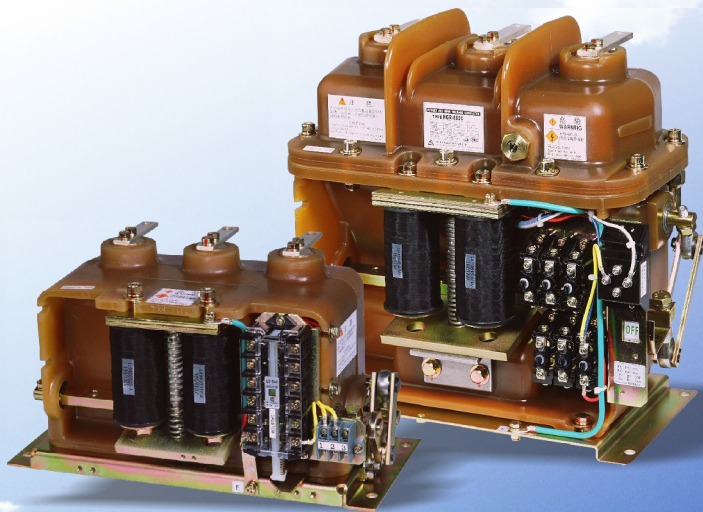


# ROTARY-ARC

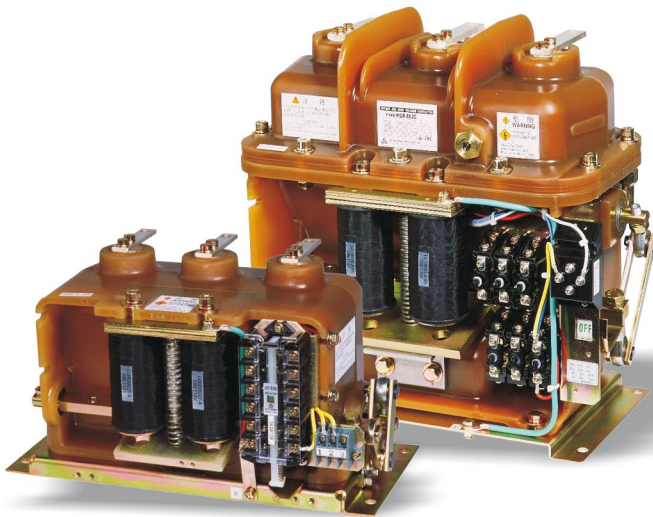


## High-Voltage Magnetic Contactors

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License by YASKAWA ELECTRIC CO.

# A Wide Choice of Models to Meet Every Requirement

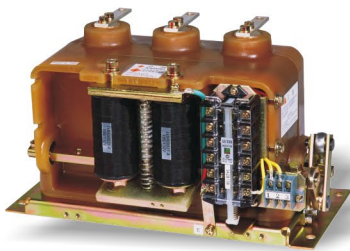


Highly evaluated molded type high-voltage electromagnetic contactors have been used in many fields of industry as switches for motors, transformers and capacitors. These contactors have enjoyed an enviable reputation attested by a great number of users for their outstanding characteristics such as stable switching performance, high dielectric strength, high reliability and properties even under the most extreme temperature and environmental conditions.

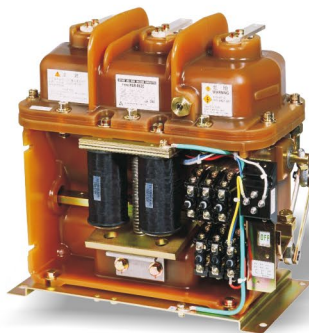
The most suitable selection for a variety of applications has become possible as a result of commercialization for a special model for 3.3 kV, 100A.

This new model will meet your requirements for reducing space and cost as well as increasing reliability.

## Rotary-Arc High-Voltage Magnetic Contactor (Stationary Type)



Type HGR-851C,  
3.3kV, 100A

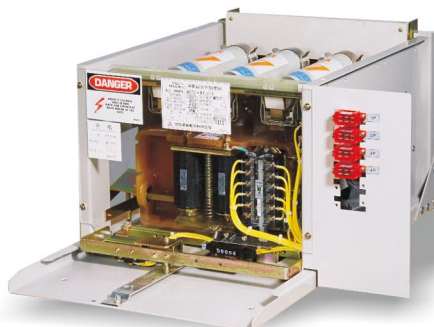


Type HGR-862C (863C)  
3.3/6.6kV, 200A



Type HGR-873C (974C)  
3.3/6.6kV, 400A

## Rotary-Arc High-Voltage Magnetic Contactor with Power Fuses (Drawout Type)



Type HGFO-857C-F,  
3.3kV, 100A, 40kA



Type HGFO-867C  
3.3kV, 200A, 40kA

# STRUCTURE

## The Highest Technical Achievement for Reliability and Safety

### EPOXY RESIN MOLDED COVER

This ultra miniature and light weight type has been achieved by employing an epoxy resin molded structure with the SF<sub>6</sub> gas switch.

This model can replace any model which has been used previously. In addition, it can be used under severe environmental condition. Because all the high-voltage main circuits are sealed.

### ABSORBENT

This substance absorbs gases decomposed due to water dilution and arc discharge.

### PERMANENT MAGNET FOR ARC QUENCHING

### ARC-QUENCHING ENCLOSURE

### MAIN CIRCUIT POWER TERMINAL

### ARC DRIVE COIL

### MAIN STATIONARY CONTACT

### MAIN MOVABLE CONTACT

No harmful surge generation when the motor is turned ON ; capable of high frequent switching such as motor jogging.

Most suitable for application like transformers and capacitors because of the excellent breaking capability of lagging and leading currents.

In addition, long life time due to small amount of contact wearing due to arcing.

### O-RING

O-rings are used for sealing because of their performance and reliability. In addition, the number of sealing area is less than one-third of those of conventional models.

### OPERATION SHAFT (INSULATION)

A torsion tube which has small torsional stress and long life is used at the penetration point of the operation shaft. There have been absolutely no abnormalities experienced after 2.5M times of operation.

### MOVABLE ARMATURE

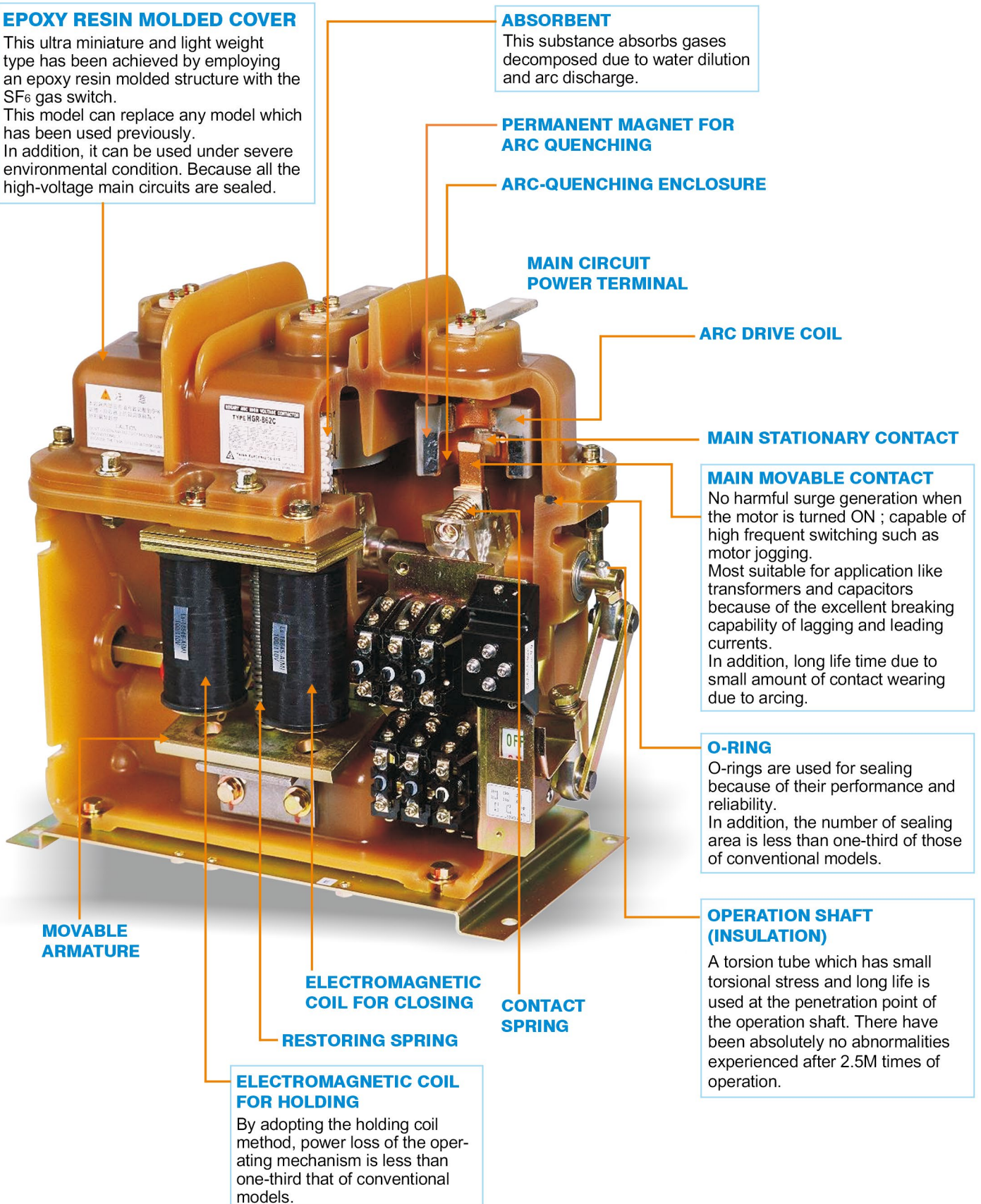
### ELECTROMAGNETIC COIL FOR CLOSING

### RESTORING SPRING

### ELECTROMAGNETIC COIL FOR HOLDING

By adopting the holding coil method, power loss of the operating mechanism is less than one-third that of conventional models.

### CONTACT SPRING



# STRUCTURE

## The Highest Technical Achievement for Reliability and Safety

### ● INTERRUPTING METHOD

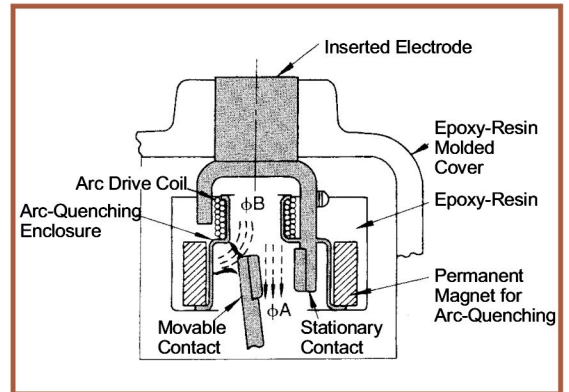
The rotary arc method is adopted which removes energy from a rotating arc in the SF<sub>6</sub> gas effectively combining a constant magnetic flux from a permanent magnet and instantaneous magnetic flux generated by an arc rotation coil.

1. Circuit breaking in the range of small no-load currents and currents with a load. An arc is extinguished by a constant magnetic flux ( $\phi A$ ) of a permanent magnet, rotating a generated arc at high speed from the instant of the contact opening. Long electrical life time is obtained by preventing arc spots on the contact consumption by rotating the arc at a high speed.
2. Circuit breaking in the range of large current. A circuit is broken at no current, rotating the arc at a high speed by magnetic flux ( $\phi B$ ) which is generated by an arc current through the arc rotation coil and proportional to the interrupted current, and magnetic flux from a permanent magnet ( $\phi A$ ) in the SF<sub>6</sub> gas with a cooling effect.

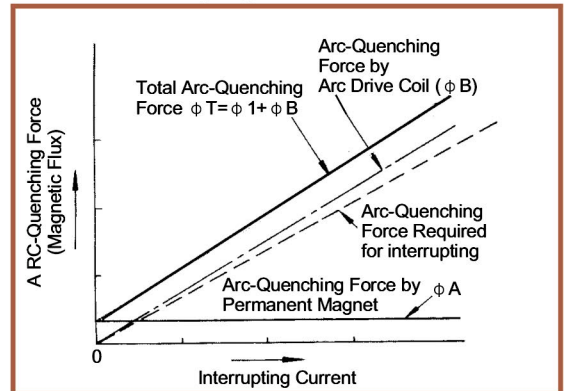
### ● FEATURES OF SF<sub>6</sub> GAS

Circuit interrupting, insulation and cooling performance of the SF<sub>6</sub> gas are far more superior to those of air. The miniaturized and light weight model of high-voltage contactors was realized by utilizing properties of the SF<sub>6</sub> gas. In addition, the electrical performance of the SF<sub>6</sub> gas is almost the same as that of oil. Considering the thermal stability of the SF<sub>6</sub> gas, switches with the SF<sub>6</sub> gas are much safer. The SF<sub>6</sub> is an ideal insulator for high-voltage switches because this gas is nonpoisonous, odorless and nonhazardous, and is easy to handle. The dielectric strength of the SF<sub>6</sub> gas is approx. 2 to 3 times that of air. The dielectric strength of oil is almost the same as that of the SF<sub>6</sub> gas at several atmospheric pressure.

Cross Sectional View of Arc-Quenching



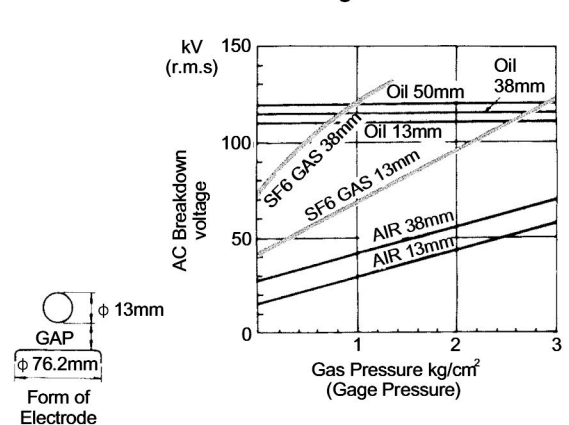
The Relation between Arc-Quenching Force and Interrupting Current



### Comparisons of SF<sub>6</sub> Gas, Air and Insulation Oil

	SF <sub>6</sub> GAS	Air	Insulation Oil
Density (at 20°C)	6.139g/l	1/5 of SF <sub>6</sub> GAS	860g/l
Dielectric Strength	45kV/cm (at 1kg/cm <sup>2</sup> · G)	1/2 to 1/3 of SF <sub>6</sub> GAS	120kV/cm
Arc-quenching ability	—	1/100 of SF <sub>6</sub> GAS	—
Flamability	Nonflammable	—	Ignition point 140°C
Heat Stability	500°C and below	—	105°C and below
Thermal Degradation	None	Oxidation of Materials	Oxidation of Oil
Toxicity	Nontoxic	Nontoxic	—
Coefficient of Thermal Conductivity	3.36 × 10 <sup>-5</sup> (cal/sec cm <sup>2</sup> · °C)	2.5 of SF <sub>6</sub> gas	Excellent

### Dielectric Breakdown Voltage of SF<sub>6</sub> Gas



# RATINGS AND SPECIFICATIONS

## Standard

### ● Magent Holding

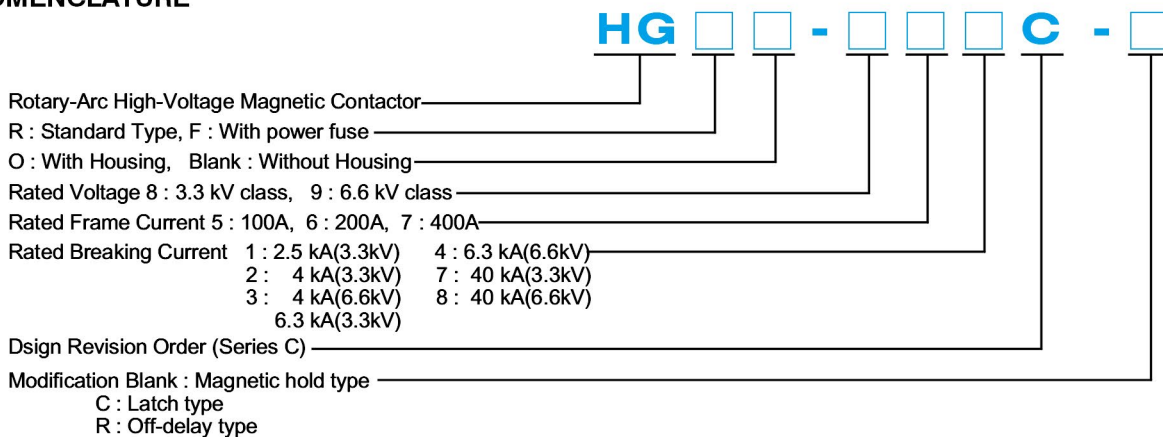
Item	Mounting Type	Stationary Type					Drawout Type											
		Unfused					Unfused					Fused						
Rated Insulation Voltage	kV	3.6	3.6	7.2	3.6	7.2	3.6	3.6	7.2	3.6	7.2	3.6	3.6	7.2	3.6	7.2		
Rated Thermal Current	A	100	200	400			100	200	400			100	200	400				
Contactor Type		HGR-□					HGR(O)-□					HGF(O)-□						
		851C	862C	963C	873C	974C	851C	862C	963C	873C	974C	857C	867C	968C	877C	978C		
Rated Operational Voltage	kV	3.3	3.3	6.6	3.3	6.6	3.3	3.3	6.6	3.3	6.6	3.3	3.3	6.6	3.3	6.6		
Rated Frequency	Hz	50 / 60					50 / 60											
Rated Interrupting Current	kA	2.5	4	6.3			2.5	4	6.3			40						
Rated Short-Time Current (2 sec)	kA	2.5	4	6.3			2.5	4	6.3			2.5	4			6.3		
Insulation Class		3A	3A / 6A				3B	3B / 6B				3B	3B / 6B					
Making Current Capacity		Class AC4 : 10 times rated current,																
Breaking Current Capacity		Class AC4 : 8 times rated current																
Switching Frequency		1200 operations per hour																
Mechanical Endurance (Number of times)		2,500,000			1,000,000			2,500,000			1,000,000			2,500,000			1,000,000	
Electrical Endurance *1 (Number of times)		250,000			100,000			250,000			100,000			250,000			100,000	
Overcurrent Class		—						—						C				
Control Circuit	Rated Insulation Voltage (V)	250						250										
	Rated Operational Voltage (V)	100/110 VAC, 200/220 VAC ; 100/110 VDC, 200/220 VDC																
Auxiliary Contact Arrangement *2		3NO, 2NC						3NO, 2NC										
Maximum Load Capacity	Motor kW	375	750	1500	1500	3000	375	750	1500	1500	3000	375	750	1500	1500	2000		
	Transformer kVA	500	1000	2000	2000	4000	500	1000	2000	2000	4000	500	1000	1500	2000	3000		
	Capacitor*3 kVA	500	1000	2000	1500	3000	500	1000	2000	1500	4000	300	700	1000	1400	2000		
Approx. Mass (kg)		11	22	25			52	100	110			52	110			120		
Standard		JEM-1167						JEM- 1225										

\*1 : The electrical endurance was tested at class AC3 switching frequency. (600% of the rated current was input to check if more than 100% of the breaking current would flow.)

\*2 : The contact number of the auxiliary contactor is the number of contacts available for external use.

\*3 : When used on capacitor application, Reactor will need to be installed.

### NOMENCLATURE



# RATINGS AND SPECIFICATIONS

## Standard

### ● Magent Holding (Off Delay : 2 sec)

Mounting Type		Stationary Type					Drawout Type									
Item																
Power Fuse		Unfused					Unfused					Fused				
Rated Insulation Voltage	kV	3.6	3.6	7.2	3.6	7.2	3.6	3.6	7.2	3.6	7.2	3.6	3.6	7.2	3.6	7.2
Rated Thermal Current	A	100	200		400		100	200		400		100	200		400	
Contactor Type		HGR-□-R					HGR(O)-□-R					HGF(O)-□-R				
		851C	862C	963C	873C	974C	851C	862C	963C	873C	974C	857C	867C	968C	877C	978C
Rated Operational Voltage	kV	3.3	3.3	6.6	3.3	6.6	3.3	3.3	6.6	3.3	6.6	3.3	3.3	6.6	3.3	6.6
Rated Frequency	Hz	50/ 60					50/ 60									
Rated Interrupting Current	kA	2.5	4		6.3		2.5	4		6.3		40				
Rated Short-Time Current (2 sec)	kA	2.5	4		6.3		2.5	4		6.3		2.5	4		6.3	
Insulation Class		3A	3A / 6A				3B	3B / 6B			3B	3B / 6B				
Making Current Capacity		Class AC4 : 10 times rated current,														
Breaking Current Capacity		Class AC4 : 8 times rated current														
Switching Frequency		1200 operations per hour														
Mechanical Endurance (Number of times)		2,500,000			1,000,000		2,500,000			1,000,000		2,500,000			1,000,000	
Electrical Endurance *1 (Number of times)		250,000			100,000		250,000			100,000		250,000			100,000	
Overcurrent Class		—					—					C				
Control Circuit	Rated Insulation Voltage (V)	250					250									
	Rated Operational Voltage (V)	100/110 VAC, 200/220 VAC ; 100/110 VDC, 200/220 VDC														
Auxiliary Contact Arrangement *2		3NO, 2NC					3NO, 2NC									
Maximum Load Capacity	Motor kW	375	750	1500	1500	3000	375	750	1500	1500	3000	375	750	1500	1500	2000
	Transformer kVA	500	1000	2000	2000	4000	500	1000	2000	2000	4000	500	1000	1500	2000	3000
	Capacitor *3 kVA	500	1000	2000	1500	3000	500	1000	2000	1500	4000	300	700	1000	1400	2000
Approx. Mass (kg)		11.5	23		26		52	100		110		56	110		120	
Standard		JEM-1167					JEM-1225									

\*1 : The electrical endurance was tested at class AC3 switching frequency. (600% of the rated current was input to check if more than 100% of the breaking current would flow.)

\*2 : The contact number of the auxiliary contactor is the number of contacts available for external use.

\*3 : When used on capacitor application, Reactor will need to be installed.

#### NORMAL SERVICE CONDITION

- Altitude : Less than 1000m.
- Ambient temperature : - 5°C to 40°C
- Humidity : 45% to 85%

#### Notes :

- Short-time current, making current capacity, breaking current capacity, and switching capacity are performed by the magnetic contactor without a current limiting power fuse (PF).
- The weight of the drawing type is the total weight including the housing, 2 each potential transformers (PTs),

# RATINGS AND SPECIFICATIONS

## Standard

### Latch Type

Mounting Type		Stationary Type					Drawout Type									
Item																
Power Fuse		Unfused					Unfused					Fused				
Rated Insulation Voltage	kV	3.6	3.6	7.2	3.6	7.2	3.6	3.6	7.2	3.6	7.2	3.6	3.6	7.2	3.6	7.2
Rated Thermal Current	A	100	200		400		100	200		400		100	200		400	
Contactor Type		HGR-□-C					HGR(O)-□-C					HGF(O)-□-C				
		851C	862C	963C	873C	974C	851C	862C	963C	873C	974C	857C	867C	968C	877C	978C
Rated Operational Voltage	kV	3.3	3.3	6.6	3.3	6.6	3.3	3.3	6.6	3.3	6.6	3.3	3.3	6.6	3.3	6.6
Rated Frequency	Hz	50/ 60					50/ 60									
Rated Interrupting Current	kA	2.5	4		6.3		2.5	4		6.3		40				
Rated Short-Time Current (2 sec)	kA	2.5	4		6.3		2.5	4		6.3		2.5	4		6.3	
Insulation Class		3A	3A / 6A				3B	3B / 6B			3B	3B / 6B				
Making Current Capacity		Class AC4 : 10 times rated current,														
Breaking Current Capacity		Class AC4 : 8 times rated current														
Switching Frequency		300 operations per hour														
Mechanical Endurance (Number of times)		2,500,000			1,000,000		2,500,000			1,000,000		2,500,000			1,000,000	
Electrical Endurance *1 (Number of times)		250,000			100,000		250,000			100,000		250,000			100,000	
Overcurrent Class		—					—					C				
Control Circuit	Rated Insulation Voltage (V)	250					250									
	Rated Operational Voltage (V)	100/110 VAC, 200/220 VAC ; 100/110 VDC, 200/220 VDC														
Auxiliary Contact Arrangement *2		2NO, 2NC					2NO, 2NC									
Maximum Load Capacity	Motor kW	375	750	1500	1500	3000	375	750	1500	1500	3000	375	750	1500	1500	2000
	Transformer kVA	500	1000	2000	2000	4000	500	1000	2000	2000	4000	500	1000	1500	2000	3000
	Capacitor *3 kVA	500	1000	2000	1500	3000	500	1000	2000	1500	4000	300	700	1000	1400	2000
Approx. Mass (kg)		11.5	23		26		52	100		110		56	110		120	
Standard		JEM-1167					JEM1225									

\*1 : The electrical endurance was tested at class AC3 switching frequency. (600% of the rated current was input to check if more than 100% of the breaking current would flow.)

\*2 : The contact number of the auxiliary contactor is the number of contacts available for external use.

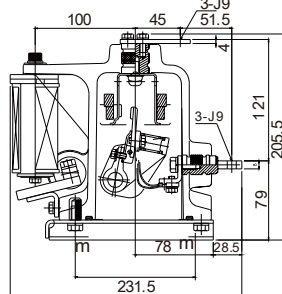
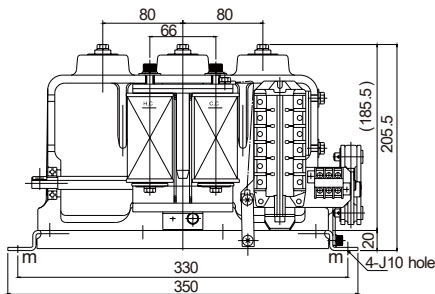
\*3 : When used on capacitor application, Reactor will need to be installed.

# Dimensions

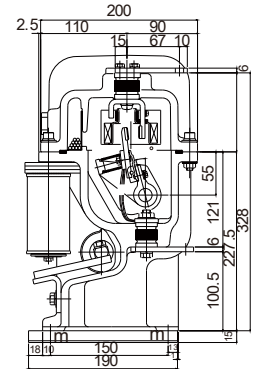
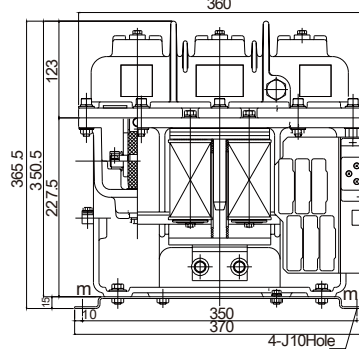
in mm

## Stationary Type HGR

• 3.3kV 100A



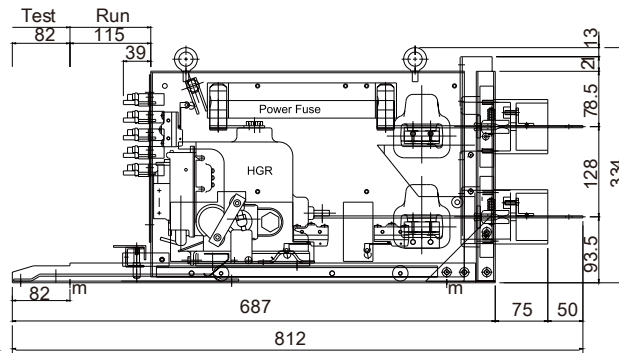
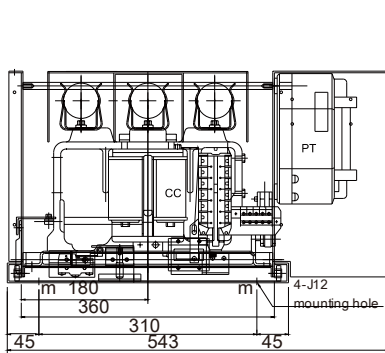
• 3.3kV 200/400A  
6.6kV 200/400A



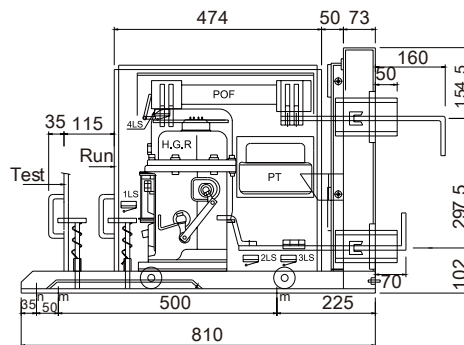
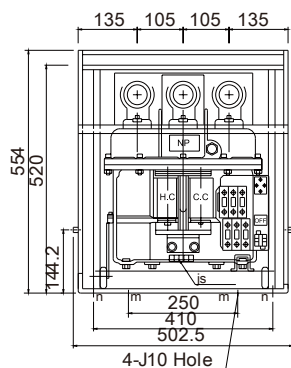
in mm

## Drawout Type HGRO / Type HGFO (with power-fuse and housing)

• 3.3kV 100A



• 3.3kV 200/400A  
6.6kV 200/400A



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