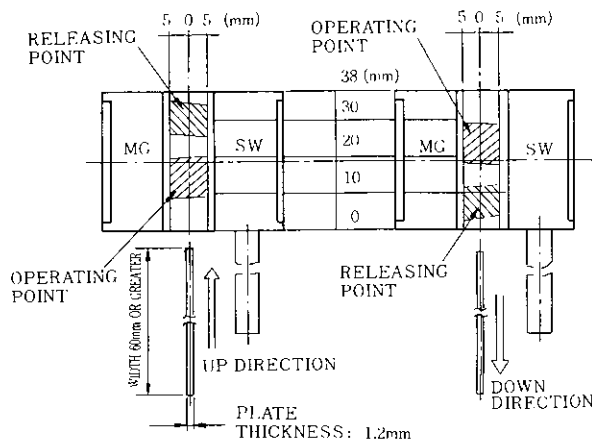
Stop level detectors and door-open command switches for passenger and freight elevators, stop level detector switches for vertical parking garages, passage point detector switches for transporters, passage detector switches for general industrial machinery.

□ OPERATING CHARACTERISTICS

(Actuating range where the vane is inserted to a depth of 40 mm as it passes through in a horizontal fashion)

• Type PSMO-15G1

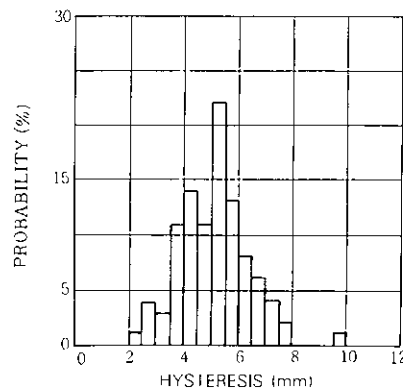
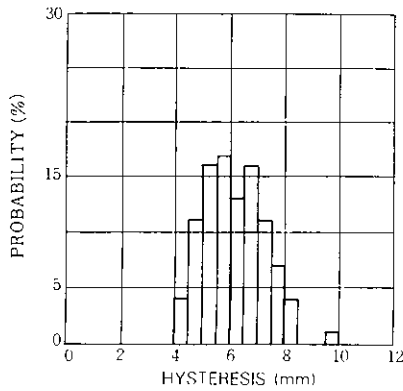
• Type PSMO-15G2



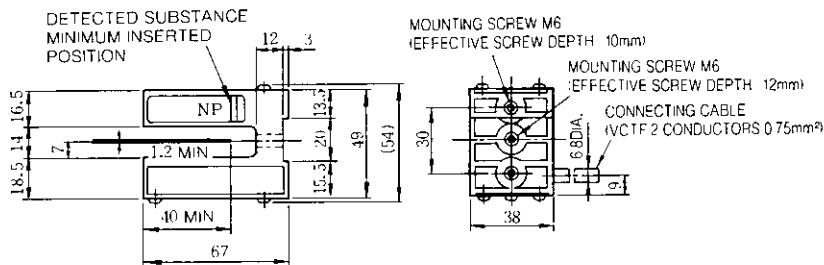
(Hysteresis Characteristics) N=100. Ambient temperature 20°C

• Type PSMO-15G1

• Type PSMO-15G2



□ DIMENSIONS in mm



- Note: 1 This switch operates upon passage of steel plate. Set the inserted depth to a minimum of 40mm
 2 Where this switch is used in DC circuit, connect the black lead to ⊕ and the white lead to ⊖.

SEPARATE TYPE MAGNETIC PROXIMITY SWITCHES

Type PSMS (Medium-capacity)
(Large-capacity)

Any Number of Combination of Switch Units and Magnet Units to Set up an Effective Detecting System

- Directly controlled on 100 VDC or greater without power supply unit or amplifying relay
- No erroneous operations or circuit failure due to noise and surge
- Contactless detection assures maintenance free operation and long life

□ RATINGS AND SPECIFICATIONS

• Medium-Capacity Type

Type	Switch Unit (Incorporated Bestact*1)	PSMS-R1G1
	Magnet Unit	PSMS-MP10
Rated Sensitive Distance	mm	10
Maximum Sensitive Distance	mm	8 to 12
Contact Arrangement		1NO
Enclosure		Dustproof type IP 50*2
Switching Frequency		3600 times/hour
Rated Insulation Voltage		250 VAC
Rated Continuous Current		3A
Maximum Making Current		240 VAC 15 A (PF : 0.7)
Operational Power Ratings		240 VAC 0.5 A 115 VDC 0.3 A
Withstand Voltage	Across Contacts	500 VAC for 1 minute
	To Ground	1500 VAC for 1 minute
Mechanical Life		100 million operations
Electrical Life		240 VAC 20 mA (relay load) 30 million operations 24 VDC 40 mA (relay load) 15 million operations
Ambient Temperature	Operating Temperature	- 10 to +60°C
	Storage	- 25 to +80°C

Note : *1. Incorporated Bestact is R25U. For details of contact ratings other than those tabulated above, refer to pages 7 and 10.
*2. Refer to page 33 and 37.

• Large-Capacity Type

Type	Switch Unit (Incorporated Bestact)	PSMS-R1D1	PSMS-R2D1	PSMS-R3D1	PSMS-R4D1	
	Magnet Unit	PSMS-M105	PSMS-M215	PSMS-M325	PSMS-M450	PSMS-MX70
Rated Sensitive Distance *1	mm	5	15	25	50	70
Maximum Sensitive Distance *2	mm	8 to 11	16 to 24	30 to 40	65 to 85	100 to 110
Common Ratings and Specifications *3		<ul style="list-style-type: none"> • Contact arrangement : 1NO • Enclosure : Floodtight type IP 67*4 • Operational ambient temperature : - 10 to +60 °C • Operating frequency : 3600 times/hour (7200 times/hour *5) • Rated insulation voltage : 250 VAC • Rated continuous current : 5 A • Maximum making current : 240 VAC 30A (PF 0.7) • Operational power ratings : 240 VAC 1A 		<ul style="list-style-type: none"> • Withstand voltage : 230 VDC 0.05A 115 VDC 0.5A • 800 VAC for 1 minute across contacts • 1500 VAC for 1 minute to ground • Mechanical life : over 50 million operations • Electrical life : 240VAC 20mA (relay load) 30 million operations 115VDC 20mA (relay load) 15 million operations 		

Note : *1. Detectable distance when both switch and magnet units are mounted on iron plate at 20°C

*2. Maximum detectable distance between units when switch is mounted on non-magnetic substance at 20°C (Value range shows performance variation of each product, but not those due to repetitive operations)

*3. Incorporated Bestact is R14U. For details of contact ratings other than those tabulated above, refer to pages 7 to 10

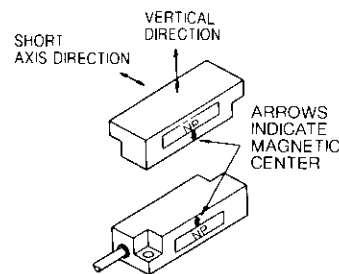
*4. Refer to page 33 and 37

*5. Applicable to light load such as power relay

6. Only switch units are equipped with a cable of 1 meter long.

□ OPERATING METHOD

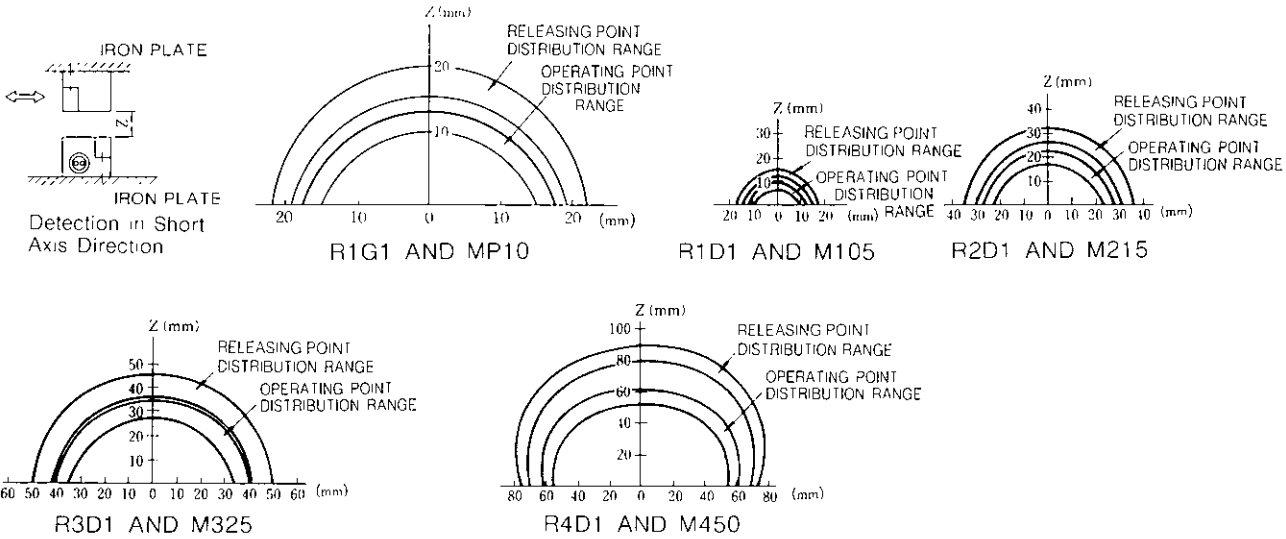
There are two actuation directions of the magnet available to operate the switch



- Short axis direction
Easy to mount and most stable operating characteristics are assured
- Vertical direction
Operating characteristics are stable. But mounting method must be selected due to stoppage conditions of the magnet unit.

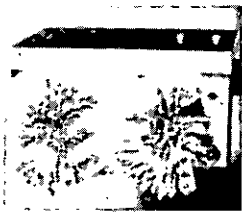
□ OPERATING CHARACTERISTICS

<Short axis direction, vertical stroke range>

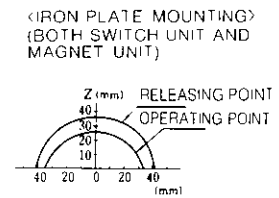
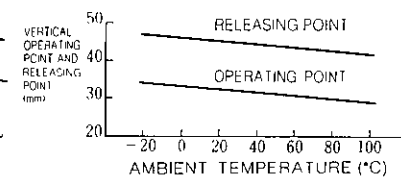
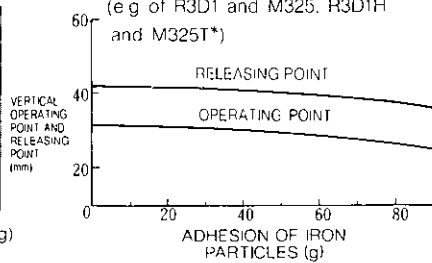


□ INFLUENCE BY ENVIRONMENTAL AND OPERATION CONDITIONS

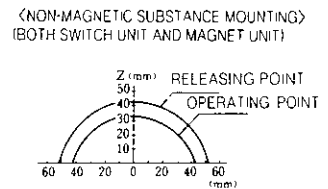
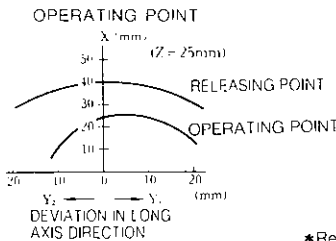
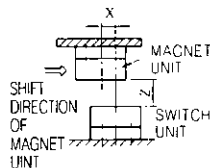
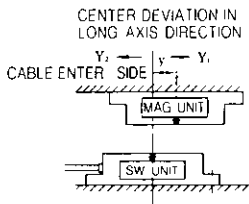
- Adhesion of iron particles and operation characteristics (e.g. of R3D1 and M325, R3D1H and M325T*)
- Ambient temperature and operation (e.g. of R3D1 and M325)
- Comparison of performance when mounting on magnetic and non-magnetic substances (e.g. of R3D1 and M325)



Adhesion of Iron Particles (30g) (if adhered to as in this photo, almost no influence is observed)

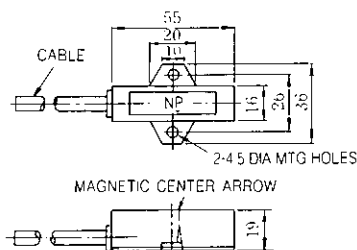


- Influence by deviation in long axis direction during short axis movement (e.g. of R3D1 and M325, R3D1H and M325T*)

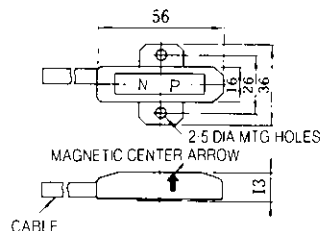


*Refer to page 51

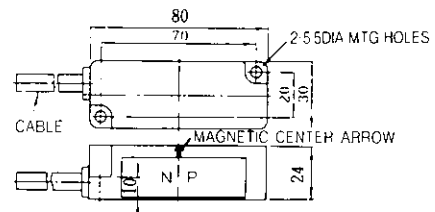
□ DIMENSIONS in mm



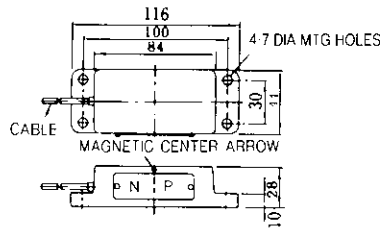
Weight : 0.08kg
Type PSMS-R1G1



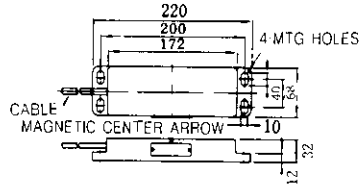
Weight : 0.13kg
Type PSMS-R1D1



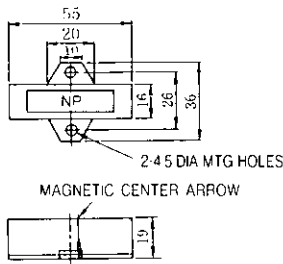
Weight : 0.22kg
Type PSMS-R2D1



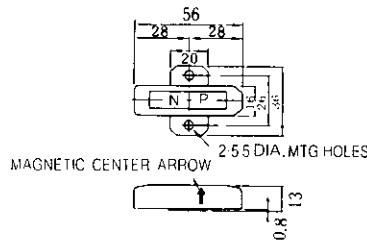
Weight : 0.35kg
Type PSMS-R3D1



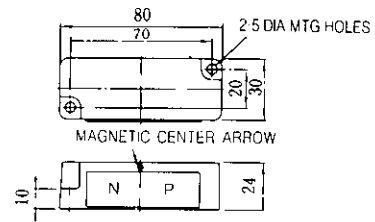
Weight : 1.6kg
Type PSMS-R4D1



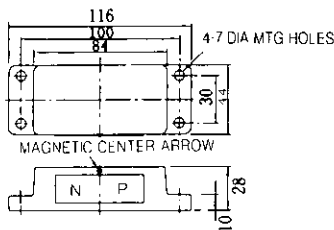
Weight : 0.04kg
Type PSMS-MP10



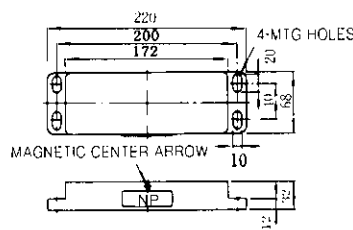
Weight : 0.03kg
Type PSMS-M105



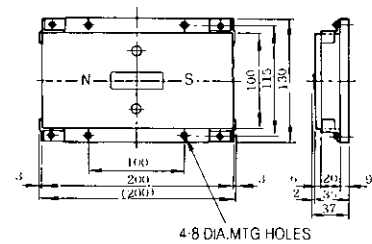
Weight : 0.16kg
Type PSMS-M215



Weight : 0.45kg
Type PSMS-M325



Weight : 1.6kg
Type PSMS-M450



Weight : 3kg
Type PSMS-MX70

□ HOW TO USE

• Repetitive detection accuracy

If detecting distance is not varied after mounting the product, repetitive operation accuracy is within $\pm 1\text{mm}$ at temperatures of $\pm 20^\circ\text{C}$. Where the detecting distance is repetitively varied, the accuracy will change also.

• Allowable magnet unit speed of detected substance (at 20°C)

Operating Conditions		Allowable Magnet Unit Speed in Short Axis Direction (mm/s)
Type of Magnet Unit	Detecting Distance (mm)	
PSMS-M105	5	320 or less
PSMS-M215	15	625 or less
PSMS-M325	25	770 or less

Note . 1. Values tabulated above based on the switch unit ON time : 50ms
2. For other than the speed above, use the magnet unit in a parallel installation.

• Connection

Where the switch is used in DC circuit, connect the black lead wire to positive terminal.

• Mounting

(1) Unit can even be mounted to flat magnetic substance such as iron plate. Avoid mounting so as to surround the units.

(2) When mounting, adjust the location in long axis direction so as to meet magnetic center arrow.

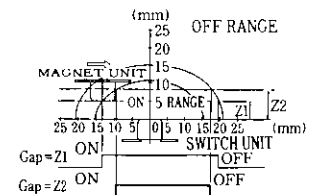
(3) There is no interference with each other if 2 sets of switches or more are installed in parallel. Thus, it is possible to determine the required mounting pitch in combination for individual actuation range.

(4) When installing two or more magnet units in parallel, use the arrangement as illustrated below for the direction of magnet polarity (N or S). The nameplate is a good indication as to the direction.



• Operational gap range

The center of magnet unit moving within the range of figure actuates contact.



MEMORY TYPE MAGNETIC PROXIMITY SWITCHES

Type PSMM

Self-Holding Type Magnetic Proximity Switches Make Sequencing Simple

RATINGS AND SPECIFICATIONS

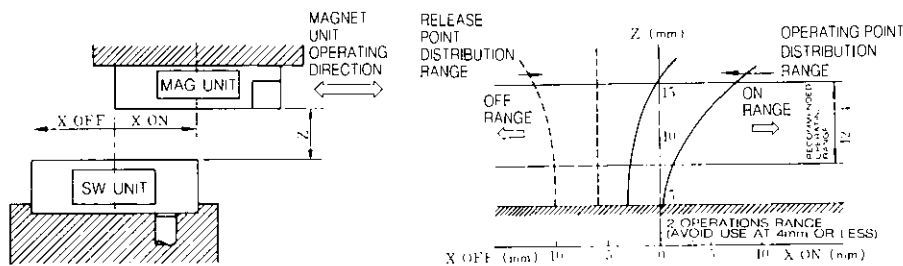
Type	Switch Unit	PSMM-RPD1U	PSMM-RPE1U
	Magnet Unit	PSMM-MP15U	
Incorporated Bestact Type		R14U	R15U
Rated Sensitive Distance *1		15 mm (at mounting on non-magnetic substance)	
Operational Gap Range *1		5 to 20 mm (at mounting on non-magnetic substance)	
Enclosure		Floodtight type IP67*2 (NEMA 4)	Dripproof type IP52*2 (NEMA 2)
Allowable Shock		10 G or less	
Allowable Vibration		5 G (10 to 55 Hz) or less	
Maximum Response Speed		600 m/min	
Rated Insulation Voltage		250 VAC	
Rated Continuous Current		5 A	
Operational Power Ratings		240VAC 1 A, 115 VDC 0.5 A (Inductive load)	
Minimum Operational Power Ratings		1V 1 mA	24V 1mA
Electrical Life	240VAC 20 mA Relay	30,000,000 operations	
	115 VDC 20 mA Relay	15,000,000 operations	
Mechanical Life		Over 50,000,000 operations	Over 100,000,000 operations
Withstand Voltage	Across Contacts	800 VAC for 1 minute	
	To Ground	1500 VAC for 1 minute	
Ambient Temperature	Operating Temperature	- 10 to +60°C	
	Storage	- 25 to +80°C	

Note *1 At ambient temperature of 20°C Sensitive distance where ambient temperature = T (°C) can be calculated by the following equation

$$\text{Sensitive distance (mm)} = \text{Rated sensitive distance} \times \{1 - 0.0018 (T - 20)\}$$

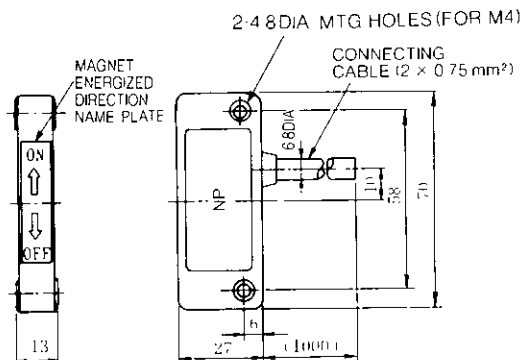
 *2 Refer to page 33 and 37.

OPERATION CHARACTERISTICS



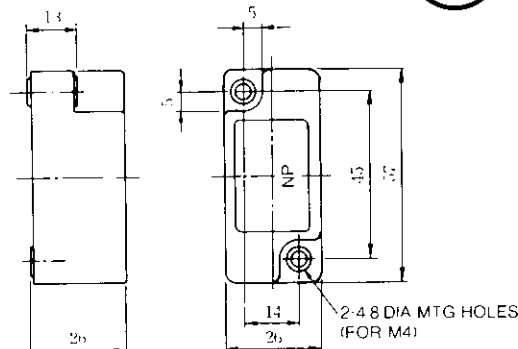
DIMENSIONS in mm

Type PSMM-RPD1U (Switch Unit)
 Type PSMM-RPE1U (Switch Unit)



Weight : 0.12kg

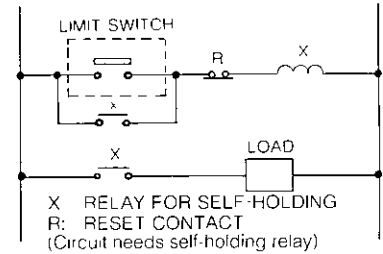
Type PSMM-MP15U (Magnet Unit)



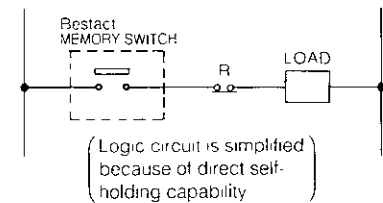
Weight : 0.1kg

APPLICATION EXAMPLES

Circuit Using Conventional Limit Switch



Circuit Using Bestact Memory Type Switch



OPERATING METHOD

Magnet moving in long axis direction actuates contact. With the magnet moved to ON side, contact is turned on and maintained (latched)

UL LISTED IN ACCORDANCE WITH USA AND CANADIAN STANDARD
File No. E158813

For Class I, Division 2
 Groups A, B, C, D



Note Refer to page 60

- This unit should be mounted to non-magnetic substance
- When the switch is used in DC circuit, connect black lead wire of power cable to ⊕, and white lead wire to ⊖

VANE TYPE HIGH-TEMPERATURE-USE MAGNETIC PROXIMITY SWITCHES

Type PSMO-TH

**Unsurpassed Performance at High Temperature, Humidity Atmosphere,
Exceeding any Non-Contact Types
130 °C Continuous, or 180 °C for Short Time**

- Direct control of 100 VDC or greater, no power supply unit or amplifying relay needed
- No erroneous operations or break in circuit due to noise and/or surge
- Contactless design assures long service life and maintenance free operation

□ RATINGS AND SPECIFICATIONS

Type *1	PSMO-25D1TH	PSMO-25D2TH
Contact Arrangement	1NO	1NC
Groove Width mm	25	
Groove Depth mm	120	
Terminal Connection	With heat-resistant cable(4.6mm outer dia. 0.75mm ²) of 3m	
Enclosure	Floodtight type IP67 *2	
Standard Vane	Structural iron plate (SPCC, etc.) t2.3×50×135mm	
Rated Insulation Voltage	250 VAC	
Rated Continuous Current	5 A	
Operational Power Ratings	240 VAC 1 A, 115 VDC 0.5 A	
Ambient Temperature	Operating Temperature	-25 to +130°C
	Storage	-40 to +150°C

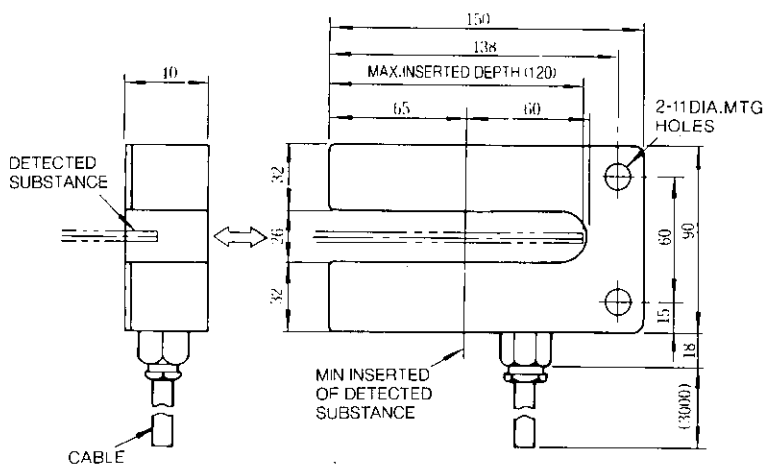
□ TYPICAL APPLICATIONS

Continuous casting machines, coke ovens, converters, rolling mills, cement curing ovens, refrigerators internal equipment

- Note
- *1. As for ratings and specifications other than those to the left, refer to those of standard type on page 42
 - *2 Refer to page 33 and 37.
 - *3 Incorporated Bestact is R14U. For details of contact ratings other than those tabulated left, refer to pages 7 to 10.

□ DIMENSIONS in mm

• Type PSMO-25 TH



Weight : 1 kg

Influence of Ambient Temperature, and Compensation

Where temperature varies widely from the beginning and during operation, the actuating point and return point may change a little due to thermal characteristic of the magnetic unit. Therefore, for applications requiring higher accuracy, make the compensation first before mounting.

Connection

- Refer to page 43 and 44.

SEPARATE TYPE HIGH-TEMPERATURE-USE MAGNETIC PROXIMITY SWITCHES

Type PSMS-H,T

Designed for High Temperature, High Humidity Atmosphere; Best among Non-Contact Types. Assuring 130°C for Continuous Duty or 180°C for Short Time

□ RATINGS AND SPECIFICATIONS

Type	Switch Unit (Incorporated Bestact)	PSMS-R2D1H		PSMS-R3D1H		
	Magnet Unit	PSMS-M105T	PSMS-M215T	PSMS-M325T	PSMS-M450T	PSMS-MX70T
Rated Sensitive Distance* ¹	mm	5	15	25	50	70
Maximum Sensitive Distance* ²	mm	6 to 9	16 to 24	30 to 40	65 to 80	100 to 110
Contact Arrangement		1NO				
Enclosure		Floodtight type IP67* ³				
Ambient Temperature	Operating Temperature	- 25 to + 130°C				
	Storage	- 40 to + 150°C				
Power Cable		3m heat-resistant cable (4 6mm outer dia. 0.75mm ²) is included				

Notes *1 Detectable distance at ambient temperature of 20°C when both switch and magnet units are mounted on the iron plate. Setting gap where ambient temperature T (°C) can be calculated by the following equation
Setting gap (mm) = Rated sensitive distance × {1 - 0.0018 (T - 20)}

*2. Maximum detectable distance when switch is mounted on non-magnetic substance (Value range shows performance variation of each product, but not those due to repetitive operations)

*3 Refer to page 33 and 37

*4 As for ratings and specifications other than those above, refer to listed standard type on page 47

*5 Incorporated Bestact is R14U
For details of contact ratings other than those tabulated above, refer to pages 7 to 10

□ TYPICAL APPLICATIONS

Continuous casting machines, coke ovens, converters, rolling mills, cement curing ovens, refrigerator's internal equipment

Influence of Ambient Temperature, and Compensation

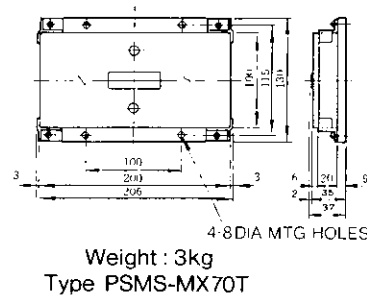
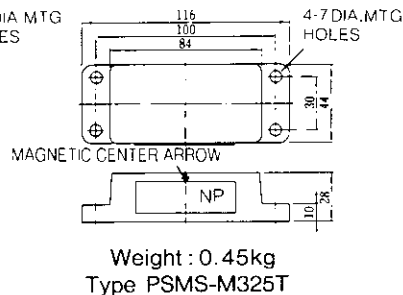
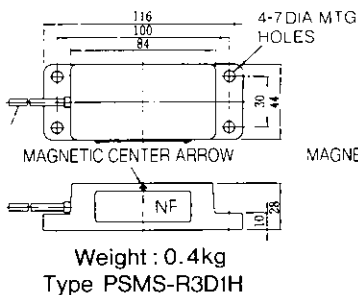
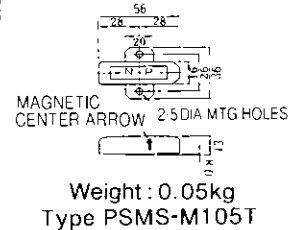
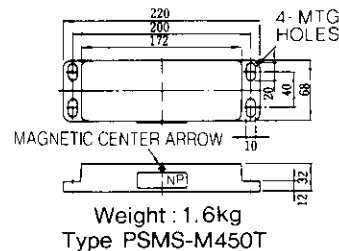
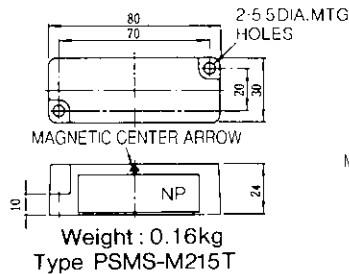
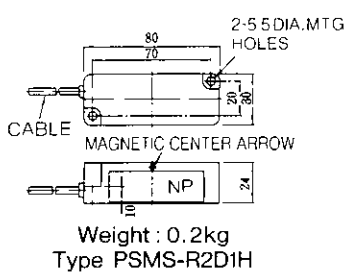
Where temperature varies widely from the beginning and during operation, the actuating point and return point may change somewhat due to thermal characteristic of the magnetic unit.

For applications requiring higher accuracy, make the compensation first before mounting.

Connection, and Others.

- Refer to page 48 and 49.

□ DIMENSIONS in mm



MEMORY TYPE HIGH-TEMPERATURE-USE MAGNETIC PROXIMITY SWITCHES

Type PSMM-H, T

Stable Self-Holding Performance at High Temperature, Humid Atmosphere

- Continuous duty at 130°C
- Excellent vibration and shock resistance
- Simplified logic circuit with elimination of external self-holding/seal-in relay

□ RATINGS AND SPECIFICATIONS

Type*1	Switch Unit	PSMM-R3D1H		
	Magnet Unit	PSMM-M325T	PSMM-M450T	PSMM-MX70T
Rated Sensitive Distance *2	mm	25	50	70
Operational Gap Range *2	mm	10 to 35	10 to 60	10 to 85
Enclosure		Floodtight type IP67 *3		
Shock Resistance (Erroneous operation)		98.0m/s ² {10G}		
Vibration Resistance (Erroneous operation)		5 G(10 to 55 Hz)		
Maximum Response Speed		200 m/min		
Mechanical Life		Over 50 million operations		
Withstand Voltage	Across Contacts	800 VAC for 1 minute		
	To Ground	1500 VAC for 1 minute		
Ambient Temperature	Operating Temperature	- 25 to + 130°C		
	Storage	- 40 to + 150°C		
Power Cable		3m heat-resistant cable (4.6mm outer dia. 0.75mm ²) is included		

Note *1 As for ratings and specifications other than those above, refer to listed standard type on page 50
 *2 Detectable distance at ambient temperature of 20°C when both switch and magnet units are mounted the iron plate. Setting gap where ambient temperature T (°C) can be calculated by the following equation
 Setting gap (mm) = Rated sensitive distance × {1 - 0.0018 (T - 20)}

*3 Refer to page 33 and 37.
 *4 Incorporated Bestact is R14U
 For details of contact ratings other than those tabulated above, refer to pages 7 to 10.

□ TYPICAL APPLICATIONS

Continuous casting machines, coke ovens, converters, rolling mills, cement cure ovens, refrigerator's internal equipment.

Influence of Ambient Temperature, and Compensation

Where temperature varies widely from the beginning and during operation, the actuating point and return point may change somewhat due to thermal characteristic of the magnetic unit. For applications requiring higher accuracy, make the compensation first before mounting.

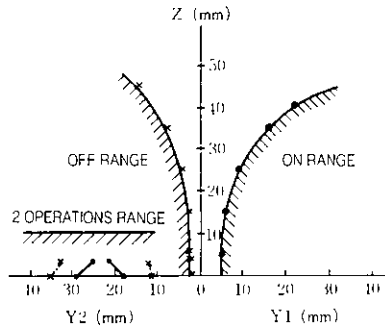
Connection and Mounting.

- Refer to page 51.

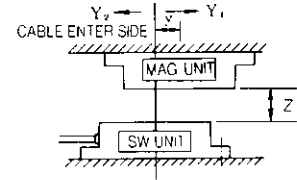
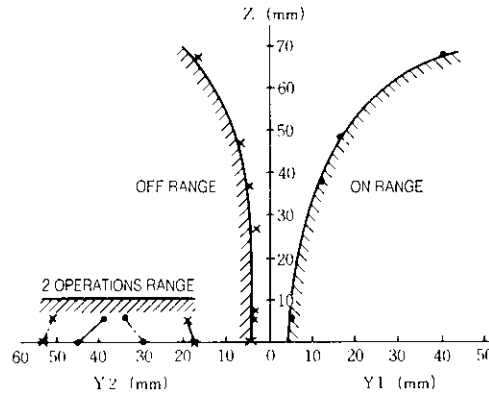
OPERATING CHARACTERISTICS (at 20°C)

(When the switch unit is mounted on non-magnetic substance, and the magnet unit, on ferromagnetic substance)

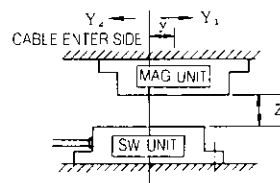
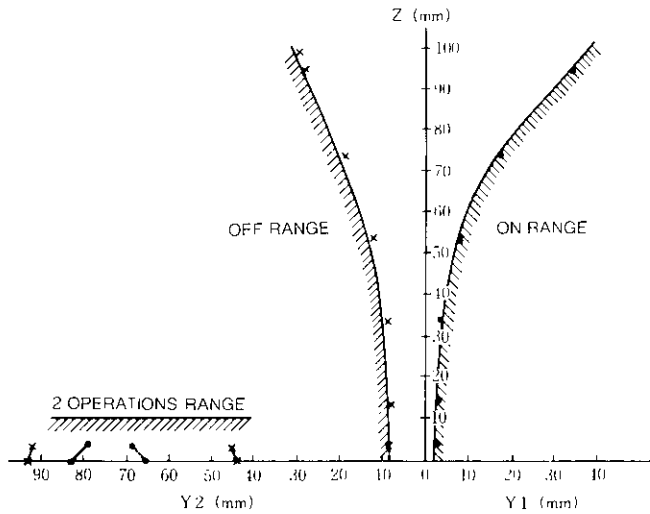
(1) Type PSMM-M325T



(2) Type PSMM-M450T

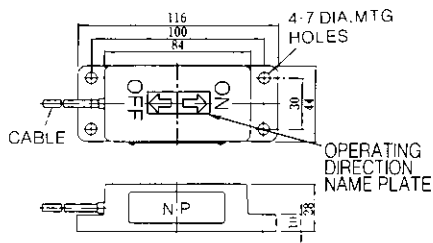


(3) Type PSMM-MX70T

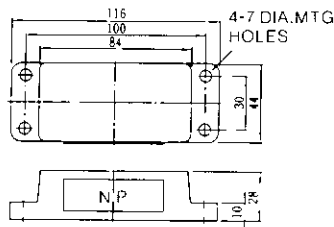


Note
Shown here are typical examples. ON and OFF points vary with switch performance and mounting conditions of switches. Where the switch unit is mounted on ferromagnetic substance, the operating characteristics may change.

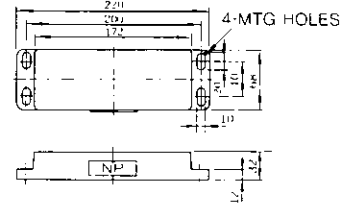
DIMENSIONS in mm



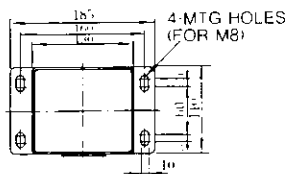
Weight : 0.4kg
Type PSMM-R3D1H



Weight : 0.45kg
Type PSMM-M325T



Weight : 1.6kg
Type PSMM-M450T



Weight : 2.5kg
Type PSMM-MX70T

COLUMN TYPE MAGNETIC PROXIMITY SWITCHES

Type PSMS-RV□

- Directly controlled on 100 VDC or greater without power supply unit or amplifying relay
- No erroneous operations or circuit failure due to noise and surge
- Contactless detection assures maintenance free and long life



□ RATING AND SPECIFICATIONS

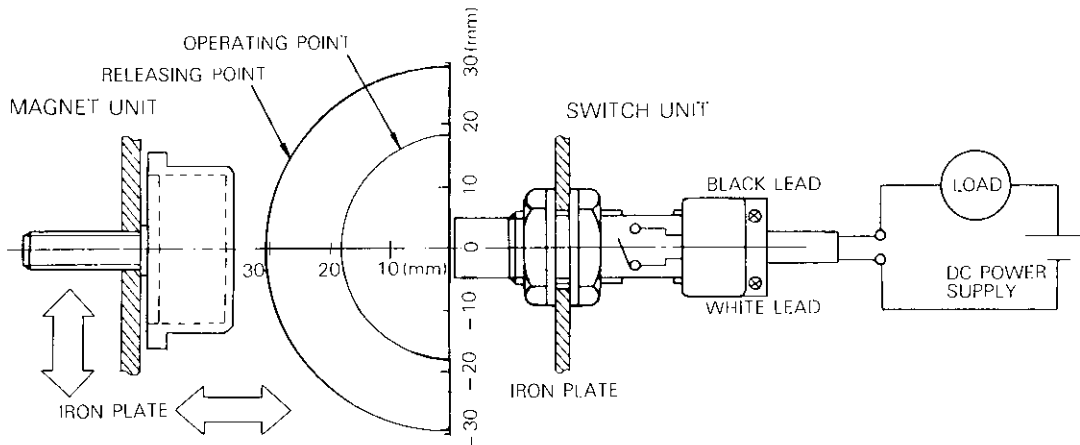
Type	Switch Unit	PSMS-RV1G1T	PSMS-RV3G1TH	
	Magnet Unit	PSMS-MV10TH (M6 SCREW) PSMS-MV10THA (M8 SCREW)		
Rated Sensitive Distance (mm)		10		
Contact Ratings	Incorporated Bestact		R25U	
	Contact Arrangement		1NO	
	Rated Continuous Current		3A	
	Rated Operational Current	AC	240V 0.5A (inductive load)	
		DC	115V 0.3A (inductive load)	
	Electrical life (Rated Operation)	AC	300000	
		DC	200000	
Minimum Operational Power Ratings		DC24V 1mA		
Characteristics	Vibration Resistance		49m/s ² (5G) (16.7 to 1000Hz)	
	Shock Resistance	Erroneous Operation	98m/s ² (10G)	
		Breakdown	980m/s ² (100G)	
	Withstand Voltage	Across Contacts	500VAC for 1 minute	
		To Ground	1500VAC for 1 minute	
Insulation Resistance		100MΩ or greater (with 500V megger)		
Ambient Temperature	Operating Temperature	-10 to +60°C	-25 to +130°C	
	Storage	-20 to +80°C	-30 to +130°C	
Enclosure *		IP67		
Unit Case Material		Aluminum		
Cable		0.75mm 2 conductors 1m long		

Note: * Refer to page 33.

□ TYPICAL APPLICATIONS

Stop level detectors and door-open command switches for passenger and freight elevators, stop level detector switches for vertical parking garages, passage point detector switches for transporters, passage detector switches for general industrial machinery.

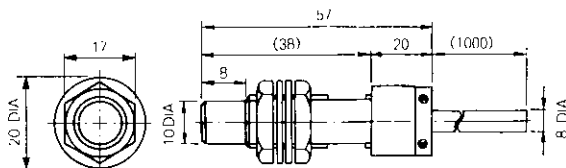
□ OPERATING CHARACTERISTICS



□ DIMENSIONS in mm

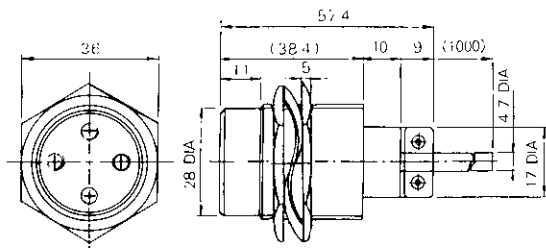
SWITCH UNIT

- PSMS-RV1G1T



Weight : 120g

- PSMS-RV3G1TH

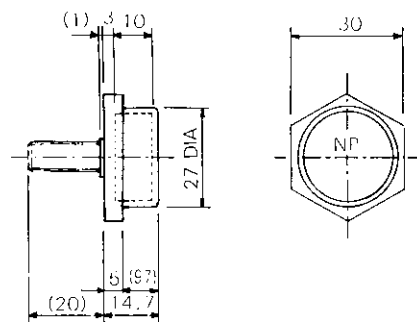


Weight : 170g

MAGNET UNIT

TYPE PSMS-MV10TH : M6 SCREW

PSMS-MV10THA : M8 SCREW



Weight : 55g

Bestact

PUSHBUTTON SELECTOR SWITCHES

Type PBR
Type PPKO-R
Type PPWO-R

□ FEATURES

1. Ensures high contact reliability.
2. Handles a large, 15A making current, eliminating the need for a surge suppressor when wiring long-distance cable or a spark quenching circuit when switching an inductive load.
3. Contacts do not age, making the unit suitable for applications of infrequent use.
4. Permits direct control over a wide range from electronic circuits to electromagnetic power.
24VAC 1mA to 240VAC 0.5A
24VDC 1mA to 115VDC 0.3A
5. The panel area (30.5mm Dia.) is the same as for our previous unit (break-in-air contact), permitting easy replacement.
6. The mounting dimensions are the same as for previous unit.

□ TYPICAL APPLICATIONS

- Industrial automatic control systems
- Computer peripheral equipment
- Water supply and sewage treatment plants

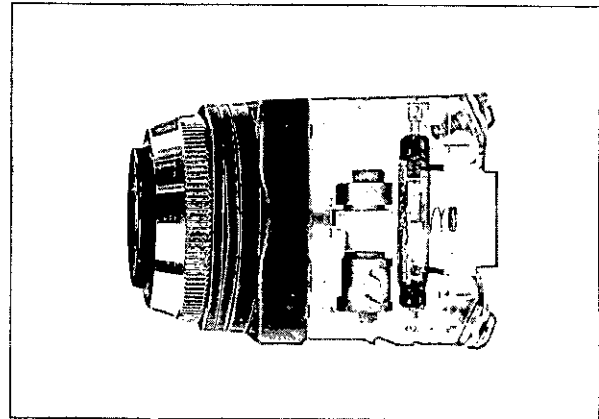
□ UL RECOGNIZED (Only type PBR) File No. E87146

For Class I, Division 2
Groups A, B, C, D



Note: Refer to page 60.

CSA CERTIFIED (Only type PBR) File No. LR21376



Note: The contact unit of pushbutton switch is a transparent body in photograph but an opaque body

□ RATINGS AND SPECIFICATIONS

	Incorporated Bestact	R24U*	R25U
	Rated Continuous carrying current	3A	
	Rated Operational Current	AC	240V 5A ON 0.5A OFF (Inductive load)
		DC	115V 0.3A (Inductive load L/R=40ms)
	Maximum Making Current	240VAC 15A (PF 0.7)	
	Maximum Breaking Current	240VAC 15A (PF 0.7) 115VDC 0.5A(L/R=40ms)	
	Minimum Operational Power Ratings	5VDC 1mA	24VDC 1mA
	Withstand Voltage Across Contacts	500VAC	
	Insulation Resistance	100MΩ or greater (with 500VDC megger)	
	Initial Contact Resistance	100mΩ or less	500mΩ or less
	Electrical Life	AC	Over 1million operations (Rated operational current)
		DC	Over 300,000 operations (Rated operational current)
	Mechanical Life	Pushbutton Switches	Over 5,000,000 operations
		Illuminated Pushbutton Switches	Over 2,500,000 operations
		Selector Switches	Over 500,000 operations
	Mechanical Performance	Vibration Resistance (Erroneous operation)	49.0m/s ² {5G} or greater (20 to 55Hz)
		Impact Resistance (Erroneous operation)	196.0m/s ² {20G} or greater (breakdown G: 980.0m/s ² {100G} or greater)
	Ambient Temperature	Operating Temperature	- 25 to +50°C
		Storage	- 25 to +70°C
	Terminal	Screw Size	M3.5
		Connecting Wire Size	2.0mm ² or less

Note *R24U is only available as a custom-order product.

PANEL-MOUNTED PUSHBUTTONS

Type PBR

TYPE DESIGNATION

P B R - □ - □ □

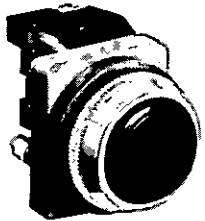
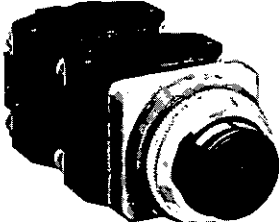
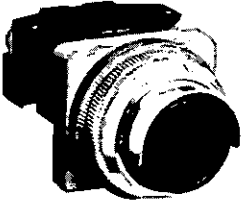
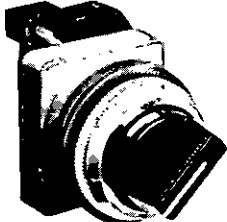
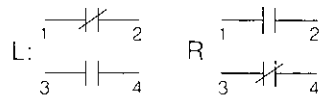
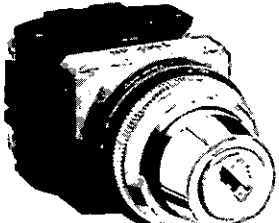
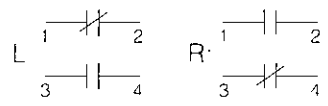
• Type of Button

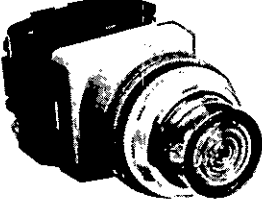
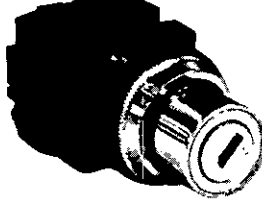
- 1: Flush
- 2: Salient
- 5: Flush Head with Cylinder Lock
- 7: Half Shrouded
- 52: Cylinder Lock 2-Position
- 62: Knob 2-Position

• Contact Arrangement

- 10: 1NO 11: 1NO1NC
- 20: 2NO 12: 1NO2NC
- 30: 3NO 13: 1NO3NC
- 40: 4NO 21: 2NO1NC
- 01: 1NC 22: 2NO2NC
- 02: 2NC 31: 3NO1NC
- 03: 3NC
- 04: 4NC

MODEL LIST

Appearance	Operator	Color of Button	Type	Remarks
	Flush head	Red Green Black	PBR-1-□	General purpose
	Salient head	Red Green Black	PBR-2-□	General purpose
	Half shrouded head	Red Green Black	PBR-7-□	Protection against accidental contact
	Knob 2-position	(Knob) Black	PBR-62-□	
	Cylinder lock 2-position	(Cylinder) Chrome plated	PBR-52-□	

Appearance	Operator	Color	Type	Remarks
	Illuminated lamp head	(Globe) Red Green	PBLR-[]-[]-[]-[]*1	<ul style="list-style-type: none"> Transformer type Lamp: 6.3V 1W Not approved by UL
	Flush head with cylinder lock	(Cylinder) Chrome plated	PBR-5-[]	<ul style="list-style-type: none"> Normal operation when key is rotated to left. Pressing the button and rotating the key to the right will lock the contact in the closed position. Rotating to the left will release the lock. Rotating the key to the right in the normal position will prevent push-button operation.

Note * 1. Illuminated lamp head type has the following significance.

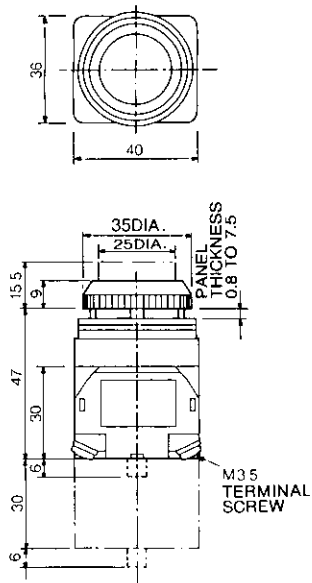
PBLR - [] [] [] []

- Voltage
 - 1 100 to 110V
 - 2 200 to 220V
- Contact Arrangement
 - 20: 2NO 11: 1NO1NC
 - 02: 2NC 13: 1NO3NC
 - 40: 4NO 22: 2NO2NC
 - 04: 4NC 31: 3NO1NC
- Globe Color
 - R: Red
 - G: Green

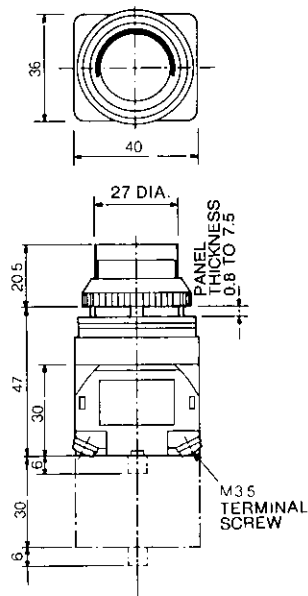
- Knob 3-position unit cannot be manufactured
- When using with DC circuits, connect odd terminal numbers to ⊕, and even terminal numbers to ⊖.

[] DIMENSIONS in mm

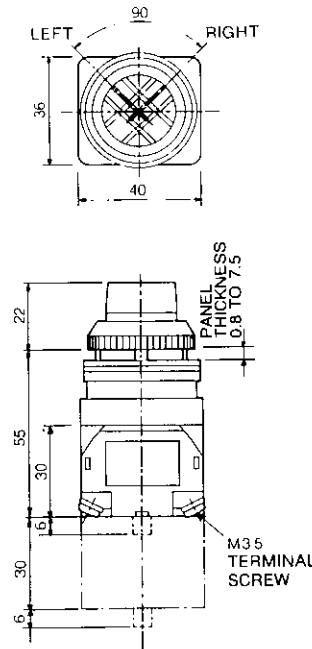
Type PBR-1-[]
Type PBR-2-[]



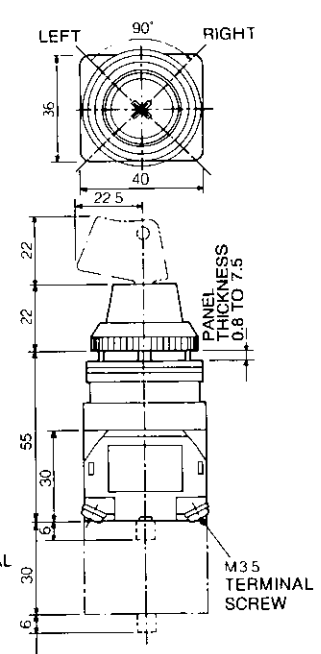
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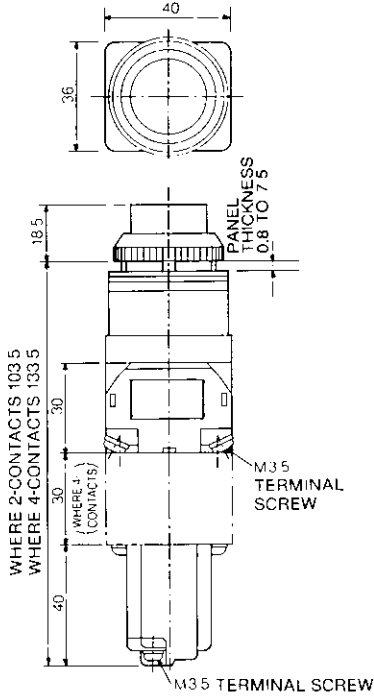
Type PBR-62-[]



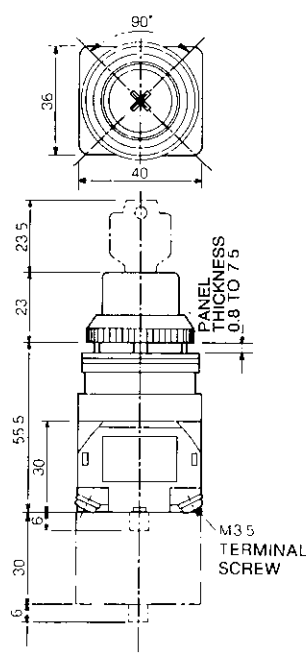
Type PBR-52-[]



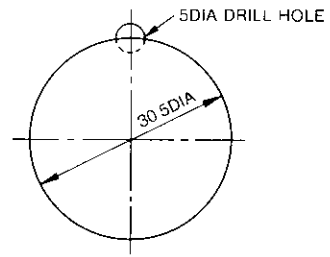
Type PBLR-



Type PBR-5-



DRILLING PLAN FOR MOUNTING HOLE



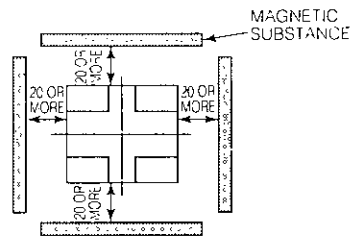
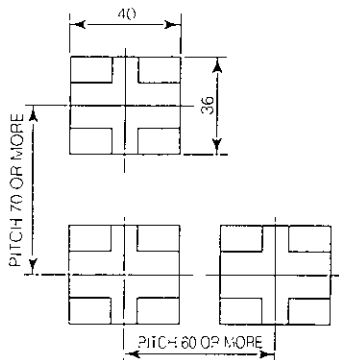
Note The 5mm hole is used to stop whirl. If nameplates are not used, or nameplate does not have a whirl-stop, the hole is not required.

Diameter of Mounting Part: 30mm


● MOUNTING PITCH

• To avoid interference when mounting units in close proximity to one another, refer to the dimensions specified below for proper separation. Units mounted closer together than specified may affect operations and result in unsatisfactory performance.

• Refer to the dimensions specified below for proper mounting and separation from other magnetic substance. Units mounted closer together than specified may affect operations and result in unsatisfactory performance.



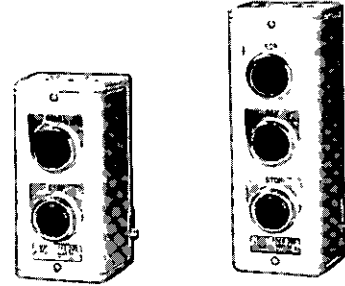
□ UL STANDARD SUMMARY OF CLASSIFICATION CHART

Class	Division	Group
I. GAS 	1. HAZARD MAY EXIST May Exist In Atmosphere Under Normal Operating Conditions	A. Acetylene
		B. Hydrogen and Manufactured Gases containing Hydrogen
		C. Petrochemicals (e.g. ethylene)
		D. Petrochemicals (e.g. alcohol)
	2. POTENTIAL HAZARD A. May Be Present In Atmosphere Only Under Abnormal Circumstances B. Location Adjacent To Division 1 Location	A. Acetylene
		B. Hydrogen and Manufactured Gases Containing Hydrogen
		C. Petrochemicals (e.g. ethylene)
		D. Petrochemicals (e.g. alcohol)

PUSHBUTTON STATIONS ENCLOSED TYPE Type PPKO-R

RATINGS

Rated Insulation Voltage (V)	Rated Continuous Current (A)	Rated Operational Voltage (V)	Rated Operational Current (A)	
			AC	DC
250	3	100 to 110	5A ON, 0.5A OFF	0.3
		200 to 220		—



Type PPKO-200R

Type PPKO-300R

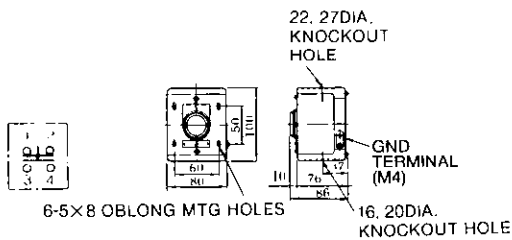
MODEL LIST

Type	No. of Buttons	Contact Arrangement		Nameplate	Color of Button	Approx. Weight (kg)
PPKO-100R	1	—	1NO	SIGNAL or STOP	Black	0.4
PPKO-200R	2	UPR	1NO	START	Black	0.6
		LWR	1NC	STOP	Red	
PPKO-300R	3	UPR	1NO1NC	FOR	Black	0.85
		CTR	1NO1NC	REV	Black	
		LWR	1NC	STOP	Red	
PPKO-400R	4	—	(1NO1NC) × 4	User's spec.	User's spec.	1.1
PPKO-500R	5	—	(1NO1NC) × 5	User's spec.	User's spec.	1.3

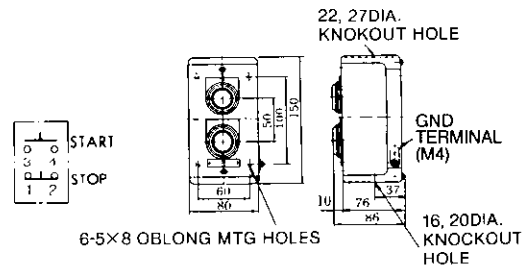
- Note: 1 By combining the 1NO and 1NC units, a two-pole contact configuration for the pushbutton unit is possible.
 2 When using with DC circuits, connect odd terminal numbers to ⊕, and even terminal numbers to ⊖.
 3 Pushbutton switches with illuminated lamp heads cannot be assembled.
 4 Enclosure: IP 40 Refer to page 33 and 37.

DIMENSIONS in mm

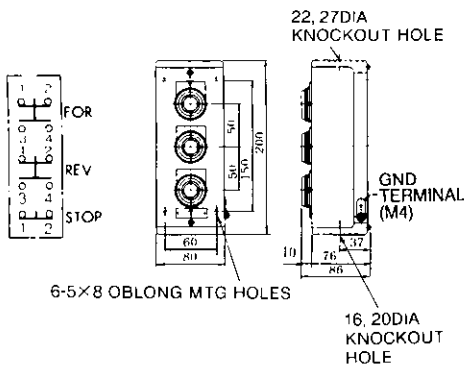
Type PPKO-100R



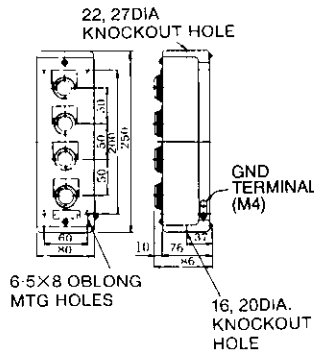
Type PPKO-200R



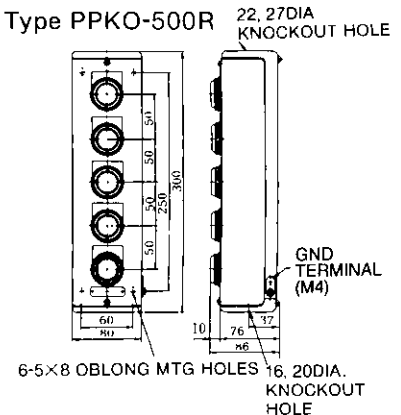
Type PPKO-300R



Type PPKO-400R



Type PPKO-500R



PUSHBUTTON STATIONS, CORROSION-RESISTANT, RAIN-PROOF TYPE

Type PPWO-R

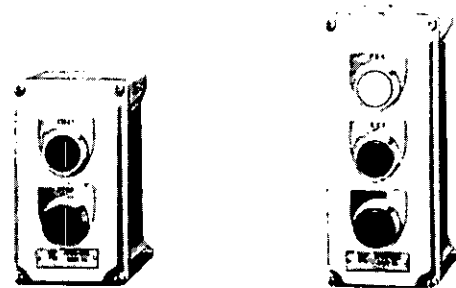
RATINGS

Rated Insulation Voltage (V)	Rated Continuous Current (A)	Rated Operational Voltage (V)	Rated Operational Current (A)	
			AC	DC
250	3	100 to 110	5A ON, 0.5A OFF	0.3
		200 to 220		—

MODEL LIST

Type	No. of Button	Contact Arrangement	Nameplate	Color of Button	Approx. Weight (kg)	
PPWO-100R	1	—	1NO SIGNAL or STOP	Black	0.7	
PPWO-200R	2	UPR	1NO	START	Black	0.75
		LWR	1NC	STOP	Red	
PPWO-300R	3	UPR	1NO1NC	FOR	Black	1.0
		CTR	1NO1NC	REV	Black	
		LWR	1NC	STOP	Red	
PPWO-400R	4	—	(1NO1NC)×4	User's spec.	User's spec.	1.4
PPWO-500R	5	—	(1NO1NC)×5	User's spec.	User's spec.	1.5

- Note
- 1 By combining the 1NO and 1NC units, two-pole contact configuration for the pushbutton unit is possible.
 - 2 When stuffing box is provided, the model number is type PPWO-100RS.
 3. When using with DC circuits, connect odd terminal numbers to ⊖, and even terminal numbers to ⊕.
 4. Pushbutton switches with illuminated lamp heads cannot be assembled.
 - 5 Enclosure: IP 53 Refer to page 33 and 37

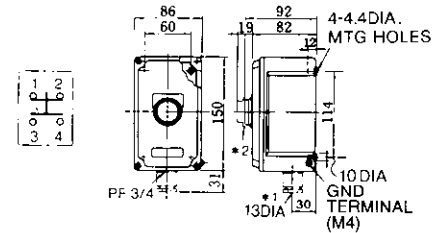


Type PPWO-200R

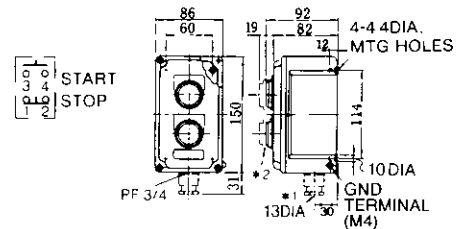
Type PPWO-300R

DIMENSIONS in mm

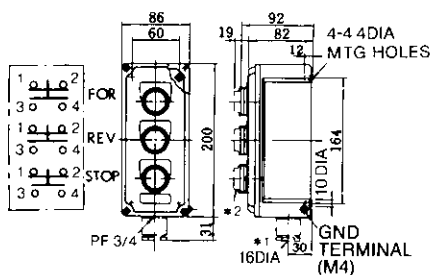
Type PPWO-100R
Type PPWO-100RS



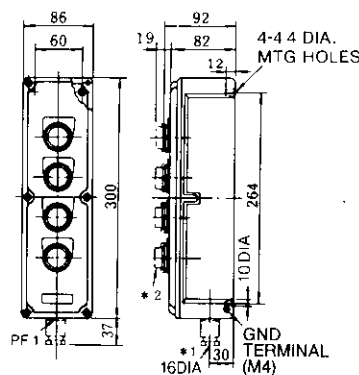
Type PPWO-200R
Type PPWO-200RS



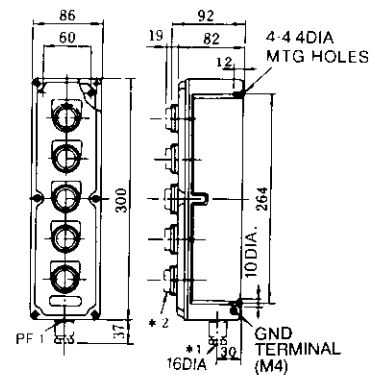
Type PPWO-300R
Type PPWO-300RS



Type PPWO-400R
Type PPWO-400RS



Type PPWO-500R
Type PPWO-500RS



- Note:
- * 1. For waterproof structure, the value indicated is the diameter of the lead passage hole
 - * 2. Products can be fitted with rubber covers upon request.

Bestact

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YASKAWA
CONTROL

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KAE-C542-0M

Due to ongoing product modification/improvement, data subject to change without notice

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