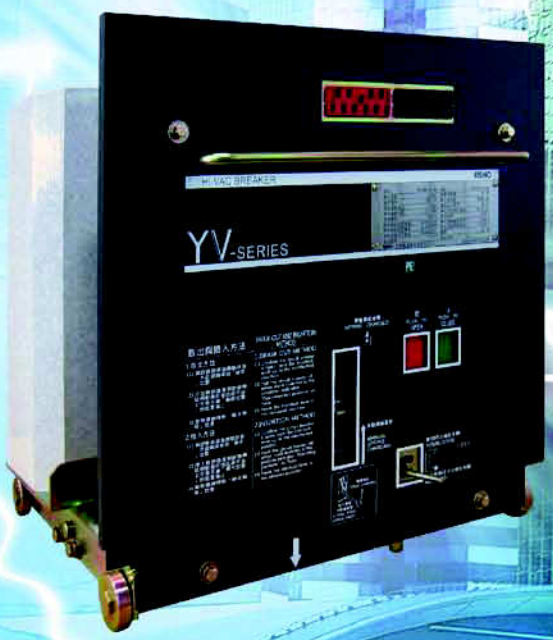
永彰機電
TAIWANCALSONIC

永彰牌真空斷路器

來自於日本日立的技術

EISHO VCB



ilac-MRA TAF Testing Laboratory 2570

Licensed by HITACHI

特點 Features

－使用日本日立原廠真空管－

使用日本日立原廠製真空管，除20年內仍能確保其內部的真空度低於 $5*10^{-4}$ Torr的優越特性外，更使用了日立最新的”複極軸向磁場型”電極技術，實現完美的消弧保証。

－Hitachi vacuum are used－

Hitachi-made vacuum interruptors are used , which have outstanding characteristics of guarranting the inside vacuum pressure to be maintained below 5×10^{-4} torr in 20 years. Besides , Hitachi unique “multipole axial magnetic field electrode technology” gurantees perfect and beautiful arc exinquish phenomena.

－機構部100% MIT－

整台真空斷路器機構從螺絲到內部的所有部品、儲能馬達…等，100% 台灣製造，以確保產品品質，進而保障供電安全。

－Mechanical mechanism is 100% M.I.T－

The mechanical construction of the vacuum circuit breaker has all the parts inside and outside, from screws and nuts to the charging motors , all made in Taiwan (M.I.T). The product quality is quaranteed, and the power distribution safety is perfectly assured.

－日本各重電大廠信賴的品質－

為日本各重電大廠OEM、ODM代工20餘年，將完整的製造技術與品質管理程序，100%延續到永彰牌真空斷路器上。

－Best quality－

With the experiences of OEM, ODM vacuum circuit breakers for many Japanese power companies for more than 20 years, the complete manufacture techniques and quality control procedures are 100% carried over to EISHO VCB's

－完整的產品資質－

符合國際IEC 62271-100標準，同時依據台灣最新公怖之「屋內線路裝置規則」第401條款之規定，通過經濟部能源局高壓用電設備原製造廠家認可。

－Perfect product attributes－

The products conform to international standard IEC 62271 -100. Our factory has been offered an approval of original manufacturer of high voltage power equipments, pardoned by the energy bureau of the ministry of economic affairs based on the newly issued “ Indoors Circuit Distribution Regutations 401 article”

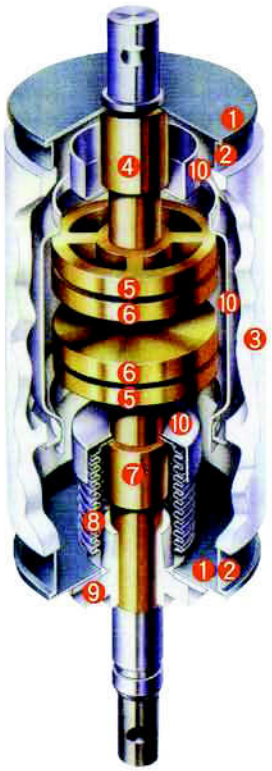
■ YV-10F-16FA

■ YV-20F-16FA

■ YCVG-20L-25FA

特點 Features

1. 末端板(End plate)
2. 金屬真空密封套 (Metal vacuum seal)
3. 絕緣真空封套 (Insulating vacuum envelope)
4. 固定電極端末 (Stationary electric terminal)
5. 線圈電極 (Coil electrode)
6. 主電極 (Main electrode)
7. 可動電極末端 (Movable electric terminal)
8. 金屬波紋管 (Metallic bellows)
9. 導管 (Guide)
10. 金屬蒸氣凝結護片 (Metal vapor condensing shield)



■ 真空斷路器優越的性能取決於下列技術的應用

◆ 具高真空技術以維持較長時間週期的高真空度。
Vacuum-technology to maintain a high vacuum for a longer period of time.

◆ 具高真空鑄造技術以生產具備高斷路能力和無氣吸弧特性之電極。
Vacuum-casting technology to produce electrode materials with high interrupting capabilities and non-gas arc absorption characteristics.

◆ 以先進的品質保證程序為基礎的設計和製造技術。請注意真空斷路器剖面圖內電極的構造。此電極乃由在真空下以先進的溶造的鑄造技術製成的特殊銅合金所製造而成。
Design and manufacturing technologies based on advanced quality assurance processes. Note the construction of the electrode in the diagram of the vacuum interrupter. The electrodes are made of a special copper alloy produced by advanced melting and casting technologies in vacuum, and have the following remarkable features.

◆ 大的斷路容量。
Large interrupting capability.

◆ 即使極大的電流，也可以阻止溶解。
Resistance to melting, even in heavy current.

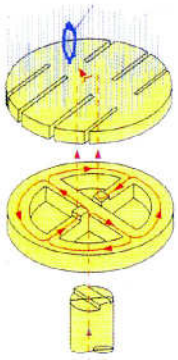
◆ 削弱傷害電極的電弧電流。對於大電流遮斷，複極軸向磁場型電極，由主電極和線圈電極所構成，適用以縮小整體斷路器的大小。
Reduced chopped current, for large current interruption, multi-pole axial magnetic field type electrodes, consisting of main and coil electrodes, are used to reduce the size of the whole interrupter.

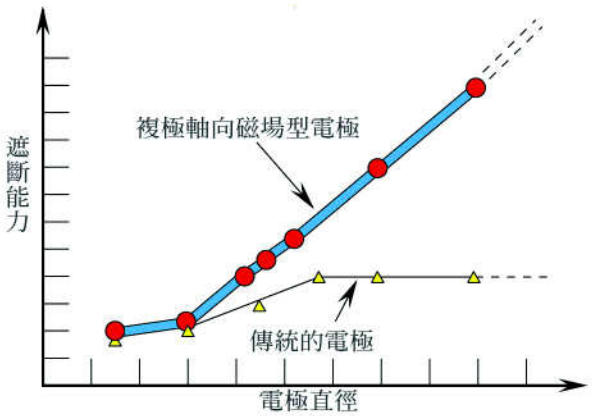
特點 Features

■ 大電流啟斷技術 Heavy current interruption technology

日立以新原理為基礎，成功地發展出新型的電極。稱為"複極軸向磁場型電極"如圖所示他包括一個主電極和一個線圈電極會感應產生一個軸向磁場。因為此電磁對電弧的效應，使電弧平均散佈在整個電極表面。

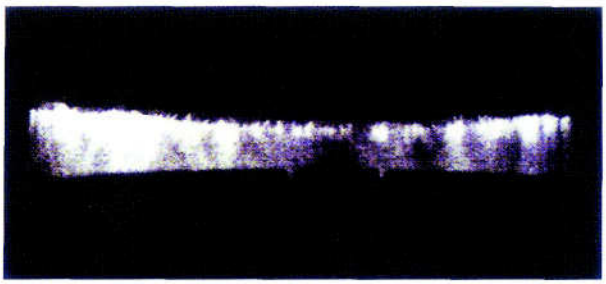
Hitachi successfully developed a new type of electrode based on a new principle, called the "multipole axial magnetic field type electrode", which has a main electrode and a coil electrode that induce an axial magnetic field as shown in the illustration. Because of this magnetic effect on the arc, the arc is distributed uniformly over the whole electrode surface.





即使在極高電流範圍內，在軸向磁場內的真空電弧仍維持在低電流的電弧形態。在此情況之下，陽極表面能量密度被完全地控制在低值，於電弧籠罩下保護住陽極，大大增進了遮斷能力。如圖所示，遮斷能力均衡地分佈在電極的直徑上，和傳統電極有很大的不同，高速照相顯示出真空電弧以線狀電弧，均勻的分佈在電極上。應用此技術，日立成功地達到90kA的大電流遮斷能力。

Vacuum arcs in the axial magnetic field are kept in the low current arc form even in extremely high current regions.In this case, since the energy density on the anode surface is controlled fully to a low value, the anode is protected from arc energy and its interrupting ability is greatly enhanced. As shown in the graph, the interrupting ability is distributed evenly to the diameter of the electrodes. This is much different from traditional electrodes. High-speed photograph shows that the vacuum arcs consist of many widely spread, thread-like arcs. With this technology, Hitachi successfully achieves heavy current interruption up to 90kA.

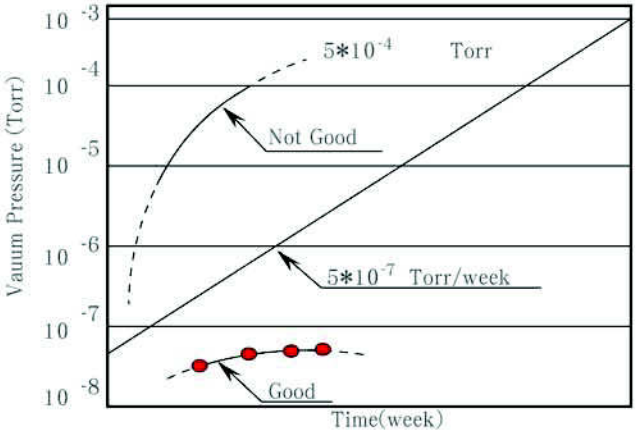


特點 Features

■ 低突波技術 Low Surge Technology

日立發展出一種新的電極材料，具有低截斷電流和高頻電流斷路能力。新材料的最大截斷電流為0.7A - 比任何其他材料都小。材料則採用銅鋁合金，突波保護裝置不再需要。

Hitachi developed a new electrode material, which has low chopping current and high frequency current interruption capabilities.The maximum chopping current of the new material is a maximum 0.7A, smaller than that of any other similar materials. This new material is made of copper-aluminum alloy.Surge protection mechanism is no longer necessary.



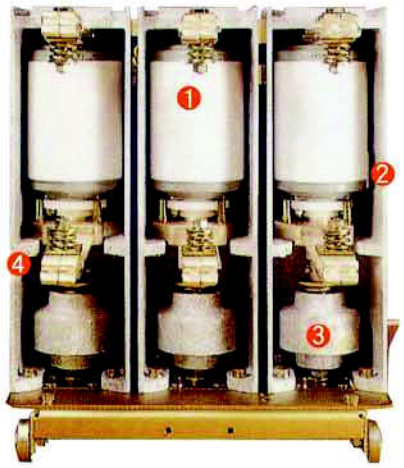
■ 真空技術的保證 Vacuum Technology

於真空預期壽命(20年)年限內，真空斷路壓力必須一直保持在5＊10^{-4} Torr以下。因此平均壓力上昇率必須低於5＊10^{-7} Torr/week。真空管製造階段，其真空壓力必須每周測量一次，以驗証其壓力上升率符合上述之要求，如圖所示，當軸向磁場及高壓脈衝加到真空斷路器時，其斷電電流是由離子所導電的，因此，斷電電流和真空壓力成正比，可從圖中推知。

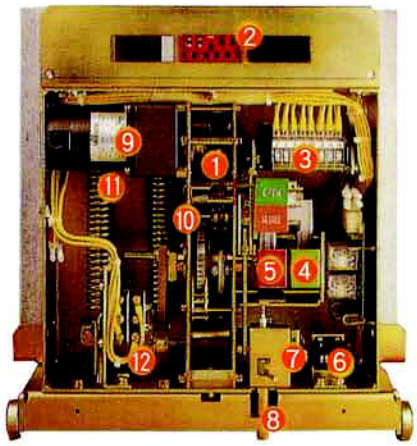
Vacuum interrupter pressure must be kept uniformly below 5*10^{-4} Torr for the expected life (20 years) of the vacuum. To guarantee this, the average pressure rise must be lower than 5*10^{-7} Torr/week. The pressure should be measured once a week, over a certain period of time , to monitor the rate of pressure rise and to assure that as shown in the graph. When an axial magnetic field and a high voltage pulse are applied to the vacuum interrupter, the current is conducted by ions in the vacuum. So the currents are proportional to the vacuum pressure, and can be shown by the representative calibration curves.

操作機構說明 Description on mechanism

■ 操作機構說明



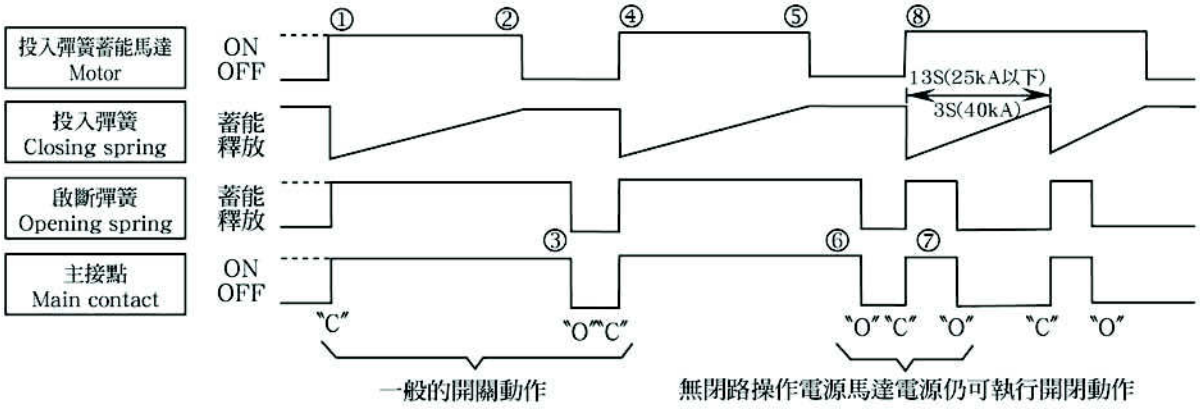
1. 真空管 (Vacuum interrupter)
2. 絕緣筒 (Insulation cylinder)
3. 絕緣操作桿 (Insulation operation rod)
4. 主脫離端子 (Main disconnecting terminal)



1. 即時投入電動式彈簧蓄能操作器 (Motor charged spring mechanism)
2. 操作回路插座 (Plug-in secondary terminal)
3. 補助開關 (Auxilliary switch)
4. 手動投入按鈕 (Manual closing button)
5. 手動啟斷按鈕 (Manual trip button)
6. 動作計數器 (Operation counter)
7. 鎖定桿 (Interlocking lever)
8. 鎖定裝置 (Interlocking device)
9. 投入彈簧蓄能馬達 (Closing spring charging motor)
10. 投入彈簧 (Closing spring)
11. 啟斷彈簧 (Opening spring)
12. 極限開關 (Limit switch)

操作機構說明 Description on mechanism

■ 動作開關時序



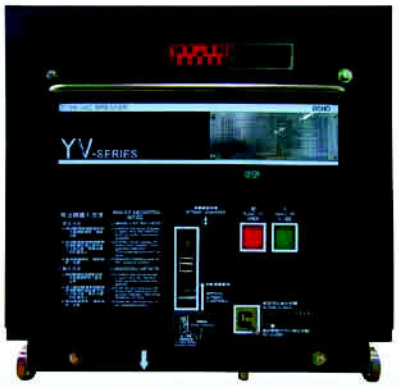
■ 機械連鎖特性

◆ 當斷路器在迴路投入位置時，本體之機械連鎖機構處於鎖定位置。此時所有可移動組件均不能移動，除非先使斷路器開路方可移動。

◆ 斷路器在試驗或操作位置時，必須於定位點之正確位置且定位鎖定裝置連桿正確鎖定後，此時方可投入斷路器。如若可移動組件不在正確之定位點時斷路器將無法投入。

◆ 當斷路器之彈簧儲能機構在儲能狀態中，機械連鎖機構可避免斷路器被抽出或導入。

◆ 抽出型斷路器之構造則分為固定部及移動部，固定部設有供本體抽出及導入之移動導軌，當可動部抽出後固定部裝有可將主電路帶電部隔離之遮蔽板可隨斷路器本體之抽出或導入而自動關閉及開啟。



■ Interlock

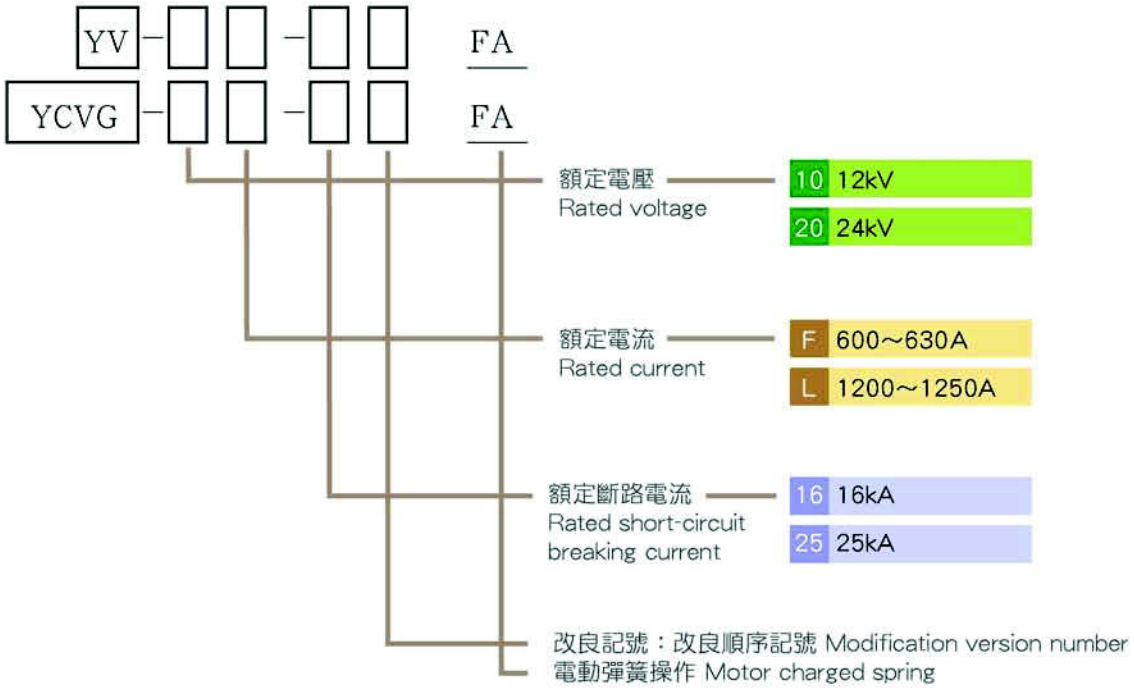
◆ When the circuit breaker is in the circuit input position, the status of the mechanical chain is in lock position. All removable components are not movable, unless the circuit breaker is tripped.

◆ Circuit breaker in the test /operation position, the breaker must be in the correct position and anchored, with locking device-link correctly locked, then the breaker can be closed. If any of the removable components is not in the correct position the breaker can not be closed.

◆ When the spring energy storage mechanism is in the charged status, the mechanical chain can prevent the breaker from being drawn out or put in.

◆ The structure of the draw-out type breakers is divided into fixed part and removable part. The fixed part has guiding rails for drawing out or putting in the breaker main body.There is an insulation shutter in the fixed part, which will close or open auto matically when the main body is been drawn out or insterted in. When the shutter is closed, i.e., when the main body is drawn out, the live part of the main circuit is isolated (insulated) by the shutter, to prevent any possible electric shock.

型式說明 Description on type



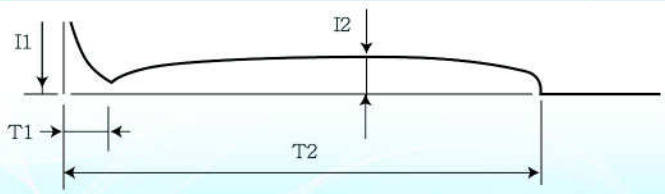
＊抽出座可選配標準型，W/S(附遮板)，F2(BUSHING TYPE)
Fixing Frame Type：Standard，w/s(with shutter)，F2

■ 中國大陸市場用永磁式真空斷路器同步上市

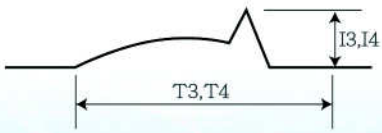
- ◆ 採用無油固體潤滑技術，實現永久免加油潤滑
- ◆ 採用特殊長壽命型電容器，保証20年壽命
- ◆ 採用抗干擾電子元件與技術
- ◆ 符合中國五防標準櫃體設計
- ◆ 機構原理簡單易懂
- ◆ 維護成本低
- ◆ 操作電源容量小

額定規格 Rating specifications

1	型號(Type)			YV-10F-16FA	YV-20F-16FA
2	型式(Forms)			FA(電動彈簧操作)	
3	額定電壓 (Rated voltage)		(kV)	12	24
4	絕緣等級(Rated Insulation level)			衝擊耐電壓75kV・(Lightning impulse 75kV) 商用頻率耐壓28kV (Power frequency 28kV)	衝擊耐電壓125kV・(Lightning impulse 125kV) 商用頻率耐壓50kV (Power frequency 50kV)
5	額定過渡回復電壓(TRV)	波峰值(Peak value)	kV	20.6	41
6		上升率(Rate of rise)	kV/μs	0.34	0.47
7	額定電流(Rated normal current)		(A)	600/630	
8	額定頻率(Rated frequency)		(Hz)	50/60	
9	額定斷路電流(Rated short-circuit breaking current)		(kA)	16	
10	額定短路開斷次數 Rated short-circuit breaking times			50回(100回以上為可選用品)	
11	額定投入電流(Rated short-circuit making current)		(kA)	40	41.6
12	額定短時間耐電流(Rated short-time withstand current)		(kA)	16kA×3S	
13	額定開極時間(Rated opening time)		(S)	0.03	
14	額定斷路時間(Rated break time)			3 cycles	
15	開極時間(Opening time)		(S)	0.07	
16	機械壽命Mechanic life			20,000回(30,000回以上為可選用品)	
17	電氣壽命Electric life			10,000回(30,000回以上為可選用品)	
18	標準動作順序(Rated operating sequence)			("O" −1M− "CO" −3M− "CO")・("O" −0.3S− "CO" −180S− "CO") ("O" −3M− "CO" −3M− "CO")・("CO" −15S− "CO") ※("O" −0.3S− "CO" −15S− "CO")	
19	操作方式(Operation Method)	投入(close)		即時投入式電動彈簧操作(Motor charged spring)	
20		啟斷(open)		電壓跳脫(Shunt trip)	
21	額定閉路操作電壓(Motor supply voltage)			DC 100/110V	
22	馬達操作(Motor operation)	電流(Current)(A)	I 1	2	
		時間(Time) (S)	T1	0.04	
23		電流(Current)(A)	I 2	0.5	
		時間(Time) (S)	T2	13	
24	額定控制電壓(Rated control supply voltage)			DC 100/110V	
25	閉路控制(Closing control)	電流(Current)(A)	I 3	3.5	
26		時間(Time) (S)	T3	0.04	
27	開路控制(Opening control)	電流(Current)(A)	I 4	3.5	
28		時間(Time) (S)	T4	0.03	
29	補助接點(Auxiliary switch)	(※可選購5a+5b)		3a+3b	5a+5b
30	依據規格(Standard)			IEC 62271-100, IEC 60056, JEC-2300	
31	大約重量(Weight)		(kg)	43	120



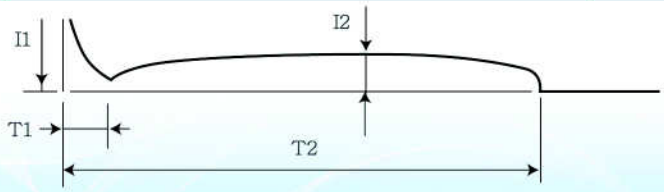
(註一)閉路操作電流時間特性



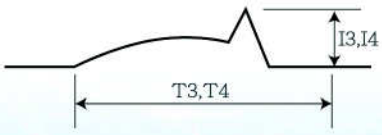
(註二)閉路・開路控制電流時間特性

額定規格 Rating specifications

1	型號(Type)			YCVG-20F-25FA	YCVG-20L-25FA
2	型式(Forms)			FA(電動彈簧操作)	
3	額定電壓 (Rated voltage)		(kV)	24	
4	絕緣等級(Rated Insulation level)			衝擊耐電壓125kV，商用頻率耐壓50kV Lightning impulse 125kV / Power frequency 50kV	
5	額定過渡回復電壓(TRV)	波峰值(Peak value)	kV	41	
6		上升率(Rate of rise)	kV/μs	0.47	
7	額定電流(Rated normal current)		(A)	600/630	1200/1250
8	額定頻率(Rated frequency)		(Hz)	50/60	
9	額定斷路電流(Rated short-circuit breaking current)		(kA)	25	
10	額定短路開斷次數 Rated short-circuit breaking times			50回(100回以上為可選用品)	
11	額定投入電流(Rated short-circuit making current)		(kA)	63	
12	額定短時間耐電流(Rated short-time withstand current)		(kA)	25kA×3S	
13	額定開極時間(Rated opening time)		(S)	0.04	
14	額定斷路時間(Rated break time)			3 cycles	
15	開極時間(Opening time)		(S)	0.07	
16	機械壽命Mechanic life			20,000回(30,000回以上為可選用品)	
17	電氣壽命Electric life			10,000回(30,000回以上為可選用品)	
18	標準動作順序(Rated operating sequence)			("O" −1M− "CO" −3M− "CO")，("O" −0.3S− "CO" −180S− "CO") ("O" −3M− "CO" −3M− "CO")，("CO" −15S− "CO") ※("O" −0.3S− "CO" −15S− "CO")	
19	操作方式(Operation Method)	投入(close)		即時投入式電動彈簧操作(Motor charged spring)	
20		啟斷(open)		電壓跳脫(Shunt trip)	
21	額定閉路操作電壓(Motor supply voltage)			DC 100/110V	
22	馬達操作 (Motor operation)	電流(Current)(A)	I 1	6	
		時間(Time) (S)	T1	0.2	
23		電流(Current)(A)	I 2	2	
		時間(Time) (S)	T2	3	
24	額定控制電壓(Rated control supply voltage)			DC 100/110V	
25	閉路控制 (Closing control)	電流(Current)(A)	I 3	5	
26		時間(Time) (S)	T3	0.05	
27	開路控制 (Opening control)	電流(Current)(A)	I 4	5	
28		時間(Time) (S)	T4	0.04	
29	補助接點(Auxiliary switch)	(※可選購5a+5b)		2a+2b, 1c(信號燈用)	
30	依據規格(Standard)			IEC 62271-100, IEC 60056, JEC-2300	
31	大約重量(Weight)		(kg)	210	225



(註一)閉路操作電流時間特性



(註二)閉路，開路控制電流時間特性