

BSR Series

使 用 手 冊

螺旋式冷媒壓縮機

**SCREW REFRIGERANT
COMPRESSOR**



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前言

「復盛公司」所生產的雙螺旋式冷媒壓縮機，從一般製冷空調，高科技無塵室，恆溫控制室到食品冷凍冷藏系統，都是各種應用系統的最佳搭配。

為配合各地區眾多客戶以及系統的需求，特別開發出「BSR」系列，以符合客戶的使用工況與應用場合。最佳化的產品性能，符合綠色環保高效率之需求。

在歷經客戶多年的使用與磨練，我們所生產的壓縮機已獲得國內外各機組廠家的肯定與讚賞，並榮獲多項國內外產品認證與品質認證，例如：「美國實驗室國家認證」「UL」、「歐盟安全法規認證 CE mark」、「歐盟壓力容器認證 PED」、「ISO 9001 國際品質認證」、「臺灣精品獎」等。

「復盛公司」為在冷凍空調業更上一層樓，不惜投入更多資金，引進最新式的螺旋轉子加工研磨機與三次元精密量床，為的就是要製作出更高品質、高效率的螺旋式冷媒壓縮機，以讓客戶得到百分百的滿意度為期許。

Preface

From air conditioning systems, hi tech clean room, climate control room to food refrigeration systems, Fu Sheng screw refrigerant compressors have been the best choice of various application systems.

In order to meet demands for various working condition from clients, Fu Sheng has particularly developed the 「BSR」 series of screw refrigerant compressors to satisfy each client' s unique application condition and design specification. With BSR series chiller makers can easily optimize their chiller performance and conformity to the environmental protection requirement of high energy efficiency.

After years of practice and working with clients, our compressors have acquired numerous appreciations from various domestic and international institutes; such as the UL(USA), CE mark(EU), PED(EU), ISO 9001 and “ Symbol of Excellence” Award (Taiwan), etc.

In order to satisfy our client's prospect of compressors with high quality and efficiency, Fu Sheng Co. has invested significant resources to introduce the state-of-art screw rotor grinding machines and coordinated measuring machines in the production process.

「復盛公司」始終以提升客戶滿意度為宗旨，持續為客戶提供更具競爭力、性能更優越、品質更可靠的雙螺旋式冷媒壓縮機。並期待在未來與客戶一同成長與茁壯。

「復盛公司」為確保客戶能夠順利的啟用「BSR」雙螺旋式冷媒壓縮機，特別在本使用手冊中，編寫有關 BSR 系列的特色與功能，以及在安裝操作、使用、保養維修時，所應注意的各項要點與內容，來提醒與告知。在此特別提醒您，在安裝使用「復盛」「BSR」雙螺旋式冷媒壓縮機之前，請先仔細閱讀本使用手冊，並確實遵守本手冊所陳述的各項注意事項與使用規範。

如果您還有不明白之處或是額外需求的特殊使用條件，可與我們公司聯絡；或是您在使用上需要我們協助，我們都將即時為您提供解答與服務，以符合您的需求。

Our motto is to provide our value customers screw refrigerant compressors bearing better competitive edge, performance and quality to increase satisfactions from customers or even to.

This instruction manual is prepared to ensure that users can operate or install Fu Sheng 「BSR」 screw refrigerant compressors correctly. Reader will find BSR series information about the features, the principles of compressor installation, operation, trouble shooting, and limitation in operation. Please read this Manual carefully and follow the notes and specification illustrated in this Manual before operating the compressors.

Should you have any questions or need any help, please do not hesitate to contact us. We will provide you with assistance and answer immediately.

I.「BSR」系列冷媒壓縮機特色

機械部份：

- 使用「復盛公司」特有 (5 : 6) 非對稱齒型有最佳的效率。
- 在最佳的恆溫加工場所製造最好的機殼及轉子。
 - 新一代的齒型剛性高
 - 專業的加工技術確保最高精度
- 高效率的電動機。
 - 內置 3 個 PTC 熱敏電阻保護
 - 特殊設計的冷卻流道
- 耐久型軸承設計及充分潤滑。
 - 五個軸向軸承，耐用性更佳
 - 內建油路提供最好的潤滑
- 震動小及穩定的排氣。
 - 運轉動件少
 - 沒有閥門的機構設計
- 高效率的油分離器及大面積油過濾器。
 - 特殊設計的油分離器
 - 高效的精密油過濾器

I. FEATURES OF「BSR」SERIES

Mechanism:

- Newly asymmetrical rotor profile, best tooth ratio 5:6, the compressor provides high efficiency in operation.
- Precise cases and rotors are machined in climate control room
 - New generation rotor profile provides high rigidity.
 - Professional manufacturing technology ensures high accuracy quality.
- High efficiency electrical motor
 - Built-in 3 PTC thermistor sensors.
 - Special design of refrigerant cooling flow passage.
- Long service life of bearings with sufficient lubrication
 - Five axial bearings provide more durability.
 - Built-in oil channel provides perfect lubrication.
- Low vibration and discharge pulse.
 - Limited motion parts.
 - No need to use discharge valve.
- Built-in high efficiency oil separator with large area filtration.
 - Innovative design of oil separator.
 - Equipped with high efficiency oil filter.

- 在可變 Vi 的容調裝置
 - 特有的無段及四段滑塊控制
 - 利用簡單的外置電磁閥進行控制加洩載
- 進氣接口位於馬達端蓋上可依需要旋轉角度.
 - 方便機組配管使用
- 搭配不同的冷媒(R-134a, R-407C, R-22...) 系統, 可發揮最佳的性能.
 - 最佳化容積比設定
 - 不同的冷凍油匹配
 - 馬達最佳匹配
 - 優異的 COP 值
 - 寬廣的應用範圍
- 壓縮機排氣量.
 - 60Hz (168~2350m³/hr)
 - 50Hz (140~1959m³/hr)
- Flexible capacity control
 - Delicate design of slider.
 - Precisely control the loading by solenoid valves.
- Mounting suction port can be rotated to different piping angle.
 - It is convenient for the piping of chiller unit.
- Suitable for each kind of refrigerant(R-134a, R-407C, R-22...) It is possible for the chiller system to operate at its best efficiency.
 - Optimized volume ratio design.
 - Matched with different oil.
 - Optimized motor size.
 - Excellent COP.
 - Wide application range.
- Displacement range
 - 60Hz(168 to 2350 m³/hr)
 - 50Hz(140 to 1959 m³/hr)

電氣控制及保護裝置部分:

- PTC 排氣溫度監控
- PTC 馬達溫度監控
- PT100 馬達溫度監控
- 逆相監控
- 欠相監控
- 潤滑油位監控
- 電壓保護

Electrical control and protection device:

- PTC discharge temperature monitor sensor.
- PTC motor temperature monitor sensor.
- PT100 motor temperature monitor sensor.
- Power phase sequence monitor.
- Power phase loss monitor.
- Oil level detection.
- Abnormal voltage detection.

標準配件:

- 排氣止回閥
- 油視窗
- 油位開關
- 油加熱器(BSR21X~BSR42X)
- 洩油閥
- 精密油過濾器
- 大面積的進氣濾網
- 電氣保護模組
- 預留中間壓與低壓液噴射接頭
- 節能器法蘭(BSR413~BSR616)
- 液噴設法蘭(BSR513II~BSR616)

完善的選配件:

- 液噴射電磁閥
- 排氣關斷閥
- 吸氣關斷閥
- 液噴毛細管
- 防震墊
- 安全閥
- 節能器接頭(BSR213~326)

Standard fittings:

- Discharge check valve
- Oil sight glass
- Oil level switch
- Oil heater. (BSR21X~BSR42X)
- Oil draining valve.
- Precision oil filter.
- Large size suction filter.
- Electrical protection module.
- Reserved liquid injection adapters at middle pressure side and low pressure side.
- Economizer connection flange(BSR413~BSR616)
- Liquid injection connection flange(BSR513II~BSR616)

Complete optional fittings:

- Liquid injection solenoid valve
- Discharge service valve
- Suction service valve
- Liquid injection capillary.
- Anti-vibration mounting pad.
- Safety valve.
- Economizer adapter (BSR213~326)

1.1 高優化的機體結構

壓縮機結構如圖一所示。

■ 規格化

機殼為螺旋式冷媒壓縮機之主體。

BSR 系列分成 6 大類 23 型，來滿足客戶需求。

■ 高精度

機殼是以精密之 M/C 加工機加工，並與三次元精密量測儀確認精度。

BSR 系列嚴格要求加工品質，以確保壓縮機之品質與精度能夠符合最佳效率。

■ 雙層機體設計

符合耐壓及降低噪音之功能。

1.2 轉子

■ 最佳化

轉子為螺旋式冷媒壓縮機之主要動件，採用「復盛」榮獲多國多項設計專利最新式的 (5 - 6) 非對稱轉子齒型，並由特殊高精度之轉子研磨機加工成形，精度佳，品質穩定。

■ 效率佳

在連續運轉狀況下，轉子可保持最佳間隙值，以達到最高效率之要求。

1.1 Superior compact structure

Compressor structure showed as figure 1.

■ Modular design

Casing is the major component of screw refrigerant compressor. BSR series have 6 frames and 23 models which meet various demands and applications.

■ High Accuracy

To reach high operation efficiency, the casing is manufactured by precise machining centers and inspected by a coordinate measuring machine to make sure that the requested precision and quality can be retained in the compressor.

■ Double-layered design

The double-layered design casing made by high strength cast iron not only can endure intensive high pressure but also reduce noise level while in operation.

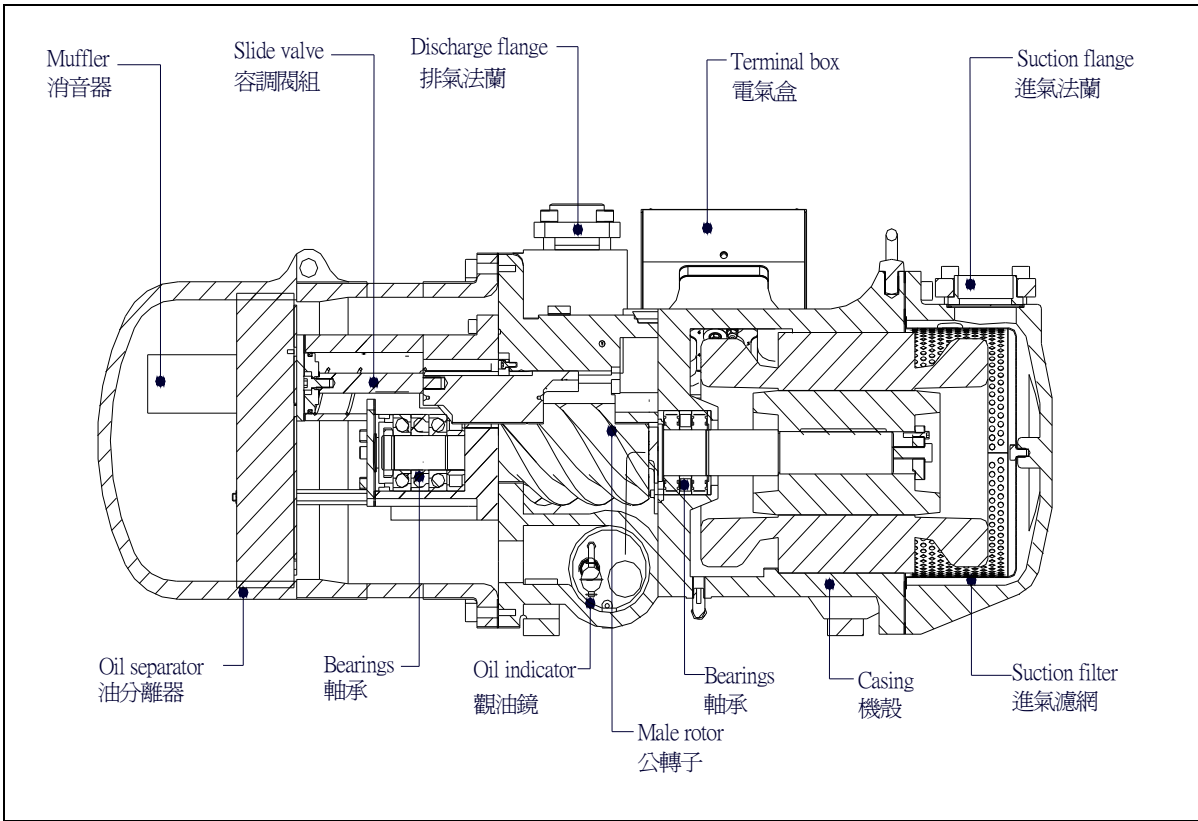
1.2 Rotors

■ Optimization

Fusheng compressor adopts the latest multi-national patented asymmetric rotor profile (tooth ratio 5:6). The rotors are machined by advanced CNC grinding machine to reach their accuracy and quality.

■ High efficiency

Under continuous operation, the rotors still keep their best clearance and achieve highest efficiency.



圖一：機體結構圖

Figure 1: Compressor structure

1.3 軸承

■ 壽命長

以高精度大框號的軸向與徑向軸承穩固支撐公母轉子，穩定耐用壽命長。

並配合優良油路與機構設計，有效提高軸承壽命。運轉中各軸承均有潤滑油以壓差方式注入，使軸承獲得充分之潤滑。

1.4 進氣濾網

■ 大面積進氣濾網，可避免吸氣壓降耗損。

■ 可靠安全的保護

裝設於在壓縮機入口處，可以將系統中不潔之顆粒與異物過濾，以防止被吸入壓縮機內，造成馬達與轉子故障。

1.5 油過濾器

■ 精密過濾

位在機殼之下方的冷凍油儲槽內。冷凍油在進入容調活塞室、軸承與轉子之潤滑油皆經過此油過濾器淨化，以防止異物進入容調室及軸承內，損壞機件。

1.6 馬達及保護裝置

■ 高效率，兩極三相 F 級絕緣感應式馬

1.3 Bearing

■ Long service life

High-precision large-sized axial and radial bearings are selected to support the male and female rotors for long lasting life. With effective lubrication system, the bearing service life can be further extended. While the compressor is running, lubricant is injected into all bearings due to pressure difference.

1.4 Suction filter

■ Large suction with low pressure drop.

■ Reliable and safe protection

Installed at the suction end of the compressor, the filtaminated particles from enter prevents foreign objects or contring the compressor and guarantees the normal operation of compressor. We recommend dismantling and cleaning the filter completely shortly after the commission of compressor to ensure the ongoing normal operation and prolong operating lifetime.

1.5 Oil filter

■ Superior high precision

Oil filter is located in oil tank under the compressor casing. Any oil that passes through piston chamber, bearings and rotors must be filtered and purified in order to prevent foreign objects or steel chips from entering and causing damages to the parts.

1.6 Driving motor

■ High-efficient two-pole, three-phase,

達。

- 內置 PTC 熱敏電阻搭配馬達保護模組，精確監控壓縮機馬達的線圈溫度，以確保壓縮機的正常運轉；適合降壓啟動 (star-delta) 及直接啟動。

1.7 油分離器

- 內置式油分離器，內部構造採三段濾油機構，配合高密度油濾網，達到最佳的油氣分離效果，效率高達 99% 以上。

1.8 容調活塞及控制電磁閥

- 容調滑閥機構精準控制系統所需之容量調節。
- 可選用四段式或無段式設計，控制壓縮機的容量調節。
- 可配合多種內建式容積比，應用於各種不同冷媒不同工況，以作最高效率的運轉。

2. 容調系統

2.1 四段式容調

四段式容調系統由一個容調滑塊、三個 NC 電磁閥與一組容調活塞組成，可調節的範圍有 25%、50%、75%、100%。其原理系利用活塞帶動容調滑塊，當負載需求降低時，容調滑塊移動將部份冷媒傍通回吸氣端，使冷媒排氣量減少以達到降低負載之功能。

class F inductive motor.

- With built-in PTC thermistor electrical protection module to monitor the winding temperature of compressor motor closely, the compressor is insured to run under normal condition. It's suitable for star-delta or direct-on-line start-up.

1.7 Oil separator

- The internal of built-in oil separator utilizes three-stage filter mechanism with high-density filter element to achieve optimal oil separation effect and its efficiency is higher than 99%.

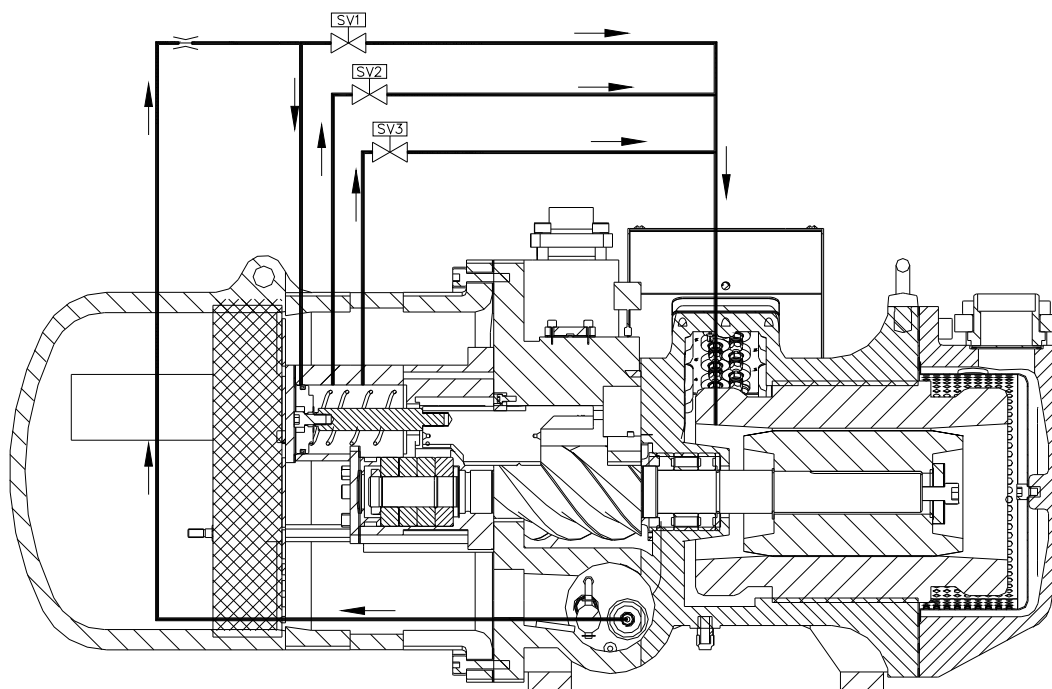
1.8 Capacity-control piston and solenoid valves

- The capacity-control slider valve mechanism accurately controls the required refrigerant flow responding to the system loading variation.
- The compressor provides 4-step capacity control as a standard. The linear capacity control is also available as an option.
- For special operation conditions, there are various built-in volume ratios to be adopted. This leads to high energy efficiency.

2. Capacity control system

2.1 Four-step capacity control

The 4-step capacity control system is made of one slider, three NC solenoid valves and one piston with adjustable range of 25%, 50%, 75% and 100%. The principle of capacity control is by moving the slider to allow partial refrigerant to bypass back to the intake and regulate the refrigerant flow.



容調系統圖 Capacity-control diagram

四段式容調電磁閥作動表

Solenoid valve activating table of four-stage capacity control

負載 \ 電磁閥	SV1 (常閉)	SV2 (常閉)	SV3 (常閉)
100%	OFF	OFF	OFF
75%	OFF	OFF	ON
50%	OFF	ON	OFF
25%(啟動)	ON	OFF	OFF

ON : 通電, OFF : 斷電

Status \ Solenoid valve	SV1 (NC)	SV2 (NC)	SV3 (NC)
100%	OFF	OFF	OFF
75%	OFF	OFF	ON
50%	OFF	ON	OFF
25%(startup)	ON	OFF	OFF

ON: energize, OFF: de-energize

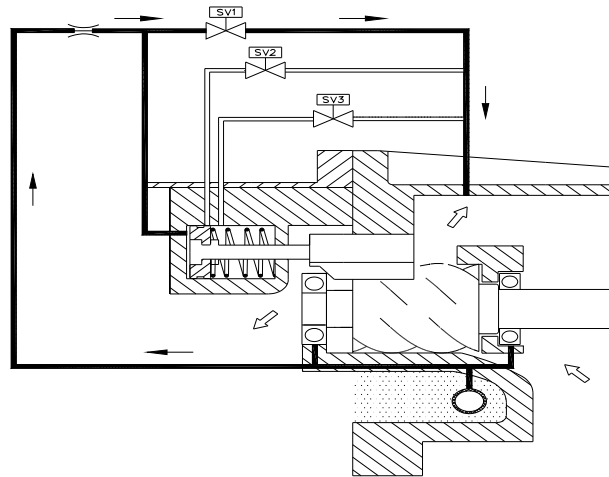
2.1.1 啟動運轉：25%負載

壓縮機在啟動時，必須使負載降到最低才容易啟動。所以 SV1 通電作動，油直接傍通回到低壓側，此時容調滑塊傍通空間最大負載只有 25%，待啟動完成後，壓縮機才可以逐漸加載，一般啟動 25% 負載運轉時間約設 30 秒左右。

2.1.1 Startup: 25% loading

For easier startup of compressor, the loading must be minimized. Therefore, SV1 is energized to bypass oil to the low-pressure side directly. The slider does not move and keep the maximum opening in suction end to bypass the refrigerant. After the completion of startup the compressor then can increase loading gradually by de-energizing the SV1 solenoid valve. It is recommended to run compressor at 25% loading for about

30 seconds before starting to increase loading.



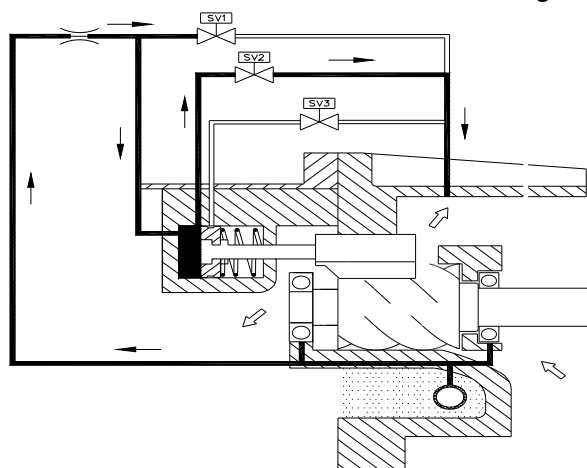
◆ 25% 容調啟動流程圖 Flowchart of 25% capacity(for startup)

2.1.2 部分負載：50%運轉

2.1.2 Partial load: 50% Operation

依 25%相同之原理，SV2 通電作動，壓縮機即作 50%之負載運轉。

With the same principle as stated in 25% loading, SV2 is energized and others are de-energized to achieve 50% loading.



50% 容調流程圖 Flowchart of 50% capacity

2.1.3 部分負載：75%運轉

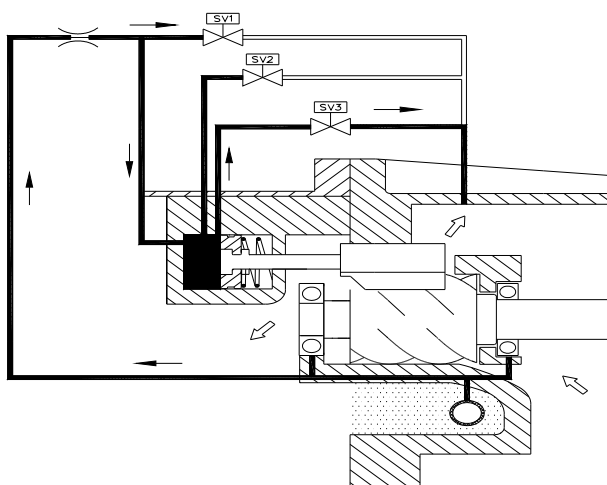
2.1.3 Partial load : 75% Operation

當系統設定之溫度開關作動，信號直接給電磁閥 SV3，SV3 通電，傍通打開，油即

Receiving a feedback from system demanding for lower capacity, the SV3 is energized to allow oil to flow back to the

從此 SV3 傍通流至低壓側，活塞即因油路傍通之關係返到傍通口位置，容調滑塊傍通打開，部份冷媒從傍通回路回到低壓側，壓縮機排氣量減少，壓縮機 75% 負載運轉。

low-pressure side through the valve channel. The piston returns to the outlet of SV3 oil passage and the slide block bypass opens to let part refrigerant flow back to the low-pressure side through bypass opening. This action would reduce the discharge volume and make the compressor operating at 75% loading.



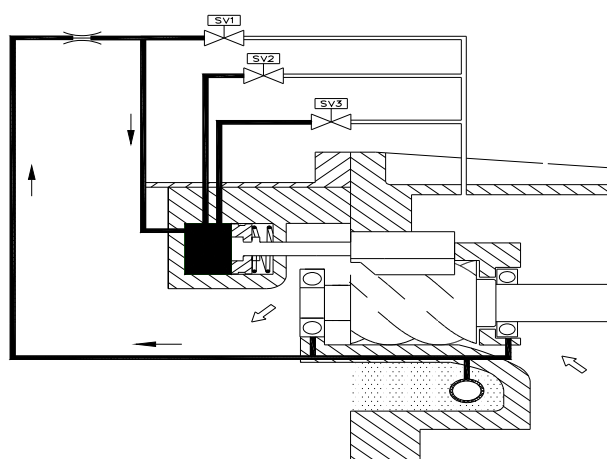
75% 容調流程圖 Flowchart of 75% capacity control

2.1.4 全載：100%運轉

壓縮機起動完成後，SV1,2,3 均不通電，油直接進入油壓缸內推動容調活塞向前，容調活塞帶動容調滑塊，使冷媒傍通逐漸減少，直到容調滑塊完全推到底，此時壓縮機全負載 100% 運轉。

2.1.4 Full load: 100% operation

After the completion of startup, SV1, SV2 and SV3 are de-energized and oil flows straight to cylinder and pushes piston forward, driving the slider to gradually reduce bypass opening. When the opening is closed completely, the compressor is running at 100% loading.



100% 容調流程圖 Flowchart of 100% capacity control

2.2 無段容調 (25%~100%)

無段容調系統與四段式容調其基本原理

2.2 Linear capacity control (25%~100%)

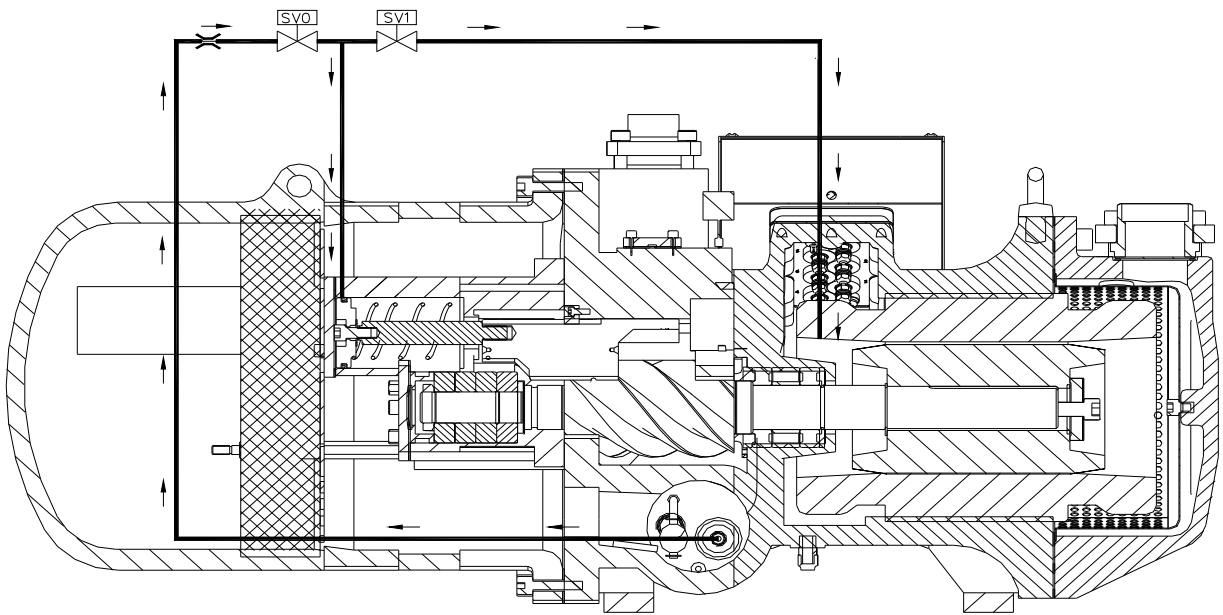
The principle of linear capacity control system is same as four-step one, except

相同，所不同者在於電磁閥之控制應用，四段式容調控制採用三個常閉電磁閥，無段式容調控制則採用兩個常閉電磁閥，控制電磁閥的開關，以決定壓縮機之加載或洩載。

利用兩個常閉電磁閥 SV0 及 SV1,依負載需要控制 SV0 及 SV1 通電或不通電以達到容調控制效果，如此無段容調可在 25%~100%容量之間作連續式控制以達到穩定輸出之功能。電磁閥控制作動時間建議在 0.1~0.5 秒左右，依實際狀況調整。

that the control logic of solenoid valve varies. The four-step capacity-control needs three NC (normal close) solenoid valves, whereas the linear one uses two NC (normal close) solenoid valve to control the increase or decrease of loading.

The system dynamically controls the energize or de-energize SV0 and SV1 solenoid valves to adjust the compressor output continuously and linearly in a range between 25% and 100% loading in response to the actual loading requirement. The recommended pulse time of solenoid valves is about 0.1~0.5 second and it shall be adjusted according to actual operating status.



無段容調流程圖(25%~100%)Flowchart of linear capacity control(25%~100%)

當壓縮機啟動時，SV1 需通電以便將液壓缸之冷凍油透過 SV1 油路，導回壓縮機之低壓端(SV0 斷電)。容調滑塊因內部彈簧之作用

When starting compressor, SV1 is energized to bypass the oil in hydraulic cylinder back to the low-pressure suction end while SV0 is de-energized. Slider remains in its initial position due to the

力，確保壓縮機在 25% 負載的位置；啟動之後 SV0 通電 SV1 斷電，讓壓縮機加載到 100% 負載運轉。

在穩態時 SV0、SV1 持續斷電，以維持穩定的冷凍能力輸出；當環境負荷變動時，控制 SV0 及 SV1 的斷電與通電，調整壓縮機輸出冷凍能力之大小，以符合環境的實際負荷需求。

當環境負荷增加時 SV0 短暫通電，使得少量冷凍油能夠流入油壓缸，使得容調滑塊往增加冷凍能力的方向移動；當環境負荷減少時 SV1 短暫通電，使得少量冷凍油能夠經由 SV1 流出油壓缸，使得容調滑塊往減少冷凍能力的方向移動。

電磁閥 負載	SV0 (常閉)	SV1 (常閉)
啟動	OFF	ON
加載	ON	OFF
卸載	OFF	ON
保持	OFF	OFF

無段容調(25%~100%)電磁閥作動表

ON : 通電, OFF : 斷電

2.2.2 運轉範圍 : 50%~100%

為防止冷媒壓縮機馬達長時間在低負載下運轉(25%)，造成馬達溫度過高或因膨脹閥能力

spring force, and then the compressor can be sure to start at 25% loading. Once the startup process is completed, SV0 is energized while SV1 is de-energized to increase the loading up to 100%.

To keep compressor running in steady state, SV0、SV1 is de-energized continuously to maintain the stable refrigeration capacity output. Once loading has been changed, the system energizes de-energizes of SV0 and SV1 to adjust output of compressor in order to fit actual loading requirement.

When loading increases, SV0 energizes shortly to allow small amount of oil to flow into hydraulic cylinder and force slider to move in the direction of increasing refrigeration capability. If loading decreases, SV1 energizes shortly to allow small amount of oil to flow out of hydraulic cylinder and cause slider to move in the direction of decreasing the refrigeration capability.

Solenoid valve Status	SV0 (NC)	SV1 (NC)
Startup	OFF	ON
Loading	ON	OFF
Unloading	OFF	ON
Holding	OFF	OFF

Control sequence of linear capacity control

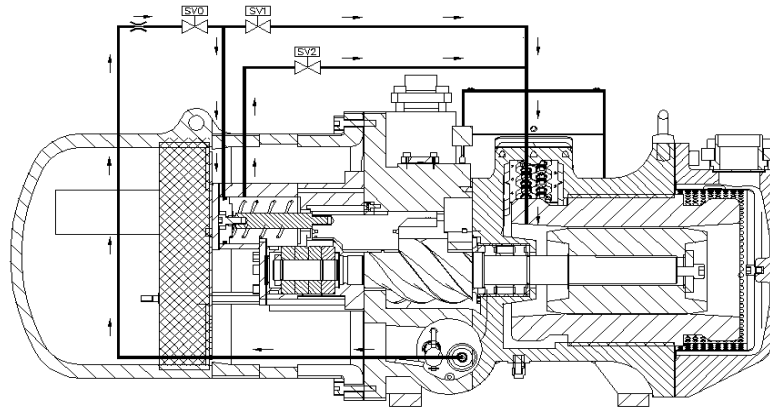
ON: energize, OFF: de-energize

2.2.2 Capacity control range: 50%~100%

To prevent the compressor from running at low-loading state (25%) that would make motor overheat or liquid

過大造成液壓縮，在設計無段容調系統時將壓縮機最低容調限制在 50% 負載以上。採用一個常閉電磁閥 SV1(控制傍通)確保壓縮機在最低負載下進行啟動；此外利用一個常閉電磁閥 SV0(控制進油通路)及常閉電磁閥 SV2(控制洩油通路，選配配件)限制壓縮機在 50%~100% 範圍之間運轉，依需要控制 SV0 及 SV2 受電或不受電以達到容調控制效果，無段容調可在此容量範圍作連續式控制以達到穩定輸出之功能。電磁閥控制作動時間建議在 0.1~0.5 秒左右，依實際狀況調整。

compression due to oversized expansion valve, it is recommended to maintain the minimum operating capacity at 50% loading for linear capacity control. For startup, energize the SV1 (to bypass oil) to make sure that the compressor can be started at minimum loading. A normal-close solenoid valve SV2 (option) is used to bypass oil from cylinder while SV0 to feed oil into cylinder. The compressor only operates between 50% and 100% loading by controlling the on/off of SV0 and SV2. The recommended pulse time of solenoid valves is about 0.1-0.5 second and it shall be adjusted according to actual operating status.



無段容調流程圖(50%~100%) Flowchart of linear capacity control(50%~100%)

電磁閥 負載	SV0 (常閉)	SV1 (常閉)	SV2 (常閉)
啟動	OFF	ON	OFF
加載	ON	OFF	OFF
卸載	OFF	OFF	ON
保持	OFF	OFF	OFF

無段容調(50%~100%)電磁閥作動表
ON : 通電, OFF : 斷電

Solenoid valve Status	SV0 (NC)	SV1 (NC)	SV2 (NC)
Startup	OFF	ON	OFF
Loading	ON	OFF	OFF
Unloading	OFF	OFF	ON
Holding	OFF	OFF	OFF

Control sequence of linear capacity control

ON: energize, OFF: de-energize

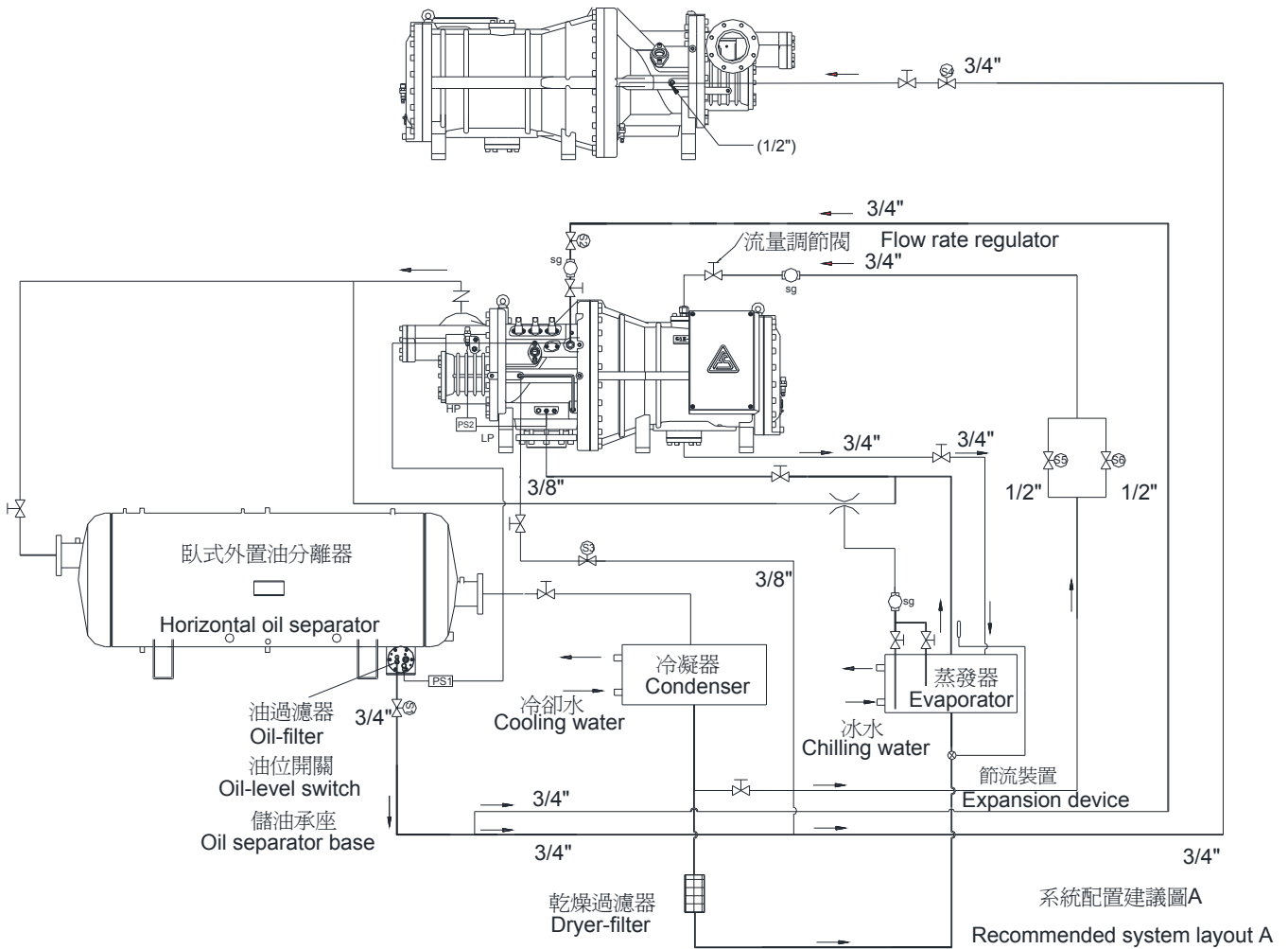
Recommended control sequence of compressor START/STOP

2.3.BSR51XII/BSR61X 系統控制與配置建議

2.3.BSR51XII /BSR61X instruction for system control and allocation.

■ 系統圖 A(外部油分配置保護模組)

■ Flowchart of System A (Oil separator protection module)



系統配置建議圖A
Recommended system layout A

壓縮機油路電磁閥控制 compressor oil system control	S1(3/4")	S2(3/4")	S3(3/8")	S4(1/2")
壓縮機-啓動 Compressor startup	ON	ON	OFF	OFF
壓縮機-啓動後 30S 30S after startup	ON	ON	ON	OFF
壓縮機-啓動後 60S after startup	ON	ON	ON	ON
壓縮機-停機 compressor stop	OFF	OFF	OFF	OFF

S1/S2 與壓縮機啓停同步 SV1/SV2 ON/OFF control
synchronously with compressor
S3/S4 與壓縮機全載穩定後作動 starting S3/S4 ON/OFF

壓縮機電機溫度監測與控制 compressor motor temperature monitor and control	S5-1/2"	S6-1/2"
壓縮機-啓動(Compressor startup)	ON	OFF
壓縮機-啓動-PT100 高於 50°C (Compressor startup when PT100 >50°C)	ON	ON
壓縮機-啓動(Compressor startup) (Compressor startup when PT100 <45°C)	ON	OFF
壓縮機-啓動(Compressor startup) (Compressor startup when PT100 <30°C)	OFF	OFF

電機溫度建議控制於 80°C 以下 Recommended motor temperature to be kept below 80 °C

壓縮機停機保護控制 compressor trip setting for protection	油位開關 Oil level switch	$\Delta P1$	$\Delta P2$	馬達溫度 motor temperature	排器溫度 Discharge temperature
	ON	大於 1bar higher than 1 bar	全載時小於 4bar below 4 bar at full load	高於 130°C above 130°C	高於 110°C above 110°C
	壓縮機-停機 compressor stops				

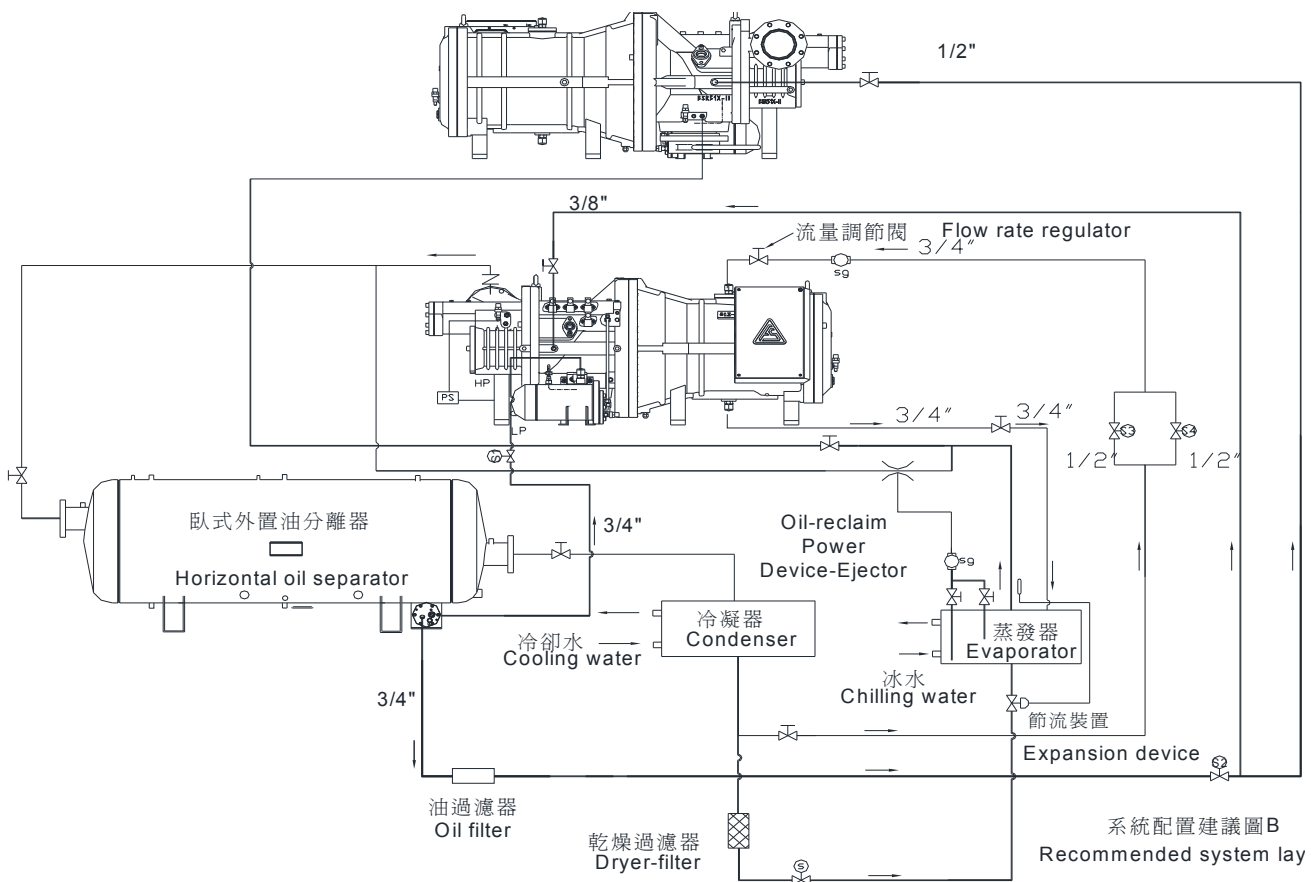
$\Delta P1$ 油分壓力與壓縮機回油口壓力差值(含油過濾器,管路閥件與壓損值)

Pressure difference between oil separator and compressor oil inlet port.

$\Delta P2$ 壓縮機高低壓差值 High-Low pressure difference of compressor

■ 系統圖 B(壓縮機配置保護模組)

■ Flowchart of System B (Compressor protection module)



運轉注意事項 Notice during operation

壓縮機回油與均壓電磁閥的使用說明:Instruction for compressor oil circulatation system and solenoid valve control of pressure balance.

1. 回油電磁閥SV1-(3/4")-於停機時避免高壓回流至油分離器, Oil return soleoid valve (SV1-(3/4") – to prevent high pressur refrigerant from flowing back to oil separator when compressor stops.
 於開機時電磁閥開啓-油路導通Solenoid valve energizes when compressor starts up – oil passage is opened.
 於關機時電磁閥關閉-油路關閉Solenoid valve de-energizes when compressor shuts down. – oil passage is closed.
2. 均壓電磁閥(3/8")-於停機時將壓縮機油槽高壓旁通 pressure balance solenoid valve (3/8") – to by-pass the high pressure tank to low pressure side on compressor
 至低壓側
 於開機時電磁閥關閉-油路關閉Solenoid valve energizes when compressor starts up- oil passage open
 於關機時電磁閥開啓-油路導通Soloid valve de-energizes when compressor stops- oil passage close
3. 壓縮機降噪音SV2電磁閥與手閥說明instruction for noise reduction solenoid valve SV2 and manual valves
 SV2電磁閥與手閥V1/V2啓動前皆關閉SV2 solenoid valve is de-energized and manual V1/V2valves are closed
 運轉穩定後開啓SV2電磁閥並調整V1與V2 Energize SV2 and adjust V1 and V2 after stable operation

壓縮機電機溫度監測與控制

motor temperature monitor and control

壓縮機電機溫度監測與控制 motor temperature monitor and control	S3-1/2"	S4-1/2"
壓縮機-啓動(Compressor startup)	ON	OFF
壓縮機-啓動-PT100 高於 50°C (Compressor startup when PT100 >50°C)	ON	ON
壓縮機-啓動(Compressor startup) (Compressor startup when PT100 <45°C)	ON	OFF
壓縮機-啓動(Compressor startup) (Compressor startup when PT100 <30°C)	OFF	OFF

電機溫度建議控制於 80°C 以下 Recommended motor temperature to be kept below 80 °C

壓縮機運轉中當油槽內皆為氣體時油位下降,油位開關作動通知均壓電磁閥開-此時開始排氣,若此時油位開關於連續偵測10sec時間內未復歸則壓縮機停機.If oil tank accumulates gas refrigerant continuously, the oil level go down till the minimum level and the oil level switch sends a signal to solenoid valve to release gas back to compressor. If the low oil level signal lasts 10 seconds, the compressor shall be shut down.

*若於 10sec 內壓縮機油槽內仍無油請再確認相關程序 if the oil level can not be recovered after 10seconds, need to check the process of oil circulation control.

註:1.油分離器冷凍油添加量-BSR51XII 建議值為 60L/BSR61X 為 70L recommended oil charge volume in the oil separator - 60L/70L for BSR51XII/BSR61X

2.壓縮機馬達冷卻為利用冷凝器液管冷卻 , 機組設計液管溫度大於 50°C則建議裝設節流裝置

馬達內置 PT100 溫度則供監測運轉使用 liquid refrigerant is used to cool the compressor motor. extra expansion device is recommended if the liquid temperature after condenser is higher than 50°C. The cooling device

is controlled by the PT100 signal.

節流裝置選用建議(若由其他特殊需求請與復盛聯繫) Recommended expansion device capacity (for other special application, contact Fusheng Engineering Department)

節流裝置選用建議(RT)Recommended capacity of expansion device (RT)		
HZ	BSR51XII	BSR61X
50	5	9
60	6	11

II.螺旋式冷媒壓縮機規範

II. Screw refrigerant compressor specification

1.產品規範

1. Product specification

系列 Series			BSR																		
機型 Model			213S	213	216	311S	311	314	316	321	323	324	326	413	415	421	423	424	426	427	428
基本規格 specification	排氣量 (50Hz) displacement	m ³ /hr	119	135	172	194	215	268	316	331	395	440	472	556	619	696	760	854	942	1058	1115
	排氣量 (60Hz) displacement	m ³ /hr	143	162	206	233	258	322	379	397	474	528	566	667	743	835	912	1025	1130	1270	1338
	轉速 speed	rpm	2950 / 3550 for 50/60 Hz																		
	容調調節 Capacity	%	四段容調 (25 / 50 / 75 / 100) 或 無段容調 (25~100) Step control (25 / 50 / 75 / 100) or linear control (25~100)																		
	冷媒 Refrigerant	-	R-134a / R-22 / R-407C / R404A																		
馬達 Motor	型式 Type	-	三相, 兩極, 感應馬達 3 phases, 2 poles, Induction motor																		
	電源 Voltage	-	380~415V, 50Hz / 220, 380, 440, 460V, 60Hz																380~415V, 50Hz /380, 440, 460V, 60Hz		
	啟動方式 Start-up	-	Y-Δ 啟動或直接啟動 Y-Δ start-up or direct-on-line start-up																		
	保護裝置 Protection Device	-	供電欠相, 逆相保護及馬達高溫保護 phase loss, phase sequence, and motor PTC /PT100 thermistor																		
吸氣口尺寸 Dimension of suction port	Inch (mm)	2-5/8 (66.67)			3-1/8 (79.37)			4 (101.60)			5 (127.00)			6 (152.4)							
排氣口尺寸 Dimension of discharge port	Inch (mm)	1-5/8 (41.27)			2-5/8 (66.67)			3-1/8 (79.37)			4 (101.60)			4 (101.60)							
液壓試驗 Hydraulic test	bar (G)	42																			
油加熱器 Oil heater	W	150						300						300							
潤滑油填充量 Oil charge	Liter	11			13			17			21			25			30				
重量 Weight	kg	476	481	486	595	600	609	615	726	736	762	777	849	899	1115	1125	1135	1181	1032	1055	

系列 Series			BSR									
機型 Model			516L	518	614L	616L	513II	514II	516II	613	614	616
基本規格 Specification	排氣量 (50Hz) displacement	m ³ /hr	1227	1452	1762	1959	986	1099	1227	1449	1762	1959
	排氣量 (60Hz) displacement	m ³ /hr	1472	1743	2114	2351	1183	1319	1472	1739	2114	2351
	轉速 speed	rpm	2950 / 3550 for 50/60 Hz									
	容調調節 Capacity	%	四段容調 (25 / 50 / 75 / 100) 或 無段容調 (25~100) Step control (25 / 50 / 75 / 100) or linear control (25~100)									
	冷媒 Refrigerant	-	R-134a / R-22 / R-407C / R404A									
馬達 Motor	型式 Type	-	三相, 兩極, 感應馬達 3 phases, 2 poles, Induction motor									
	電源 Voltage	-	380~415V, 50Hz / 380, 440, 460V, 60Hz									
	啟動方式 Start-up	-	Y-Δ 啟動或直接啟動 Y-Δ start-up or direct-on-line start-up									
	保護裝置 Protection Device	-	供電欠相, 逆相保護及馬達高溫保護 phase loss, phase sequence, and motor PTC /PT100 thermistor									
吸氣口尺寸 Dimension of suction port	Inch (mm)	6 (152.4)	8 (203.2)			6 (152.4)			8 (203.2)			
排氣口尺寸 Dimension of discharge port	Inch (mm)	5 (127.0)	5 (127.0)	(152.4)		5 (127.0)			6 (152.4)			
液壓試驗 Hydraulic test	bar (G)	42										
油加熱器 Oil heater	W	300	300	300		-						
潤滑油填充量 Oil charge	Liter	35	35	40	40	-						
重量 Weight	kg	1530	1750	2220	2330	1032	1055	1072	1760	1780	1800	

2. 安裝與試俾規範

2.1 壓縮機安裝

2.1.1 運送

請用安全鋼索勾著壓縮機機殼上方之環首螺栓與油氣桶上之吊孔；或利用二條安全吊帶，環繞壓縮機機體，而將其吊起安裝。搬運或吊運途中請勿碰撞壓縮機機體，尤其是機體上所安裝之零組件(例如：輸油銅管、電磁閥、洩油閥、銅接頭、接線盒組等)，並保持水平，嚴禁重落地。

2.1.2 安裝

請安裝合適材質之防震腳墊(5~10mm)於壓縮機腳座之上下兩側，以阻絕壓縮機振動與噪音之傳遞。其固定螺栓需鎖緊至上防震腳墊變型為止。

避免放置于通風不良、高濕度、高熱度的地方，並預留日後保養與維修之服務空間。

2. Installation and commission specification

2.1 Installation of the compressor

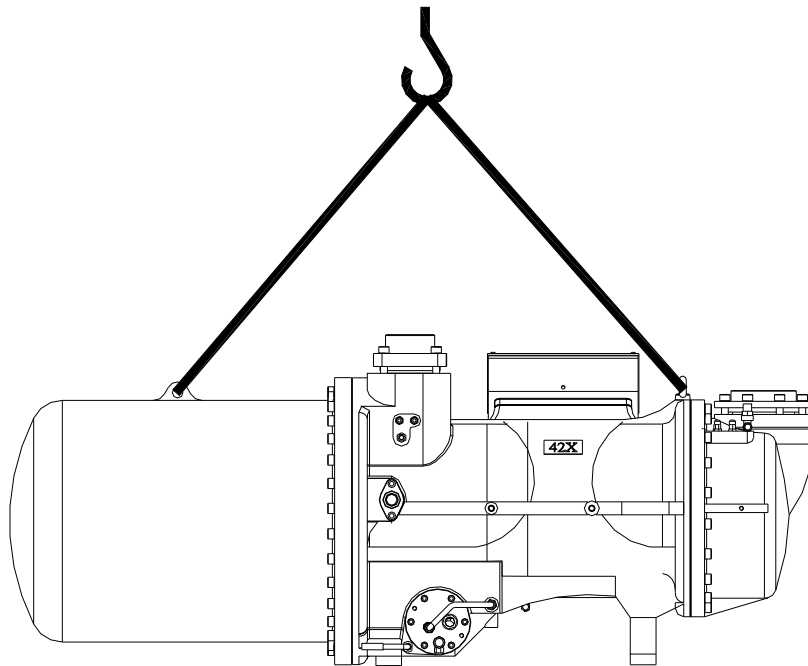
2.1.1 Delivery :

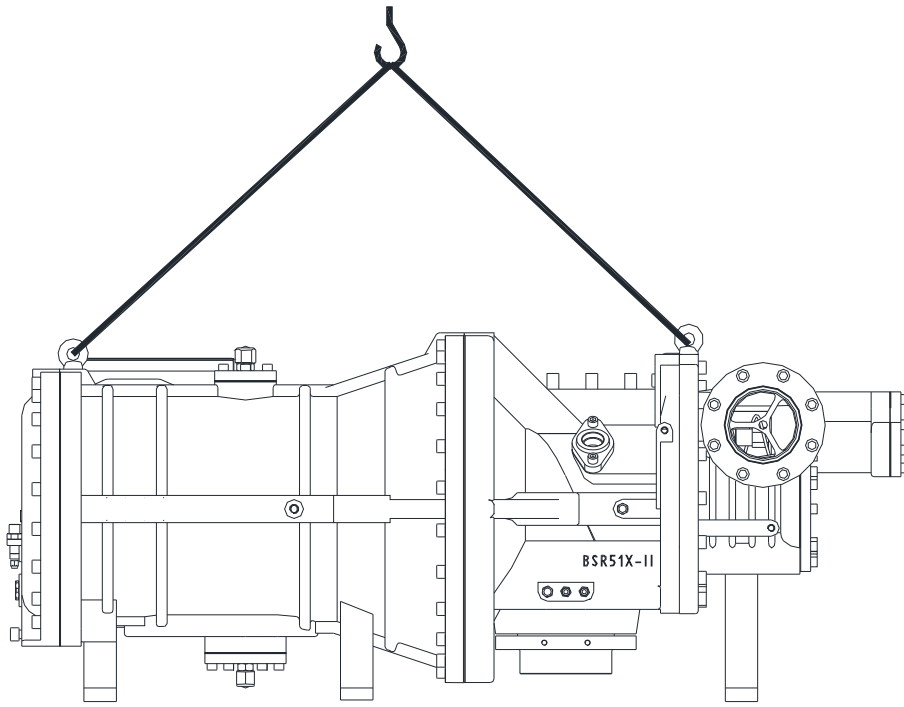
Use eyebolts attached to compressor body or two safety belts to wrap around the compressor body and hoist it up. Do not crash the compressor body during the transporting or hoisting process especially those parts assembled on compressor (ex. copper oil tube, solenoid valves, draining valve, copper connectors, and terminal box, etc.) Keep the compressor body leveled and avoid severe ground impact.

2.1.2 Installation :

Install suitable anti-vibration pads (5-10mm) between the compressor seat to block out the vibration and noise generated by the compressor. The fixed bolt must be screwd until the upper rubber deformed.

Keep compressor in a well-ventilated, low humidity and low heat environment with plenty of space for maintenance and service in future.



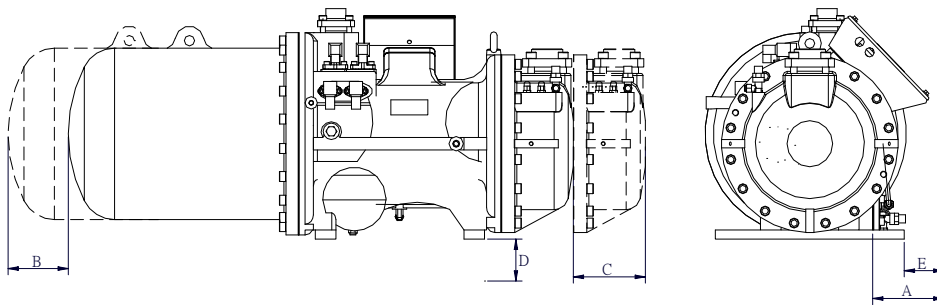


2.1.3 維修空間預留尺寸

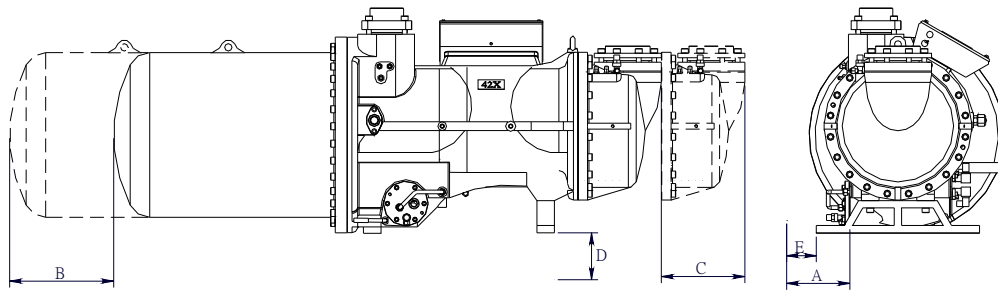
2.1.3 Required maintenance space

單位:公分 Unit: cm

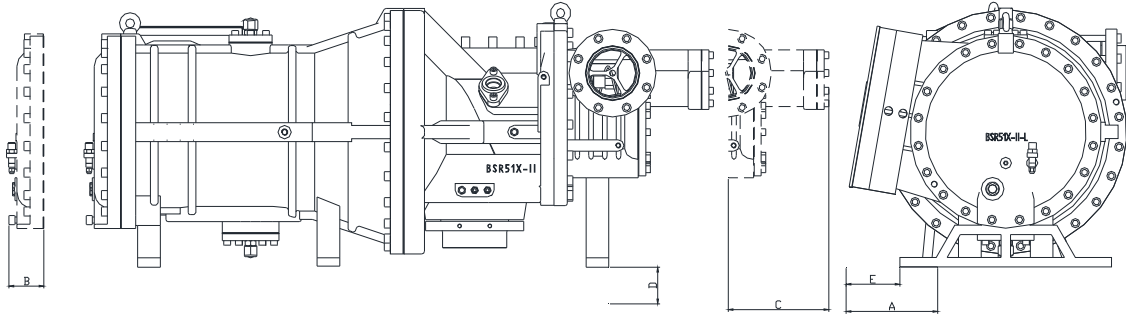
位置 Position	型號 Model	BSR21X	BSR31X	BSR32X	BSR41X	BSR42X	BSR51XII	BSR61X
A(油過濾器)Oil filter		25	25	25	25	25	25	35
B(油分離器)Oil separator/馬達前蓋-(BSR51X/BSR61X)		35	40	40	45	45	30	30
C(進氣濾清器)Suction filter/軸承座-(BSR51X/BSR61X)		20	20	20	20	20	30	50
D(垂直機台距離) Vertical distance from		15	15	15	15	15	15	15
E(水平機台距離) Horizontal distance from compressor body		10	10	10	10	10	10	10



BSR21X~41X



BSR42X



BSR51XII~61XX

2.1.4 開封洩壓：

安裝相關之零附件時，請先行利用吸入端止回接頭將壓縮機內部充填之氮氣(0.5 bar)排出後，再進行下一步之安裝動作。而出廠之壓縮機已添加所須之冷凍油，由於冷凍油具有強烈之吸濕性，故壓縮機於開封後、配管安裝前，請勿使油品直接暴露在大氣中超過 15 分鐘。

2.1.4 Release the sealed Nitrogen：

Before installing parts, open the check adaptor at the suction end to release the Nitrogen charged inside the compressor (0.5 bar) first. The new compressor has been filled with lubricant in factory before delivery. Since the lubricant is very hygroscopic, do not expose the lubricant to the atmosphere over 15 minutes after the compressor is unsealed or before installation.

2.1.5 更換油品

若需更換油品請使用復盛壓縮機專用油品，並請將壓縮機內部所有潤滑油清理乾淨再添入新油，切記不可二種不同品牌之油品混合使用。若須使用特殊油品，請與復盛經銷商或服務人員連繫。

2.1.5 Use of other lubricant oil

It is necessary to use Fu Sheng specified oil when replacing the compressor oil. Emptying and cleaning the internal of compressor completely is a must before adding new oil. Do not mix different brands of oil. Contact FuSheng service representative before using any other special oil.

更換新油品後，請啟動油加熱器加熱抽真空。此外，合成油具有強烈的吸濕性，故開封後請勿使油品直接暴露在大氣中。

2.1.6 配管：

管路焊接部位，至少須承受 30 bar 以上之壓力測試，並於焊接後確實清理焊渣，以避免異物吸入壓縮機內，造成壓縮機損壞。

2.1.7 系統雜質與水份含量限制：

冷媒系統中各種雜質的含量直接與壓縮機的效率與運轉壽命有關。因此降低系統內不凝結氣體含量是十分重要的。水份在冷媒系統中易造成凍結阻塞、生鏽、破壞馬達線圈絕緣及鍍銅等現象。冷媒管路過長時必須考慮抽真空的位置，以達到相同的抽真空效率；冷媒管路中的乾燥劑與水份指示劑必要時，務須適時更換，以減少冷媒管路中水份的含量；雜質容許量，以壓縮機吸入口過濾網之壓降為基準，前後壓差不得大於 30 kpa (約 4.3 psi)。當壓差過大，則表示過濾器有過多異物，須拆下濾清器清洗。機組完成試車後，可量測進氣過濾網前後端之壓降，以確認熱交換器銅管及冷媒管路上相關零組件之清潔度。

After oil change, please turn on oil heater to heat and vacuum. In addition, because the hygroscopicity character of synthetic oil, do not expose the oil to the atmosphere after the oil barrel is unsealed.

2.1.6 Piping：

The welded parts of pipes must withstand pressure over 30 bar. Be sure to remove all the slags after welding to avoid any foreign objects from entering compressor and causing damages.

2.1.7 Impurity limitation in system：

The contaminants in the refrigerant system affect the lifetime and efficiency of compressor directly. It is crucial to reduce non-condensed gas content in the refrigerant system. Moisture mixed with refrigerant tends to block the pipe line due to the frozen water, causes rust to components, and damages the winding insulation generates copper coating on the rotors. If the refrigerant pipeline is very long, it is essential to vacuum the system by connecting pipes to vacuum machine from different part of the chiller unit in order to reach the required vacuum level. It is also important to change the dryer-filter and moisture indicator in the refrigerant pipeline regularly to reduce the moisture concentration within the pipeline. The contaminants can block the suction filter and cause pressure drop over the filter. When the ΔP of suction filter is greater than 30 kpa (4.3 psi) it means the filter is clogged by foreign particles and needs to be cleaned right away. Right after the compressor is installed and commissioned, it is recommended to measure the ΔP of suction filter to ensure the cleanness of copper tubes in heat exchanger and parts in refrigerant pipeline.

2.2 運轉前注意事項

2.2.1 壓縮機：

- 冷凍油油位是否填滿觀油鏡？
- 機油加熱器加熱時間是否足夠？(長時間停機後，需加熱 8hr 以上)
- 每一手動閥(冷卻水、冰水之出入口閥及冷媒側之進出口關斷閥)是否皆已開啟？
- 馬達線圈與排氣溫度保護開關之接線確實連接且並無作動？

2.2.2 電氣系統

- 壓縮機之主電源與控制電源之電壓與頻率是否正確？
- 馬達端子相間與對地之絕緣值是否 $10M\Omega$ 以上？

注意：

- a. 開始抽真空後直到冷媒充填完成之前，切勿量測絕緣。
 - b. 新機冷媒充填完成後絕緣量測至少有 $10M\Omega$ (DC500V) 以上，否則應確認是否有抽真空程序不良、冷媒含水量過高、洩漏等因素，並進行矯正。
 - c. 馬達溫度保護接點請以 DC2.5V 量測絕緣，切勿使用高阻計。
- 馬達端子與接地線是否固定確實？

2.2 Items to be checked before startup

2.2.1 Compressor：

- Check if the refrigeration oil is filled up to the top level of oil indicator.
- Check if the oil heater is turned on to heat up the oil before startup. It is recommended to heat up oil for 8 hours if the compressor has been shut down for a long time.
- Check if all manual valves (service valves for the inlet/outlet cooling water, chilling water and refrigerant pipe) have been opened.
- Check if the power cables to compressor motor and discharge temperature switch have been connected firmly.

2.2.2 Electrical system

- Check if the voltages and frequencies of main and control power sources are correct.
- Check if the insulation resistances of phase to phase and phase to ground are higher than $10M\Omega$.

Warning:

- a. Do not measure the insulation between the period of starting vacuum process and the completion of refrigerant fill-up.
 - b. After the refrigerant fill-up is accomplished, the measured insulation shall be no less than $10M\Omega$ (measured by DC500V); Otherwise it is necessary to verify if the system has been vacuumed to the required level, if moisture concentration is too high in refrigerant or if piping is leaking and then take corrective action to solve the problem.
 - c. Use DC2.5V ohm meter to measure the insulation of motor protection device (PTC thermistor). It is not allowed to measure it by a mega ohmmeter.
- Check if the motor ground wire and terminal wires have been connected

- 各項控制器之設定值是否正確？

2.2.3 管路系統

- 吸排氣端之配件與管路焊接處是否有洩漏？

2.2.4 抽真空注意事項：

- 儘可能使用大口徑接管抽真空。
- 高低壓兩側同時抽真空。
- 冬天或低溫地區抽真空時，儘可能提高週邊溫度以確保效果。
- 抽真空期間，絕對不得測量馬達絕緣，可能造成馬達線圈嚴重損壞。

2.3 運轉中注意事項

- 啟動後確認轉向，注意吸氣壓力為下降、排氣壓力為上升，否則應立即關機，且變換馬達相序後再開機。
- 運轉中若有異常之振動及噪音出現，請立即停機，並與復盛維修單位聯繫。
- 壓縮機運轉過熱度最佳範圍在：
R-22/R-134a:5~10°C
R-407C/R-404A：8 ~12°C
- 過熱度太大或太小皆有不良影響。系

tightly.

- Check if the controller settings are correct.

2.2.3 Piping system

- Check if there is any leakage from welded piping or accessories connected to pipelines of suction /discharge ends.

2.2.4 Notice when vacuuming system：

- Use largest pipe available to vacuum the system.
- Vacuum system on both suction and discharge ends.
- Elevate the surrounding temperature while vacuuming the system in winter or cold region.
- Do not measure motor insulation during the vacuuming process. It might severely damage the motor winding.

2.3 Notices in operation

- Confirm the rotation direction right after the startup. Make sure that the suction pressure shall drop down and discharge pressure shall rise up gradually. Otherwise shut down the compressor immediately, change the phase sequence and then turn on compressor again.
- If any abnormal vibration or noise is detected during the operation, shut down the compressor immediately and contact Fu Sheng service representative.
- The recommended overheat range of compressor is 5~10°C (R-22/R-134a), 8 ~12°C (R-407C/R-404A).
- Any superheat beyond the range could

統初啟動時可能因負載大而過熱太大，造成壓縮機馬達線圈溫度保護開關作動而停機。

- 過熱度不足，可能造成轉子液壓縮而損壞壓縮機。並且造成失油狀況，影響潤滑軸承之功能。
- 在濕度較高地區，壓縮機應用於低溫系統時，電氣接頭如有水份凝結而影響電氣安全時，請於端子接頭加附絕緣絕熱樹脂，以避免因環境露水造成相間電氣短路。
- 在低環境溫度下運轉，為確保最低壓力差在 4 bar 以上，建議採取下列方式因應：
 - 用壓力開關控制冷凝器散熱風扇之啟動與停止。
 - 在壓縮機及冷凝器之間，加裝壓力維持閥。
 - 在壓縮機回油口與油分離器加裝油泵建立不足的壓差(BSR51XII/BSR61X)

cause damage to compressor. The overheating might become too high while compressor starts under heavy initial loading. And the high superheat could cause the motor protection device to trip off the compressor.

- Insufficient overheat could cause liquid compression and result in the damage of compressor. It also causes low oil level in compressor, which leads to insufficient lubrication to bearings.
- While the compressor is running in refrigeration system or located in a high-humidity region, it is very possible to find condensed water on the motor terminals that might cause electric shock to individual. Applying insulation resin to the motor terminals can isolate the condensed water and eliminate possible short-circuit.
- While running compressor in low temperature environment, the following actions are recommended to keep the minimum pressure difference between discharge and suction ends above 4 bar:
 - Use pressure switch to control the start/stop state of condenser cooling fan.
 - Add a pressure-maintaining valve between the compressor and condenser.
 - Add a oil pump for minimum pressure difference.

油泵選用規格建議 ecommended oil pump specification			
吐出量(flow rate)L/min	口徑 (Dimension)	壓力(pressure head)≥	馬力(horse power)≥
11.25~11.35	PT3/4"	10kgf/cm ²	½ HP

2.4 初期運轉注意事項

建議機組廠商于廠內試車前，必要時於壓縮機吸入口前加裝前置過濾器，試車測試 2~4 小時後，再將其過濾器、進氣過濾器與機油過濾器拆下清洗，清除管路與蒸發器中之焊渣與異物，以避免吸入端壓降過大而破壞濾清器，造成馬達燒毀、轉子、軸承損壞、或滑塊作動不良等現象。

2.5 壓縮機啟動/停機控制建議：

- 空重車設定溫度建議以冰水或熱水回水溫度為基準，運轉較穩定。
- 假設空調機組控制在冰水回水溫度 11°C 以上 100% 負載運轉、10~11°C 時以 75% 負載運轉、9~10°C 時以 50% 負載運轉、8°C 停機；當負載低於 50% 時，若設定於 9°C 壓縮機再次啟動運轉，將造成馬達啟動頻繁、啟動/停機間距短、馬達積熱無法完全排除、潤滑循環不充分等惡劣狀況；因此強烈建議設定壓縮機於 12°C 以上再次啟動運轉，以避免上述狀況發生。
- 壓縮機每次到達設定溫度停機前務必以 25% 負載運轉 20~30 秒，確保下次啟動時滑塊在最低負載位置。

2.4 Notices during factory test

An extra filter is recommended to be installed on the suction end of compressor for factory test purpose. Remove and clean this filter, suction filter and oil filter after the compressor has run for 2 ~ 4 hours. Clean up the pipeline and evaporator. If welding slags or other particles exist in system, they might be carried back to the suction filter and block it in consequence. Eventually, the suction filter could be broken due to high pressure drop and then the foreign particles can enter compressor freely and damage the motor, bearings, or slider etc.

2.5 Recommended control sequence of compressor start/stop

- It is recommended to use returned chilling water or hot water temperature as the basis of controlling loading/unloading in order to maintain stable operation.
- Assume control setting of chiller unit is based on returned chilling water temperature. If the temperature is above 11°C, compressor runs at 100% loading, if 10~11°C, at 75% loading, if 9~10°C at 50% loading and if below 8°C, compressor shuts down. When the loading is lower than 50% and if compressor re-startup temperature is set at 9°C, it will make motor start/stop frequently. Due to the short start/stop cycle, the accumulated heat in motor winding cannot be removed completely by cooling system; the lubrication circulation is insufficient too. Considering the case interpreted above, the re-startup temperature set at 12°C or above is recommended.
- Before each shutdown, it is necessary to run the compressor at 25% loading for 20 ~ 30 seconds in order to ensure that the slider is brought back to its initial position for next start.

3.運轉規範

3.1 運轉範圍

- 容許操作環境：-10~55°C
- 容許操作壓力(表壓)：
最高吸氣壓力:13 bar
最高排氣壓力:25 bar
- 容許最高排氣溫度：110°C

3.2 運轉限制

- 開機、停機頻率：停機後須待 10 分鐘後，才可再行開機。
- 每小時馬達之啟動次數不得超過六次。
- 每次開機運轉時間至少五分鐘以上。
- 壓縮機停止運轉前，需啟動 25%洩載電磁閥 (SV1)，並維持洩載運轉 20~30 秒，以確保再次啟動時，壓縮機在最低負載狀況下啟動。壓縮機停止運轉後，須將機油加熱器保持通電持續加熱冷凍油，以待壓縮機的再次運轉。

3.3 運轉電源

- 容許電壓範圍：額定電壓 $\pm 10\%$
- 容許頻率範圍：額定頻率 $\pm 2\%$
- 容許三相電壓不平衡量： $\pm 2.25\%$
- 容許三相電流不平衡量： $\pm 5\%$

3.4 運轉安全裝置

建議使用以下基本安全裝置，以確保系統對壓縮機的運轉保護。項目 1~4 已內建在壓縮機中。

3. OPERATION SPECIFICATION

3.1 Operation range

- Allowable ambient temperature: -10~55°C
- Allowable operating pressure (gauge) :
The maximum suction pressure : 13 bar
The maximum discharge pressure: 25 bar
- The maximum allowable discharge temperature : 110°C

3.2 Operation limitation

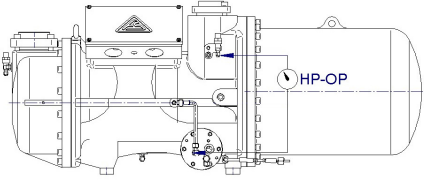
- The start-up/stop cycle: restart the compressor at least 10 minutes after it is shut down.
- The motor start-up/stop frequency shall not exceed six times per hour.
- The minimum operating time after each startup shall be no less than five minutes.
- Before stopping compressor, energize the solenoid valve(SV1) for 25% loading to unload the capacity for 20-30 seconds to move the slider back to its initial position for the next startup. This guarantees that compressor can restart in the minimum loading state. After compressor is shut down, energize the oil-heater to keep on heating the refrigeration oil and make compressor under standby condition for next start-up.

3.3 Power supply

- Voltage variation: $\pm 10\%$ of rated voltage.
- Frequency variation: $\pm 2\%$ of rated frequency.
- Voltage unbalance between phases: $\pm 2.25\%$.
- Current unbalance between phases: $\pm 5\%$.

3.4 Safety devices in operation

The safety devices are the minimum requirements applied to protect compressor in operation. Item 1~4 have been built into the compressor.

項目 Item	安全裝置 Safety devices	建議設定值 Recommended setting
1	油位開關 Oil level switch	連續 15~30sec 呈現低油位時，強制壓縮機停機檢查低油位之原因。 Time-relay setting: 15 ~ 30seconds. If low-oil-level continuously exists for 15-30 sec, compressor shall be compulsorily shut down. Check the reason for such problem.
2	馬達線圈保護(搭配 PTC 溫度保護控制模組) Motor winding protection (connected to PTC temperature control module)	跳脫溫度：130±5°C； 復歸溫度：110±5°C。 Trip temperature: 130±5°C； Reset temperature: 110±5°C.
3	排氣高溫保護(搭配 PTC 溫度控制模組) High discharge-temperature protection (connected to PTC temperature control module)	跳脫溫度：110±5°C； 復歸溫度：90±5°C Trip temperature: 110±5°C； Reset temperature: 90±5°C.
4	逆相保護器，欠相保護器 Phase sequence protector, phase loss protector	電器接線圖參考第四章說明。 Electric wiring configuration is showed at Section 4.
5	高、低壓開關 High/low pressure switch	壓縮機排氣最高運轉壓力不得高於 25bar。 The maximum discharge pressure shall not exceed 25bar.
6	過電流保護電驛 Over-current protection relay	運轉電流可由性能曲線表查得機組允許操作狀態下的最大電流決定。設計機組運轉範圍請參考壓縮機允許運轉範圍。 The setting value can be determined from the maximum current indicated in the performance data under allowable operation range. Refer to performance data manual.
7	油過濾器壓差保護開關 Pressure differential protection switch at oil filter.	壓差設定: 0.5bar. Pressure difference setting: 0.5 bar. 
8	最低運轉高低壓差 Minimum pressure difference between discharge and suction ends in operation.	4 bar
9	內置式安全閥/外置式安全閥 (BSR51XII/BSR61X) Relief valve	壓縮機排氣壓力高於 28bar.須有最後的安全保護。 The maximum discharge pressure shall exceed 28bar.

4. 電氣規範

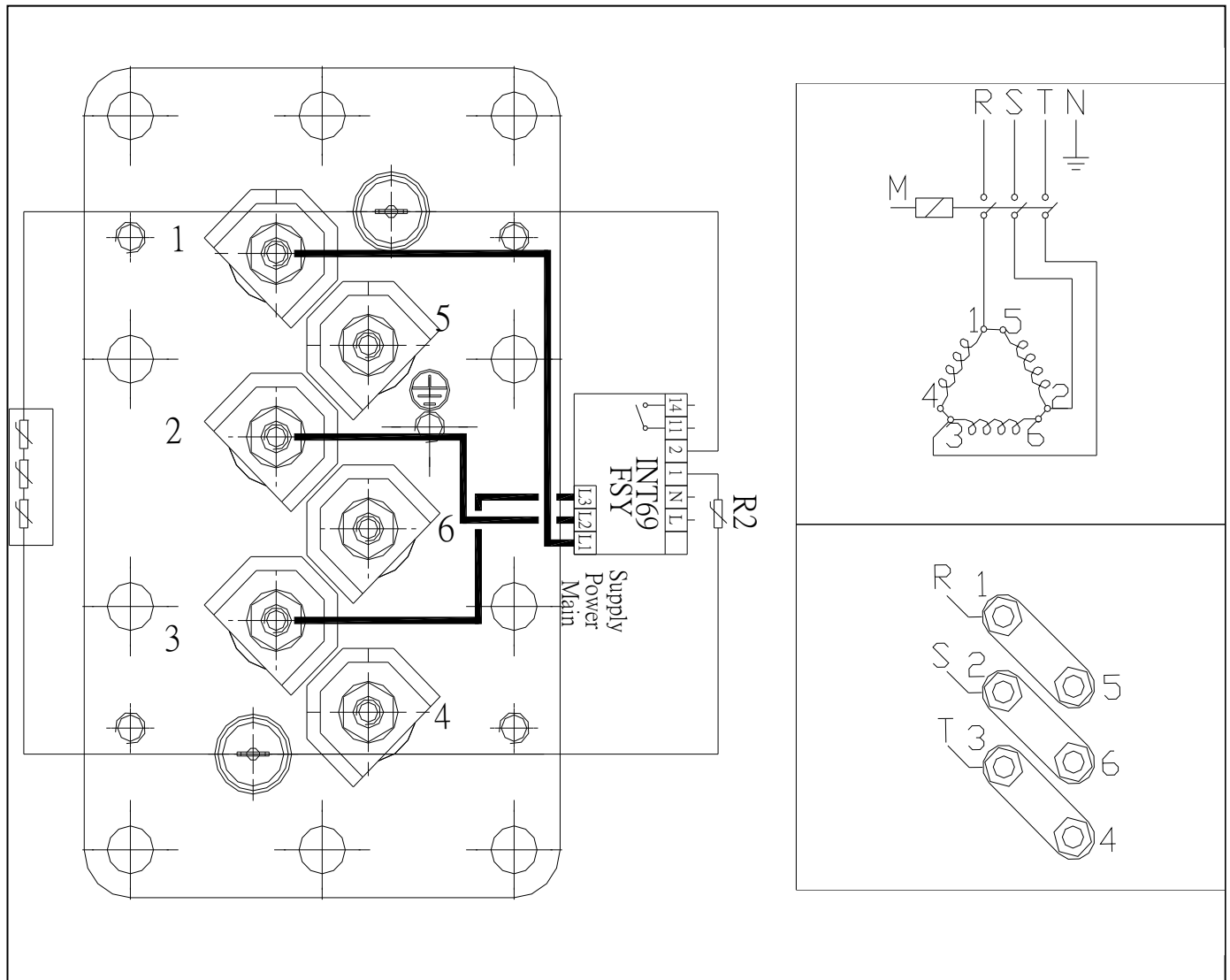
4. ELECTRIC SPECIFICATION

4.1 電氣結線方式

4.1 Electric wiring configuration

型號 Model: BSR21X~31X

直接啟動 Direct on line(INT69FSY)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactors
11/14:	保護回路	Protection circuit
1 / 2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3

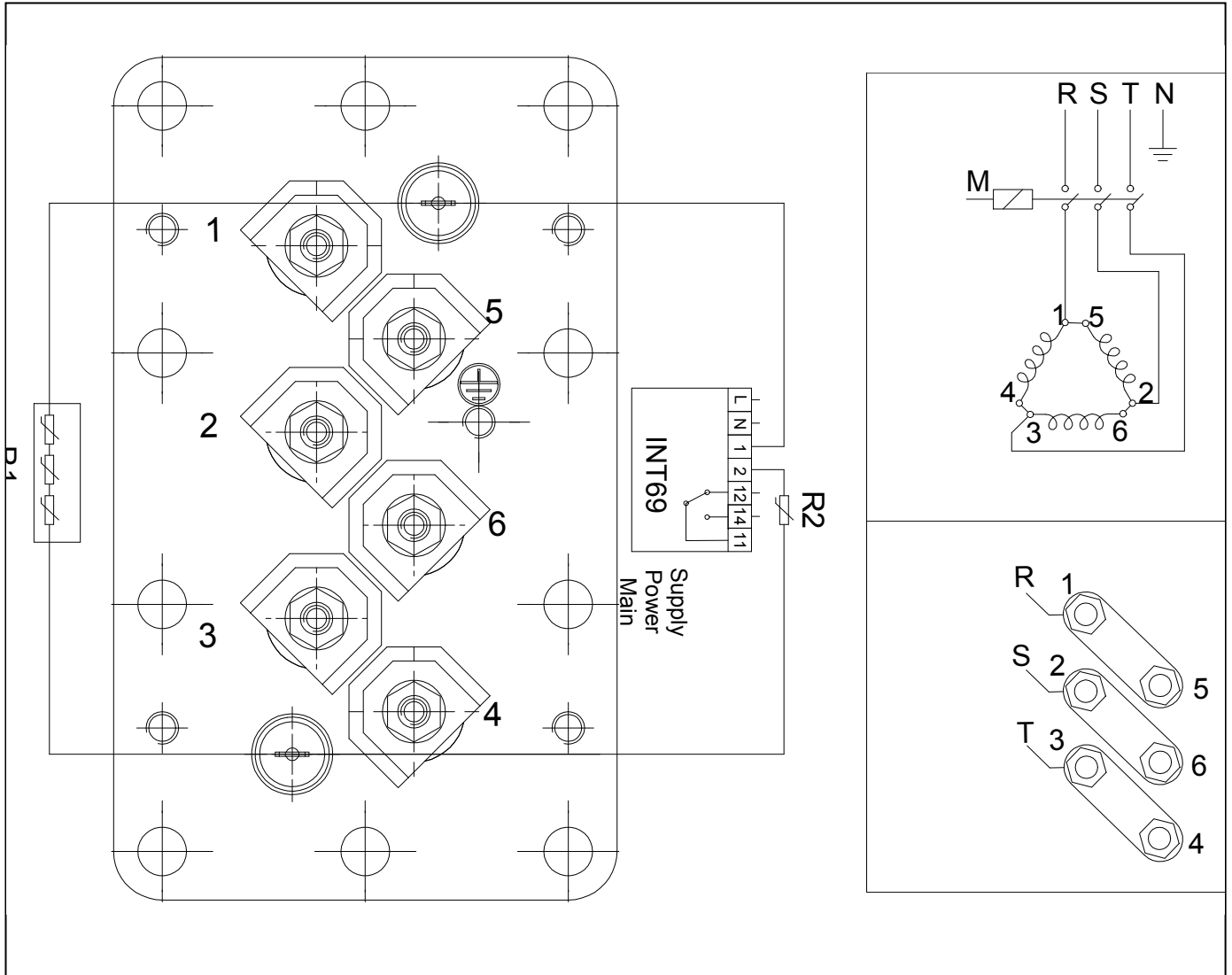


注意 Caution:

導柱(M8)銅螺帽最大容許鎖緊扭力: 20 N-m

The maximum allowed torque of terminal (M8) nuts: 20 N-m

直接啟動 Direct on line(INT69)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactors
11/14:	保護回路(NO)	Protection circuit(NO)
11/12:	保護回路(NC)	Protection circuit(NC)
1/2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無	PS : INT69 無	
L1/L2/L3 接點	L1/L2/L3 接點	



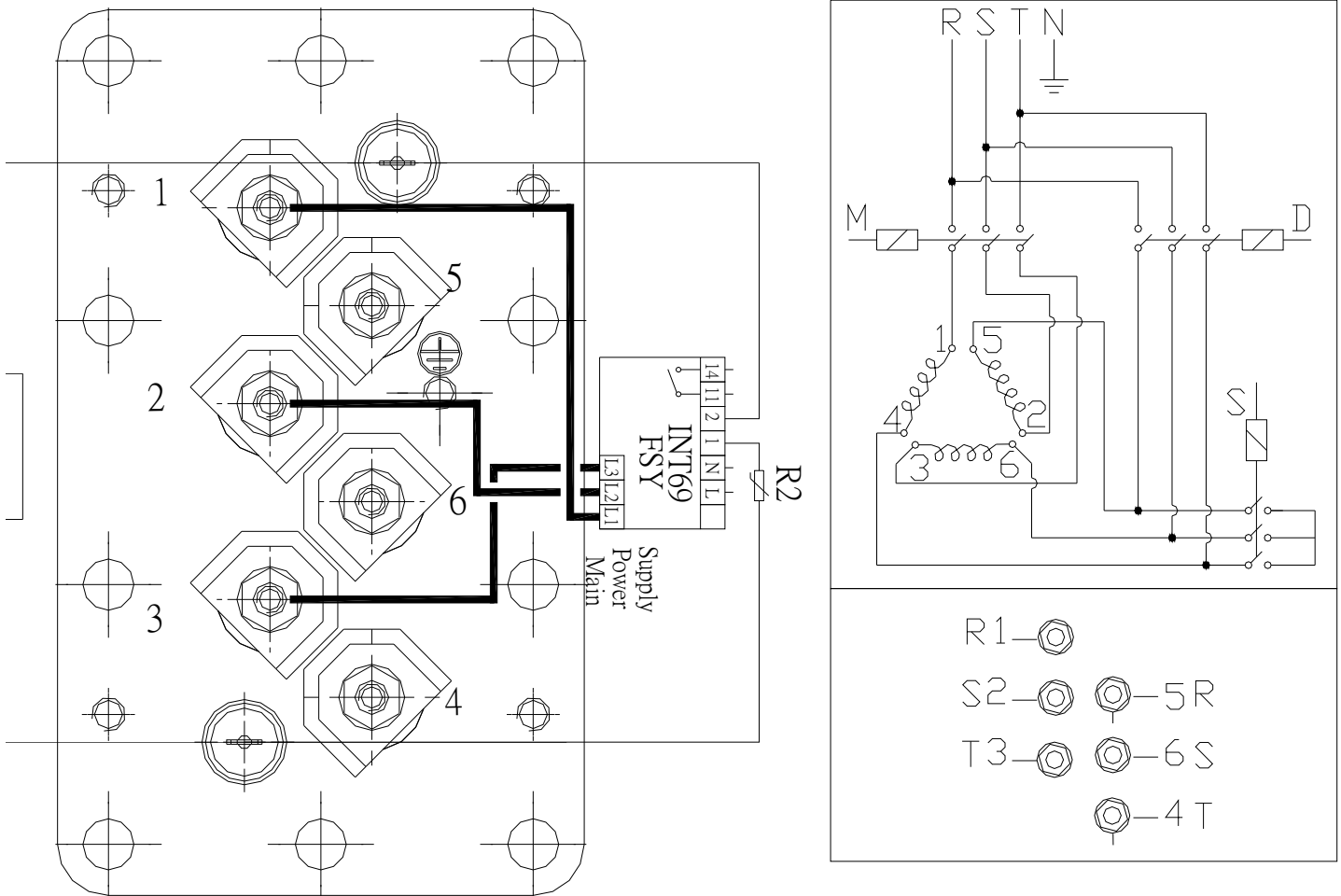
注意 Caution:

導柱(M8)銅螺帽最大容許鎖緊扭力: 20 N-m

The maximum allowed torque of terminal (M8) nuts: 20 N-m

型號 Model: BSR21X~31X

Y - Δ 啟動 startup(INT69FSY)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactor
S	啟動電磁接觸器	Start contactor
D	運轉電磁接觸器	Run contactor
11/14:	保護回路	Protection circuit
1 / 2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3

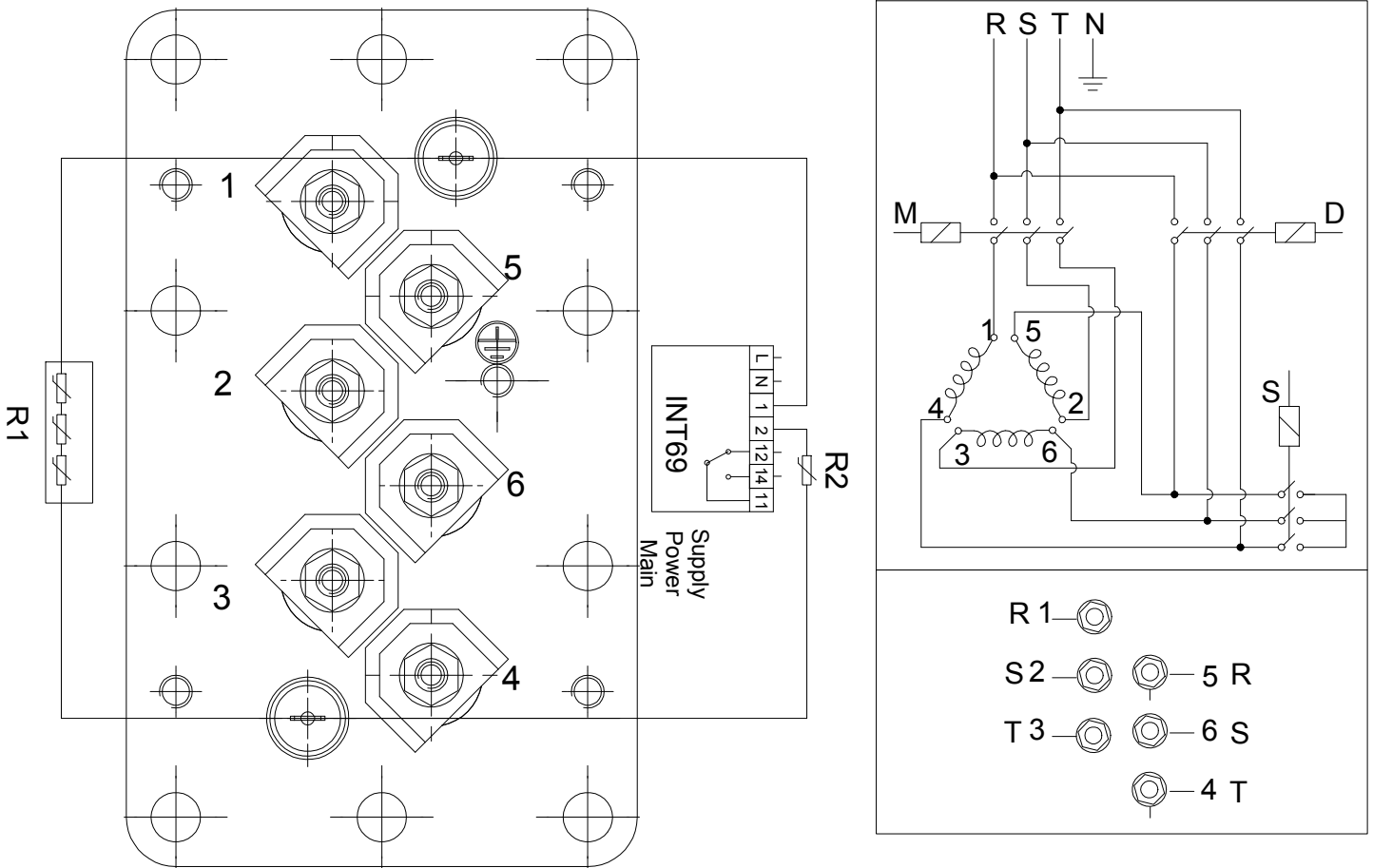


注意 Caution:

導柱(M8)銅螺帽最大容許鎖緊扭力: 20 N-m

The maximum allowed torque of terminal (M8) nuts: 20 N-m

Y - Δ 啟動 startup(INT69)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactor
S	啟動電磁接觸器	Start contactor
D	運轉電磁接觸器	Run contactor
11/14:	保護回路(NO)	Protection circuit(NO)
11/12:	保護回路(NC)	Protection circuit(NC)
1/ 2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3



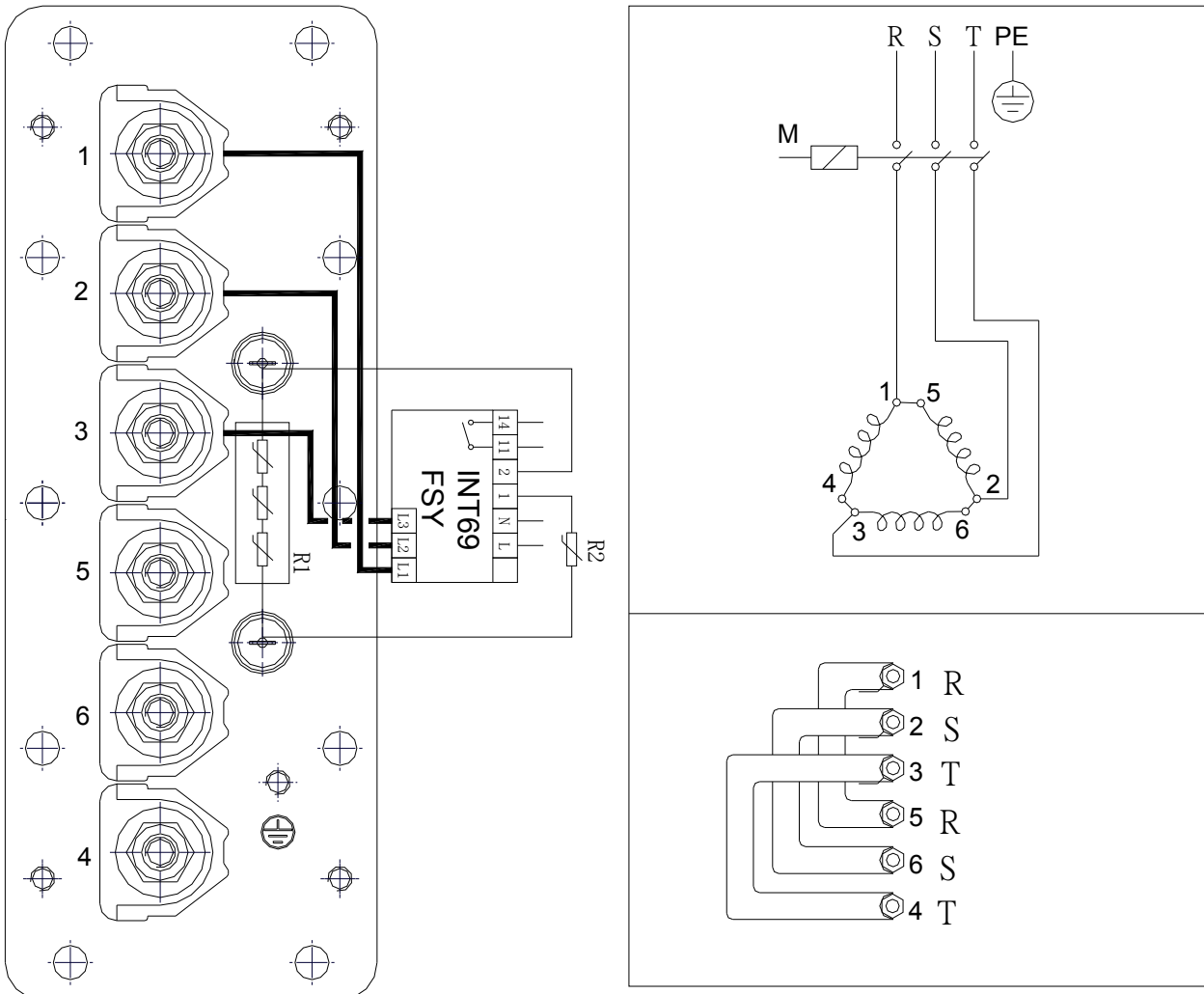
注意 Caution:

導柱(M8)銅螺帽最大容許鎖緊扭力: 20 N-m

The maximum allowed torque of terminal (M8) nuts: 20 N-m

型號 Model: BSR32X~42X

直接啟動 Direct on line(INT69FSY)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactors
11/14:	保護回路	Protection circuit
1/2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3



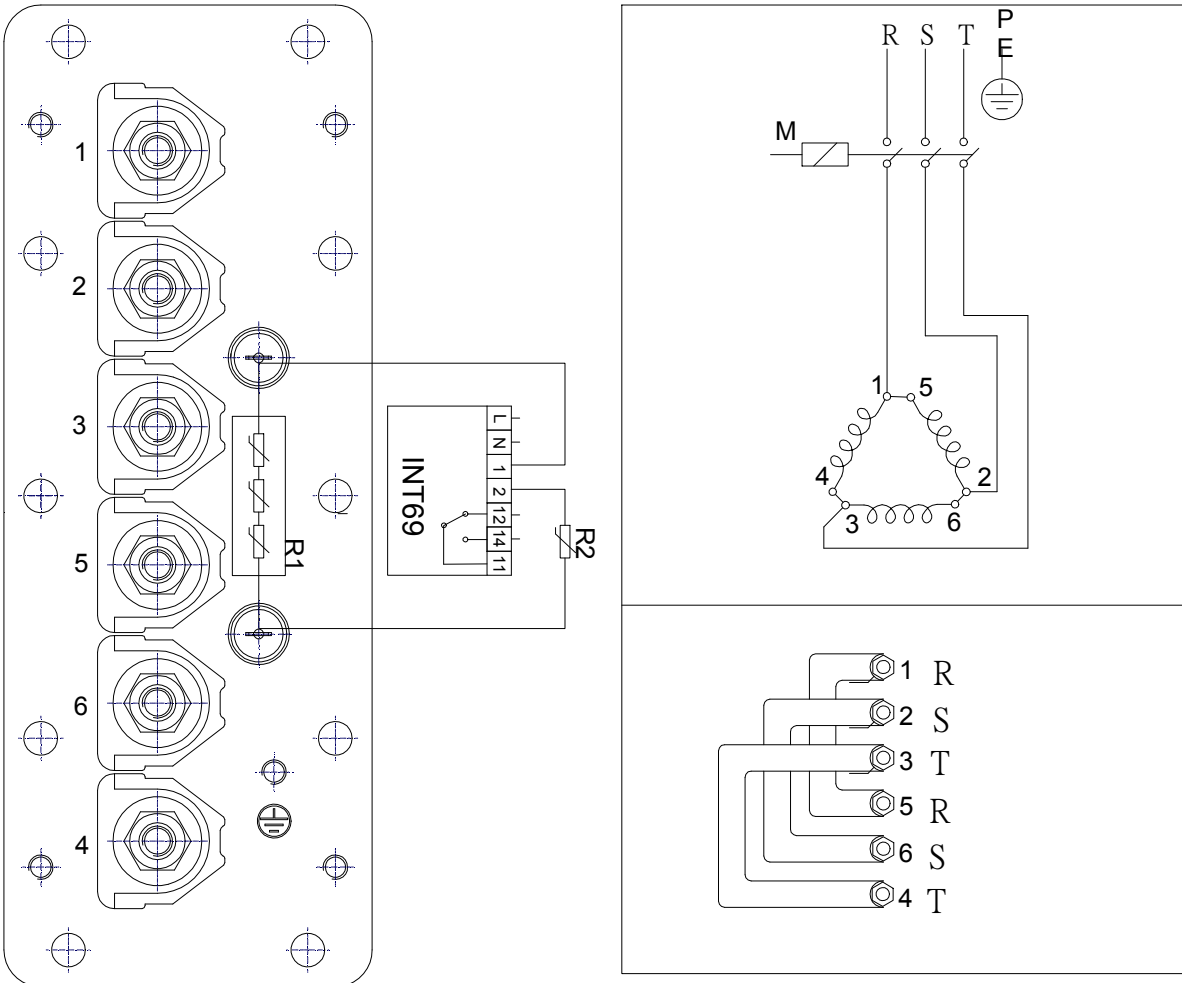
注意 Caution:

導柱銅螺帽最大容許鎖緊扭力: 32 N-m

The maximum allowed torque of terminal nuts: 32 N-m

導柱尺寸 (Bolt

直接啟動 Direct on line(INT69)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactors
11/14:	保護回路(NO)	Protection circuit(NO)
11/12:	保護回路(NC)	Protection circuit(NC)
1/ 2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3



注意 Caution:

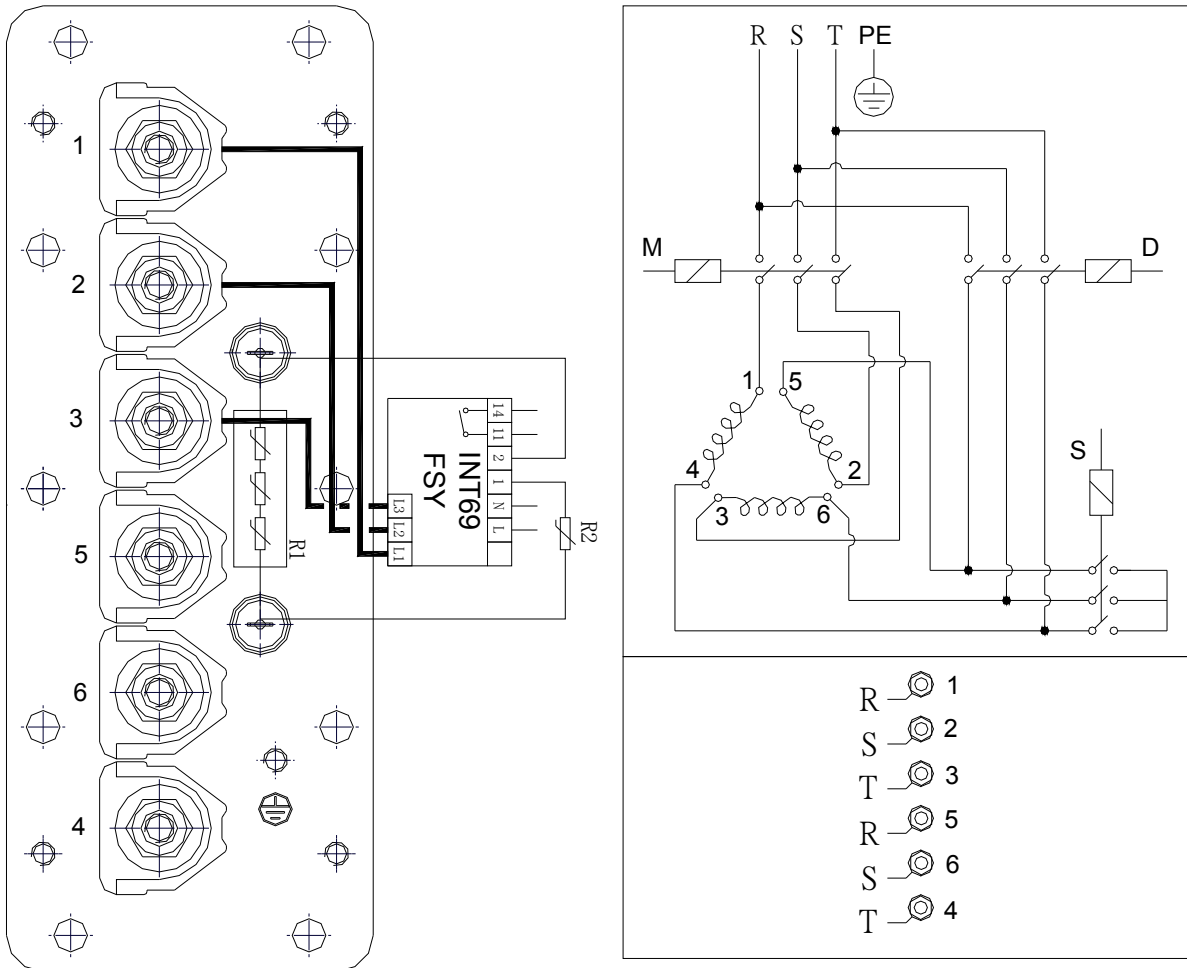
導柱銅螺帽最大容許鎖緊扭力: 32 N-m

The maximum allowed torque of terminal nuts: 32 N-m

導柱尺寸 (Bolt

型號 Model: BSR32X~42X

Y - Δ 啟動 startup(INT69FSY)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactor
S	啟動電磁接觸器	Start contactor
D	運轉電磁接觸器	Run contactor
11/14:	保護回路	Protection circuit
1/ 2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3



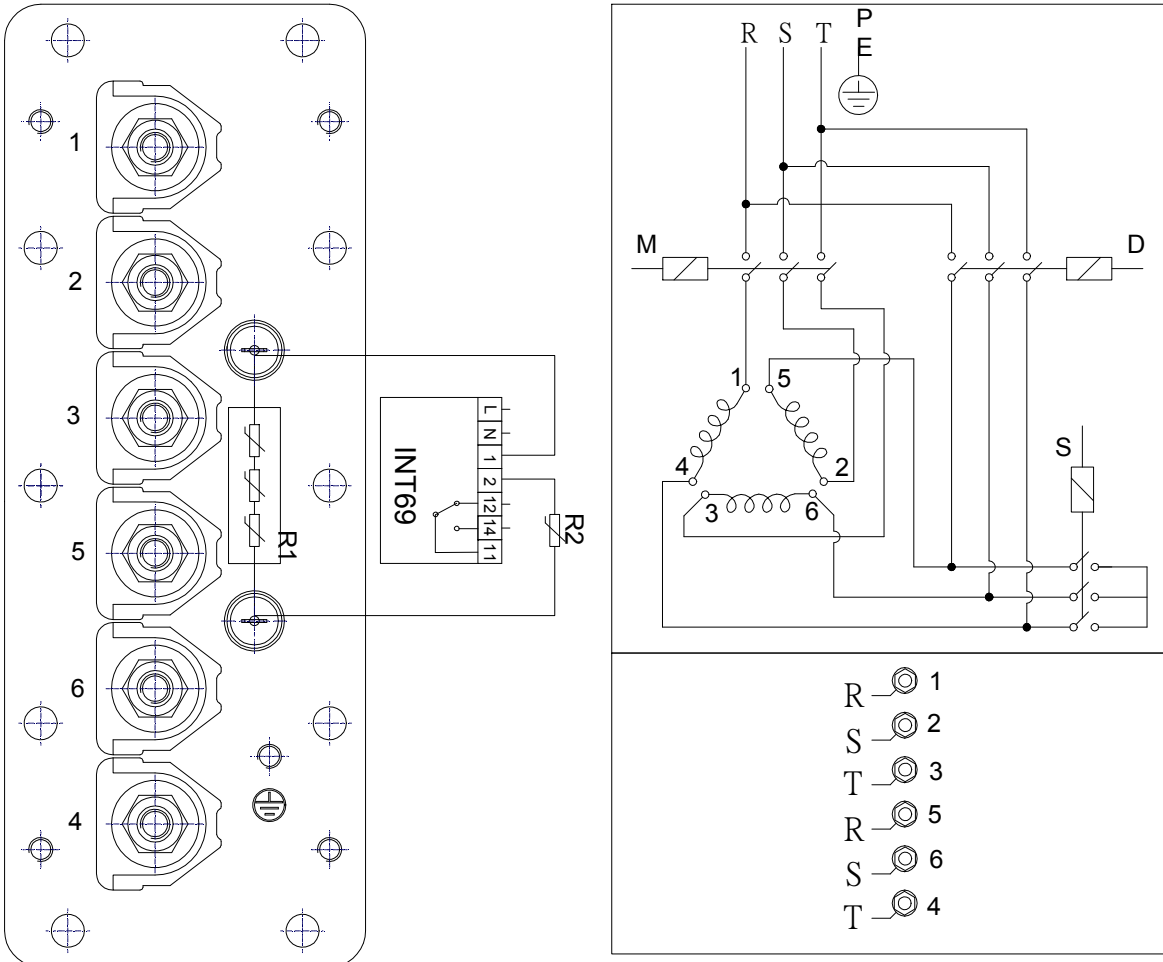
注意 Caution:

導柱銅螺帽最大容許鎖緊扭力: 32 N·m

The maximum allowed torque of terminal nuts: 32 N·m

導柱尺寸 (Bolt

Y - Δ 啟動 startup(INT69)



◆ 符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactor
S	啟動電磁接觸器	Start contactor
D	運轉電磁接觸器	Run contactor
11/14:	保護回路	Protection circuit
11/12:	保護回路(NC)	Protection circuit(NC)
1/ 2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PS :	INT69 無 L1/L2/L3 接點	INT69 without L1/L2/L3



注意 Caution:

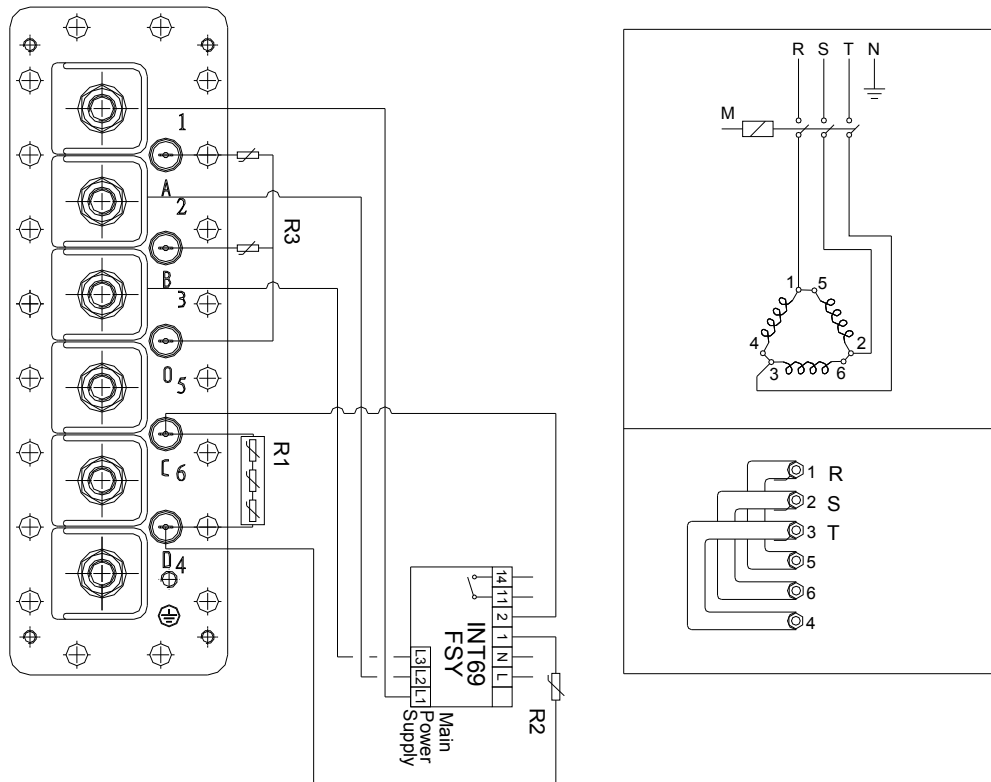
導柱銅螺帽最大容許鎖緊扭力: 32 N-m

The maximum allowed torque of terminal nuts: 32 N-m

導柱尺寸 (Bolt

型號 Model: BSR51XII~61X

直接啟動 Direct on line



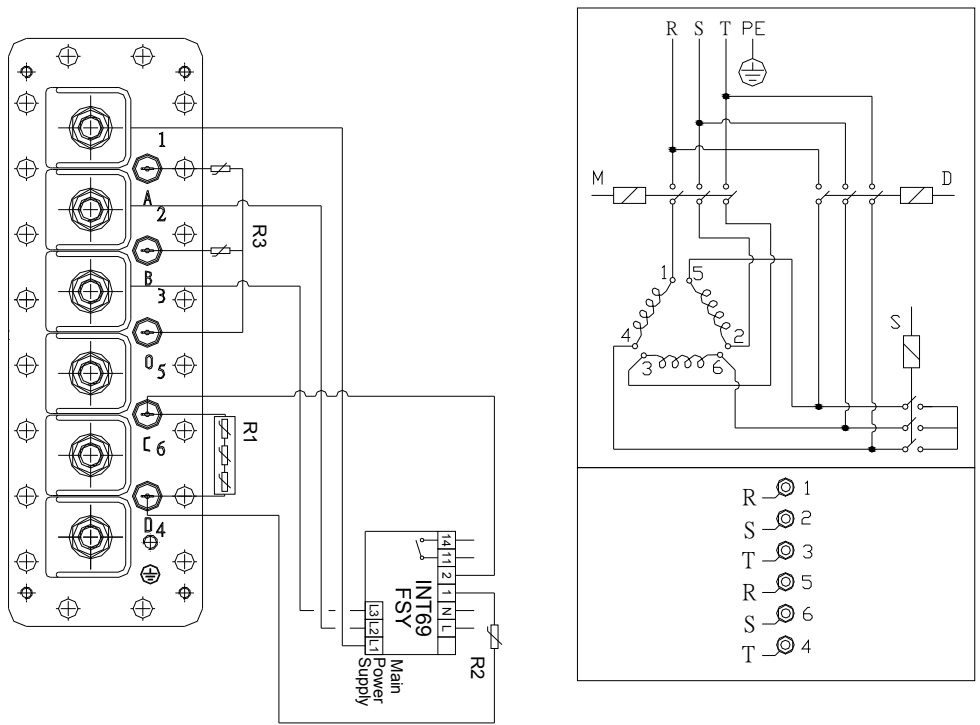
◆符號說明 Legend:

R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactor
11/14:	保護回路	Protection circuit
1/2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PT100	電機溫度監測	PT100 : A-O , B-O
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3



注意 Caution:
 導柱銅螺帽最大容許鎖緊扭力: 70 N-m
 The maximum allowed torque of terminal nuts: 70 N-m
 導柱尺寸 (Bolt size):BSR513II~616:M16

Y-Δ 啓動 startup



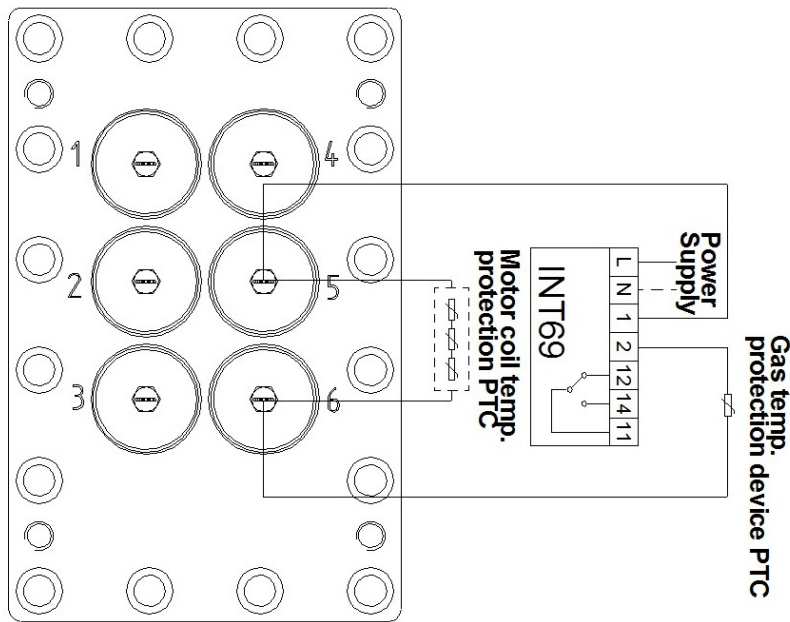
M	主電磁接觸器	Main contactor
S	啓動電磁接觸器	Start contactor
D	運轉電磁接觸器	Run contactor
11/14:	保護回路	Protection circuit
1/2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PT100	電機溫度監測	PT100 : A-O , B-O
PS :	INT69 無 L1/L2/L3 接點	PS : INT69 without L1/L2/L3



注意 Caution:
 導柱銅螺帽最大容許鎖緊扭力: 70 N-m
 The maximum allowed torque of terminal nuts: 70 N-m
 導柱尺寸 (Bolt size):BSR513II~616:M16

型號 Model: BSR51XII~61X HV

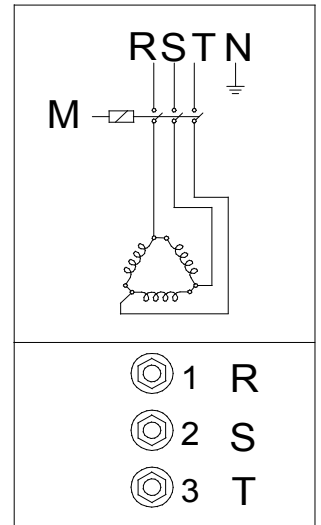
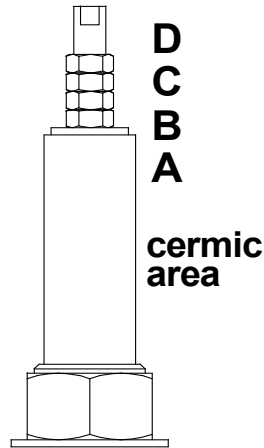
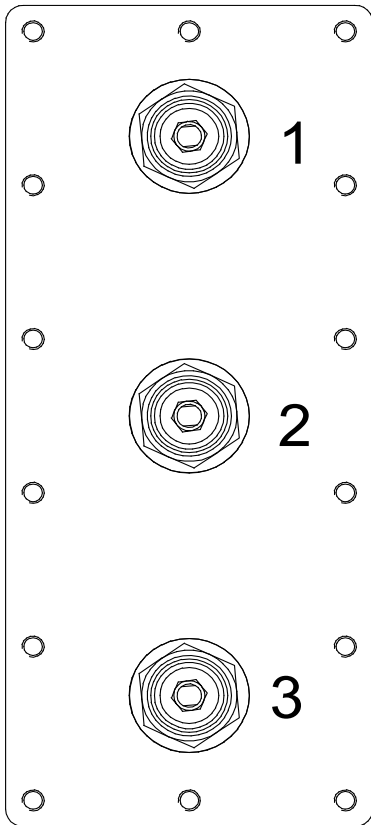
PTC terminal plate



11/14:	保護回路	Protection circuit
1/2 :	熱敏電阻接點	Thermistor contact
L/N:	控制電源接點	Power supply 230V(115V) - 50Hz/ 60Hz
R1:	馬達高溫熱敏電阻	Motor thermistor
R2:	排氣高溫熱敏電阻	Discharge temperature thermistor
PT100	電機溫度監測	PT100 : A-O , B-O, C-O(A=1, B=2, C=3, O=4)

PS : INT69 無 L1/L2/L3 接點

PS : INT69 without L1/L2/L3



R.S.T	主電源	Main power supply
M	主電磁接觸器	Main contactor
L1-L2-L3:	電源欠逆相監視接點	Phase sequence / loss monitoring contact
R1:	馬達高溫熱敏電阻	Motor thermistor
PS : INT69 無 L1/L2/L3 接點		PS : INT69 without L1/L2/L3
注意!!		
CAUTION!!		

1. 連接電纜時保持螺帽 A 與 B 不鬆動
The terminal nuts A and B must be fixed when connecting the cable.
2. 鎖緊螺帽 C 與 D 需用另一把扳手固定螺帽 B ,
避免陶瓷受到扭力
The terminal nut B must be fixed by using spanner when tightening nuts C and D.
3. 導柱與陶瓷間承受扭力不超過 30N-m
The maximum torque for the terminal pillar and

ceramic area are not more than 30 N-m.

INT69FSY LED blink code: Fault signal (Red LED), Normal (Green LED)

INT69FSY LED 閃爍燈號: 故障(LED 紅燈); 正常(LED 綠燈)

Fault category	Blink impulse (long)	Blink impulse (short)	Fault description
PTC	1	1	Static(PTC>4.5 Ω)
		2	Dynamic
		3	Time delay active(PTC<Rreset)
		4	Short/Open circuit
Phase monitoring	2	1	Phase sequence
		2	Phase loss
Supply voltage	3	1	Undervoltage
故障種類	閃燈(長)	閃燈(短)	故障說明
PTC	1	1	靜態的(PTC>4.5 Ω)
		2	動態的
		3	靜態的時間延遲(PTC<Rreset)
		4	線路短路/線路開路
相序監控	2	1	逆相
		2	欠相
電壓監控	3	1	低電壓

Notes:

1. Must remove the L1/L2/L3 connectors when check the Insulation Resistance of terminal.
2. Manual reset by removed terminal L/N over 10sec.

注意：

1. 使用高阻計量測馬達線間絕緣時，須將 L1,L2,L3 接線脫離 (1 , 2 , 3) 導柱
2. 馬達保護器手動復歸，將 L/N 斷接 10 秒以上，再接回即可。

建議配電線截面積(Hypalon)

Recommend wire cross-section(Hypalon)

導線截面積 Wire cross-section area mm ²	14	22	30	38	50	60	80	100	125	150	200	250	325
允許電流量 Allowable current Amp	105	140	180	210	250	290	350	410	480	520	630	720	840

註:以上導線數不包括中性線、接地線、控制線及訊號線等線路

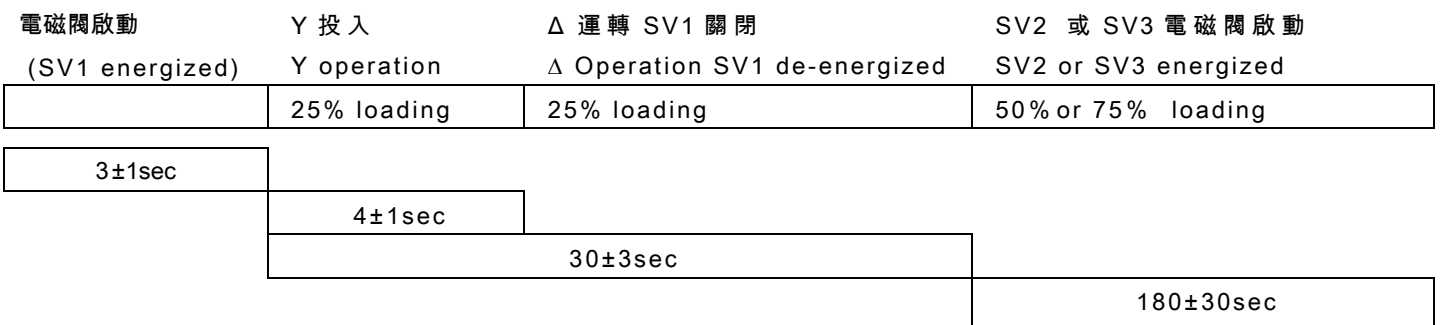
Note: The conductors do not include the neutral wire, ground wire or signal wire.

4.2 啟動程序

Y-Δ 轉換時之電磁接觸器切換時間須控制在 40msec 以下，設定切換值時須注意電磁接觸器消弧能力。完成整個起動程式後，壓縮機載入須注意回水溫度。若季節變換，系統負載小，壓縮機直接加載至 100%易造成壓縮機起動次數頻繁而降低壓縮機壽命(參照 2.5 壓縮機啟動/停機控制建議)。

4.2 Start-up sequence

While converting Y-Δ , the setting of magnetic contactor switchover time should be 40 ms or shorter. It is necessary to consider the electrical-arc eliminating capability when setting up the switchover time. After completing the entire starting process, keep an eye on the returned chilling water temperature. Low returned chilling water temperature means the system loading is lower than designed capacity. Under this circumstance, it would cause frequent startup and shorten compressor's operation lifetime if the compressor is running at full loading (100%) right after the startup. (Refer to Sec. 2.5: Recommended control sequence of compressor start/stop)



4.3 進相電容使用注意事項：

- 壓縮機起動完成後至少 0.5 秒，再連接進相電容。
- 功因補償上限為 0.95。

4.3 Notice when adopting capacitor:

- Connect phase-leading capacitor at least 0.5 sec after compressor starts up.
- The upper limit of power factor compensation is 0.95.

- 停機前一秒(至少), 先切離進相電容。
- 原則上進相電容僅在運轉中作用。

4.4 無熔絲開關(NFB)之選用

無熔絲開關的選用主要考慮框架容量 AF(KVA)、額定跳脫電流 AT、額定電壓(V) 三項電氣特性, 低電壓配線器具建議選用標準, 可將選用容量估算方式為: 框架容量 AF 取大於起斷電流 AT 一等級之值。

$$\text{額定跳脫電流 AT(A)} = \text{起動電流乘率} \\ (1.5\sim 2.5) \times \text{電動機最大運轉電流 I}_{\text{max}}(\text{A})$$

此外, 當同一冰水機組有多台壓縮機時不允許同時啟動壓縮機, 而不同時序啟動之額定跳脫電流 AT 估算, 建議低電壓配線器具選用標準, 可將選用容量估算方式:

$$\text{額定跳脫電流 AT(A)} = \text{起動電流乘率} \times \text{最大電動機} \\ \text{額定電流} + \text{其餘電動機額定電流總和}$$

4.5 電磁接觸器 MC 之選用

電磁接觸器的選用除考慮使用電壓、控制電壓外, 最重要的是考慮連續電流 I_{th} 之大小 (亦即接點承受之電流大小), 連續電流 I_{th} 的估算方式建議為 $I_{th} = \text{馬達額定電流} \times 1.25 / \sqrt{3}$ 。

- Cut off the phase-leading capacitor at least one second before shutting down compressor.
- Basically the phase-leading capacitor is activated only while compressor is in operation.

4.4 NFB selection

Selection of NFB is based on the Frame capacity AF and Interrupting Current AT(A). After the AT is decided, choose the next larger grade frame capacity AF.

$$\text{AT(A)} = \text{starting current multiple factor} \\ (1.5-2.5) \times \text{motor I}_{\text{max}}(\text{A}) \text{ current}$$

Besides, it is not allowed to start two or more compressors concurrently in a multi-compressor chiller. To select the AT under different starting sequence, follow the formula:

$$\text{AT(A)} = \text{starting current multiple factor} \times \\ \text{rated current of the largest motor} + \text{sum} \\ \text{of all other motors' rated currents}$$

4.5 Magnetic contactor (MC) selection

Except the operation voltage and control voltage, the most important factor in MC selection is the scale of I_{th} (current flowing through the contacting point). The formula is: $I_{th} = \text{motor' s rated current} \times 1.25 / \sqrt{3}$.

4.6 電氣資料

4.6 Electrical data

- 50Hz , R-22/-R407C, air-cooled, models (BSR*** – HB, BSR*** – HC)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		35	43	52	65	75	81	96	106	113	135	150	170	187	206	230	277	296.6	240	268	-	353	430	478	
50Hz 380V	Y 接線堵住電流 Star -LRA (A)	124	137	188	257	267	267	331	359	359	459	506	506	628	715	850	878	953	878	953	-	1057	1153	1277	
	Δ 接線堵住電流 Delta -LRA (A)	404	438	607	802	855	855	1023	1148	1148	1437	1568	1568	1979	2246	2647	3030	2944	3030	2944	-	3776	4121	4563	
	最大運轉電流 I _{max} (A)	76	93	112	143	165	178	213	236	253	307	334	381	419	461	505	539	601	539	601	-	776	943	1049	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	54	67	81	103	119	128	154	170	182	221	241	275	302	332	389	389	434	389	434	-	560	681	757
		參考線徑 Nominal cross section(mm ²)	14	22	30	50	50	60	80	100	100	150	150	200	250	250	325	325	400	325	400	-	500	600	600
	NFB AF		125	225	225	225	250	400	400	400	400	600	600	600	800	800	800	1000	1000	1000	1000	-	1200	1500	1800
	NFB AT (A)		125	150	175	225	250	300	350	400	400	500	500	600	700	700	800	900	900	900	900	-	1200	1500	1800
	M、D 接觸器電流 Magnetic contact current(A)		65	80	100	125	125	150	180	180	220	300	300	300	400	400	400	400	400	500	500	-	600	800	800
	S 接觸器電流 Magnetic contact current(A)		35	50	50	65	80	80	100	100	125	150	150	180	180	220	220	300	300	300	300	-	400	500	500
50Hz 400V	Y 接線堵住電流 Star -LRA (A)	118	130	178	244	265	265	314	341	341	422	493	493	602	717	807	985		985		-	1004	1095	1212	
	Δ 接線堵住電流 Delta -LRA (A)	378	410	568	750	830	830	956	1073	1073	1341	1529	1529	1851	2183	2475	2919		2919		-	3530	3853	4266	
	最大運轉電流 I _{max} (A)	73	88	108	139	160	172	208	231	246	296	320	364	405	445	488	512	571	512	571	-	737	896	997	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	52	64	78	100	116	124	150	167	178	214	231	263	292	321	370	412		370	412	-	532	647	720
		參考線徑 Nominal cross section(mm ²)	14	22	30	38	50	60	80	100	100	125	150	200	200	250	325	325		325	325	-	500	600	600
	NFB AF		125	225	225	225	250	400	400	400	400	600	600	600	800	800	800	800	1000	800	1000	-	1200	1500	1600
	NFB AT (A)		125	150	175	225	250	300	350	350	400	500	500	600	700	700	800	800	900	800	900	-	1200	1500	1600
	M、D 接觸器電流 Magnetic contact current(A)		65	65	80	100	125	125	150	180	180	220	300	300	300	400	400	400	500	400	500	-	600	800	800
	S 接觸器電流 Magnetic contact current(A)		35	50	50	65	80	80	100	100	125	125	150	180	180	220	220	220	300	220	300	-	400	400	500
50Hz 415V	Y 接線堵住電流 Star -LRA (A)	112	124	170	233	253	253	300	325	325	403	470	470	574	684	770	940		940		-	958	1045	1157	
	Δ 接線堵住電流 Delta -LRA (A)	357	387	536	708	784	784	903	1014	1014	1266	1444	1444	1749	2062	2338	2757		2757		-	3335	3639	4030	
	最大運轉電流 I _{max} (A)	71	86	105	137	158	169	206	230	244	292	314	355	399	439	481	494	550	494	550	-	730	888	987	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	51	62	76	99	114	122	149	166	176	211	227	256	288	317	356	397		356	397	-	527	641	712
		參考線徑 Nominal cross section(mm ²)	14	22	30	38	50	60	80	100	100	125	150	200	200	250	325	325		325	325	-	500	600	600
	NFB AF		125	225	225	225	250	400	400	400	400	600	600	600	600	800	800	800	1000	800	1000	-	1200	1600	1600
	NFB AT (A)		125	150	200	225	250	300	350	350	400	500	500	600	600	700	800	800	900	800	900	-	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		65	65	80	100	125	125	150	180	180	220	300	300	300	400	400	400	400	400	400	-	600	800	800
	S 接觸器電流 Magnetic contact current(A)		35	50	50	65	80	80	100	100	125	125	150	150	180	220	220	220	300	220	300	-	400	400	500

● 50Hz , R-22/R-407C, water-cooled, models (BSR*** – WB, BSR*** – WC)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		29	35	45	53	62	67	78	87	93	111	123	140	153	169	189	228	244	197	220	246	290	352	392	
50Hz 380V	Y 接線堵住電流 Star -LRA (A)	113	124	137	188	224	224	267	331	359	365	459	459	506	628	715	850	878	850	878	953	964	1057	1153	
	Δ 接線堵住電流 Delta -LRA (A)	367	404	438	607	717	717	855	1023	1148	1120	1437	1437	1568	1979	2246	2647	3030	2647	3030	2944	3445	3776	4121	
	最大運轉電流 I _{max} (A)	68	83	102	126	149	160	188	211	227	277	306	348	375	413	461	474	539	474	539	602	695	846	940	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	49	60	73	91	107	116	136	152	164	200	221	251	271	298	342	342	389	342	389	434	502	611	678
		參考線徑 Nominal cross section(mm ²)	14	22	30	38	50	50	60	80	80	125	150	200	200	200	250	250	325	250	325	400	500	600	600
	NFB AF		100	125	225	225	225	250	400	400	400	600	600	600	600	800	800	800	1000	800	1000	1000	1200	1600	1600
	NFB AT (A)		100	125	150	200	225	250	300	350	350	500	500	600	600	700	700	800	900	800	900	1000	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	180	180	220	300	300	300	300	400	400	400	400	400	500	600	800	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	80	100	100	125	150	150	180	180	220	220	300	220	300	300	300	400	400
50Hz 400V	Y 接線堵住電流 Star -LRA (A)	107	118	130	178	213	213	265	314	341	328	422	422	493	602	717	807	985	807	985		915	1004	1095	
	Δ 接線堵住電流 Delta -LRA (A)	343	378	410	568	670	670	830	956	1073	1000	1341	1341	1529	1851	2183	2475	2919	2475	2919		3221	3530	3853	
	最大運轉電流 I _{max} (A)	65	79	97	121	143	154	181	206	223	266	295	334	358	400	446	459	512	459	512	571	660	804	893	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	47	57	70	87	103	111	131	149	161	192	213	241	258	288	331	331	369	331	369	412	476	580	644
		參考線徑 Nominal cross section(mm ²)	14	22	22	30	50	50	60	80	80	125	125	150	200	200	250	250	325	250	325	325	500	600	600
	NFB AF		100	125	225	225	225	250	400	400	400	400	600	600	600	600	800	800	800	800	800	1000	1000	1600	1600
	NFB AT (A)		100	125	150	200	225	250	300	350	350	400	500	600	600	600	700	700	700	800	800	900	1000	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	150	180	220	220	300	300	300	400	400	400	400	400	500	500	600	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	80	100	100	125	125	150	150	180	220	220	220	220	220	300	300	400	400
50Hz 415V	Y 接線堵住電流 Star -LRA (A)	102	112	124	170	203	203	253	300	325	313	403	403	470	574	684	770	940	770	940		873	958	1045	
	Δ 接線堵住電流 Delta -LRA (A)	324	357	387	536	633	633	784	903	1014	945	1266	1266	1444	1749	2062	2338	2757	2338	2757		3042	3335	3639	
	最大運轉電流 I _{max} (A)	62	77	94	118	141	151	178	205	223	261	291	326	349	394	439	455	493	455	493	551	636	775	861	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	45	56	68	85	102	109	128	148	161	189	210	236	252	284	328	328	356	328	356	398	459	559	621
		參考線徑 Nominal cross section(mm ²)	14	22	22	30	50	50	60	80	80	100	125	150	200	200	250	250	325	250	325	325	500	600	600
	NFB AF		100	125	225	225	225	250	400	400	400	400	600	600	600	600	800	800	800	800	800	1000	1000	1200	1600
	NFB AT (A)		100	125	150	200	225	250	300	350	350	400	500	500	600	600	700	700	800	700	800	900	1000	1200	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	150	180	220	220	300	300	300	400	400	400	400	400	400	500	600	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	100	100	125	125	150	150	180	220	220	220	220	220	300	300	400	400

● 50Hz, R-134a, air-cooled, models (BSR*** - HA)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		21	26	32	40	47	51	60	67	76	86	95	108	119	131	146	175	188	153	170	190	228	276	305	
50Hz 380V	Y 接線堵住電流 Star -LRA (A)	113	113	137	188	177	177	224	267	267	285	365	459	459	506	628	715	850	715	850	1038	778	964	1057	
	Δ 接線堵住電流 Delta -LRA (A)	367	367	438	607	563	563	717	855	855	876	1120	1437	1437	1568	1979	2246	2647	2246	2647	3122	2777	3445	3776	
	最大運轉電流 I _{max} (A)	60	74	92	112	134	147	173	190	217	256	282	318	352	383	426	444	486	444	486	554	648	788	877	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	44	53	66	81	97	106	125	137	156	184	203	230	254	276	320	320	400	320	400	400	468	569	633
		參考線徑 Nominal cross section(mm ²)	14	14	22	30	38	50	60	60	60	100	125	150	200	200	250	250	325	250	325	325	500	600	600
	NFB AF		100	125	225	225	225	225	400	400	400	400	600	600	600	600	800	800	800	800	800	1000	1000	1200	1600
	NFB AT (A)		100	125	150	200	225	225	300	300	350	400	500	500	600	600	700	700	800	700	800	900	1000	1200	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	100	125	125	150	180	220	220	300	300	300	400	400	400	400	400	400	500	600	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	80	100	125	125	150	150	180	180	220	220	220	220	300	300	400	400
50Hz 400V	Y 接線堵住電流 Star -LRA (A)	107	107	130	178	168	168	213	265	265	262	328	422	422	493	602	717	807	717	807	985	739	915	1004	
	Δ 接線堵住電流 Delta -LRA (A)	343	343	410	568	526	526	670	830	830	805	1000	1341	1341	1529	1851	2183	2475	2183	2475	2919	2596	3221	3530	
	最大運轉電流 I _{max} (A)	58	71	88	108	128	140	165	183	207	243	271	307	337	365	411	430	470	430	470	526	616	749	833	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	42	51	63	78	92	101	119	132	150	175	195	221	243	264	310	310	380	310	380	380	445	541	601
		參考線徑 Nominal cross section(mm ²)	14	14	22	30	38	50	50	60	80	100	125	150	150	200	250	250	325	250	325	325	500	600	600
	NFB AF		100	125	225	225	225	225	250	400	400	400	600	600	600	600	800	800	800	800	800	800	1000	1200	1600
	NFB AT (A)		100	125	150	200	200	225	250	300	350	400	500	500	600	600	700	700	800	700	800	800	1000	1200	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	80	100	125	125	150	150	180	220	300	300	300	300	400	400	400	400	400	500	630	630
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	80	100	125	125	150	150	180	180	180	220	180	220	220	300	400	400
50Hz 415V	Y 接線堵住電流 Star -LRA (A)	102	102	124	170	160	160	203	253	253	250	313	403	403	470	574	684	770	684	770	940	705	873	958	
	Δ 接線堵住電流 Delta -LRA (A)	324	324	387	536	497	497	633	784	784	760	945	1266	1266	1444	1749	2062	2338	2062	2338	2757	2452	3042	3335	
	最大運轉電流 I _{max} (A)	55	68	85	106	125	136	161	180	202	237	266	301	330	356	404	425	465	425	465	507	593	722	803	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	40	49	62	76	90	98	116	130	145	171	192	218	238	257	306	306	336	306	336	366	428	521	580
		參考線徑 Nominal cross section(mm ²)	8	14	22	30	38	38	50	60	80	100	125	125	150	200	250	250	250	250	250	325	500	600	600
	NFB AF		100	125	225	225	225	225	250	400	400	400	400	600	600	600	800	800	800	800	800	800	1000	1200	1600
	NFB AT (A)		100	125	150	200	200	225	250	300	350	400	400	500	500	600	700	700	700	700	700	800	1000	1200	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	50	80	80	100	100	125	150	150	180	220	220	300	300	300	400	400	400	400	400	500	600	600
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	80	100	100	125	150	150	180	180	220	180	220	220	220	300	400	400

● 50Hz, R-134a, water-cooled, models (BSR*** – WA)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		18	22	27	34	39	43	51	56	63	72	80	90	99	110	121	148	159	127	142	158	191	232	259	
50Hz 380V	Y 接線堵住電流 Star -LRA (A)	113	113	113	124	177	177	177	224	224	285	285	285	365	459	506	628	715	628	715	850	778	778	964	
	Δ 接線堵住電流 Delta -LRA (A)	367	367	367	404	563	563	563	717	717	876	876	876	1120	1437	1568	1979	2246	1979	2246	2647	2777	2777	3445	
	最大運轉電流 I _{max} (A)	44	53	65	80	95	104	122	135	153	178	198	227	249	275	295	313	349	313	349	383	558	679	755	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	32	38	47	58	69	75	88	98	111	128	143	163	179	198	226	226	252	226	252	276	403	490	545
		參考線徑 Nominal cross section(mm ²)	6	8	14	22	22	30	30	38	20	60	80	80	100	125	150	150	200	150	200	200	500	600	600
	NFB AF		100	100	100	125	225	225	225	225	250	400	400	400	400	600	600	600	600	600	600	600	1000	1200	1200
	NFB AT (A)		75	100	100	125	150	200	200	225	250	300	300	350	400	500	500	500	600	500	600	600	1000	1200	1200
	M、D 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	100	125	150	150	180	180	220	220	300	300	300	300	300	500	500	600
	S 接觸器電流 Magnetic contact current(A)		20	35	35	35	50	50	80	80	80	80	100	100	125	125	125	150	150	150	150	180	300	300	400
50Hz 400V	Y 接線堵住電流 Star -LRA (A)	107	107	107	118	168	168	168	213	213	262	262	262	328	422	493	602	717	602	717	807	739	739	915	
	Δ 接線堵住電流 Delta -LRA (A)	343	343	343	378	526	526	526	670	670	805	805	805	1000	1341	1529	1851	2183	1851	2183	2475	2596	2596	3221	
	最大運轉電流 I _{max} (A)	43	51	63	77	92	100	117	131	148	172	191	217	241	267	285	309	342	309	342	376	530	645	717	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	31	37	45	55	66	72	85	95	106	124	138	156	174	193	223	223	247	223	247	271	382	465	517
		參考線徑 Nominal cross section(mm ²)	6	8	14	14	22	30	30	38	50	60	60	80	100	125	150	150	150	150	150	200	500	600	600
	NFB AF		100	100	100	125	225	225	225	225	225	400	400	400	400	400	600	600	600	600	600	600	800	1000	1200
	NFB AT (A)		75	100	100	125	150	150	200	200	225	300	300	350	400	400	500	500	600	500	600	600	800	1000	1200
	M、D 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	100	125	125	150	180	180	220	220	300	300	300	300	300	400	500	600
	S 接觸器電流 Magnetic contact current(A)		20	35	35	35	50	50	50	80	80	80	80	100	100	125	125	150	150	150	150	180	300	300	300
50Hz 415V	Y 接線堵住電流 Star -LRA (A)	102	102	102	112	160	160	160	203	203	250	250	250	313	403	470	574	684	574	684	770	705	705	873	
	Δ 接線堵住電流 Delta -LRA (A)	324	324	324	357	497	497	497	633	633	760	760	760	945	1266	1444	1749	2062	1749	2062	2338	2452	2452	3042	
	最大運轉電流 I _{max} (A)	40	48	60	75	91	99	115	129	145	170	188	212	238	265	282	310	343	310	343	378	511	622	691	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	29	35	43	54	66	71	83	93	104	123	135	153	172	191	224	224	248	224	248	272	369	449	499
		參考線徑 Nominal cross section(mm ²)	6	8	14	14	22	30	30	38	50	60	60	80	100	125	150	150	150	150	150	200	500	600	600
	NFB AF		100	100	100	125	225	225	225	225	225	400	400	400	400	400	600	600	600	600	600	600	800	1000	1200
	NFB AT (A)		75	75	100	125	150	150	200	200	225	300	300	350	400	400	500	500	600	500	600	600	800	1000	1200
	M、D 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	100	100	125	125	150	180	180	220	220	300	300	300	300	300	400	500	500
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	100	100	125	125	150	180	180	220	220	300	300	300	300	300	300	300	300

● 50Hz, R-404A, low-temp., models (BSR*** – LD)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		25	32	40	50	58	60	72	79	85	98	109	123	134	151	166	182	195	174	194	216	-	-	-	
50Hz 380V	Y 接線堵住電流 Star -LRA (A)	113	124	137	188	224	224	267	331	359	365	459	459	506	628	715	850	879	850	879	953	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	367	404	438	607	717	717	855	1023	1148	1120	1437	1437	1568	1979	2246	2647	3030	2647	3030	3287	-	-	-	
	最大運轉電流 I _{max} (A)	65	83	104	129	152	156	186	207	221	256	283	321	350	392	431	475	508	453	504	561	-	-	-	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	47	60	75	93	110	113	134	149	160	185	204	232	252	283	311	343	366	327	364	405	-	-	-
		參考線徑 Nominal cross section(mm ²)	8	8	14	14	22	22	22	30	30	38	38	50	60	60	80	80	100	80	100	100	-	-	-
	NFB AF		100	100	125	225	225	225	250	250	400	400	400	400	600	600	600	600	600	600	600	800	-	-	-
	NFB AT (A)		75	100	125	150	175	175	225	250	250	300	350	400	400	500	500	600	600	500	600	700	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	150	180	220	220	300	300	300	400	400	400	400	400	500	-	-	-
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	80	100	100	125	125	150	150	180	180	220	220	220	220	300	-	-	-
50Hz 400V	Y 接線堵住電流 Star -LRA (A)	106	116	128	176	210	210	250	310	336	342	430	430	473	588	669	795	822	795	822	892	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	322	372	404	559	661	661	788	943	1058	1032	1324	1324	1445	1824	2070	2439	2792	2439	2792	3029	-	-	-	
	最大運轉電流 I _{max} (A)	62	78	99	123	145	149	177	196	210	243	269	305	332	372	410	451	482	431	479	533	-	-	-	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	45	57	71	89	104	107	128	142	152	176	194	220	240	269	296	326	348	311	345	385	-	-	-
		參考線徑 Nominal cross section(mm ²)	6	8	14	14	14	22	22	30	30	30	38	50	50	60	80	80	80	80	100	100	-	-	-
	NFB AF		100	100	125	225	225	225	225	250	400	400	400	400	600	600	600	600	600	600	600	600	-	-	-
	NFB AT (A)		75	100	125	150	175	175	200	225	250	300	300	350	400	500	500	500	600	500	600	600	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	150	180	180	220	220	300	300	300	400	400	400	400	400	-	-	-
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	80	100	100	125	125	150	150	180	180	220	220	180	220	300	-	-	-
50Hz 415V	Y 接線堵住電流 Star -LRA (A)	101	111	122	168	200	200	238	296	321	326	410	410	452	561	638	759	785	759	785	851	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	304	352	381	528	624	624	744	890	999	975	1251	1251	1365	1723	1955	2304	2637	2304	2637	2861	-	-	-	
	最大運轉電流 I _{max} (A)	59	76	95	119	139	143	170	189	203	235	259	294	320	359	395	435	465	415	461	514	-	-	-	
	導線選用 Wire selected	需求安培容量 Maximum capacity(A)	43	55	69	86	101	103	123	137	146	169	187	212	231	259	285	314	336	299	333	371	-	-	-
		參考線徑 Nominal cross section(mm ²)	6	8	14	14	14	22	22	30	30	38	50	50	60	60	80	80	80	80	100	100	-	-	-
	NFB AF		100	100	125	225	225	225	225	225	400	400	400	400	400	600	600	600	600	600	600	600	-	-	-
	NFB AT (A)		75	100	125	150	175	175	200	225	225	300	300	350	400	400	500	500	600	500	600	600	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	125	150	150	180	220	220	300	300	300	400	400	300	400	400	-	-	-
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	80	100	100	125	125	150	150	180	220	220	180	220	220	-	-	-

● 60Hz, R-22/R-407C, air-cooled, models (BSR*** – HB, BSR*** - HC)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		42	51	62	78	91	97	115	127	136	162	180	204	224	247	276	303	324	289	322	359	424	515	573	
60Hz 220V	Y 接線堵住電流 Star -LRA (A)	292	310	417	539	590	590	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	930	990	1342	1631	1876	1876	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	最大運轉電流 I _{max} (A)	161	191	234	298	342	368	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	116	138	169	215	247	266	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		參考線徑 Nominal cross section(mm ²)	50	60	100	125	150	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NFB AF		250	400	400	600	600	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NFB AT (A)		250	300	400	500	600	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	M、D 接觸器電流 Magnetic contact current(A)		125	150	180	220	300	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S 接觸器電流 Magnetic contact current(A)		80	80	100	125	150	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
60Hz 380V	Y 接線堵住電流 Star -LRA (A)	167	182	245	297	345	345	424	507	507	545	649	649	748	903	1192	985	1146	985	1146	1146	1160	1271	1384	
	Δ 接線堵住電流 Delta -LRA (A)	533	582	789	900	1094	1094	1311	1624	1624	1717	2045	2045	2361	2800	3814	3464	3820	3464	3820	3820	4146	4542	4944	
	最大運轉電流 I _{max} (A)	93	111	136	171	198	213	261	279	299	366	403	460	505	553	609	675	721	647	721	805	931	1132	1259	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	67	80	98	123	143	154	188	201	216	264	291	332	364	399	439	487	521	467	520	581	672	817	909
		參考線徑 Nominal cross section(mm ²)	22	30	38	60	80	80	100	125	125	200	200	250	325	325	400	500	500	400	500	600	600	800	800
	NFB AF		225	225	225	400	400	400	400	600	600	600	800	800	800	1000	1000	800	800	1000	1200	1600	1600	1800	2000
	NFB AT (A)		150	200	225	300	300	350	400	500	500	600	700	700	800	900	1000	800	800	1000	1100	1300	1600	1800	2000
	M、D 接觸器電流 Magnetic contact current(A)		80	80	100	125	150	180	220	220	220	300	300	400	400	400	500	500	600	500	600	600	800	900	1000
S 接觸器電流 Magnetic contact current(A)		50	50	80	80	100	100	125	125	125	180	180	220	220	300	300	300	400	300	300	400	400	500	600	
60Hz 440V	Y 接線堵住電流 Star -LRA (A)	144	155	215	269	302	302	320	403	403	494	586	586	717	793	1028									
	Δ 接線堵住電流 Delta -LRA (A)	460	495	690	817	937	937	1018	1250	1250	1592	1790	1790	2242	2582	3290									
	最大運轉電流 I _{max} (A)	80	96	118	149	171	184	218	242	260	317	346	396	433	474	526	583	623	559	623	695	804	978	1087	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	58	69	85	107	123	133	157	175	188	229	249	286	312	342	379	420	450	403	449	502	580	706	784
		參考線徑 Nominal cross section(mm ²)	22	22	30	50	60	60	80	100	100	150	150	200	250	250	325	325	400	325	400	500	600	800	800
	NFB AF		125	225	225	225	400	400	400	400	400	600	600	600	800	800	800	800	800	1000	1000	1200	1600	1600	1800
	NFB AT (A)		125	150	200	225	300	300	350	400	400	500	600	600	700	800	800	700	700	900	1000	1100	1600	1600	1800
	M、D 接觸器電流 Magnetic contact current(A)		80	80	100	125	125	150	180	180	220	300	300	300	400	400	400	500	500	500	500	600	600	800	1000
S 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	125	125	150	150	180	180	220	220	300	300	300	300	300	400	500	500	
60Hz 460V	Y 接線堵住電流 Star -LRA (A)	125	138	190	259	269	269	355	387	387	466	514	514	636	720	900									
	Δ 接線堵住電流 Delta -LRA (A)	407	441	611	808	861	861	1095	1239	1239	1458	1593	1593	2008	2262	2800									
	最大運轉電流 I _{max} (A)	76	92	112	143	165	177	211	235	252	306	331	378	418	459	503	557	596	534	596	665	769	935	1040	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	55	66	81	103	119	128	152	170	182	221	239	273	301	331	363	402	430	386	430	480	555	675	751
		參考線徑 Nominal cross section(mm ²)	14	22	30	50	50	60	80	100	100	150	150	200	250	250	325	325	400	325	400	500	600	800	800
	NFB AF		125	225	225	225	250	400	400	400	400	600	600	600	800	800	800	800	800	1000	1000	1000	1200	1600	1600
	NFB AT (A)		125	150	200	225	250	300	350	400	400	500	500	600	700	700	800	700	700	900	900	1000	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		80	80	100	125	125	150	180	180	220	300	300	300	400	400	400	400	500	400	500	500	600	800	800
S 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	100	125	150	150	180	180	220	220	300	300	300	300	300	400	400	500	

● 60Hz, R-22/R-407C, water-cooled, models (BSR*** – WB, BSR*** - WC)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		34	42	51	64	74	80	94	104	112	133	148	168	184	203	226	249	266	237	264	295	348	423	470	
60Hz 220V	Y 接線堵住電流 Star -LRA (A)	254	292	310	417	471	471	590	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	814	930	990	1342	1460	1460	1876	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	最大運轉電流 I _{max} (A)	143	175	209	263	310	334	389	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	103	126	151	190	224	241	281	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		參考線徑 Nominal cross section(mm ²)	50	60	80	100	150	150	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NFB AF		225	400	400	400	600	600	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NFB AT (A)		225	300	350	400	500	500	600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		125	150	180	220	300	300	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	S 接觸器電流 Magnetic contact current(A)		80	80	100	125	150	150	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60Hz 380V	Y 接線堵住電流 Star -LRA (A)	141	167	182	245	265	265	345	424	507	449	545	545	649	748	903	1192	985	1192	985	1146	1050	1160	1271	
	Δ 接線堵住電流 Delta -LRA (A)	459	533	582	789	840	840	1094	1311	1624	1381	1717	1717	2045	2361	2800	3814	3464	3814	3464	3820	3750	4146	4542	
	最大運轉電流 I _{max} (A)	83	101	121	153	179	193	225	258	269	336	364	417	453	498	553	605	646	571	646	722	834	1015	1128	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	60	73	87	110	129	139	163	186	194	242	263	301	327	359	399	436	467	412	466	521	602	733	814
		參考線徑 Nominal cross section(mm ²)	22	30	30	50	60	60	80	100	125	150	200	250	250	325	325	400	400	400	400	500	600	800	800
	NFB AF		125	225	225	250	400	400	400	400	600	600	600	800	800	800	1000	800	800	1000	1000	1200	1400	1600	1800
	NFB AT (A)		125	150	200	250	300	300	350	400	500	600	600	700	700	800	900	700	800	900	1000	1100	1400	1600	1800
	M、D 接觸器電流 Magnetic contact current(A)		80	80	100	125	150	150	180	220	220	300	300	400	400	400	400	500	500	500	500	600	800	800	1000
	S 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	125	125	150	180	180	220	220	300	300	300	300	300	400	400	500	500
60Hz 440V	Y 接線堵住電流 Star -LRA (A)	130	144	155	215	241	241	302	320	403	366	494	494	586	717	793	1028		1028						
	Δ 接線堵住電流 Delta -LRA (A)	403	460	495	690	747	747	937	1018	1250	1136	1592	1592	1790	2242	2582	3290		3290						
	最大運轉電流 I _{max} (A)	71	87	104	132	155	167	195	216	233	286	315	361	389	427	475	522	558	493	558	623	721	876	975	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	52	63	75	95	112	120	141	156	168	206	228	261	281	308	343	377	403	356	403	450	520	632	703
		參考線徑 Nominal cross section(mm ²)	14	22	30	38	50	50	80	80	100	125	150	200	200	250	250	325	325	325	325	400	500	600	800
	NFB AF		125	225	225	225	250	250	400	400	400	600	600	600	600	800	800	600	800	800	1000	1000	1200	1600	1600
	NFB AT (A)		125	150	200	200	250	250	300	350	350	500	500	600	600	700	800	600	700	800	900	1000	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		80	80	80	100	125	125	150	180	180	220	300	300	300	400	400	400	400	400	500	500	600	800	800
	S 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	100	100	125	150	150	180	180	220	220	300	220	300	300	400	400	500
60Hz 460V	Y 接線堵住電流 Star -LRA (A)	114	125	138	190	233	233	269	355	387	370	466	466	514	636	720									
	Δ 接線堵住電流 Delta -LRA (A)	370	407	441	611	722	722	861	1095	1239	1137	1458	1458	1593	2008	2262									
	最大運轉電流 I _{max} (A)	68	83	101	126	148	160	188	209	226	275	304	347	372	412	460	499	534	471	534	596	689	838	932	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	49	60	73	91	107	115	135	151	163	199	220	250	268	297	332	360	385	340	385	430	497	605	673
		參考線徑 Nominal cross section(mm ²)	14	22	30	38	50	50	60	80	80	125	125	150	200	200	250	325	325	250	325	400	500	600	600
	NFB AF		125	125	225	225	225	250	400	400	400	600	600	600	600	800	800	600	600	800	800	1000	1200	1600	1600
	NFB AT (A)		125	125	150	200	225	250	300	350	350	500	500	600	600	700	700	600	600	800	800	900	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	180	180	220	220	300	300	300	400	400	400	400	400	500	500	800	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	80	100	100	125	150	150	180	180	220	220	300	220	300	300	300	400	400

60Hz, R-134a, air-cooled, models (BSR*** - HA)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		26	31	39	48	56	61	72	80	91	103	114	129	142	158	175	192	206	183	204	228	271	329	366	
60Hz 220V	Y 接線堵住電流 Star -LRA (A)	254	254	310	417	398	398	471	590	590	582	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	814	814	990	1342	1230	1230	1460	1876	1876	1850	-	-	-	-	-	-	-	-	-	-	-	-	-	
	最大運轉電流 I _{max} (A)	128	155	190	235	279	305	360	393	447	532	-	-	-	-	-	-	-	-	-	-	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	92	112	137	170	201	220	260	284	323	384	-	-	-	-	-	-	-	-	-	-	-	-	-
		參考線徑 Nominal cross section(mm ²)	38	50	60	100	125	125	200	200	250	325	-	-	-	-	-	-	-	-	-	-	-	-	-
	NFB AF		225	250	400	400	600	600	600	600	800	800	-	-	-	-	-	-	-	-	-	-	-	-	-
	NFB AT (A)		200	250	300	400	500	500	600	600	700	800	-	-	-	-	-	-	-	-	-	-	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		100	125	150	180	220	220	300	300	400	400	-	-	-	-	-	-	-	-	-	-	-	-	-
	S 接觸器電流 Magnetic contact current(A)		80	80	80	100	125	150	150	180	220	300	-	-	-	-	-	-	-	-	-	-	-	-	-
60Hz 380V	Y 接線堵住電流 Star -LRA (A)	141	141	182	245	231	231	265	345	345	334	449	545	545	649	748	903	1192	903	1192	1364	907	1050	1160	
	Δ 接線堵住電流 Delta -LRA (A)	459	459	582	789	714	714	840	1094	1094	1042	1381	1717	1717	2045	2361	2800	3814	2800	3814	4551	3239	3750	4146	
	最大運轉電流 I _{max} (A)	74	90	110	137	162	179	208	228	259	308	342	380	421	462	513	561	601	533	586	664	778	946	1052	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	53	65	80	99	117	129	150	164	187	222	247	274	304	334	370	405	434	385	423	479	561	683	759
		參考線徑 Nominal cross section(mm ²)	14	22	30	38	50	60	80	80	100	150	150	200	250	250	325	325	400	325	400	500	600	800	800
	NFB AF		125	225	225	225	250	400	400	400	400	600	600	600	800	800	800	800	800	800	1000	1000	1200	1600	1600
	NFB AT (A)		125	150	200	225	250	300	350	350	400	500	600	600	700	700	800	700	700	800	900	1000	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		80	80	80	100	125	150	150	180	220	300	300	300	400	400	400	500	500	400	500	500	600	800	800
	S 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	100	125	150	150	180	180	220	220	300	300	300	300	300	400	400	500
60Hz 440V	Y 接線堵住電流 Star -LRA (A)	130	130	155	215	190	190	241	302	302	291	366	494	494	586	717	793	1028	793	1028					
	Δ 接線堵住電流 Delta -LRA (A)	403	403	495	690	589	589	747	937	937	925	1136	1592	1592	1790	2242	2582	3290	2582	3290					
	最大運轉電流 I _{max} (A)	64	78	95	119	140	154	180	197	226	266	291	329	365	398	440	484	519	457	506	574	672	817	909	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	46	56	68	86	101	111	130	142	163	192	210	237	263	287	317	350	375	330	365	414	485	590	656
		參考線徑 Nominal cross section(mm ²)	14	22	22	30	50	50	60	80	80	125	125	150	200	200	250	250	325	250	325	325	500	600	800
	NFB AF		100	125	225	225	225	250	400	400	400	400	600	600	600	600	800	600	600	800	800	1000	1200	1600	1600
	NFB AT (A)		100	125	150	200	225	250	300	300	350	400	500	500	600	600	700	600	600	700	800	900	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	100	125	150	150	180	220	220	300	300	300	400	400	400	400	400	500	500	600	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	100	100	125	125	150	180	180	220	220	220	220	220	300	300	400	400
60Hz 460V	Y 接線堵住電流 Star -LRA (A)	114	114	138	190	178	178	233	269	269	289	370	466	466	514	636	720	900	720	900					
	Δ 接線堵住電流 Delta -LRA (A)	370	370	441	611	567	567	722	861	861	889	1137	1458	1458	1593	2008	2262	2800	2262	2800					
	最大運轉電流 I _{max} (A)	60	74	91	112	133	146	172	190	216	253	280	317	350	379	424	463	497	442	484	549	643	782	869	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	43	53	66	81	96	105	124	137	156	183	202	229	253	274	306	334	358	319	349	396	464	564	627
		參考線徑 Nominal cross section(mm ²)	14	14	22	30	38	50	60	60	80	100	125	150	200	200	250	250	325	250	250	325	500	600	800
	NFB AF		100	225	225	225	225	225	400	400	400	400	600	600	600	600	800	600	600	800	800	1000	1000	1200	1600
	NFB AT (A)		100	125	150	200	200	225	300	300	350	400	500	500	600	600	700	600	600	700	800	900	1000	1200	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	100	125	150	180	220	220	300	300	300	400	400	400	400	400	400	400	500	600	800
	S 接觸器電流 Magnetic contact current(A)		35	35	50	50	80	80	80	80	100	125	125	150	150	180	180	220	220	220	220	300	300	400	400

● 60Hz, R-134a, water-cooled, models (BSR*** – WA)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		22	26	33	40	47	52	61	67	76	86	96	108	119	132	146	161	172	152	170	190	228	278	309	
60Hz 220V	Y 接線堵住電流 Star -LRA (A)	254	254	254	292	398	398	398	471	471	582	582	582	-	-	-	-	-	-	-	-	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	814	814	814	930	1230	1230	1230	1460	1460	1850	1850	1850	-	-	-	-	-	-	-	-	-	-	-	
	最大運轉電流 I _{max} (A)	96	113	137	170	201	219	256	282	319	369	411	471	-	-	-	-	-	-	-	-	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	69	82	99	122	145	158	184	204	231	266	297	340	-	-	-	-	-	-	-	-	-	-	-
		參考線徑 Nominal cross section(mm ²)	22	30	38	60	80	80	100	125	150	200	200	250	-	-	-	-	-	-	-	-	-	-	-
	NFB AF		225	225	225	400	400	400	400	600	600	600	800	800	-	-	-	-	-	-	-	-	-	-	-
	NFB AT (A)		150	200	225	300	300	350	400	500	500	600	700	800	-	-	-	-	-	-	-	-	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		80	100	100	125	150	180	220	220	300	300	300	400	-	-	-	-	-	-	-	-	-	-	-
	S 接觸器電流 Magnetic contact current(A)		50	50	80	80	100	100	125	125	150	180	180	220	-	-	-	-	-	-	-	-	-	-	-
60Hz 380V	Y 接線堵住電流 Star -LRA (A)	141	141	141	167	231	231	231	265	265	334	334	334	449	545	649	748	903	748	903	1192	907	907	1160	
	Δ 接線堵住電流 Delta -LRA (A)	459	459	459	533	714	714	714	840	840	1042	1042	1042	1381	1717	2045	2361	2800	2361	2800	3814	3239	3239	4146	
	最大運轉電流 I _{max} (A)	54	65	79	98	116	127	149	163	185	213	238	273	302	327	357	483	518	376	420	462	670	815	906	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	39	47	57	71	84	91	107	118	133	154	172	197	218	236	258	349	374	271	303	333	484	588	654
		參考線徑 Nominal cross section(mm ²)	8	14	22	30	30	38	50	50	60	80	100	125	125	150	200	250	325	200	250	250	500	600	800
	NFB AF		100	100	125	225	225	225	250	400	400	400	600	600	600	600	600	600	600	600	800	800	1200	1600	1600
	NFB AT (A)		100	100	125	150	200	200	225	250	300	350	400	500	500	500	600	600	600	600	700	700	1200	1600	1600
	M、D 接觸器電流 Magnetic contact current(A)		50	50	80	80	100	100	125	125	150	180	180	220	220	300	300	400	400	300	400	400	500	600	800
	S 接觸器電流 Magnetic contact current(A)		35	35	35	50	50	80	80	80	80	100	100	125	150	150	150	220	220	180	180	220	300	400	400
60Hz 440V	Y 接線堵住電流 Star -LRA (A)	130	130	130	144	190	190	190	241	241	291	291	291	366	494	586	717	793	717	793	1028				
	Δ 接線堵住電流 Delta -LRA (A)	403	403	403	460	589	589	589	747	747	925	925	925	1136	1592	1790	2242	2582	2242	2582	3290				
	最大運轉電流 I _{max} (A)	47	56	68	85	100	109	128	141	160	183	205	235	256	283	305	417	447	320	357	399	579	704	783	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	34	40	49	61	72	79	93	102	115	132	148	170	185	204	220	301	323	231	257	288	418	508	565
		參考線徑 Nominal cross section(mm ²)	8	8	14	22	30	30	38	50	50	60	80	100	100	125	125	200	250	150	200	200	500	600	600
	NFB AF		100	100	125	225	225	225	225	250	400	400	400	400	600	600	600	600	600	600	600	600	1000	1200	1200
	NFB AT (A)		75	100	125	150	150	200	200	225	250	300	350	400	400	500	500	500	500	500	600	600	1000	1200	1200
	M、D 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	125	125	150	150	180	220	220	220	300	400	300	300	300	500	600	600
	S 接觸器電流 Magnetic contact current(A)		20	35	35	35	50	50	80	80	80	80	100	100	125	125	150	220	220	150	150	180	300	300	400
60Hz 460V	Y 接線堵住電流 Star -LRA (A)	114	114	114	125	178	178	178	233	233	289	289	289	370	466	514	636	720	636	720	900				
	Δ 接線堵住電流 Delta -LRA (A)	370	370	370	407	567	567	567	722	722	889	889	889	1137	1458	1593	2008	2262	2008	2262	2800				
	最大運轉電流 I _{max} (A)	44	53	65	80	95	103	121	135	153	177	197	225	248	274	293	399	428	313	348	382	553	673	749	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	32	38	47	58	68	74	88	97	110	128	142	162	179	198	212	288	309	226	251	275	399	486	541
		參考線徑 Nominal cross section(mm ²)	6	8	14	22	22	30	30	38	50	60	80	80	100	125	125	200	250	150	200	200	325	500	600
	NFB AF		100	100	100	125	225	225	225	225	250	400	400	400	400	600	600	600	600	600	600	600	1000	1200	1200
	NFB AT (A)		75	100	100	125	150	200	200	225	250	300	300	350	400	500	500	500	500	500	600	600	1000	1200	1200
	M、D 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	100	100	125	150	150	180	180	220	220	300	400	300	300	300	400	600	600
	S 接觸器電流 Magnetic contact current(A)		20	35	35	35	50	50	80	80	80	80	100	100	125	125	125	180	180	150	150	180	300	300	400

60Hz, R-404A, low-temp., models (BSR*** - LD)

機種		BSR																							
Model		213 (S)	216	311 (S)	314	316	321	323	324	326	413	415	421	423	424	426	427	428	513II	514II	516II	613	614	616	
額定功率 Rated Power (kW)		30	38	48	60	70	72	86	95	102	118	130	148	161	181	199	219	234	209	232	259	-	-	-	
60Hz 220V	Y 接線堵住電流 Star -LRA (A)	241	286	311	419	453	453	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	777	902	985	1336	1422	1422	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	最大運轉電流 I _{max} (A)	148	171	216	268	315	324	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	107	123	156	194	228	234	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		參考線徑 Nominal cross section(mm ²)	22	22	30	38	50	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NFB AF		125	125	225	225	225	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NFB AT (A)		125	125	175	200	225	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		80	100	100	125	150	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	S 接觸器電流 Magnetic contact current(A)		50	50	80	80	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60Hz 380V	Y 接線堵住電流 Star -LRA (A)	141	167	182	245	265	265	345	424	507	449	545	545	649	748	903	1192	985	1192	985	1146	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	459	533	582	789	840	840	1094	1311	1624	1381	1717	1717	2045	2361	2800	3814	3464	3814	3464	3821	-	-	-	
	最大運轉電流 I _{max} (A)	78	99	125	155	183	188	223	248	265	307	339	386	420	470	518	570	609	544	605	673	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	56	71	90	112	132	135	161	179	192	222	245	278	303	339	373	411	440	392	436	486	-	-	-
		參考線徑 Nominal cross section(mm ²)	8	14	14	22	22	22	30	30	38	50	50	60	80	80	100	125	125	100	125	150	-	-	-
	NFB AF		100	125	225	225	225	250	400	400	400	400	600	600	600	600	800	800	600	800	800	800	-	-	-
	NFB AT (A)		100	125	150	175	225	250	300	300	350	400	500	500	600	600	700	700	600	700	800	800	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		80	80	100	125	150	150	180	180	220	300	300	300	400	400	400	500	500	400	500	500	-	-	-
	S 接觸器電流 Magnetic contact current(A)		35	50	80	80	80	80	100	125	125	150	150	180	180	220	220	300	300	300	300	300	-	-	-
60Hz 440V	Y 接線堵住電流 Star -LRA (A)	120	142	155	208	225	225	293	361	431	382	464	464	552	636	768	1014	838	1014	838	975	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	385	447	488	661	704	704	916	1098	1360	1157	1438	1438	1713	1978	2346	3195	2902	3195	2902	3201	-	-	-	
	最大運轉電流 I _{max} (A)	67	86	108	134	158	162	193	214	229	266	293	333	363	406	447	492	526	470	522	582	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	49	62	78	97	114	117	139	155	165	192	211	240	262	293	323	355	380	339	377	420	-	-	-
		參考線徑 Nominal cross section(mm ²)	8	14	14	14	22	22	22	30	30	38	50	50	60	80	80	100	100	80	100	125	-	-	-
	NFB AF		100	100	125	225	225	225	250	400	400	400	400	400	400	600	600	600	600	600	600	800	-	-	-
	NFB AT (A)		75	100	125	150	175	200	225	250	300	300	350	400	400	500	500	600	600	600	600	700	-	-	-
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	125	150	180	180	220	220	300	300	300	400	400	400	400	400	500	-	-	-
	S 接觸器電流 Magnetic contact current(A)		35	50	50	80	80	80	80	100	100	125	125	150	180	180	220	220	220	220	220	300	-	-	-
60Hz 460V	Y 接線堵住電流 Star -LRA (A)	114	135	147	197	213	213	278	342	408	362	439	439	523	603	727	960	793	960	793	923	-	-	-	
	Δ 接線堵住電流 Delta -LRA (A)	360	419	457	620	660	660	859	1029	1275	1084	1348	1348	1606	1854	2199	2995	2720	2995	2720	3000	-	-	-	
	最大運轉電流 I _{max} (A)	64	82	103	128	151	155	185	205	219	254	280	319	347	388	428	471	503	449	499	556	-	-	-	
	導線 選用 Wire selected	需求安培容量 Maximum capacity(A)	46	59	74	93	109	112	133	148	158	183	202	230	250	280	309	340	363	324	360	401	-	-	-
		參考線徑 Nominal cross section(mm ²)	8	8	14	14	22	22	22	30	30	38	38	50	50	60	80	80	100	80	100	100	-	-	-
	NFB AF		100	100	125	225	225	225	225	250	400	400	400	400	400	600	600	600	600	600	600	800	-	-	-
	NFB AT (A)		75	100	125	150	175	225	225	250	300	350	350	400	500	500	600	600	500	600	700	-	-	-	
	M、D 接觸器電流 Magnetic contact current(A)		50	80	80	100	125	150	150	180	220	220	300	300	300	400	400	400	400	400	500	-	-	-	
	S 接觸器電流 Magnetic contact current(A)		35	35	50	80	80	80	80	100	100	125	125	150	150	180	180	220	220	220	220	300	-	-	-

5.故障分析與保養週期

5.Trouble shooting and maintenance period

5.1 故障分析與研判

5.1 Trouble shooting

故障狀況 Malfunction status	原因 Possible causes
<p>壓縮機馬達線圈，保護開關作動 Motor winding temperature-protecting switch is activated.</p>	<ol style="list-style-type: none"> 1. 負載大造成低壓側入口過熱度過高。 High compressor superheat due to heavy loading. 2. 高壓過高，負載過大。 Discharge pressure is too high that causes overload. 3. 線圈保護開關故障。 Motor winding temperature-protecting switch is out of order. 4. 電氣系統不良或故障。 Electric system is failed. 5. 馬達線圈不良，溫升過高。 Defective motor winding that causes high temperature rise-up.
<p>容調動作不確實 Modulation slider fails to move properly.</p>	<ol style="list-style-type: none"> 1. 溫度過低，潤滑油黏度高。 Low temperature causes high oil viscosity. 2. 限流孔阻塞。 Orifice is clogged. 3. 容調電磁閥阻塞。 The solenoid valve is clogged. 4. 容調電磁閥線圈故障。 The solenoid valve coil is failed. 5. 容調活塞環磨損無法完全氣密，冷媒大量進入容調油壓缸中。 The piston ring is worn out. 6. 容調油路阻塞。 Oil passage is clogged. 7. 油過濾器阻塞。 Oil filter is clogged. 8. 潤滑油量不足(油位不足)。 Insufficient oil(Low oil level). 9. 系統之溫度開關故障。 System temperature switch is failed.
<p>馬達無法啟動或 Y-Δ 無法啟動 Unable to start motor or operate</p>	<ol style="list-style-type: none"> 1. 容調閥無法回復空車狀態，造成重車起動 The slider cannot return back to no-load state that results in loaded startup. 2. 電壓過低。 Voltage is too low. 3. 電壓錯誤。 Voltage is not correct. 4. 馬達故障。 Motor fails 5. 欠相、逆相運轉。

	<p>Phase loss or phase sequence reverse.</p> <p>6. 馬達保護開關作動。 Motor protection switch is activated.</p> <p>7. 馬達線圈接線錯誤。 Motor is not connected correctly.</p> <p>8. 排氣關斷閥未開(高壓開關作動)。 Discharge service valve is closed (high pressure switch is activated).</p>
<p>異常振動或噪音 Abnormal vibration or noise</p>	<p>1. 軸承損壞故障。 Bearing fails.</p> <p>2. 機體內部固定螺絲鬆動。 Inner fixed screws become loose.</p> <p>3. 轉子相互摩擦或與機殼摩擦。 Rotor scrapes against the other one or casing.</p> <p>4. 失油。 Oil loss.</p> <p>5. 內部機件鬆動。 Inner parts become loose.</p> <p>6. 電磁聲。 Electrical magnetic noise.</p> <p>7. 有異物進入。 Foreign particles enter compressor.</p>
<p>排氣溫度過高 High discharge temperature</p>	<p>1. 過熱度過高。 Superheat is too high.</p> <p>2. 高壓過高，負載過大。 Discharge pressure or loading is too high.</p> <p>3. 失油。 Low oil level.</p> <p>4. 軸承損壞。 Bearing fails.</p> <p>5. 電動機過熱。 Motor is overheated.</p> <p>6. 壓縮比過大。 Compression ratio is too high.</p> <p>7. 系統不可壓縮氣體含量太高 Uncompressed gas ratio in system is too high.</p>
<p>壓縮機失油 Oil loss</p>	<p>1. 過熱度不足，液態冷媒回流過多，引起回油不良。 Insufficient superheat and too much liquid refrigerant returning to compressor cause poor oil circulation in system.</p> <p>2. 系統流速設計不足，匹配不合理。 Low designed flow velocity causes poor oil circulation.</p> <p>3. 系統較大或有彎角處儲存積油，致使冷凍油不足，需補充冷凍油。 Piping is too long or oil is accumulated at elbows of piping system, which causes insufficient oil. Need to charge more oil.</p>

5.2 保養週期建議表

5.2 Recommended maintenance period

Unit: hour

時間 Time	100	1000	2500	5000	10000	15000	20000	25000	30000
項目 Item									
電氣絕緣 Electrical insulation			△	△	△	△	△	△	△
油過濾器 Oil filter	△ /○			△					△ /○
進氣過濾器 Suction filter				△					△
潤滑油 Lubricant	△			△	△ /○		△ /○		△ /○
油位 Oil level		△	△	△	△	△	△	△	△
振動噪音 Vibration/noise		△	△	△	△	△	△	△	△
軸承 Bearing									△ /○
接頭部位洩漏 Leakage									△

△ 檢查 Check ; ○ 更換 Replace.

注意事項 Note :

- 馬達電氣絕緣除了表中之定期檢查外，每年在新啟動運轉前檢查其絕緣狀況。
After a long period of shutdown, an electrical insulation check should be conducted before start-up.
- 振動、噪音之檢查以人為方式檢查即可，若發現有異常狀況，可聯繫復盛公司。詳細以儀器檢查，以確定原因。
Check vibration and noise. If abnormality is found, contact Fu-Sheng to bring instrument and make detailed check to figure out the reason.
- 每次大修後，整台壓縮機須重做一次耐壓試漏，以確定各部位無洩漏。
Conduct a pressure test on compressor after each overhaul to ensure no leakage is occurred.
- 軸承壓換時須整組同時更換，不可只更換其中部份軸承。
All bearings shall be replaced concurrently rather than replacing part of them.

5.3 壓縮機馬達燒毀之處理

當馬達不慎燒毀時，請將燒毀之壓縮機拆下，回收系統冷媒避免污染環境，並更換乾燥過濾器。新機尚未裝機之前，請先將系統抽真空、充氮氣封存，以免系統受環境濕氣腐蝕。更換新機試運轉一小時後，請停機更換新的冷凍油與乾燥過濾器後再運轉一小時，確認系統之清潔度及油酸是否合格，若否則反覆上述動作。

5.4 PUMP DOWN 注意事項

- 除非有停機檢測或維修之必要，請勿於標準控制中作 PUMP DOWN。
- 請注意壓縮機之排氣溫度，如排氣溫度開關作動時，應立即停止 PUMP DOWN 之動作。
- PUMP DOWN 之最低吸氣壓力不得低於 0.5 bar(表壓)。

6.應用規範

依據復盛壓縮機之許用運轉範圍，如使用于風冷及熱泵機組，其使用之狀態均較水冷機組嚴苛，負載約提高 15%~30%，將造成排氣高溫，馬達線圈溫度過高及油溫太高等現象。為使機組可以正常達到運轉要求，需配置液噴射或油冷卻器，使其得到運轉範圍中之額外冷卻。

5.3 Handling a burnt out motor

If the motor is burnt out, disassemble the compressor, recycle the polluted refrigerant and change the dry-filter. Before the new compressor is assembled, vacuum the system and then charge with nitrogen first to block it out of ambient moisture. After replacement, run the new compressor for one hour, stop it, replace new refrigeration oil & dry-filter and make another one-hour run to confirm whether the system purity and oil are well qualified. If not, repeat the above procedure till acceptable.

5.4 Notices on pump-down

- Do not conduct pump-down during the standard control process unless it is really essential to shutdown for making inspection or maintenance,
- Keep monitoring the discharge temperature. Once the discharge temperature switch is activated, stop pump-down at once.
- The minimum pump-down suction pressure shall be 0.5 bar(gauge).

6.Application

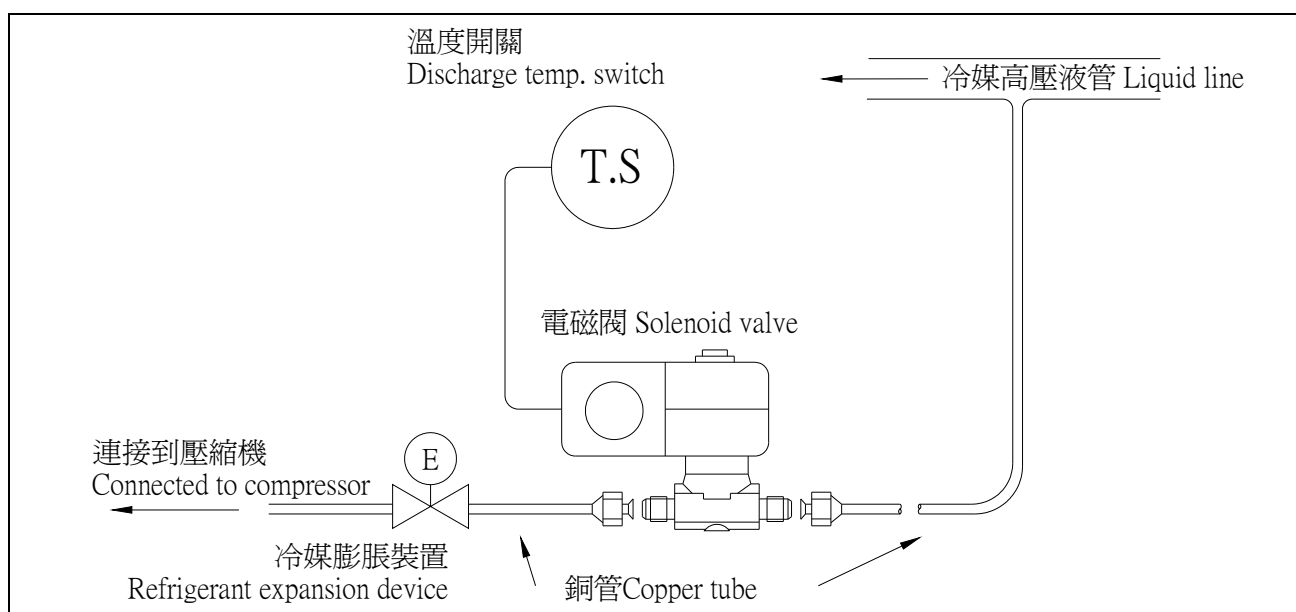
According to the allowed operation range of Fu-Sheng compressor, the operation condition under air-cooled or heat-pump applications is more critical than water-cooled one; the loading of the former condition is about 15%-30% higher than the later one, which would make discharge temperature, motor winding temperature and oil temperature high. To let compressor run normally, it's essential to install liquid injection system or oil cooler to get additional cooling to the compressor.

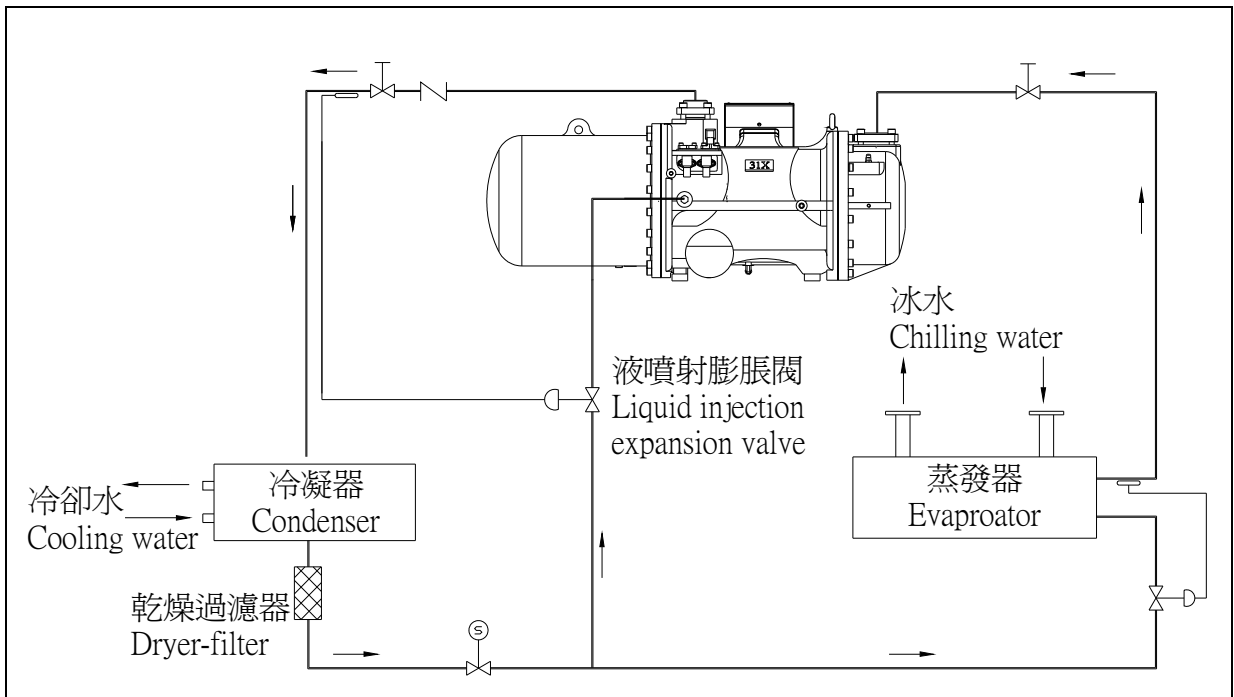
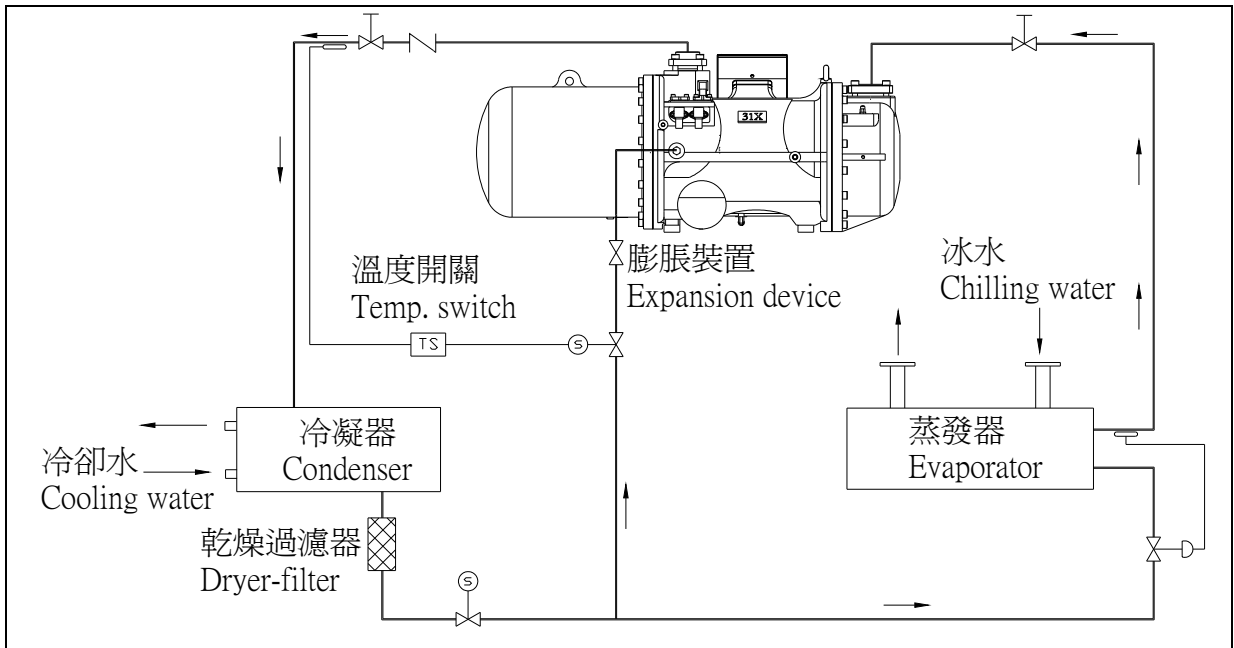
6.1 液噴射應用

引用系統中一部份液態冷媒，直接進入壓縮室或馬達吸氣側藉以降低排氣溫度和馬達線圈溫度，若排氣溫度達到100°C時，溫度開關感應排氣溫度而控制液冷媒之電磁閥，而液冷媒通過電磁閥和膨脹裝置，進入壓縮室或馬達吸氣側，利用液冷媒潛熱，得到冷卻效果，其配置如下圖。如採用感溫式膨脹閥，需留意膨脹閥控制會有不穩定現象，要依使用狀況加以調整，議建使用液噴專用膨脹閥(如：Danfoss TEAT20，Alco series 935-100，Sprlan Y1037)。

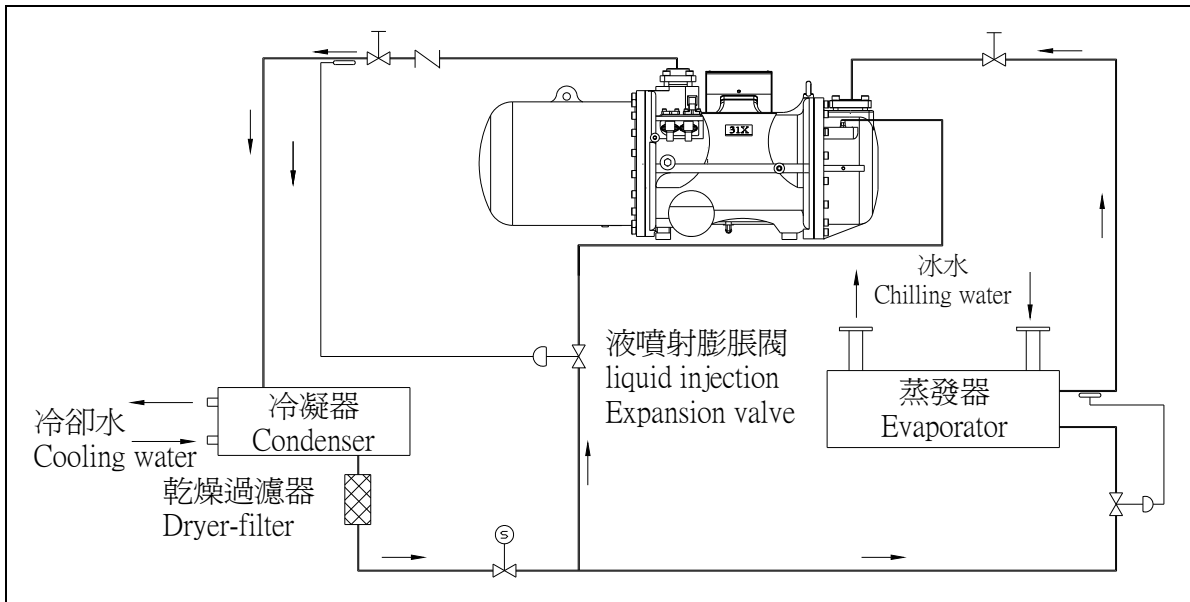
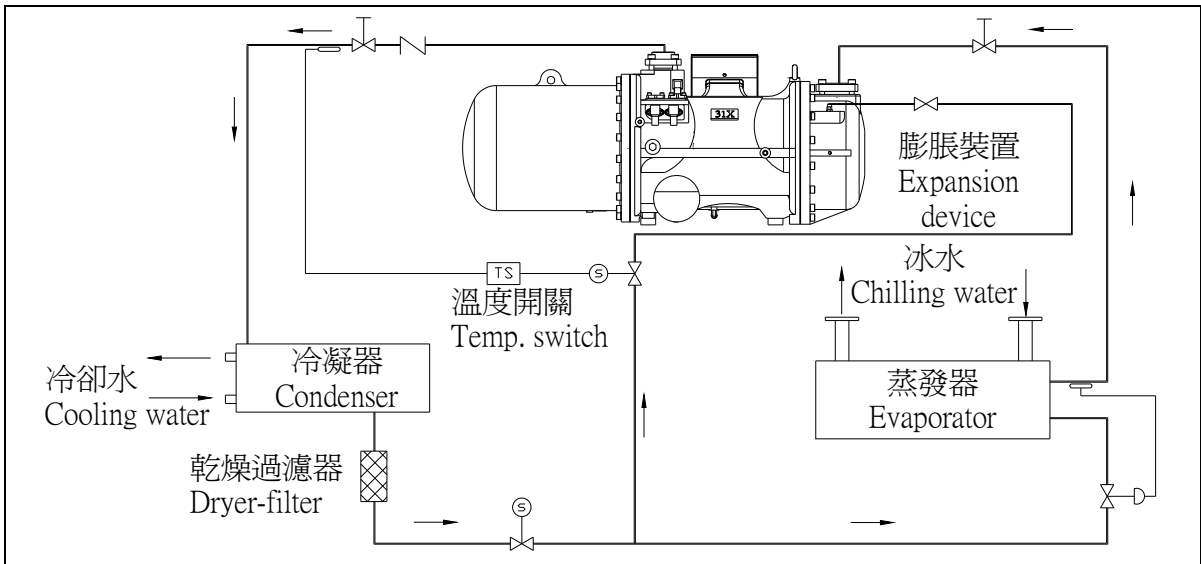
6.1 Liquid injection application

The application is made by introducing portion of liquid refrigerant directly into the compression chamber or compressor suction end for the purpose of reducing the discharge and motor winding temperature. When the discharge temperature is up to 100°C, the temperature switch sends a signal to the solenoid valve to let the liquid refrigerant enter compression chamber or motor suction end through the solenoid valve and refrigerant expansion device. The latent heat of refrigerant provides required cooling capacity to cool down the temperature of compressor when running at critical condition. Illustrated piping layout is shown below. If a thermal expansion valve is not specially designed for the liquid injection application, a solenoid valve is required to control the open/close of the expansion valve and make the system stable. It is recommended to use specific expansion valves (ex. Danfoss TEAT20, Alco series 935 or Sprlan Y1037, etc.) to control the liquid injection.





液噴射應用 Liquid injection
(中間壓) (Middle pressure)



液噴射應用 Liquid injection
(吸氣端) (Suction end)

6.2 油冷卻器應用

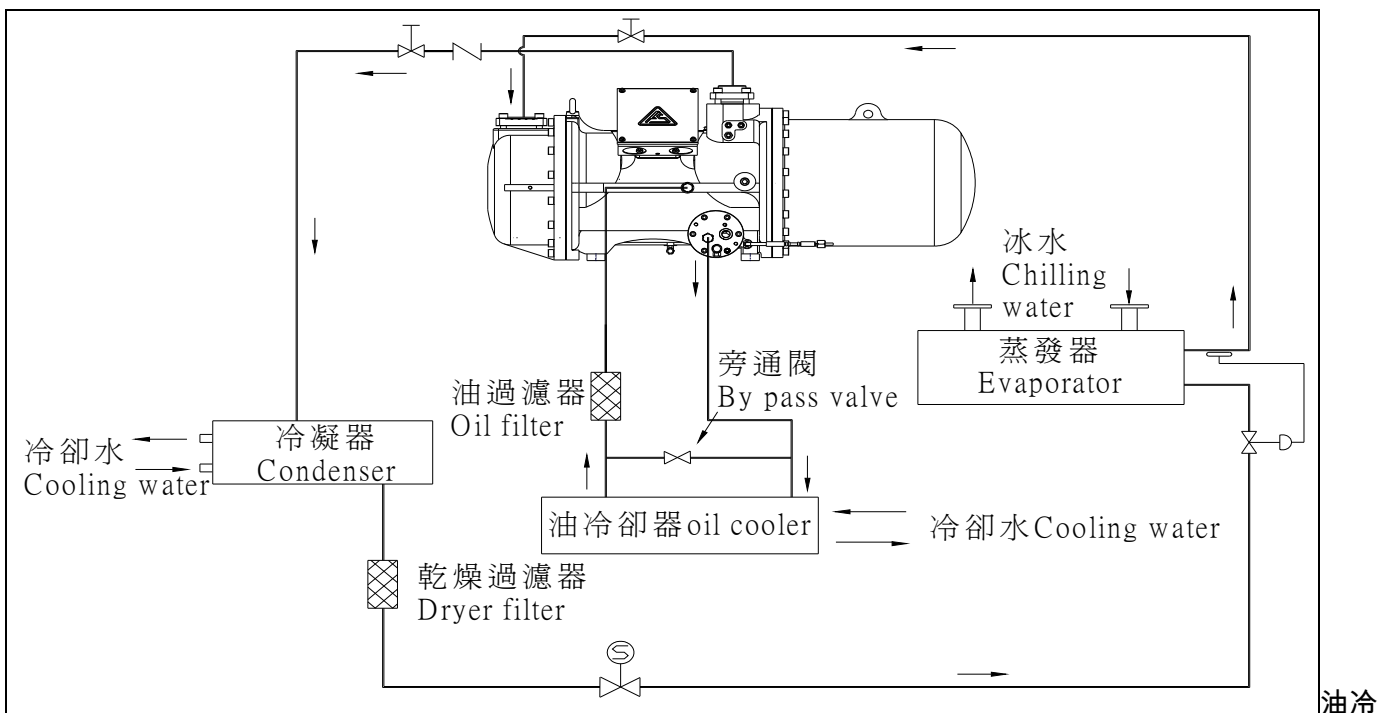
在風冷及熱泵條件運轉下，使用油冷卻器有其必要性，尤其在排氣溫度超過 100°C 時。油冷卻器之給油溫度條件：50°C~70°C。油冷卻器的容量可依據不同的運轉條件，由復盛選型軟體取得。

如果油溫過低時，則可設置旁通閥或冷熱混合閥。油冷卻器應用有空氣冷卻法、冷媒冷卻法、水冷卻法等等。無論那種方法均須考慮油壓降(壓降需小於 0.5bar)，以免造成容調動作不良及軸承潤滑不足，排氣溫度於 70°C 以下，旁通閥開通；超過 70°C，旁通閥關閉使油冷卻器工作。

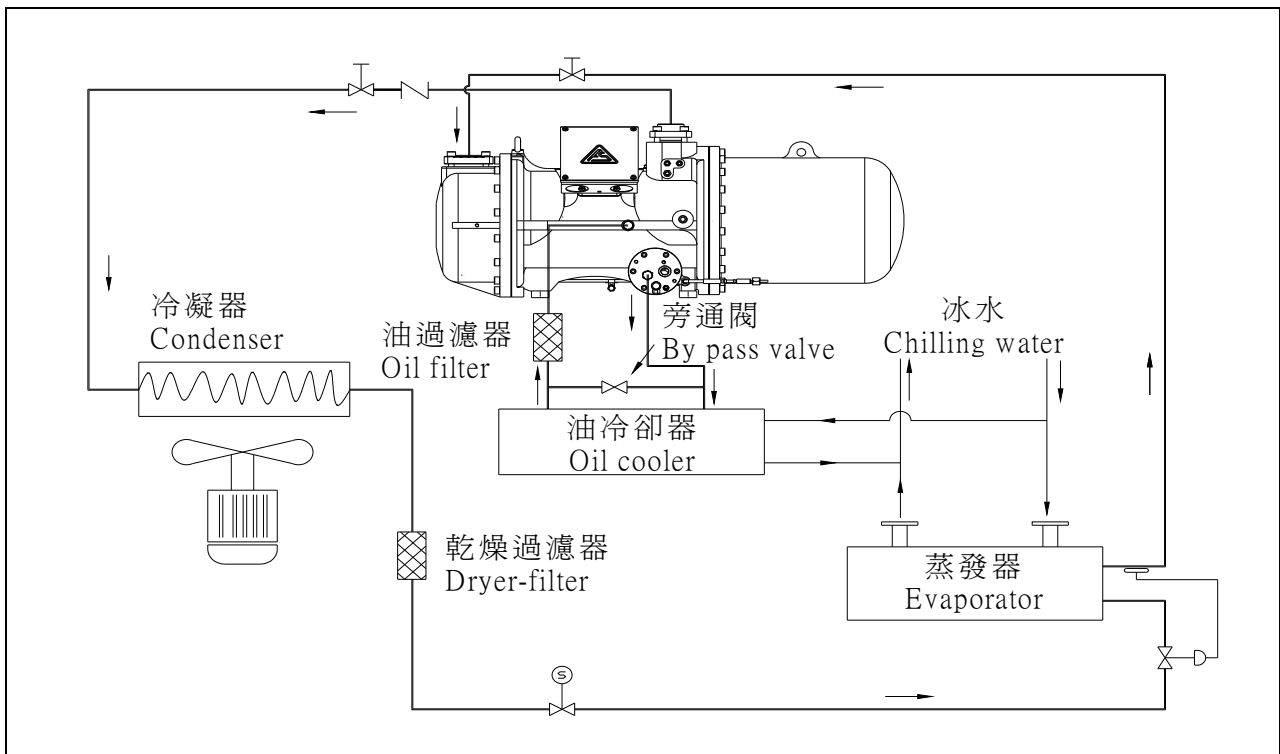
6.2 Oil cooler

Under air-cooled or heat-pump operation, it's essential to add oil cooler, particularly when the discharge temperature is over 100°C. The outlet oil temperature of oil cooler is 50°C~70°C, which varies according to the cooler capacity and compressor operation condition. The recommended oil cooler capacity can be calculated from Fu Sheng selection software.

If the oil temperature is too low, install an oil bypass valve or mixing valve (mix up cold & hot oil). The oil cooler can be cooled down by air, refrigerant or water. No matter what cooling method is applied, the maximum pressure drop through the oil cooler shall not exceed 0.5bar. Higher pressure drop could lead to malfunction of capacity control and insufficient lubrication of bearings. Open the bypass valve if the discharge temperature is lower than 70°C to bypass the oil back to compressor. Otherwise, close it to lead the oil into oil cooler.



油冷卻器應用-水冷式 Oil cooler - water-cooled type



油冷卻器應用- 氣冷式 Oil cooler - air-cooled type

6.3 儲冰空調之應用

一般空調冰水機的蒸發溫度約 $0\sim 5^{\circ}\text{C}$ ，而儲冰之蒸發溫度約 $-5^{\circ}\text{C}\sim -15^{\circ}\text{C}$ (依儲冰方式而異)，所以如此一來其壓縮比將提高，易導致排氣溫度保護開關作動。可考慮加裝液噴射或油冷卻器，以維持正常之排氣溫度。應用于儲冰系統時除了調整溫控開關、防凍開關、低壓開關、卸載控制器和膨脹閥外，請考慮加裝二次油分離器，確保在儲冰製冰運作下有較佳之回油之效果，而回油管接回至壓縮機低壓側。

6.3 Thermal storage system

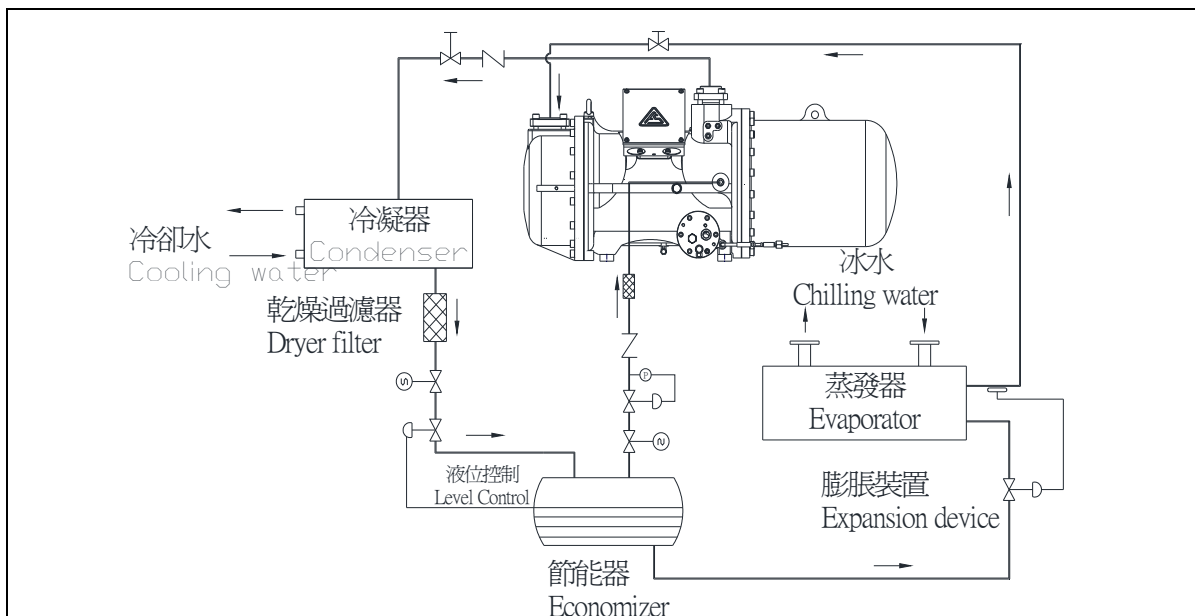
For air conditioning system the evaporating temperature is about $0\sim 5^{\circ}\text{C}$; however, it is about $-5^{\circ}\text{C}\sim -15^{\circ}\text{C}$ in thermal storage system, which would cause higher compression ratio. The compressor might be tripped off due to high discharge temperature by the protection device. Therefore, a liquid injection system or oil cooler is recommended to maintain normal discharge temperature. Except that the temperature control switch, anti-freeze switch, low-pressure switch, unload controller and expansion valve have to be adjusted, adding a 2nd oil separator is helpful to provide better oil return effect. The returning oil pipe of separator shall be connected to the low-pressure side of compressor.

6.4 節能器之應用

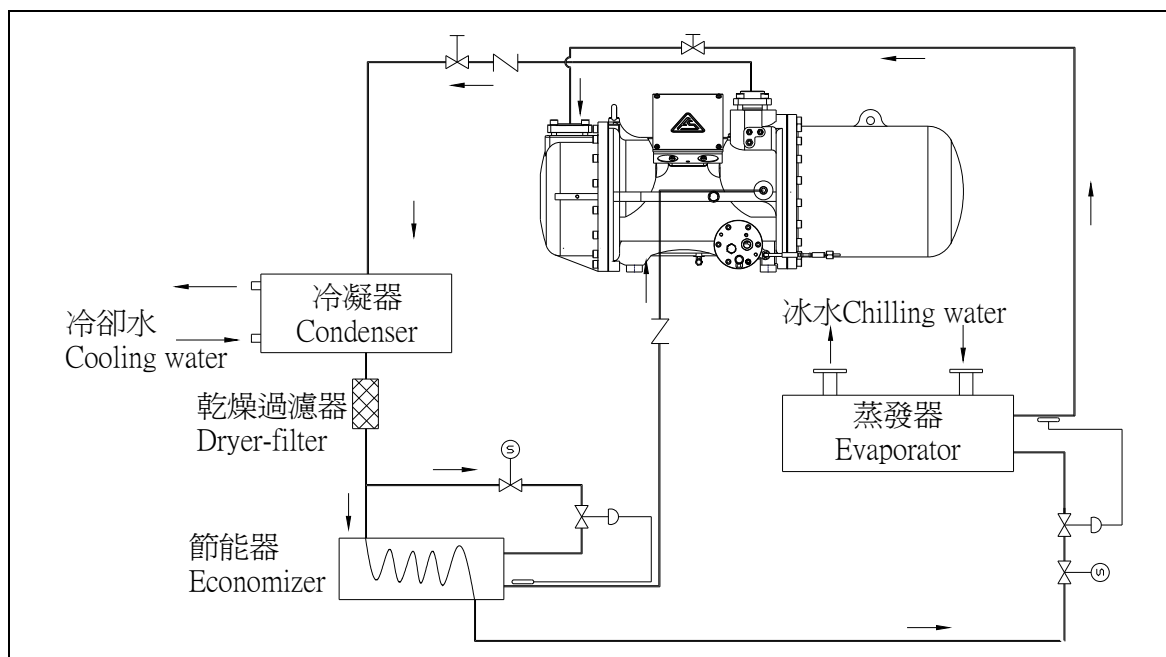
節能器之應用類似二段壓縮原理，可以提升效率，所以用於高壓縮比下其效益較明顯，(例如儲冰系統)。其系統配置有閃蒸桶(Flash tank)與過冷卻器(Liquid sub-cooler)兩種。請參考下圖。

6.4 Economizer

The principle of economizer is similar to that of two-stage compression. It can increase the efficiency of compressor especially under high compression ratio condition. The flash tank and liquid sub-cooler system layouts are illustrated as follows:



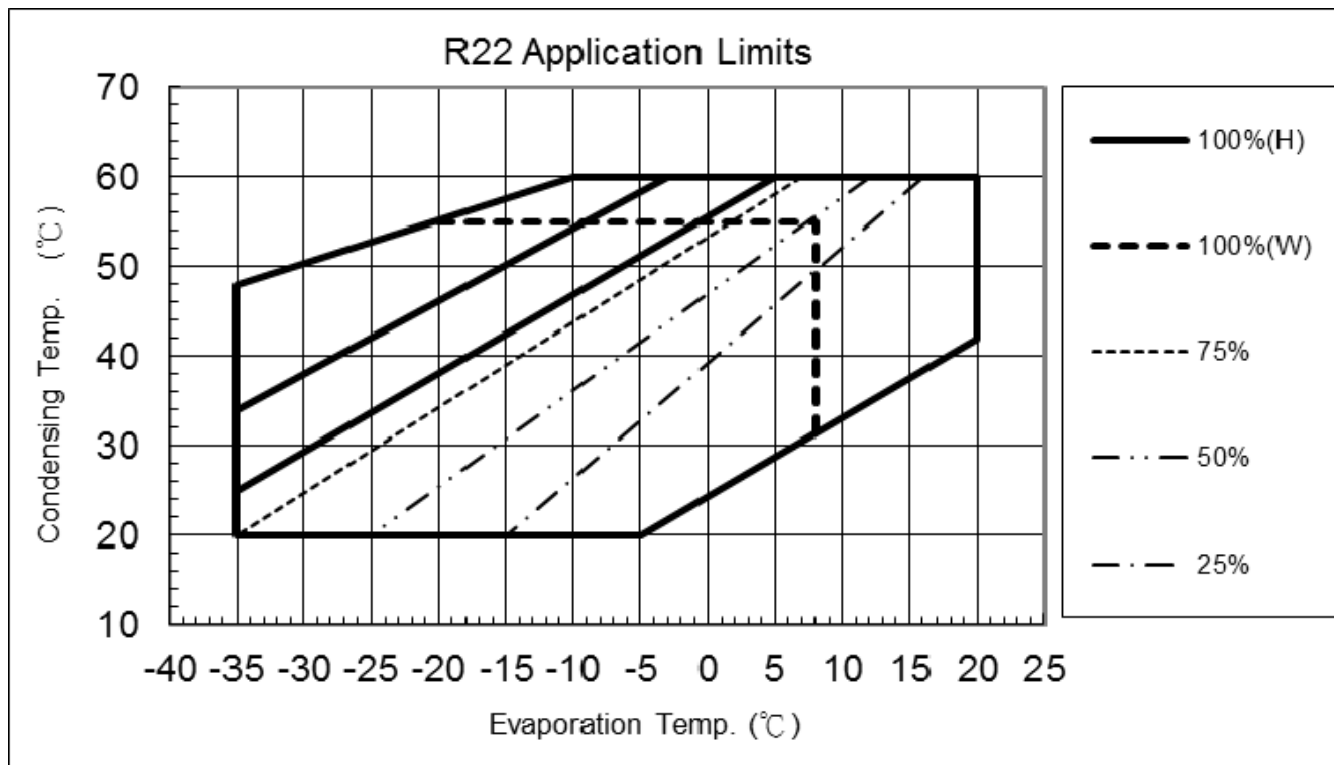
節能器應用 - 閃蒸桶 Economizer - Flash tank



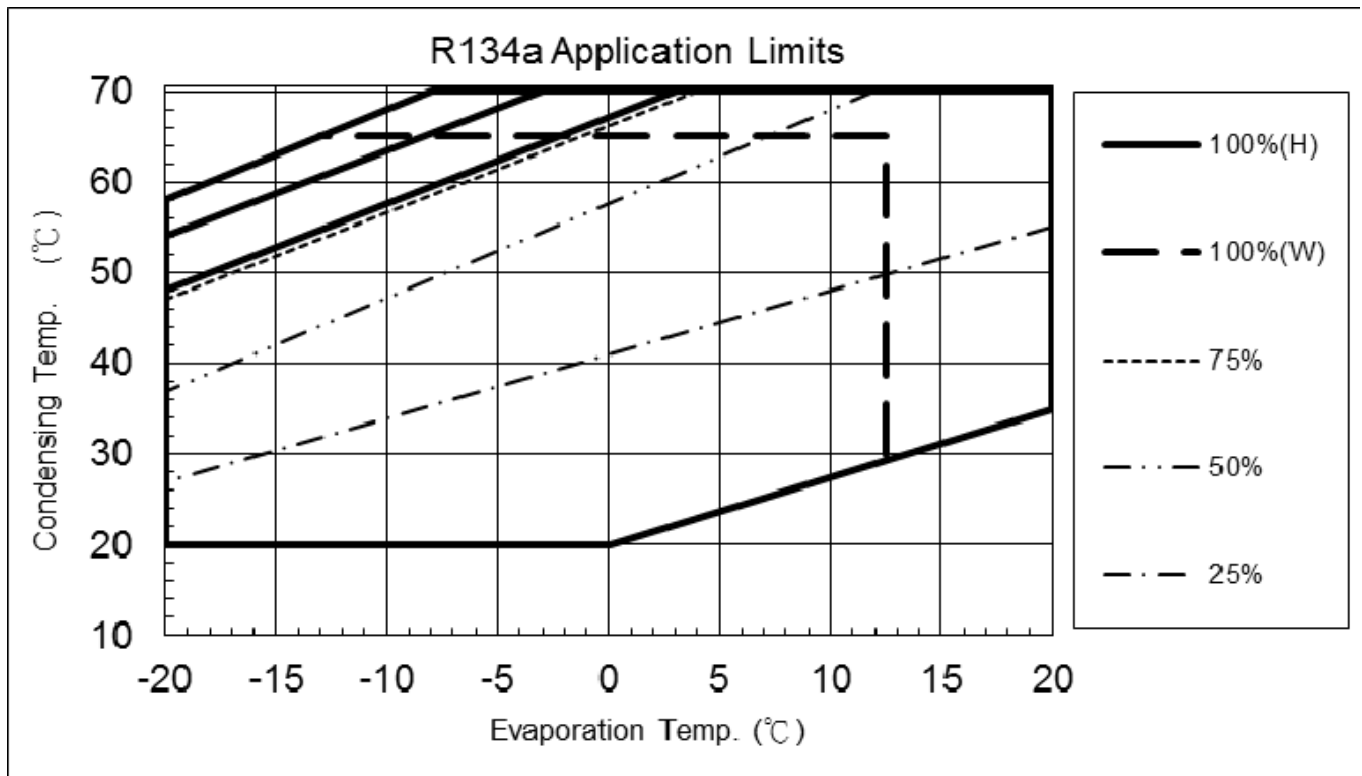
節能器應用 - 過冷卻 Economizer - Liquid sub-cooler

6.5 運轉範圍

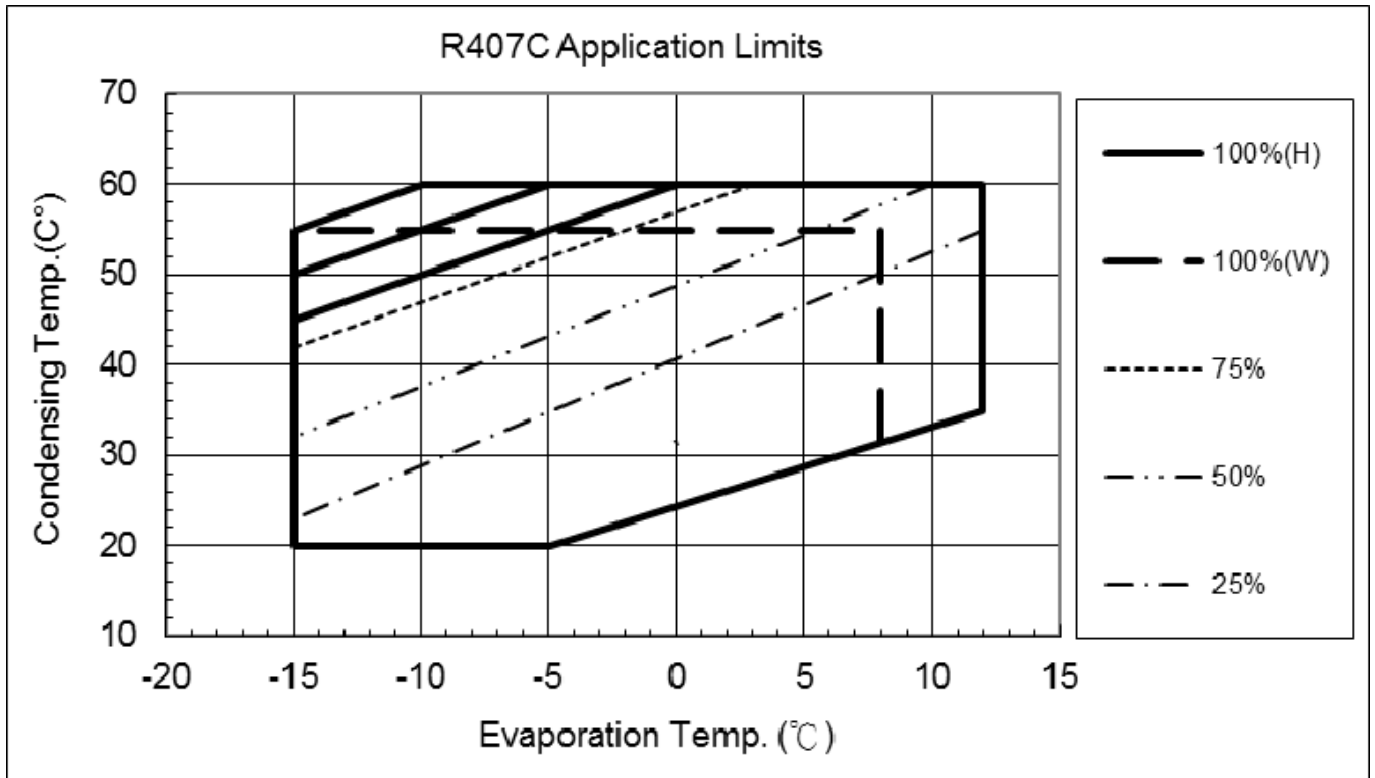
6.5 Operation envelope



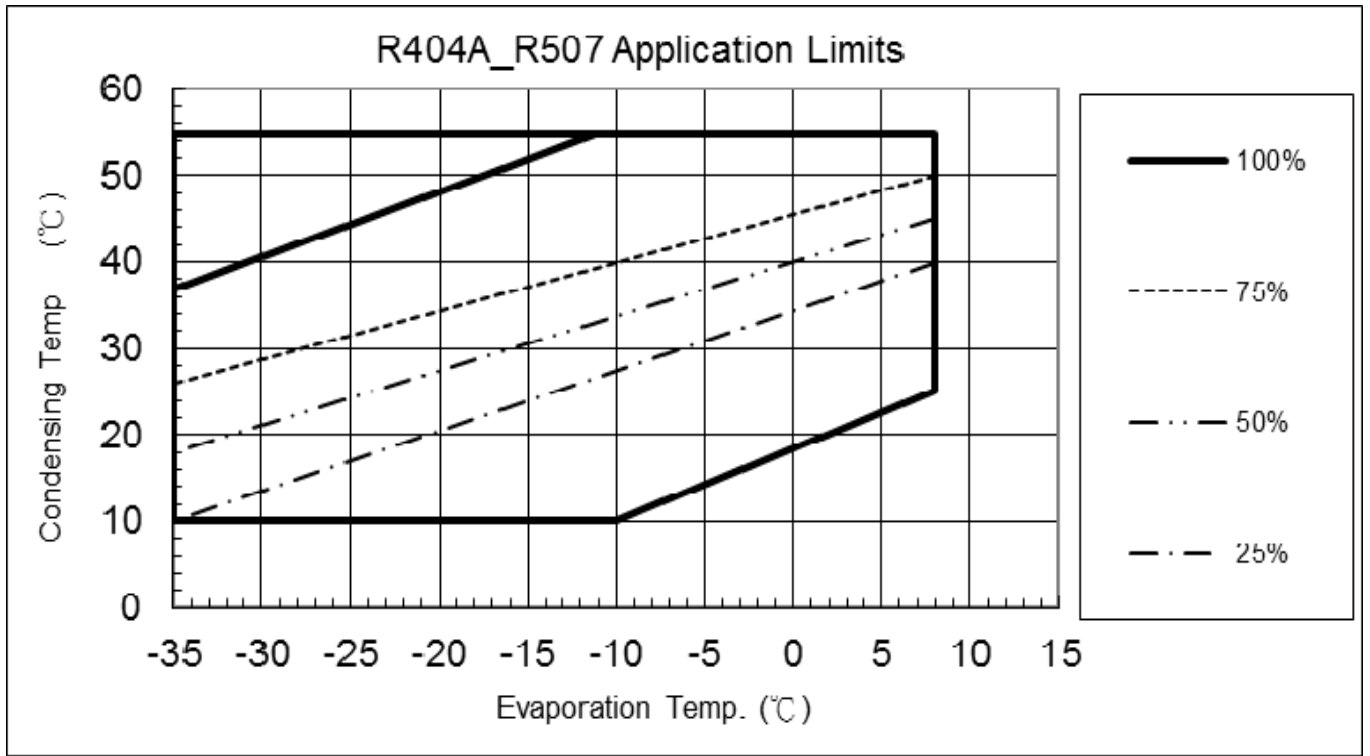
各運轉範圍說明：	Range of application：
區域 I： 壓縮機運轉需加裝液噴射和油冷卻裝置。	Region I： Need to operate with liquid injection and oil cooling.
區域 II： 壓縮機運轉需加裝液噴射或油冷卻裝置。	Region II： Need to operate with liquid injection or oil cooling.
—— 100%(氣冷運轉範圍) BSR516II R22 氣冷運轉範圍與水冷相同	—— 100% air-cooled operation envelope
..... 100%(水冷運轉範圍) 100% water-cooled operation envelope
----- 部份負載範圍	----- Part load operation envelope



各運轉範圍說明：	Range of application：
區域 I： 壓縮機運轉需加裝液噴射和油冷卻裝置。	Region I： Need to operate with liquid injection and oil cooling.
區域 II： 壓縮機運轉需加裝液噴射或油冷卻裝置。	Region II： Need to operate with liquid injection or oil cooling.
—— 100%(氣冷運轉範圍)	—— 100% air-cooled operation envelope
..... 100%(水冷運轉範圍) 100% water-cooled operation envelope
----- 部份負載範圍	----- Part load operation envelope



各運轉範圍說明：	Range of application：
區域 I： 壓縮機運轉需加裝液噴射和油冷卻裝置。	Region I： Need to operate with liquid injection and oil cooling.
區域 II： 壓縮機運轉需加裝液噴射或油冷卻裝置。	Region II： Need to operate with liquid injection or oil cooling.
—— 100%(氣冷運轉範圍)	—— 100% air-cooled operation envelope
..... 100%(水冷運轉範圍) 100% water-cooled operation envelope
----- 部份負載範圍	----- Part load operation envelope



各運轉範圍說明：	Range of application：
區域 I： 壓縮機運轉需加裝液噴射和油冷卻裝置。	Region I： Need to operate with liquid injection and oil cooling.
區域 II： 壓縮機運轉需加裝液噴射或油冷卻裝置。	Region II： Need to operate with liquid injection or oil cooling.
—— 100%(氣冷運轉範圍) BSR516II R404A 氣冷運轉範圍與水冷相同	—— 100% air-cooled operation envelope
..... 100%(水冷運轉範圍) 100% water-cooled operation envelope
----- 部份負載範圍	----- Part load operation envelope

7.產品配件

7.1 配件規格

7.1.1 容調電磁閥規格

容調電磁閥之控制電壓系採 220V，不適用異於 220V 電壓輸入；若有特殊需求 110V 之控制電壓，請與復盛公司聯繫更換電磁閥線圈。

7.1.2 加熱器規格：

- 種類：150W 或 300W；110V 與 220V 兩種電壓選擇。
- 絕緣值：以 DC500V 高阻計量測絕緣值 50MΩ 以上。

7.1.3 油位開關規格

- 絕緣值：以 DC200V 高阻計量測，絕緣值 10MΩ 以上。
- 最高使用電壓：AC230V
- 最高允許電流：0.5A,10VA
- 乾接點：低油位開路，高油位閉路

7.1.4 馬達及排氣溫度 PTC 控制模組：

- 電壓：230V，1PHASE(其他電壓 115V)
- 電驛 AC240, 2.5A, 360VA,SPST,自動復歸

7.1.5 馬達線圈溫度保護 PTC

Thermistor

- 量測電阻最高容許電壓: DC 2.5V
- 環境溫度下電阻值：小於 750 ohms
- 絕緣強度：600VAC

7.1.6 排氣溫度保護 PTC Thermistor

- 量測電阻最高容許電壓: DC 2.5V
- 環境溫度下電阻值：小於550 ohms
- 絕緣強度：600VAC

7. PRODUCT SCOPE :

7.1 Parts specification

7.1.1 Solenoid valve

The standard control voltage is 220V. Other voltage is available on request.

7.1.2 Heater

- Model: 150W or 300W, Standard voltage : 220V. Other voltage is available on request.
- Insulation value: 50MΩ or above measured by DC500V Mega-ohm meter.

7.1.3 Oil level switch

- Insulation value: 100MΩ or above measured by DC200V Mega-ohm resistance meter.
- Maximum allowable voltage: AC230V
- Maximum allowable current: 0.5A, 10VA
- Dry contact: open at low oil level, close at high oil level.

7.1.4 PTC control module for motor and discharge temperature

- Voltage: 230V , 1PHASE (115V is available on request)
- Relay: Max Amp: AC240, 2.5A, 360VA,SPST, auto reset.

7.1.5 PTC thermistor for motor winding protection

- Maximum allowable voltage for measuring resistance: DC 2.5V
- Resistance under ambient temperature: less than 750 Ω
- Insulation strength: 600VAC

7.1.6 PTC Thermistor for discharge temperature protection

- Maximum allowable voltage for measuring resistance: DC 2.5V
- Resistance under ambient temperature: less than 550 Ω
- Insulation strength: 600VAC

7.2 配件明細 Fitting list

序號 No.	配件名稱 Parts name	機型 Model
1	排氣法蘭、墊片、擋板 Discharge flange, gasket and sealing plate	S
2	進氣法蘭、墊片、擋板 Suction flange, gasket and sealing plate	S
3	進氣過濾器 Suction filter	S
4	油過濾器 Oil filter	S
5	電磁閥三只 (有段容調) 或兩只 (無段容調) Solenoid valves 3 pieces for step capacity control, or 2 pieces for linear capacity control	S
6	馬達線圈溫度熱敏電阻 Motor winding PTC thermistor	S
7	冷凍油(BSR21X~42X) Refrigerant oil (BSR21X~42X)	S
8	油加熱器 Oil heater	S
9	油位開關 Oil level switch	S
10	排氣高溫熱敏電阻 Discharge temperature PTC thermistor	S
11	洩油閥 Draining valve	S
12	壓縮室節能器噴射接口 Economizer injection port-compression chamber	S
13	中間壓與低壓端液噴射接頭 Liquid injection adapters – motor side and compression chamber	S
14	非石棉墊片 Non-asbestos gasket	S
15	排氣止回閥 Discharge check valve	S
16	安全閥 Safety valve	O
17	進氣關斷閥 Suction service valve	O
18	排氣關斷閥 Discharge service valve	O
19	防震墊 Rubber mounting pads	O
20	液冷媒噴射用毛細管或電磁閥 Liquid refrigerant injection capillary tube or solenoid valve	O
21	電氣保護模組 Electrical protection module	S

S : 標準配備 O : 選用配備 - : 無此配置

S : Standard, O : Optional, - : Not applicable.

7.3 潤滑油

7.3 Lubricant

HCFC/R-22

冷凍油特性 Lubricant characteristics	油品名稱 Lubricant			
	FS 150R	FS 300R	FS055M	FS100M
黏度(viscosity) cst@40°C ASTM D445	168	298	54.9	94.6
黏度(viscosity) cst@100°C ASTM D445	20.2	32	5.97	7.78
黏度指數 (viscosity index) ASTM D2270	150	149	0	37
比重 (Specific weight) ASTM D1298/D1250	1.01	1.05	0.916	0.918
流動點 (Flow point)(°C)ASTM D97	-43	-35	-35	-27.5
閃火點(Flash point)(°C)ASTM D92	290	271	188	208
耐電壓強度 (Voltage strength) (kV) ASTM D877	42.0	42.5	>30	>30

HFC/R-134a/R-407C

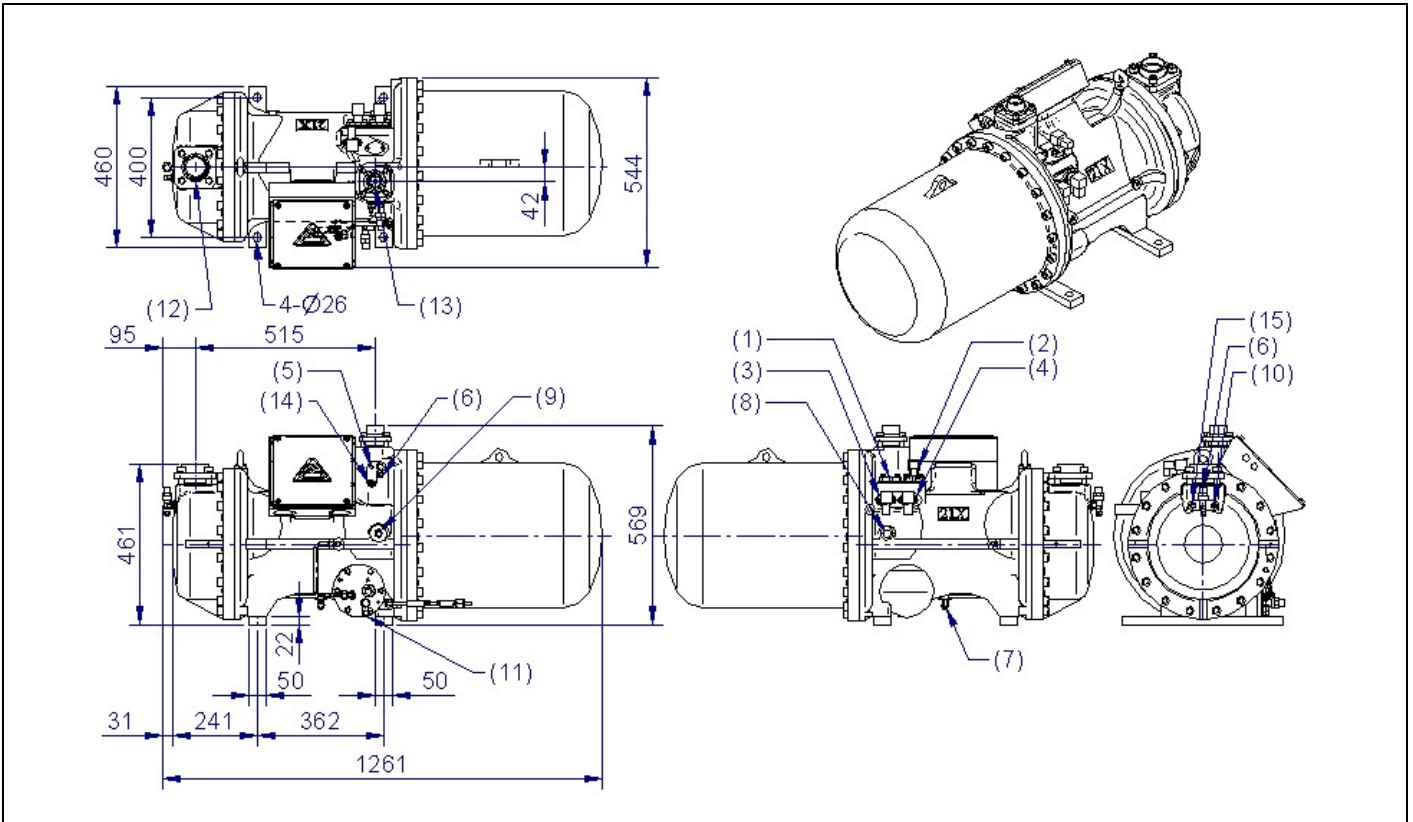
冷凍油特性 Lubricant characteristics	油品名稱 Lubricant	
	FS 070R	FS 120R
黏度(viscosity) , cst@40°C ASTM D445	66.3	127.7
黏度(viscosity) , cst@100°C ASTM D445	8.9	12.7
黏度指數(viscosity index) ASTM D2270	108	90
比重(Specific weight) ASTM D4052	0.957	0.951
流動點(Flow point)(°C)ASTM D97	-43	-33
閃火點(Flash point)(°C)ASTM D92	263	251
耐電壓強度(Voltage strength) (kV) ASTM D877	49.4	47.0

7.4 壓縮機外觀尺寸

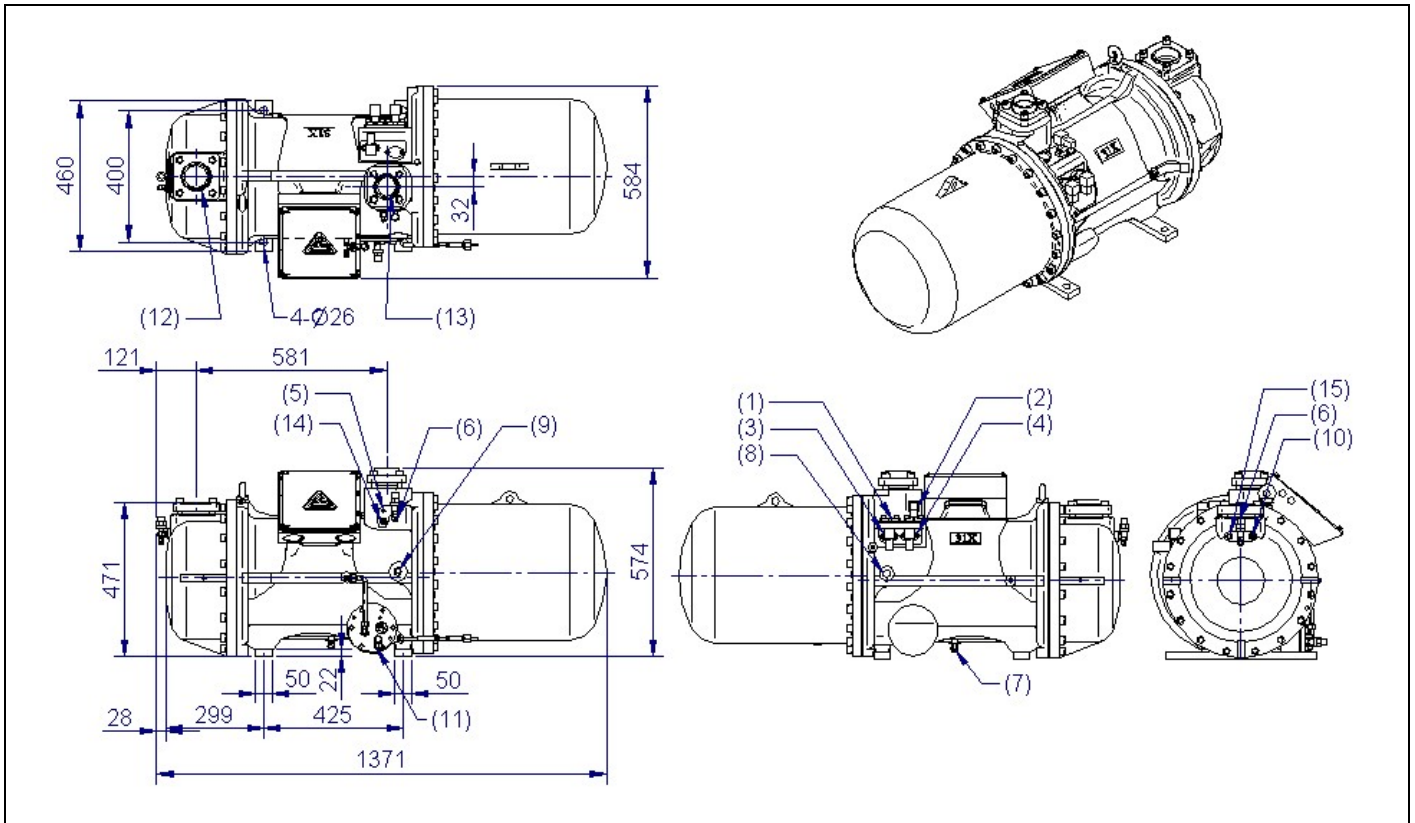
7.4 Compressor outline dimension

Model: BSR21X

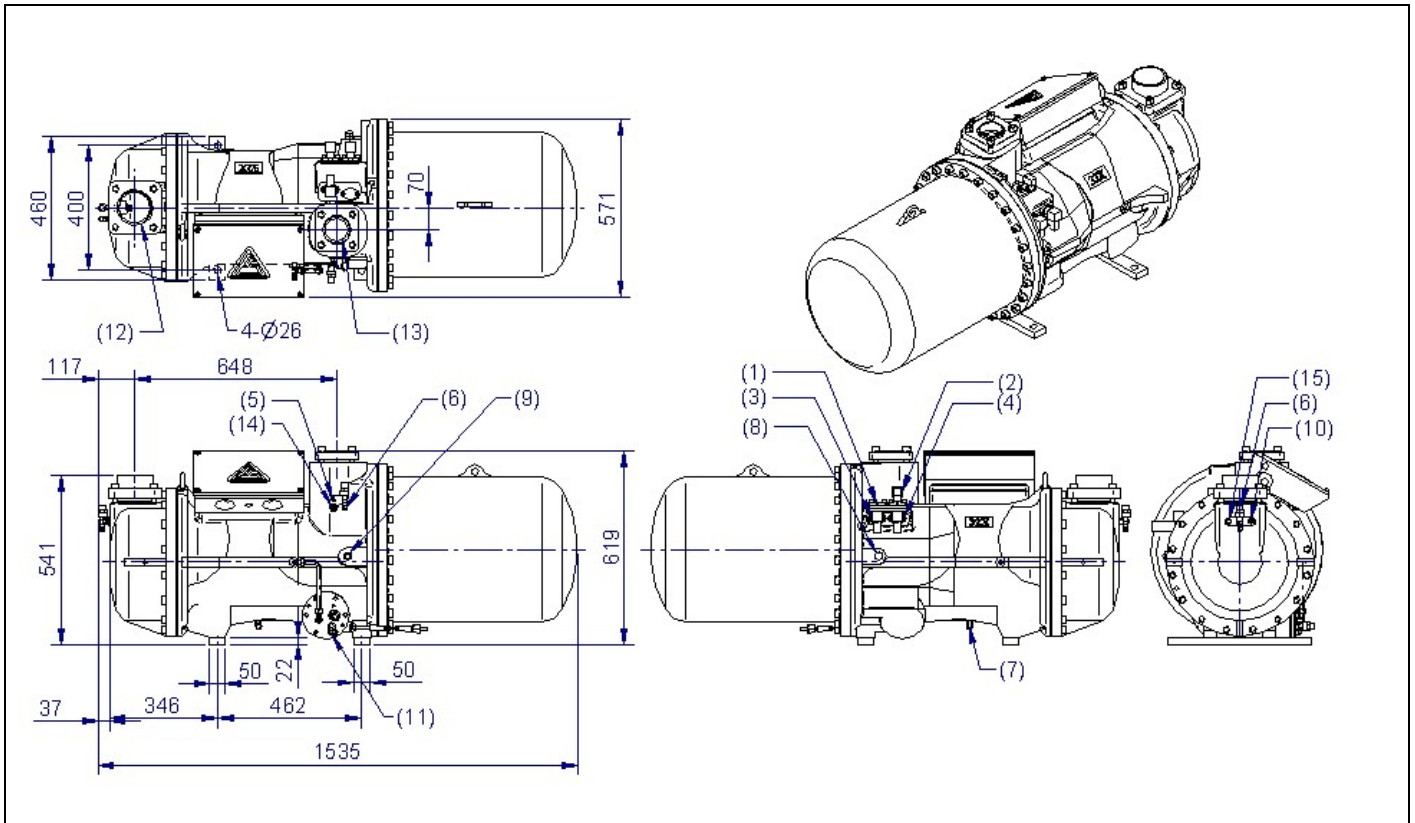
Unit : mm



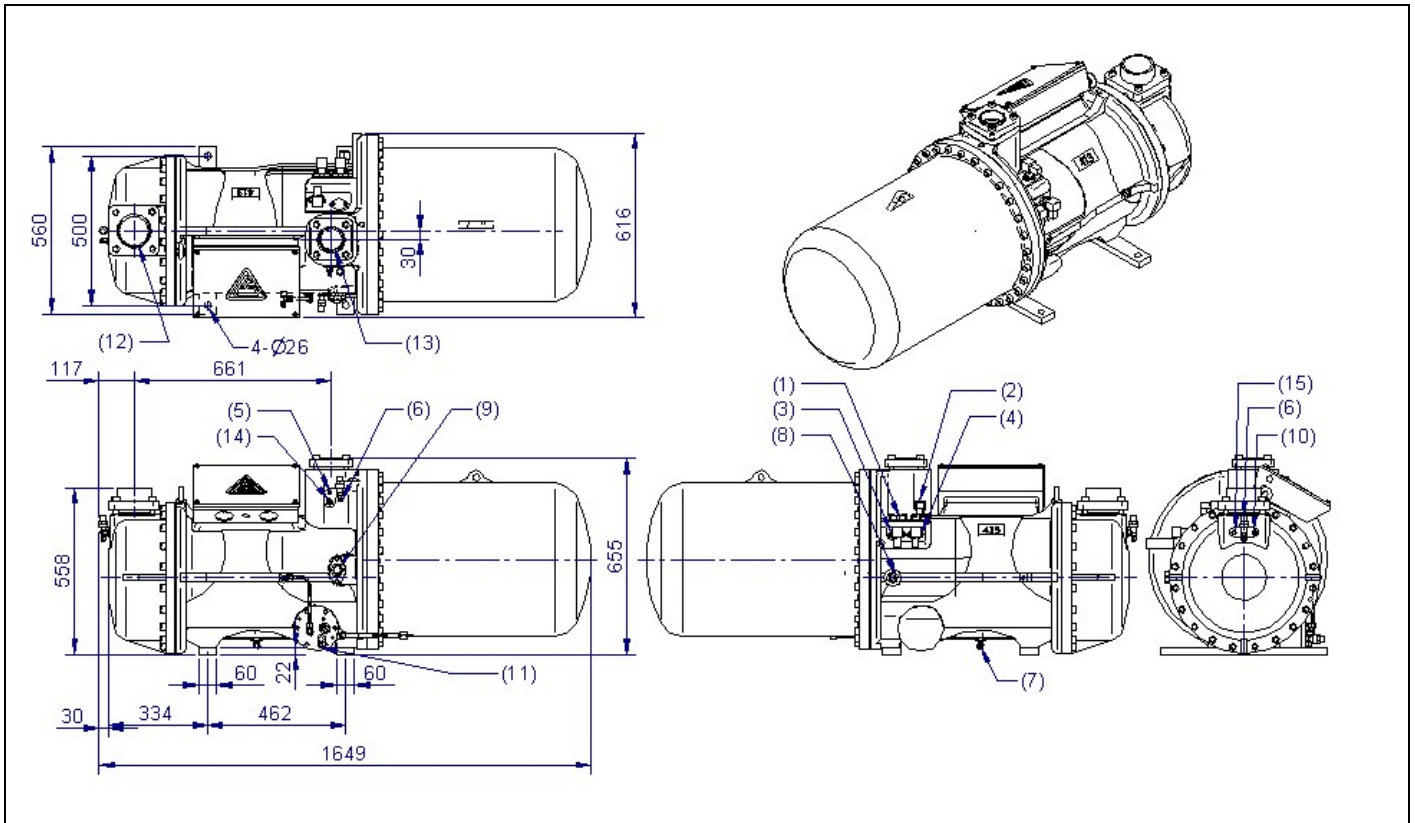
No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	高壓端偵測接頭	High pressure adapter	HP-1/4" Flare
(6)	備用接頭	Spare adapter	1/4" Angle Valve
(7)	洩油接頭	Draining adaptor	3/8" Flare
(8)	液噴射接頭	Liquid injection adaptor	LI-1/2" Flare
(9)	節能器接口	Economizer port	ECO-3/4" NPT
(10)	低壓端偵測接頭	Low pressure adapter	LP-1/4" Flare
(11)	洩油閥	Draining valve	Drain-3/8" Angle Valve
(12)	活動式套管	Suction sleeve	SL, 67(2-5/8")
(13)	活動式套管	Discharge sleeve	DL, 42(1-5/8")
(14)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(15)	備用孔位	Spare hole	3/8"NPT



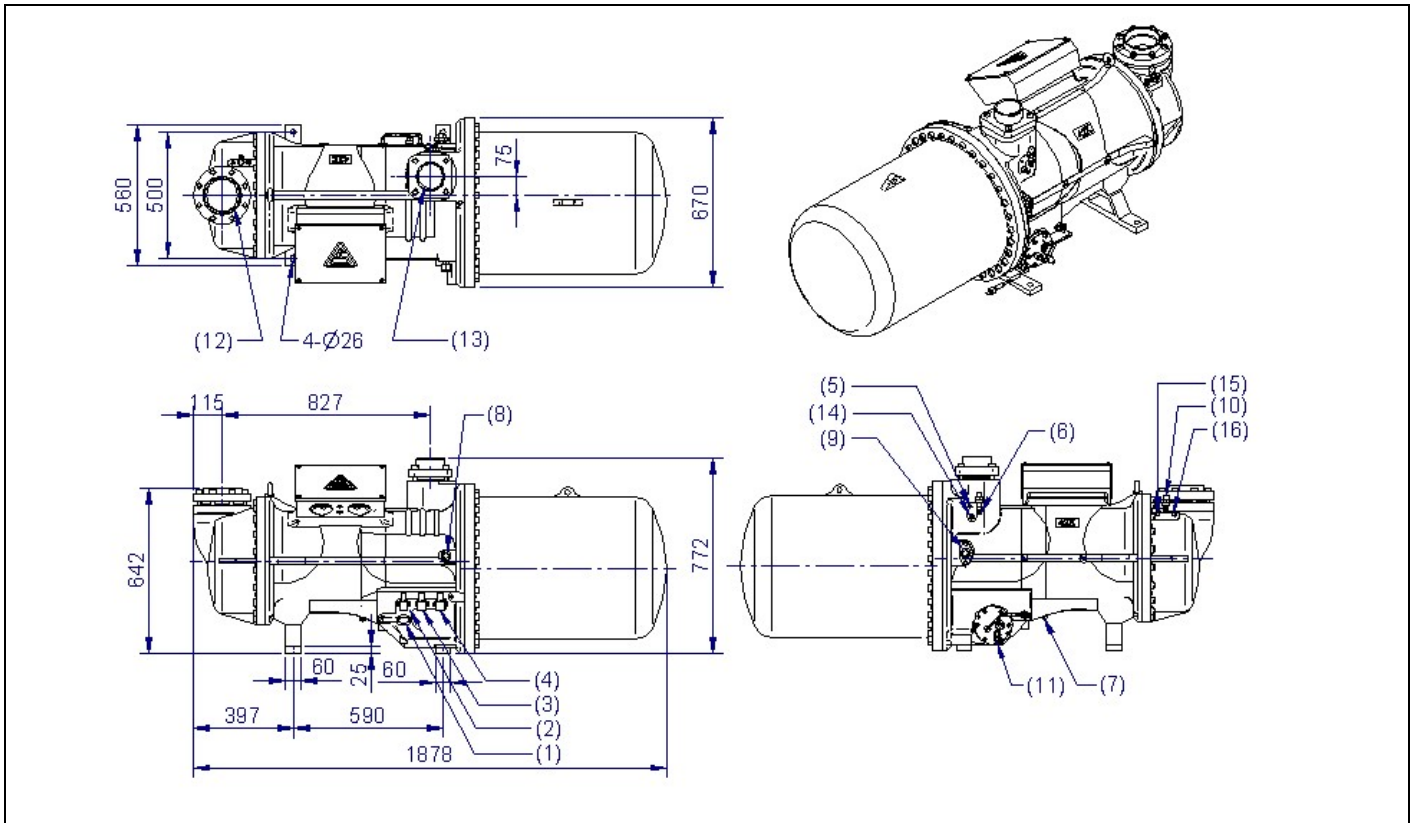
No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	高壓端偵測接頭	High pressure adapter	HP-1/4" Flare
(6)	備用接頭	Spare adapter	1/4" Angle Valve
(7)	洩油接頭	Draining adaptor	3/8" Flare
(8)	液噴射接頭	Liquid injection adapter	LI-1/2" Flare
(9)	節能器接口	Economizer port	ECO-3/4" NPT
(10)	低壓端偵測接頭	Low pressure adapter	LP-1/4" Flare
(11)	洩油閥	Draining valve	Drain-3/8" Angle Valve
(12)	活動式套管	Suction sleeve	SL, 80(3-1/8")
(13)	活動式套管	Discharge sleeve	DL, 67(2-5/8")
(14)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(15)	備用孔位	Spare hole	3/8"NPT



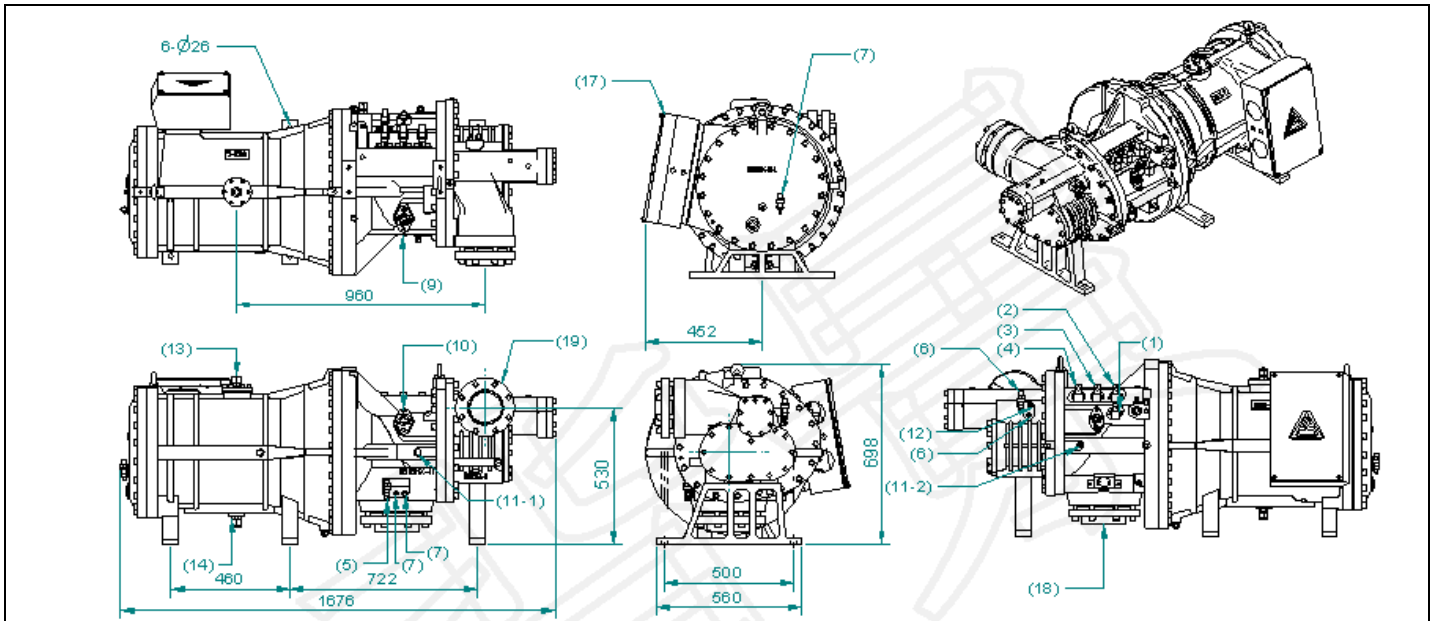
No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	高壓端偵測接頭	High pressure adapter	HP-1/4" Flare
(6)	備用接頭	Spare adapter	1/4" Angle Valve
(7)	洩油接頭	Draining adaptor	3/8" Flare
(8)	液噴射接頭	Liquid injection adapter	LI-1/2" Flare
(9)	節能器接口	Economizer port	ECO-3/4" NPT
(10)	低壓端偵測接頭	Low pressure adapter	LP-1/4" Flare
(11)	洩油閥	Draining valve	Drain-3/8" Angle Valve
(12)	活動式套管	Suction sleeve	SL, 104(4")
(13)	活動式套管	Discharge sleeve	DL, 80(3-1/8")
(14)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(15)	備用孔位	Spare hole	3/8"NPT



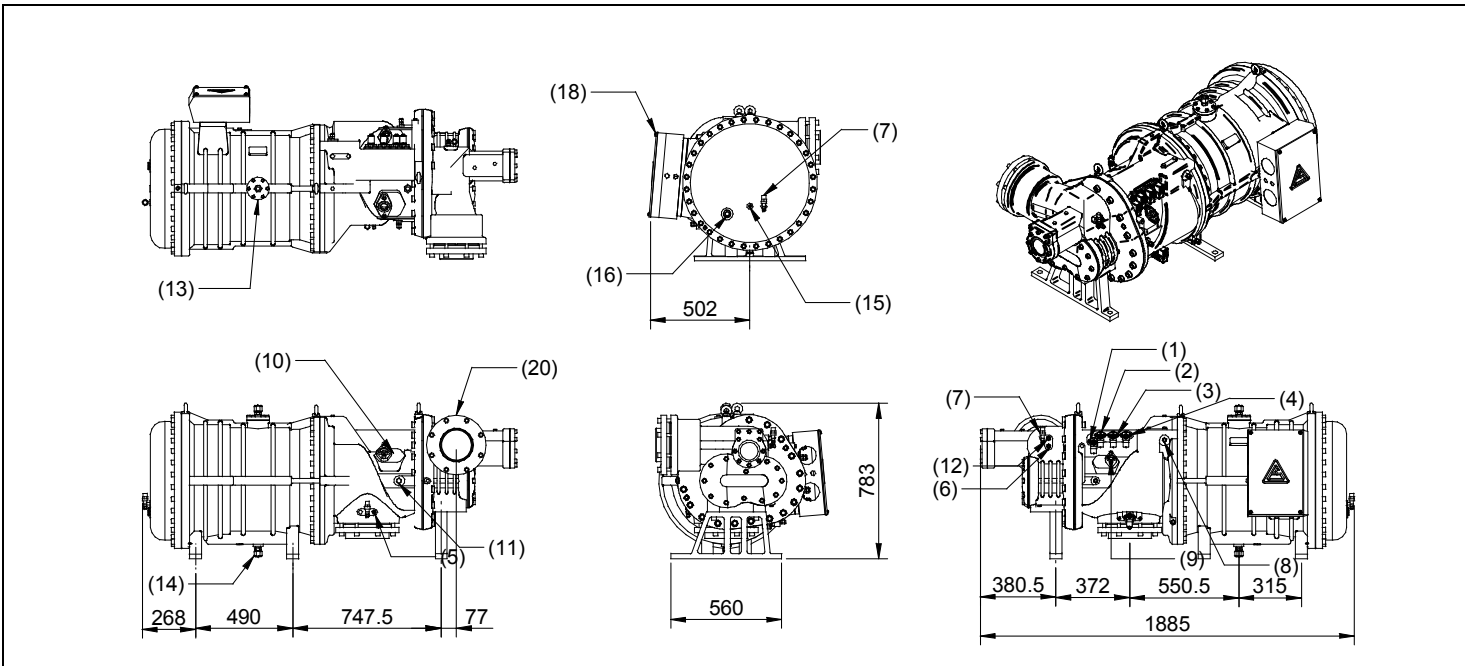
No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	高壓端偵測接頭	High pressure adapter	HP-1/4" Flare
(6)	備用接頭	Spare adapter	1/4" Angle Valve
(7)	洩油接頭	Draining adaptor	3/8" Flare
(8)	液噴射接頭	Liquid injection adapter	LI-3/4" Flare
(9)	節能器接口法蘭	Economizer flange	ECO-1"
(10)	低壓端偵測接頭	Low pressure adapter	LP-1/4" Flare
(11)	洩油閥	Draining valve	Drain-3/8" Angle Valve
(12)	活動式套管	Suction sleeve	SL, 104(4")
(13)	活動式套管	Discharge sleeve	DL, 80(3-1/8")
(14)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(15)	備用孔位	Spare hole	3/8"NPT



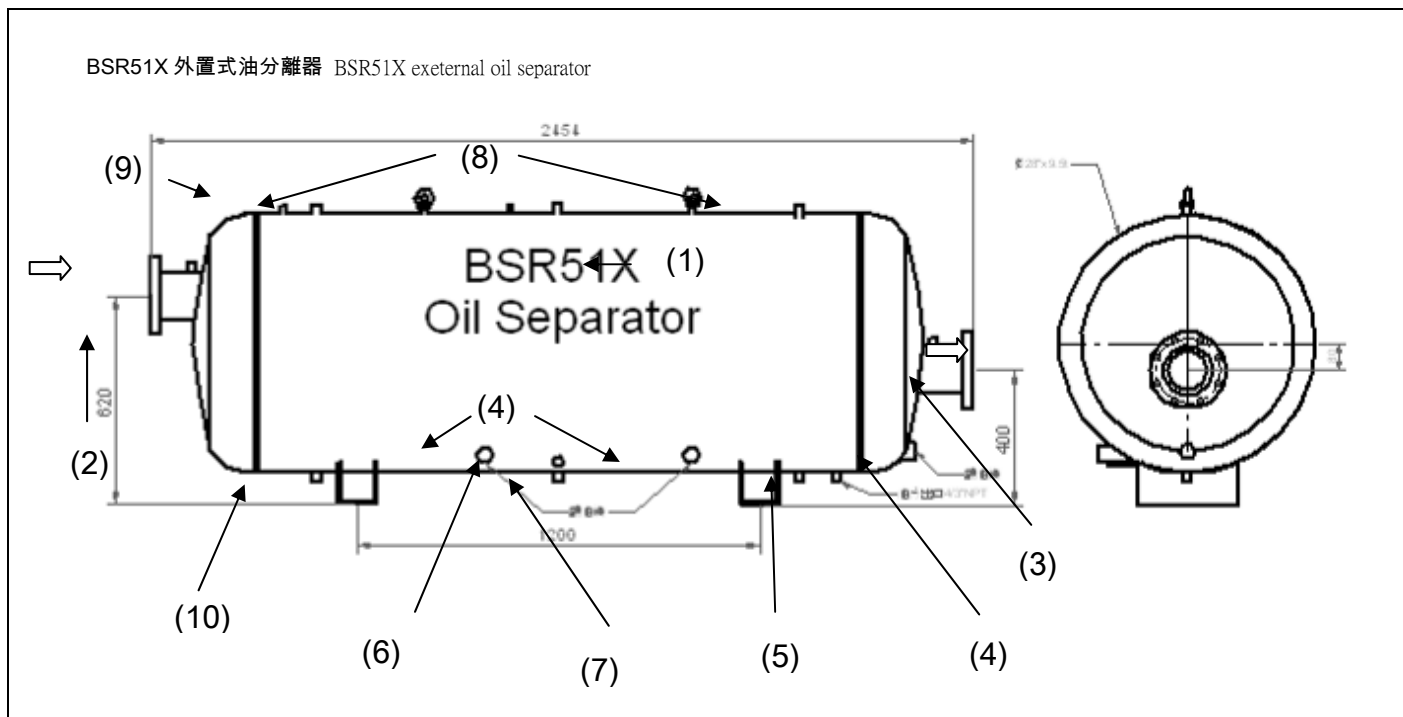
No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	高壓端偵測接頭	High pressure adapter	HP-1/4" Flare
(6)	備用接頭	Spare adapter	1/4" Angle Valve
(7)	洩油接頭	Draining adaptor	3/8" Flare
(8)	液噴射接頭	Liquid injection adapter	LI-3/4" Flare
(9)	節能器接口法蘭	Economizer flange	ECO-1"
(10)	備用接頭	Spare adapter	1/4" Angle Valve
(11)	洩油閥	Draining valve	Drain-3/8" Angle Valve
(12)	活動式套管	Suction sleeve	SL, 125(5")
(13)	活動式套管	Discharge sleeve	DL, 104(4")
(14)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(15)	低壓端偵測接頭	Low pressure adapter	LP-1/4" Flare
(16)	備用孔位	Spare hole	3/8"NPT



No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	低壓端偵測頭	Low pressure adapter	LP-1/4" Flare Connector
(6)	高壓端偵測頭	High pressure adapter	
(7)	備用接頭	Spare adapter	3/8" Flare
(8)	入油接頭	Oil inlet adapter	3/4" Flare
(9)	液噴射接口法蘭	Liquid injection adapter	LI(1") Flare
(10)	節能器接口法蘭	Economizer flange	ECO(1-1/2")Flare
(11)	中壓入油接頭	Oil inlet adapter	11-1 3/8"NPT Copper Plug 11-2 1/2" NPT Copper Plug
(12)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(13)	馬達冷卻入口法蘭	ECO inlet flange	3/4" Flare
(14)	馬達冷卻出口法蘭	ECO outlet flange	3/4" Flare
(15)	油位開關	Liquid level switch	
(16)	觀油鏡	Sight glass	
(17)	電機接線盒 PTC/PT100 端子板	Terminal box PTC/PT100 Terminal plate	
(18)	壓縮機冷媒入口	Suction sleeve	SL,152(6")
(19)	壓縮機冷媒出口	Discharge sleeve	DL,125(5")



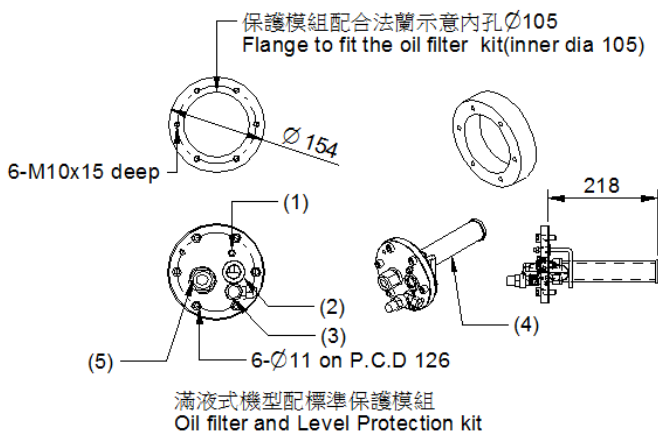
No.	品名	Parts	Remark
(1)	容調用電磁閥	Solenoid valve	SV0(stepless, option)
(2)	容調用電磁閥	Solenoid valve	SV1(25%)
(3)	容調用電磁閥	Solenoid valve	SV2(50%)
(4)	容調用電磁閥	Solenoid valve	SV3(75%)
(5)	低壓端偵測頭	Low pressure adapter	LP-1/4" Flare Connector
(6)	高壓端偵測頭	High pressure adapter	
(7)	備用接頭	Spare adapter	3/8" Flare
(8)	入油接頭	Oil inlet adapter	3/8" Flare
(9)	液噴射接口法蘭	Liquid injection adapter	LI(1") Flare
(10)	節能器接口法蘭	Economizer flange	ECO(1-1/2")Flare
(11)	中壓入油接頭	Oil inlet adapter	1/2"NPTCopper Plug
(12)	排氣溫度熱敏電阻	Discharge temp. PTC Thermistor	PTC Sensor
(13)	節能器入口法蘭	ECO inlet flange	
(14)	節能器出口法蘭	ECO outlet flange	
(15)	油位開關	Liquid level switch	
(16)	觀油鏡	Sight glass	
(17)	PTC/PT100 端子板	PTC/PT100 Terminal plate	
(18)	電機接線盒	Terminal box	
(19)	壓縮機冷媒入口	Suction sleeve	SL,152(8")
(20)	壓縮機冷媒出口	Discharge sleeve	DL,125(6")



No.	品名	Parts	Remark
(1)	BSR51X 油分離器	Oil Separator	BSR513~BSR516
(2)	入口端	Oil Input	5" flange
(3)	出口端	Oil Output	5" flange
(4)	油視窗	Sight Glass	
(5)	回油出口	Oil Return End	3/4" Flare
(6)	油加熱器	Oil Heater	300W
(7)	洩油接頭	Drain-3/8" Angle Valve	3/8" Flare
(8)	備用接頭(安全閥)	Spare adaptor	1" Flare
(9)	備用接頭	Spare adaptor	1/8" Flare
(10)	備用接頭	Spare adaptor	1/4" Flare

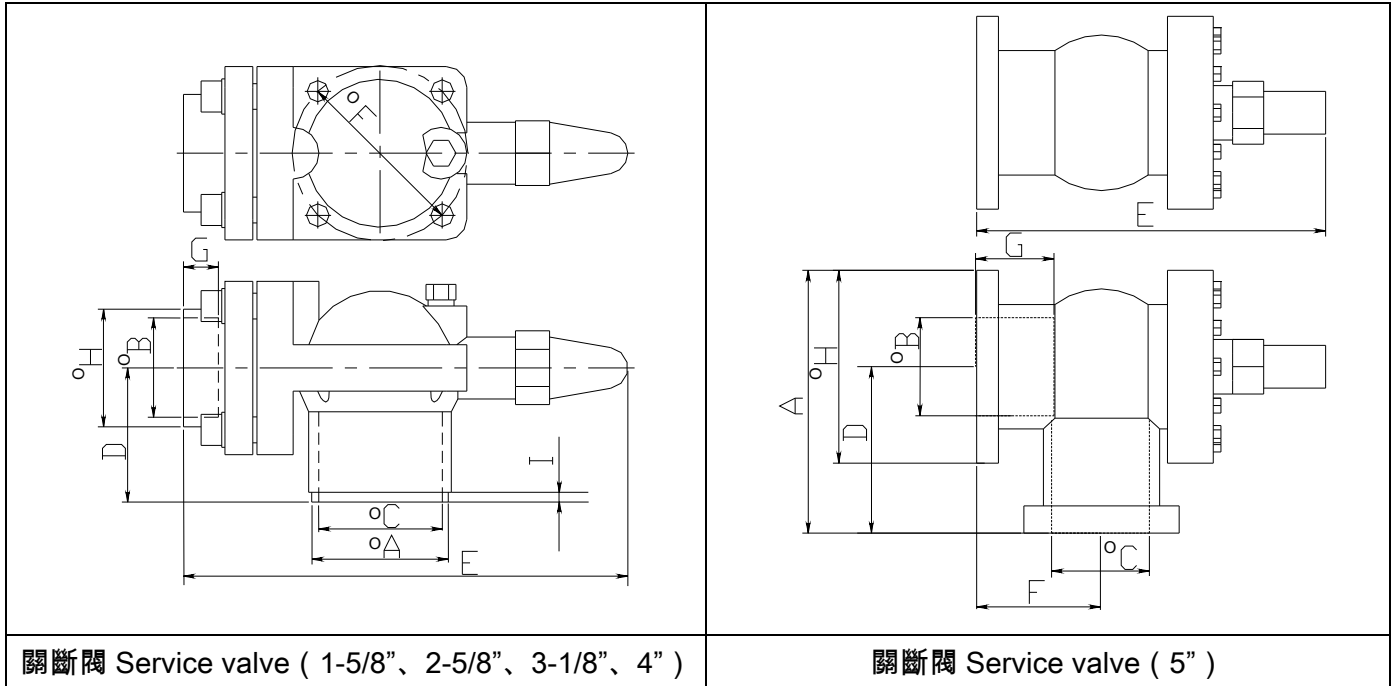
BSR51XII/BSR61X 外置保護模組-搭配系統圖 A-配置於外置油分 BSR51XII/BSR61X external protection module - used in system layout A and installed to external oil separator

(1)	油位開關	oil level switch
(2)	觀油鏡	oil sight glass
(3)	角閥	drain valve
(4)	油過濾器	oil filter
(5)	3/4"接頭	3/4"Flare



7.5 關斷閥尺寸

7.5 Service valve dimension



Unit: mm

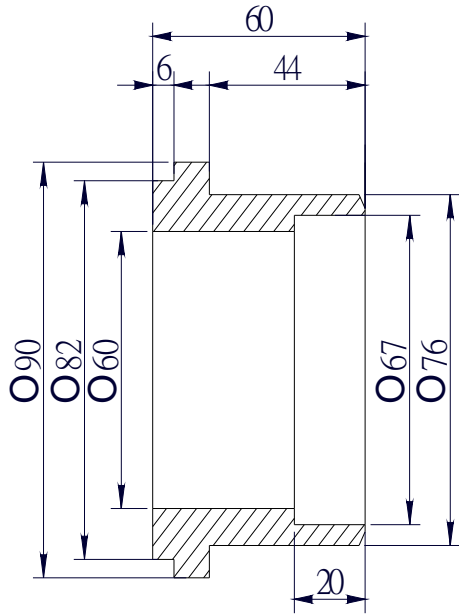
尺寸 Dimension	1-5/8"	2-5/8"	3-1/8"	4"	5"
A	70	81.5	105	130	338
B	42	67	80	105	135
C	54	65	85	111	126
D	47	64	79	95	214
E	257	317	357	440	450
F	90	110	140	173	161
G	24	28	32	50.5	35
H	48.5	77	88.5	114.5	154
I	8	8	6	6	-

關斷閥公稱尺寸 Nominal dimension of service valve

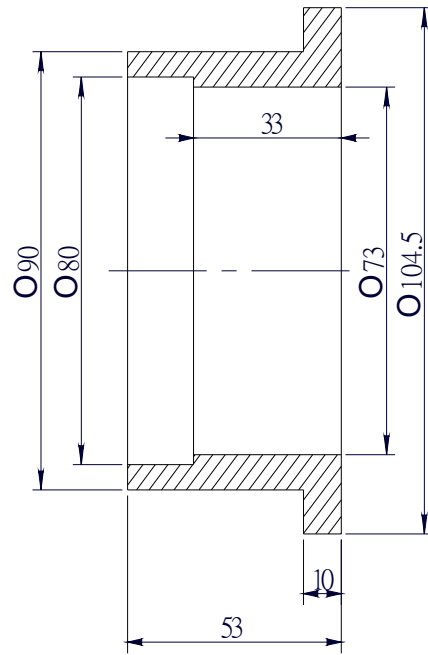
型號 Model	吸氣關斷閥 Suction service valve	排氣關斷閥 Discharge service valve
BSR213(S) BSR216	2-5/8"	1-5/8"
BSR311(S) BSR314 BSR316	3-1/8"	2-5/8"
BSR321 BSR323 BSR324 BSR326 BSR413 BSR415	4"	3-1/8"
BSR421 BSR423 BSR424 BSR426	5"	4"
BSR427 BSR428	-	4"
BSR513II BSR514II BSR516II	-	5"
BSR613 BSR614 BSR616	-	-

7.6 吸氣套管尺寸

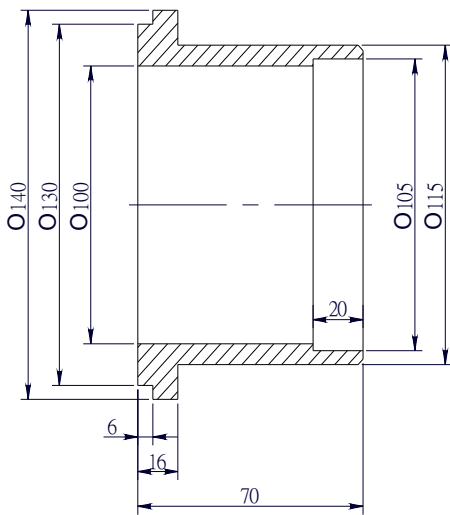
7.6 Suction sleeve dimension



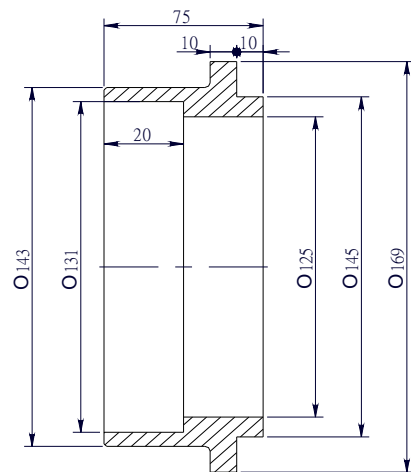
BSR21X



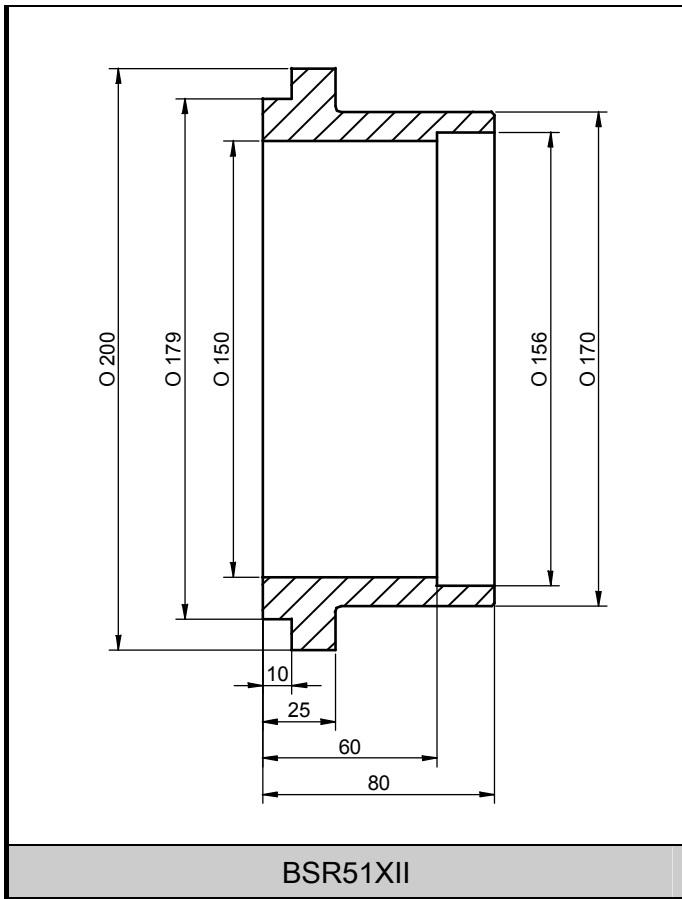
BSR31X



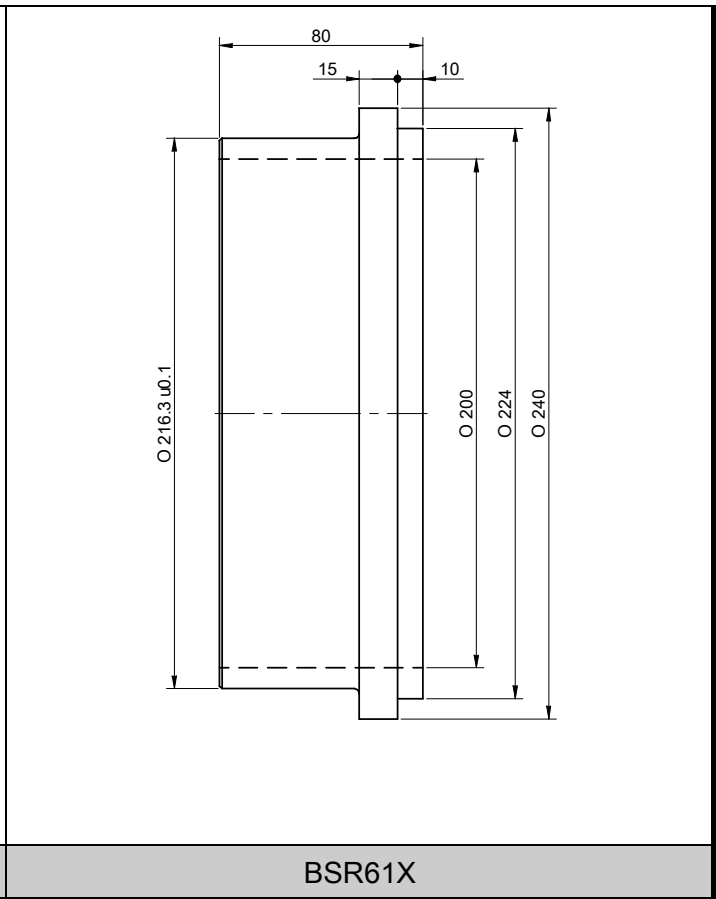
BSR32X-41X



BSR42X



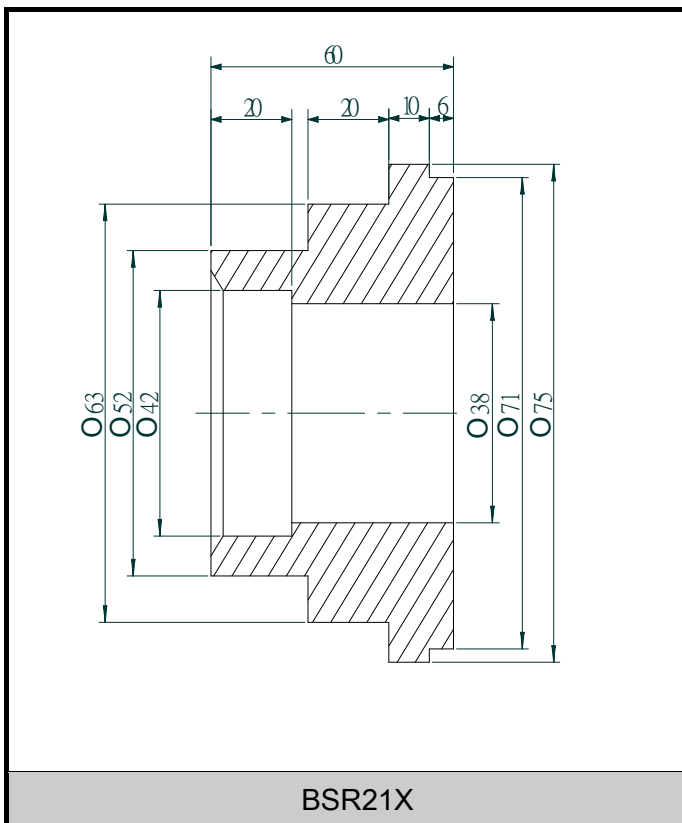
BSR51XII



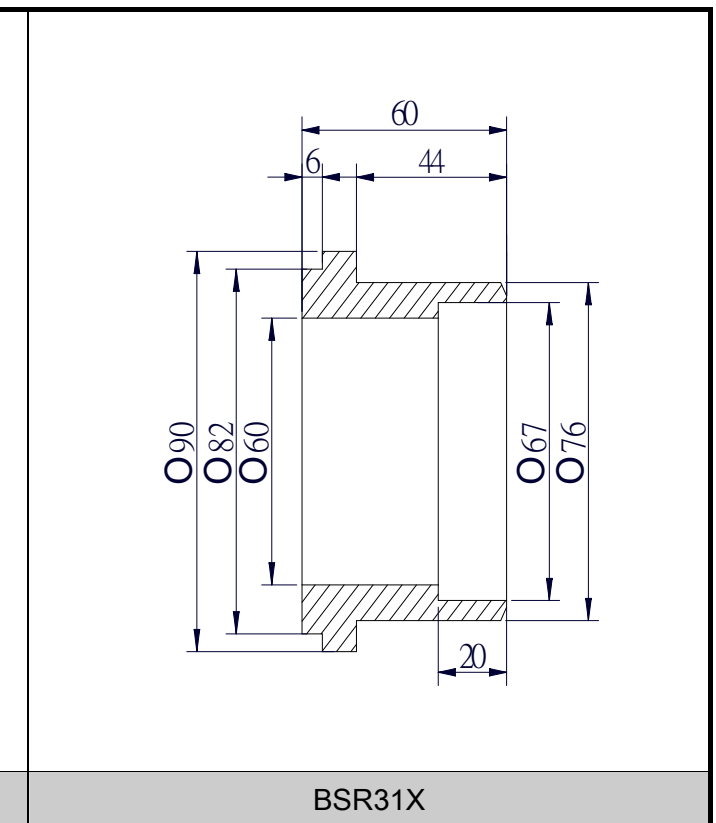
BSR61X

7.7 排氣套管尺寸

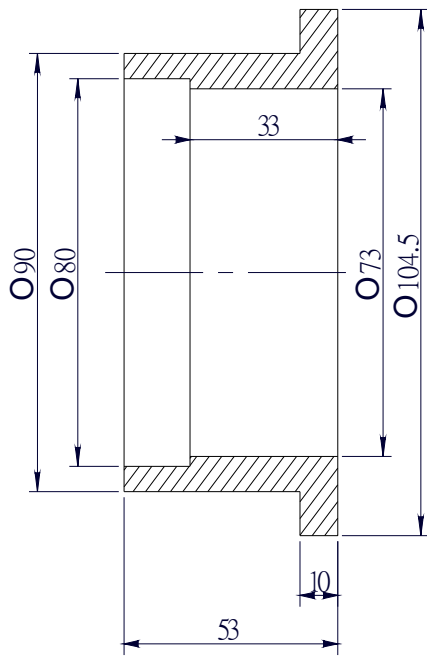
7.7 Discharge sleeve dimension



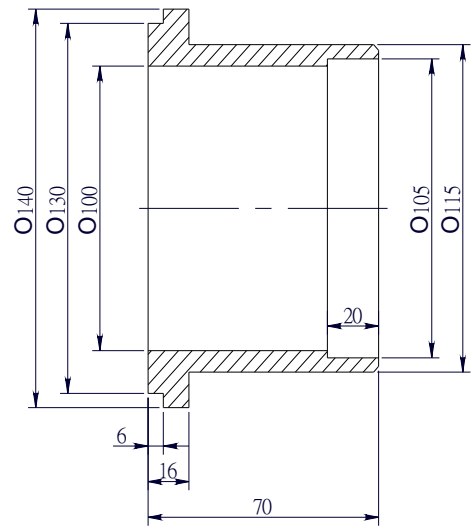
BSR21X



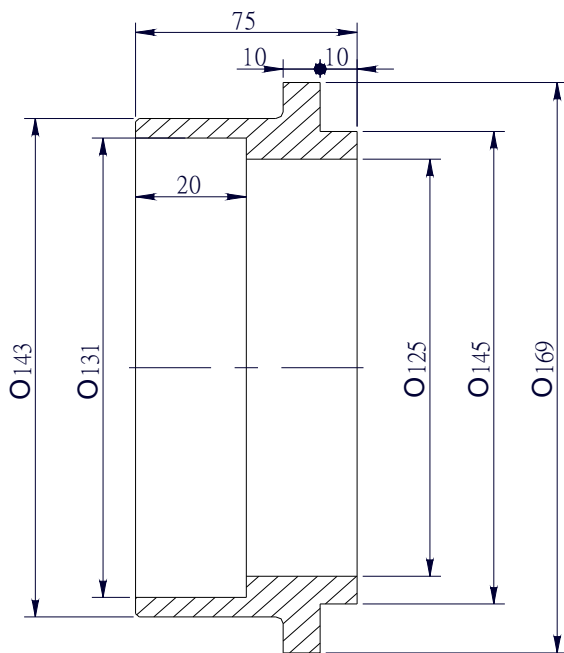
BSR31X



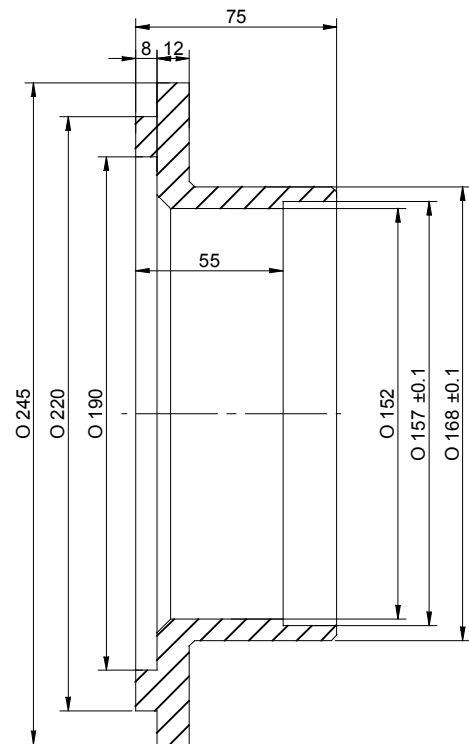
BSR32X-41X



BSR42X



BSR51XII



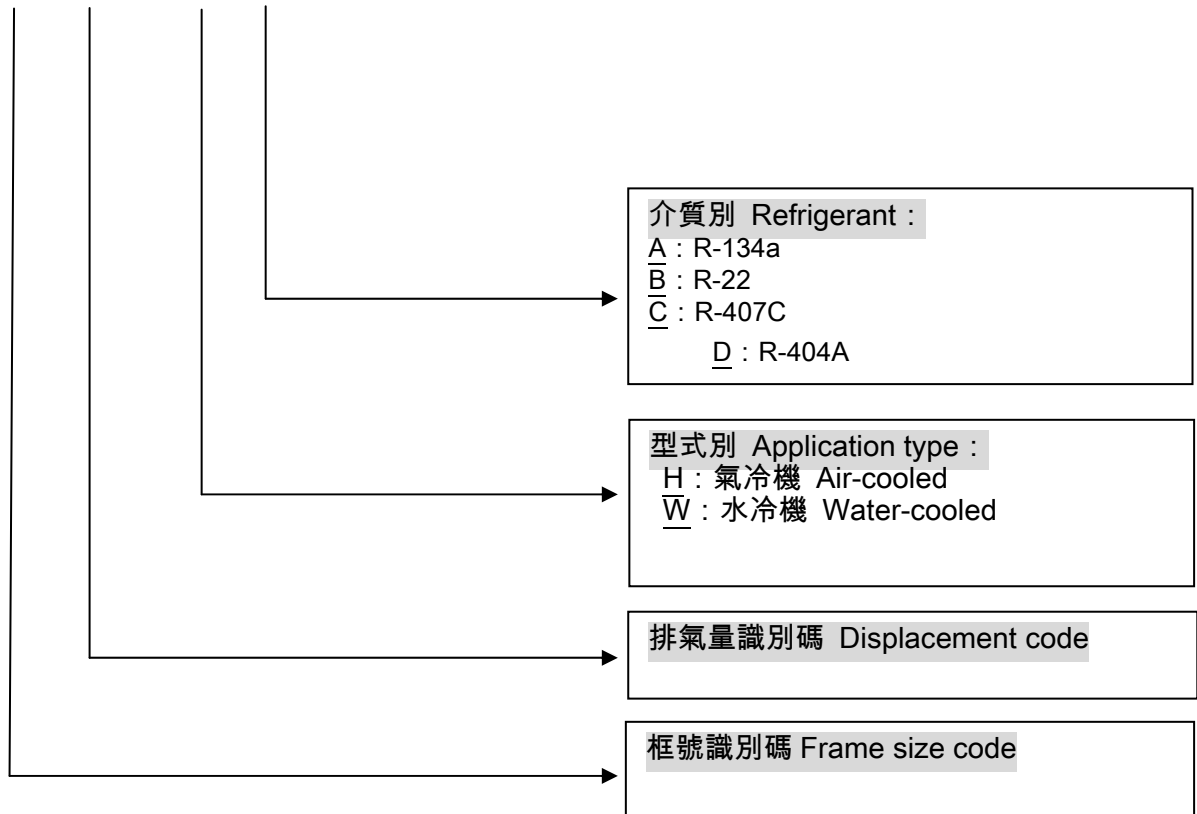
BSR61X

7.8 型號編碼原則

7.8 Model designation

冷媒壓縮機機體編碼原則：

BSR XX X - X X



7.9 噪音值

7.9 Noise level

BSR Sound pressure level (dBA)															
Model Hz	BSR 213(S)	BSR 216	BSR 311(S)	BSR 314	BSR 316	BSR 321	BSR 323	BSR 324	BSR 326	BSR 413	BSR 415	BSR 421	BSR 423	BSR 424	BSR 426
125	47.4	52.0	43.8	45.9	39.9	47.4	49.4	49.8	48.6	44.0	44.0	44.9	46.2	44.4	46.6
160	51.2	55.3	48.1	46.9	43.8	49.0	45.9	47.3	48.7	43.1	43.3	44.1	41.9	45.9	45.0
200	52.2	56.3	49.3	51.6	47.5	54.4	51.7	52.5	56.1	50.5	50.7	51.6	51.9	51.3	50.7
250	66.9	68.7	67.4	58.9	61.4	72.2	68.5	74.8	74.3	71.8	71.9	74.9	77.2	74.1	73.5
315	56.5	60.0	54.5	52.5	52.8	62.9	60.3	68.3	65.1	62.3	62.4	63.7	56.1	61.6	59.8
400	57.9	61.1	56.1	55.5	55.1	65.7	62.0	65.8	69.9	65.8	65.9	67.2	62.3	64.0	64.0
500	69.2	72.6	70.2	71.0	64.9	71.3	75.5	73.8	75.0	74.5	74.6	77.0	74.7	81.6	69.6
630	62.3	64.9	61.6	60.5	57.5	67.0	66.5	67.5	68.2	71.0	71.1	72.6	71.2	79.8	73.7
800	64.0	66.3	64.0	70.2	70.3	78.0	70.8	75.7	73.8	75.2	75.3	78.2	82.1	84.3	82.6
1000	71.8	70.2	73.5	76.0	79.2	78.5	79.9	74.6	80.2	78.3	78.5	80.1	78.3	77.5	77.3
1250	66.1	69.0	66.3	65.3	63.7	70.6	78.6	80.3	76.0	75.5	75.7	77.2	80.9	81.8	85.7
1600	72.0	67.0	73.7	64.1	66.9	70.8	66.6	69.4	68.8	77.7	77.9	79.5	75.7	77.2	82.1
2000	70.8	71.9	72.3	70.5	66.1	68.6	63.8	66.3	67.7	74.0	74.2	78.0	77.4	75.6	79.0
2500	71.2	72.2	72.9	73.1	70.3	63.8	63.5	60.8	66.3	74.8	74.9	76.5	73.6	75.2	76.0
3150	61.7	64.3	60.9	62.5	61.2	58.7	56.8	58.0	60.0	69.6	69.9	71.3	69.5	68.3	72.6
4000	60.3	63.2	59.2	63.1	56.3	64.3	53.1	53.4	56.8	64.2	64.3	65.6	64.2	64.8	65.6
5000	55.0	58.6	52.6	51.7	51.9	48.3	47.5	46.7	52.9	59.6	59.7	60.9	58.9	60.1	60.4
6300	51.0	55.2	47.9	47.2	46.5	43.6	44.7	43.2	49.8	55.1	55.4	56.4	54.3	56.1	55.8
8000	48.5	53.1	45.1	43.2	42.8	42.7	42.8	40.2	46.2	52.1	52.3	53.2	51.6	52.5	51.9
總值 Total (dBA)	79.1	79.9	80.4	80.3	80.9	83.3	83.8	84.1	84.3	85.1	85.3	87.4	87.6	89.5	89.9

BSR Sound pressure level (dBA)								
Model Hz	BSR 427	BSR 428	BSR 513II	BSR 514II	BSR 516II	BSR 613	BSR 614	BSR 616
125	45.2	46.6	47.1	46.6	46.6	45.4	45.3	50.6
160	44.3	48.2	45.2	48.0	48.2	49.2	50.2	52.6
200	48.2	50.7	49.2	51.3	50.7	52.3	53.4	54.5
250	77.5	73.5	75.2	73.5	72.6	78.2	83.5	86.7
315	58.2	59.8	60.6	61.2	65.4	76.2	76.2	78.2
400	62.1	64	62.2	64.0	64.0	63.0	65.1	70.2
500	70.1	75.3	71.4	71.3	69.6	76.5	82.1	87.5
630	72.3	73.7	73.3	73.7	74.2	73.2	73.2	75.1
800	86.4	82.6	82.5	81.2	82.6	84.1	85.3	89.2
1000	75.5	77.3	77.9	76.3	77.3	76.3	87.5	86.5
1250	85.7	87.5	86.6	84.3	85.7	86.2	87.1	83.2
1600	78.5	82.1	83.6	85.1	82.1	83.1	84.3	85.2
2000	76.8	79.3	79.2	77.5	79.0	79.0	79	80.5
2500	75.4	76	78.5	81.3	82.3	82.5	83.5	82.1
3150	73.4	72.6	75.6	72.6	77.6	77.2	77.2	85.4
4000	62.1	65.6	69.0	87.1	88.3	86.1	83.5	83.5
5000	58.2	60.4	68.0	81.1	82.3	83.5	86.4	86.4
6300	54.1	55.8	60.3	60.9	55.8	58.2	75.2	77.5
8000	53.5	51.9	61.8	63.1	65.3	67.1	70.1	76.1
總值 Total (dBA)	90.4	90.8	90.9	92.3	93.0	93.1	95.0	96.5

1. 距離壓縮機體 1m 處測量，運轉條件:R22
冷媒, 冷凝溫度 50°C, 蒸發溫度 0°C
BSR51XII/BSR61X 為 R134a 噪音值

2. 其他冷媒如 R-134a 以及 R407C 或運轉條件下噪音值變化在±2 dBA 以內

3. 噪音量測標準根據 ISO2151

1. The above 1/3 octave data are based on condensing temp. at 50°C, evaporating temp at 0°C and measured 1-m from the compressor with R-22 refrigerant. BSR51XII/BSR61X 1/3 octave data was measured from R134a.

2. For all other compatible refrigerants such as R-134a, R-407C and other working conditions within the allowed operation range, the sound pressure level varies within ±2dBA.

3. The above data was measured according to ISO2151.



M-BSR-EC3-201502

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