

WITH MORE THAN 60 YEARS OF EXPERIENCE IN COMPRESSOR TECHNOLOGY AND HIGHLY DEDICATED EMPLOYEES, OUR FOCUS IS ON DEVELOPING AND

APPLYING ADVANCED COMPRESSOR TECHNOLOGIES TO ACHIEVE STANDARD SETTING PERFORMANCE FOR LEADING PRODUCTS AND BUSINESSES AROUND THE WORLD.



MOUNTING INSTRUCTIONS FOR HERMETIC AC COMPRESSORS

GUIDELINE FOR P/T/X/D/N/F/S/G-SERIES & DELTA/KAPPA



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1. COMPRESSORS

If a compressor needs to be installed in new appliances normally there is enough time available to choose the right compressor type from data sheets and perform sufficient testing. On the contrary, when a faulty compressor needs to be replaced it can be impossible to get the same compressor type as the original in many cases. That is why it is necessary to compare relevant compressor catalogue data.

A compressor can provide a long durability if service work is done in the right way and attention is paid to keeping parts clean and dry. The service technician must observe the following when choosing a compressor: type of refrigerant, voltage and frequency, application range, compressor displacement/capacity, starting conditions, and cooling conditions. If possible use the same refrigerant type as in the faulty system.

The Secop hermetic refrigeration compressor programme consists of the types: P / T / X / D / N / F / S / G-Series and DELTA / KAPPA



1.1 Type label

All compressors for 220-240 V have a yellow label with the type designation. Compressors for 115 V have a green label with the type designation.

Direct current compressors and variable speed compressors have a gray label.

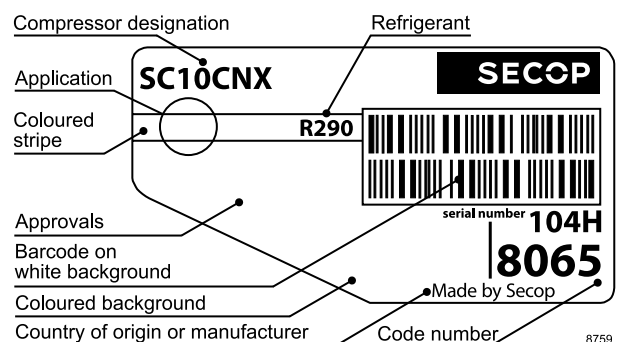
The label for "R404A R507" or "R404A R407C R507" has a lilac stripe. The label for "R134a" has a blue stripe. The labels for "R290" and "R600a" both have a red stripe.

The labels for the DELTA, KAPPA, and XV compressors do not follow all rules.

The country of origin indicated on the compressor paper label and on the compressor varies depending on the place of manufacture.

If the type label has been destroyed, the compressor type and the code number can be found on the engraving on the side of the compressor. For information please refer to Product Bulletin "Date Code Format & Country of Origin".

LST/HST mentioned both means that the starting characteristics are depending on the electrical equipment.



Barcode format

A Secop compressor type label contains two barcode lines. The first line is the full code number of the compressor and the second line is the compressor serial number. These barcodes contain 8 characters each and are printed in code 128.

Serial number

The compressor serial number will also be written in normal letters below the barcodes. The serial number contains 8 digits, written in characters 0-9 and A-Z, excluding I and O.

Key to AC-Compressor Type Designation (P / T / D / N / F / S / G-Series)

1 Compressor design	2				3							
	Protector location				Optimization level							
	Internal		External		Low ← Standard → High							
	PTC LST	Relay HST	PTC	Relay								
P	L				L	Blank	E^{a)}	Semi-direct intake				
T								S				
D		T						E^{b)}	Semi-direct or direct intake	Y^{a)/b)}	X^{a)}	
N			F									U^{a)}
F	R											
S	C		C					E	Direct intake			
G	S								Semi-direct intake			

- L** = Low
- Blank** = Standard
- S** = Semi-direct intake
- E** = Energy-optimized
- Y** = High energy-optimized +
- X** = High energy-optimized ++
- U** = High energy-optimized +++

- 1 The first letter of the denomination (P, T, D, N, F, S or G) indicates compressor series
- 2 The second letter indicates motor protection placement.
- 3 E, Y, X, and U denote different energy optimization steps. S means semi-direct suction. On all these mentioned types, the indicated suction connector has to be used. Using the wrong connector as a suction connector will lead to reduced capacity and efficiency.
- 4 A number indicates the displacement in cm³, but for PL compressors, the number indicates the nominal capacity.
- 5 The letter after the displacement indicates which refrigerant must be used as well as the field of application for the compressor.

4		5		6	7
Compressor size		Application range	Refrigerant	Code letter for starting characteristics	Generation
Capacity at rating point	Displacement				
20 30 35 50		C = LBP CL = LBP CM = LBP	R22 R404A/R507 R22		Blank → first generation
	2.5, 3, 4 4.5, 4.8, 5 5.7, 6, 6.5 7, 7.5, 8 8.7, 9, 10	CN = LBP/MBP CNL = LBP D = HBP DL = HBP	R290 R290 R22 R404A/R507 R407C R290	Blank → universal (principal rule)	.1 → updated first generation
	4, 4.8 5.7, 6.5 7.5, 8.7 9.4, 10	DN = HBP F = LBP/(MBP) FT = LBP tropical	R134a R134a R134a		
	5.2, 5.5, 5.7 6, 6.1, 7, 7.3 8.0, 8.4, 8.8, 9 10, 11, 12.6 13, 13.3, 15	G = LBP/MBP/HBP GH = Heat pump GHH = Heat pump optimized	R134a R134a R134a	K = LST characteristics (capillary tube)	.2 → second generation
	6 7.5 8.5 10 11	K = LBP/(MBP) KT = LBP/(MBP) tropical MF = MBP	R600a R600a R134a		
	10 12 15 18 21	MK = MBP ML = MBP MN = MBP S = LBP/HBP (service)	R600a R404A/R507 R290 R426A R401A/R401B R409A/R409B	X = HST characteristics (expansion valve)	.3 → third generation
	18 21 26 34	ST = LBP tropical (service)	R426A R401A/R401B R409A/R409B		.4 → fourth generation

- a) = Run capacitor compulsory
b) = Run capacitor optional

5 LBP (Low Back Pressure) indicates the range of low evaporating temperatures, typically -10 °C / +14 °F down to -35 °C / -31 °F or even -45 °C / -49 °F, for use in freezers and refrigerators with freezer compartments. MBP (Medium Back Pressure) indicates the range of medium evaporating temperatures, typically -20 °C / -4 °F up to 0 °C / +32 °F, such as in cold cabinets, milk coolers, ice machines, and water coolers. HBP (High Back Pressure) indicates high evaporating temperatures, typically -5 °C / +23 °F up to +15 °C / +59 °F, such as in dehumidifiers and some liquid coolers.

T as an extra character indicates a compressor intended for tropical application. This means high ambient temperatures and capable of working with more unstable power supply.

6 The next letter in the compressor denomination provides information on the starting torque. If, as principal rule, the compressor is intended for LST (Low Starting Torque) and HST (High Starting Torque), the place is left empty.

The starting characteristics depend on the electrical equipment chosen. K indicates LST (capillary tube and pressure equalization during idle periods) and X indicates HST (expansion valve or no pressure equalization).

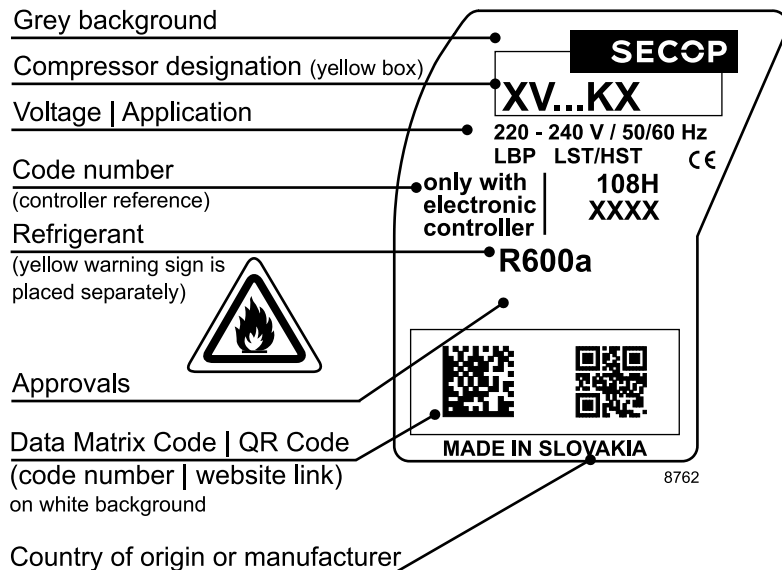
7 The final letter (separated by a dot) mentions the generation of the compressor.

1.3
Denomination
variable speed

Key to AC-Compressor Type Designation (Variable Speed)

1	2		3	4		5	6
Compressor design	Optimization level		Compressor size	Application range	Refrigerant	Code letter for starting characteristics	Generation
	Low ← Standard → High		Displacement				
XV	L	Blank	5.0 7.2 8.0	F = LBP/(MBP)	R134a	X = LST & HST characteristics (capillary tube & expansion valve)	Blank → first generation
DLV			4.0 5.7	K = LBP/(MBP)	R600a	Blank → universal (principal rule)	.1 → updated first generation
NLV			12.6	EKT = LBP/(MBP) extreme tropical	R600a		
SLV			12 15	CL = LBP	R404A/R507	K = LST characteristics (capillary tube)	
				ML = MBP	R404A/R507	X = HST characteristics (expansion valve)	.2 → second generation
				CN = LBP/MBP	R290		
				CNL = LBP	R290		
				MN = MBP	R290		

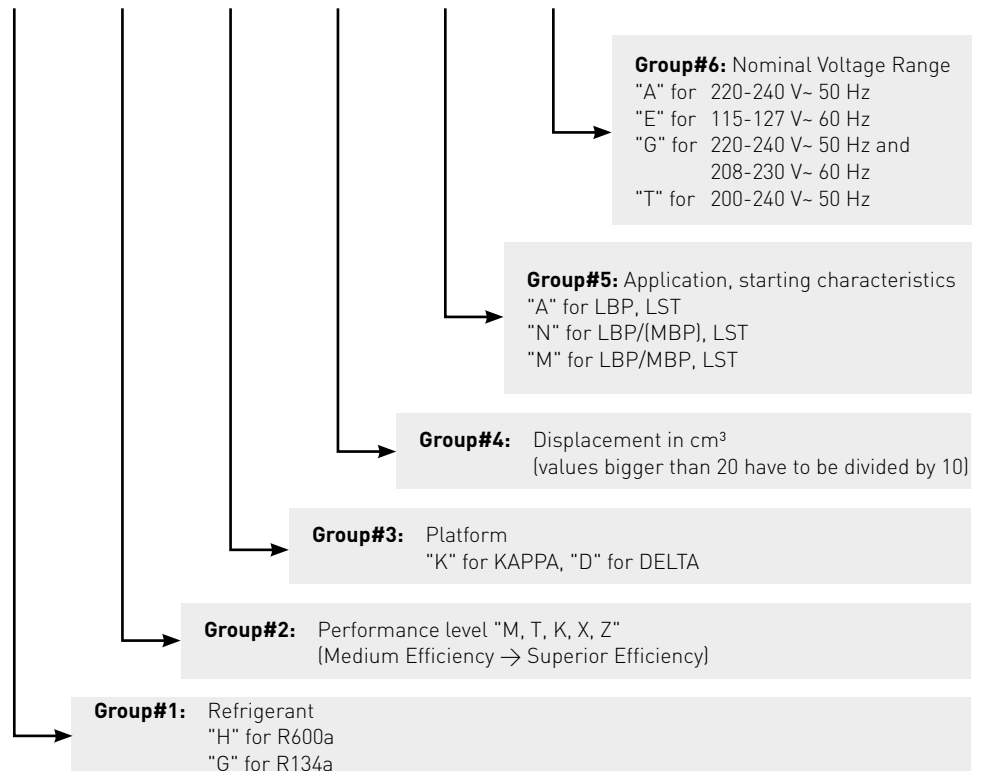
1.3.1
Type label XV



1.4
Denomination
KAPPA / DELTA

Key to AC-Compressor Type Designation (KAPPA/DELTA)

KAPPA	1	2	3	4	5	6	group
	H	X	K	12	A	T	example
DELTA	1	2	3	4	5	6	group
	H	X	D	55	A	A	example



1.4.1
Type label KAPPA



1.4.2
Type label DELTA



**1.5
Low and high starting torque**

Description of the different electrical equipment shown can be found in the data sheets for the compressors. See also chapter 4. Low starting torque (LST) compressors must only be used in refrigerating systems with a capillary tube throttling device where pressure equalization is obtained between suction and discharge sides during each idle period.

A PTC starting device (LST) requires that the idle time is at least 5 minutes, since this is the time necessary for cooling the PTC.

The HST starting device, which gives the compressor a high starting torque, must always be used in refrigeration systems with an expansion valve, and for capillary tube systems without full pressure equalization before each start. High starting torque (HST) compressors are normally using a relay and starting capacitor as starting device.

The starting capacitors are designed for short time cut-in. "1.7 % ED", which is printed on the starting capacitor. This means for instance max. 10 cut-ins per hour each with a duration of 6 seconds.

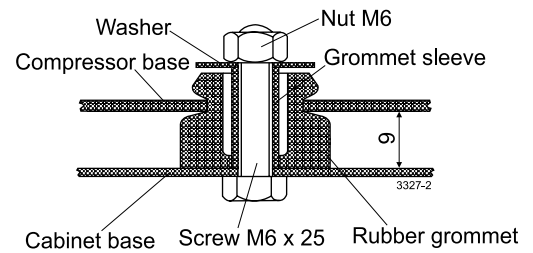
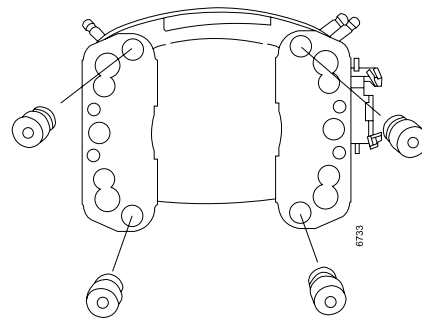
**1.6
Motor protector and winding temperature**

Most of the Secop compressors are equipped with a built-in motor protector (winding protector) in the motor windings. See also chapter 2.1. At peak load, the winding temperature must not exceed 135 °C / 275 °F and under stable conditions, the winding temperature must not exceed 125 °C / 257 °F.

Refer to our data sheets for specific information.

**1.7
Rubber grommets**

Stand the compressor on the base plate until it is fitted. This reduces the risk of oil coatings inside the connectors and associated brazing problems. Place the compressor on its side with the connectors pointing upwards and then fit the rubber grommets and grommet sleeves on the base plate of the compressor. Do not turn the compressor upside down. Mount the compressor on the baseplate of the appliance. Tightening torque for M6 bolt joint mountings should be 5 Nm ± 0,5 / 44 in-lb ± 4,4 (hand-tight).



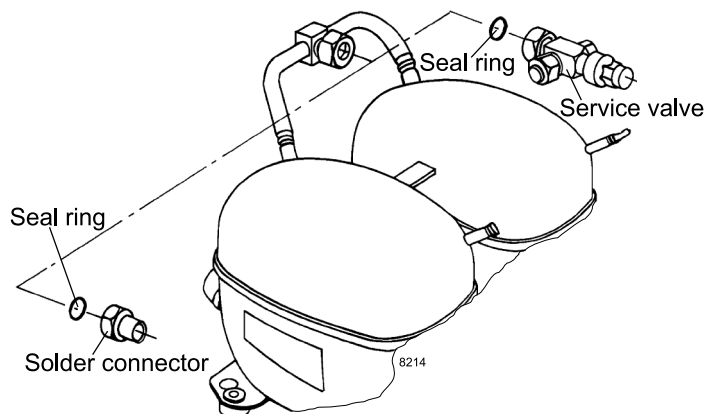
**1.8
Minimum ambient temperature**

Allow the compressor to reach a temperature above 10 °C / 50 °F before starting for the first time to avoid starting problems.

**1.9
SC Twin compressors**

The twin version consists of two SC compressors mounted on a common base plate. The two compressors are joined by an oil-equalizing tube and also have an intake manifold with screw connector for a service valve or a braze connector (these parts are supplied as accessories, please refer to data sheets for more info).

Each twin compressor is supplied with two sets of electrical equipment and mounting accessories.



2.

FINDING FAULTS

If the compressor will not run, this may be due to a number of reasons. Before replacing the compressor, make sure that it is defective. To easily determine the fault, please refer to Guideline "Repair of Hermetic Refrigeration Systems".

2.1 Winding protector cut out

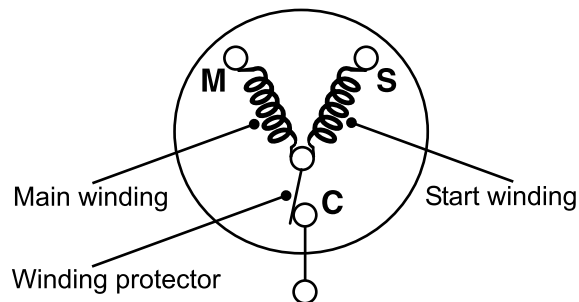
If the winding protector cuts out while the compressor is cold, it can take approx. 5 minutes for the protector to reset. If the winding protector cuts out while the compressor is warm (compressor housing above 80 °C / 176 °F) the resetting time is increased. Up to approx. 45 minutes may pass before reset.

2.2 PTC and protector interaction

The PTC starting unit requires a cooling time of 5 minutes before it can restart the compressor with full starting torque. Short time power supply cut offs, not long enough to allow the PTC to cool down, can result in start failure for up to 1 hour. The PTC will not be able to provide full action during the first protector resets, as they typically do not allow pressure equalization. Thus, the protector trips until the reset time is long enough. This can be solved by unplugging the appliance for 5 to 10 minutes typically.

2.3 Check of winding protector and resistance

In the event of compressor failure, a check is made by measuring resistance directly on the current lead-in to see whether the defect is due to motor damage or simply a temporary cut out of the winding protector. If tests with resistance measurement reveal a connection through the motor windings from point M to S of the current lead-in, but a broken circuit between point M and C and S and C, this indicates that the winding protector is cut out. If so, wait to reset.



3.

OPENING THE REFRIGERATION SYSTEM

Never open a refrigerating system before all components for the repair are available. The compressor, drier, and other system components must be sealed off until a continuous assembly can occur.

Opening a defect system must be done in different ways depending on the refrigerant used. Fit a service valve to the system and collect the refrigerant in the correct manner.

3.1 Flammable refrigerants

R600a and R290 are hydrocarbons. These refrigerants are flammable and are only allowed for use in appliances which fulfill the requirements laid down in the latest revision of EN/IEC 60335-2-24. (To cover potential risk originated from the use of flammable refrigerants). Consequently, R600a and R290 are only allowed for use in household appliances designed for this refrigerant and fulfill the above-mentioned standard. R600a and R290 are heavier than air and the concentration will always be highest at the floor. R600a must only be stored and transported in approved containers and must be handled according to existing guidelines.

The flammability limits are approx. as follows:

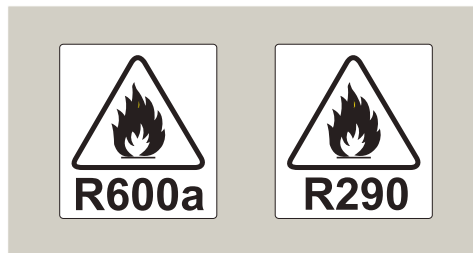
Refrigerant	R600a	R290
Lower limit	1.5 % by vol. (38g/m ³)	2.1 % by vol. (39 g/m ³)
Upper limit	8.5 % by vol. (203 g/m ³)	9.5 % by vol. (177 g/m ³)
Ignition temperature	460 °C / 860 °F	470 °C / 878 °F

In order to carry out service and repair on R600a and R290 systems, the service personnel must be properly trained to be able to handle flammable refrigerants. This includes knowledge on tools, transporting the compressor and refrigerant, and the relevant regulations and safety precautions when carrying out service and repair. Do not use open fire when working with refrigerants R600a and R290!

Secop compressors for flammable refrigerants are provided with a special warning sign. The maximal filling capacity is 150 g per system, which equates to approximately 8 g/m³ in a 20 m³ kitchen and thereby around 25 % of the lower flammability limit. These precautions minimize the risk of ignition in case of a leakage. Under favorable conditions however, exceeding these values is officially allowed.

All manufacturers of HC-systems have to follow these safety regulations. Customer service, as well as the repair of R600a and R290 applications, should only be accomplished by highly trained and experienced personnel. This implies also knowledge about tools, transporting compressors and refrigerants as well as laws, regulations, and standards.

National safety regulations demand leakage simulations and strictly require the isolation of electrical components close to the flow of refrigerants.



Yellow warning labels

Conversions from refrigerants R12 or R134a to R600a is not permitted, as the refrigerators are not approved for operation with flammable refrigerants, and the electrical safety has not been tested according to existing standards either. The same applies to conversions from refrigerants R22, R502, or R134a to R290.

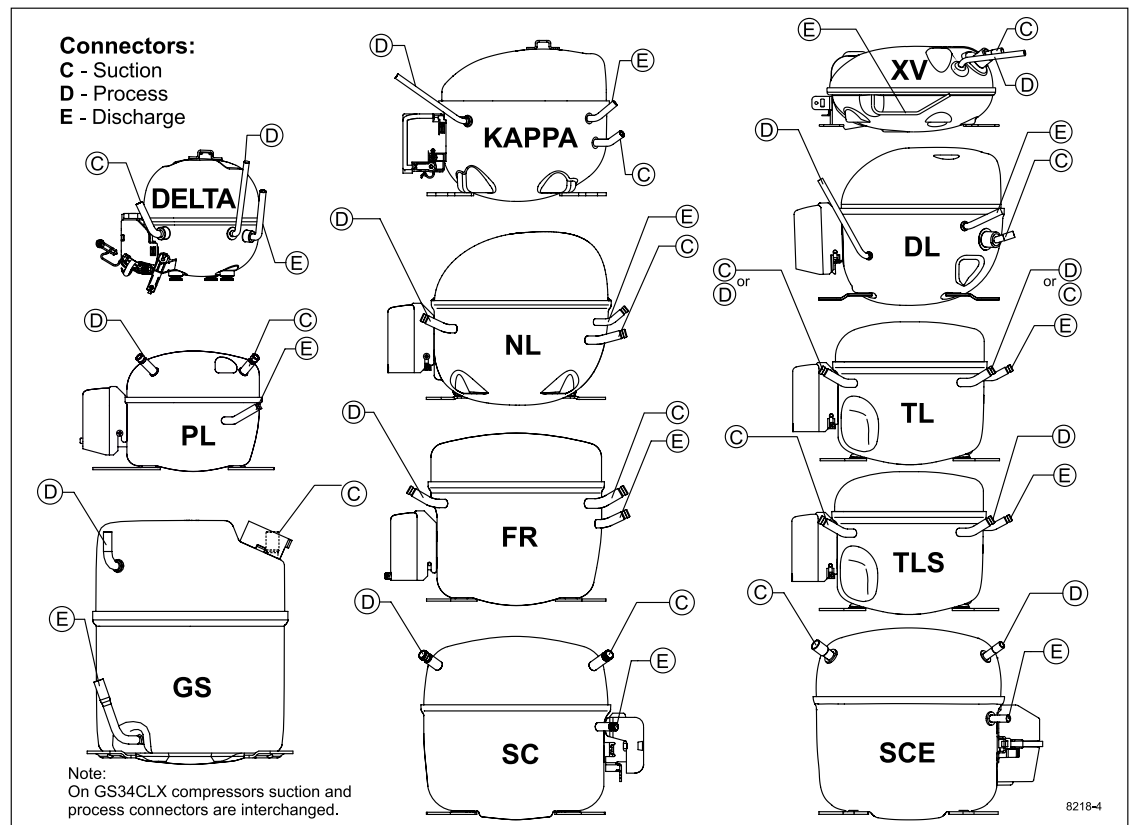
The smaller R290 compressors, types T and N, are LST types. These often need a timer to ensure sufficient pressure equalization time.

4. MOUNTING

Brazing problems caused by oil in the connectors can be avoided by placing the compressor on its base plate some time before brazing it into the system. The compressor must never be placed upside down. The system should be closed within 15 minutes to avoid moisture and dirt penetration.

4.1 Connectors

The positions of connectors are found in the sketches. "C" means suction and must always be connected to the suction line. "E" means discharge and must be connected to the discharge line. "D" means process and is used for processing the system.



Most compressors are supplied with sealed connectors, which consist of a thick-walled copper plated steel tube with great corrosion resistance and good braze ability. The connectors are welded in the compressor housing and thus the weld cannot be destroyed by overheating during brazing operations. The seal is an aluminum cap which gives a tight seal. Compressor with copper connectors are sealed with rubber plugs. The aluminum cap sealing ("capsolut") offers a tight seal. The seal ensures that the compressors have not been opened after leaving Secop's production lines. In addition to that, the seal makes a protecting charge of nitrogen superfluous.

220 V compressors are normally supplied with millimeter tubes, while 115 V compressors are supplied with inch tubes. All connectors have a shoulder to provide optimal brazing conditions. Expanding the connectors by more than 0.3 mm / 0.01 inch in is not allowed.

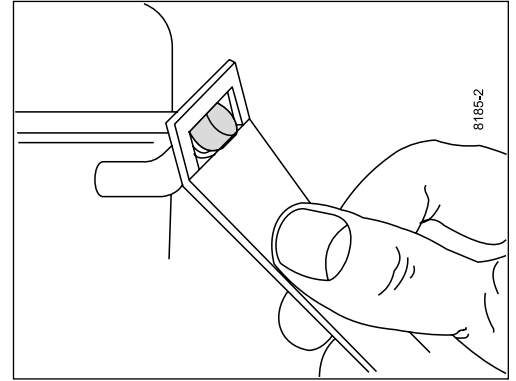
Compressors with an "S" in the model denomination and all NL/DL/SCE types have a direct intake system, which means increased capacity. The suction connectors at these compressors must be connected to the suction line to prevent capacity loss.

For the refrigerants R600a and R290, process tubes can be closed with a LOKRING® connection. Brazing is not allowed on systems with flammable refrigerants.

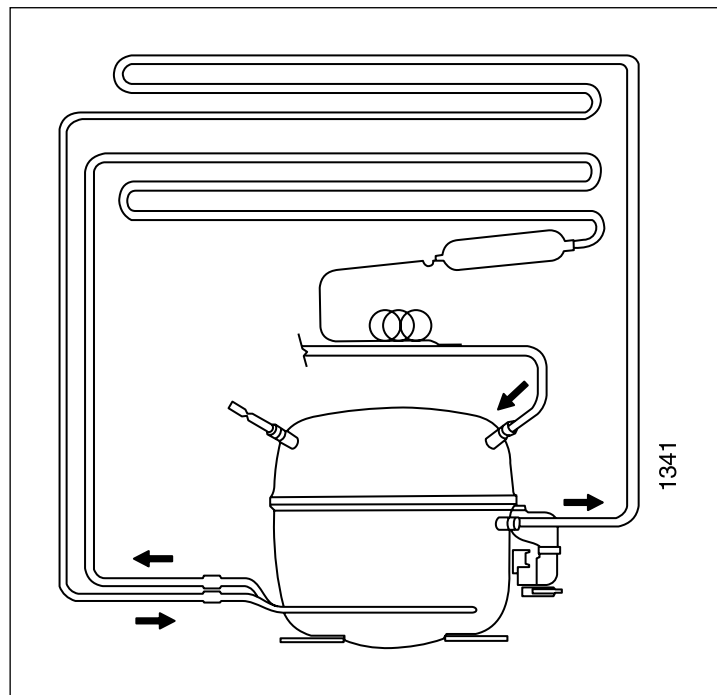
The "capsoluts" are easily removed with an ordinary pair of pliers or a special tool as shown. The "capsolut" cannot be remounted.

When the seals on the compressor connectors are removed, the compressor must be mounted in the system within 15 minutes to avoid moisture and dirt penetration.

"Capsolut" seals on connectors must never be left in the assembled system.

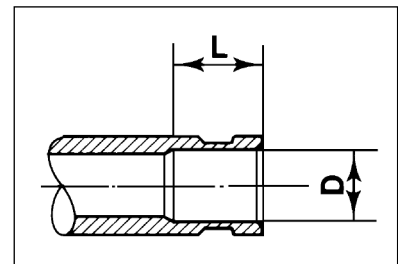


Oil coolers, if mounted (compressors from 7 cm³ displacement), are made of copper tube and the tube connectors are sealed with rubber plugs. An oil-cooling coil must be connected in the middle of the condenser circuit.



SC Twin compressors must have a non-return valve in the discharge line to compressor no. 2. If a change in the starting sequence between compressor no.1 and no. 2 is desired, a non-return valve must be placed in both discharge lines.

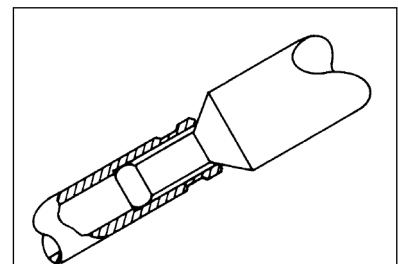
In order to create optimum conditions for brazing and to minimize the consumption of filler metal, all tube connectors on Secop compressors have shoulders, as shown



4.2 Expanding connectors

It is possible to expand the connectors with inside diameters f 6.2 mm to 6.5 mm which suit 1/4" (6.35 mm) tubes, but we advise against expanding the connectors by more than 0.3 mm (0.01 inch). When expanding, it is necessary to have a suitable counterforce on the connectors so that they don't break off.

A different solution to this problem would be to reduce the diameter of the end of the connector tube with special pliers.

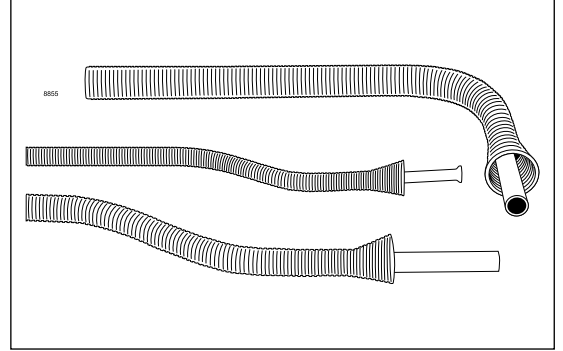
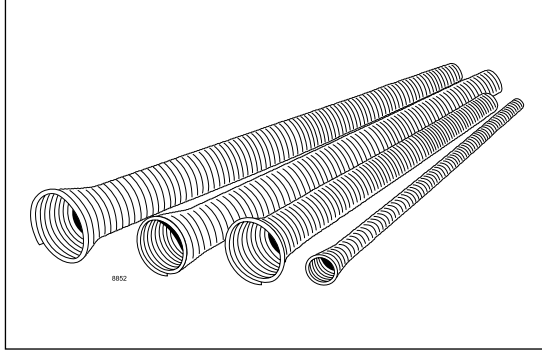


4.3 Bending copper connectors

Secop has changed most of its compressors to copper connectors to ensure easy brazing and handling. Should additional extra handling or bending of connectors be required, it is the responsibility of the technician to choose the proper bending method. Bending is not recommended without the standard support tools used for adjusting or bending normal tubes shown below. The following tools may be used for bending.

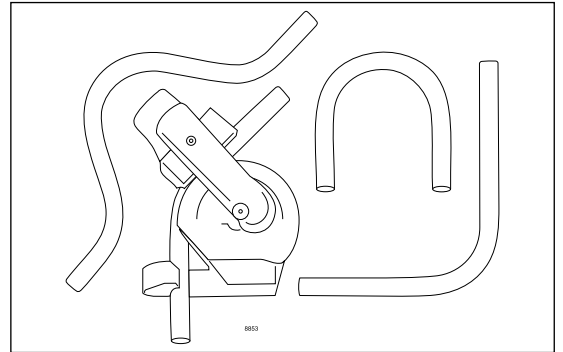
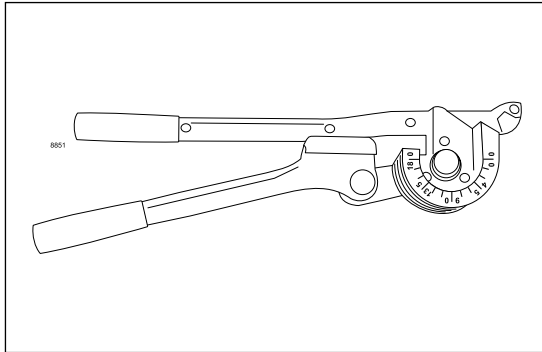
4.3.1 Spring benders

Spring benders are an efficient low-cost method for bending copper tubes. They are available in different sizes to fit over the copper tube. Please ensure that you choose the correct size. The spring must be placed over the full length of the bend. If you have difficulties removing the spring after bending, do not use force to pull on the spring, as this may damage the spring. Simply twisting the spring and "unscrewing" the spring will usually work. This procedure is only recommended for small adjustments.



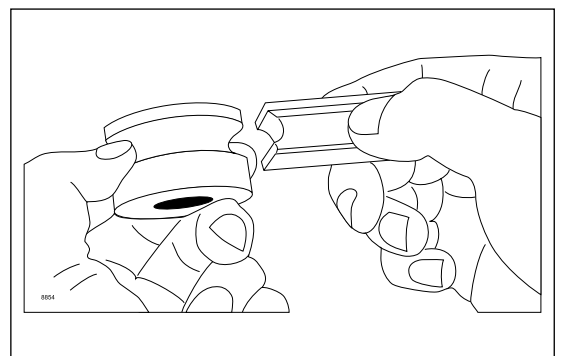
4.3.2 Lever-type benders

Lever-type benders are easy to use and are calibrated for accurate bending. Many have scales or markings to repeat the bending accuracy.



4.3.3 Tailor-made bending tools

In some cases, special bending tools are necessary due to space issues or special angles. This requires a special geometry to protect the tube against wear and tear on the profile (effective flow diameter). If you need further information, please get in contact with a bending specialist.

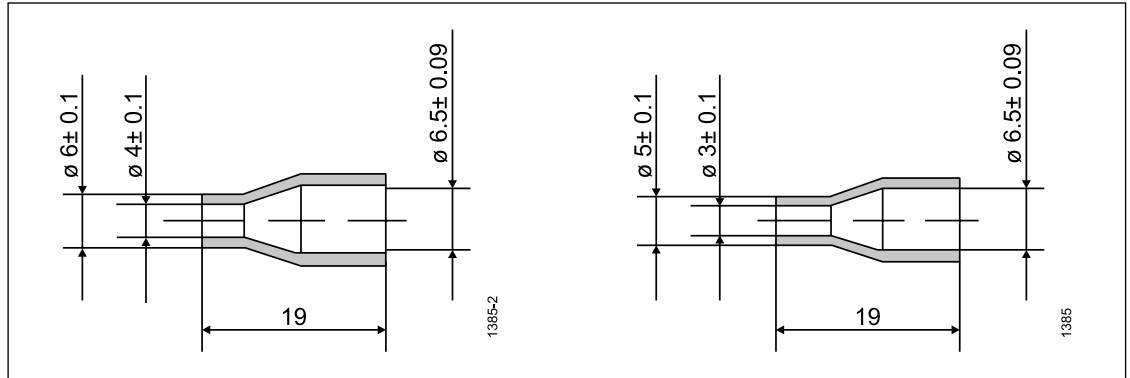


**4.4
Tube adaptors**

Instead of expanding the connectors or reducing the diameter of the connection tube, copper adapter tubes can be used for service.

A 6/6.5 mm adapter tube can be used when a compressor with millimeter connectors (6.2 mm) is to be connected to a refrigerating system with 1/4" (6.35 mm) tubes.

A 5/6.5 mm adapter tube can be used when a compressor with a 5 mm discharge connector is to be connected to a 1/4" (6.35 mm) tube.



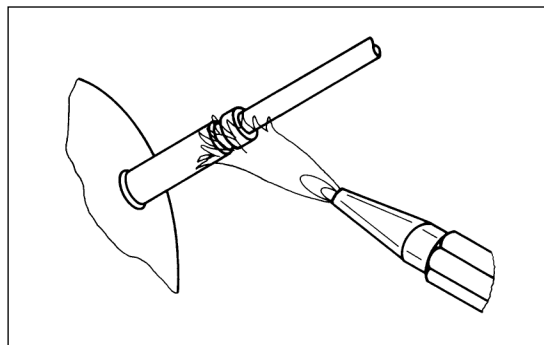
**4.5
Filler metal**

For brazing, the connectors and copper tubes filler metals with a silver content as low as 2% can be used. This means that the so-called phosphor filler metals can also be used when the connecting tube is made of copper.

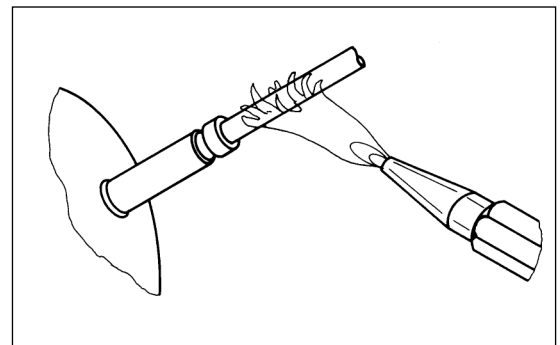
If the connecting tube is made of steel, a filler metal with high silver content, which does not contain phosphor and which has a liquidus temperature below 740 °C / 1364 °F, is required. A flux is also needed for this purpose.

**4.6
Brazing**

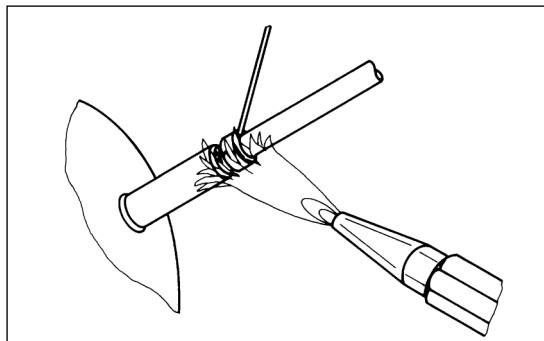
The following are guidelines for brazing steel connectors which is different to brazing copper connectors. During heating, the temperature should be kept as close to the melting point of the filler metal as possible. Overheating will lead to surface damage, so decreasing the chances of good brazing.



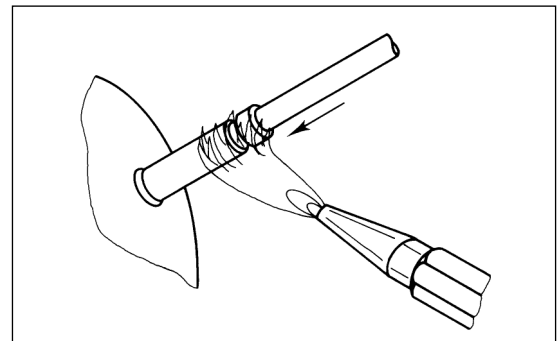
Use the "soft" heat in the torch flame when heating the joint. Distribute the flame so at least 90 % of the heat concentrates around the connector and approx. 10 % around the connecting tube



When the connector is cherry-red (approx. 600 °C / 1112 °F) apply the flame to the connecting tube for a few seconds.



Continue heating the joint with the "soft" flame and apply filler metal.



Draw the filler metal down into the gap by slowly moving the flame towards the compressor; then completely remove the flame.

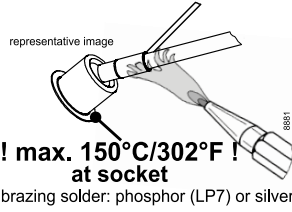
**4.7
Brazing on suction
connectors
(compressors with
direct suction intake)**

**4.7.1
Temperature at socket
TLX / NLE / NLU / NLV
DLE / DLX / DLV / XV**

Secop uses telescope pipes or similar elements inside the suction tube on some T- and N-Series compressors, on all D- and X-Series compressors and on the new SCE compressors to optimize energy consumption.

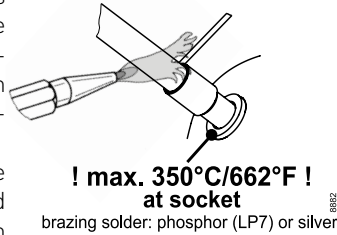
You can identify the compressors by the thicker suction tube area near the compressor shell. These telescope pipes are made out of plastic and are sensitive to high heat exposure

Make sure when brazing a tube into the suction connector that the section with the telescope never exceeds 150 °C / 302 °F.



**4.7.2
Temperature at socket
SCE**

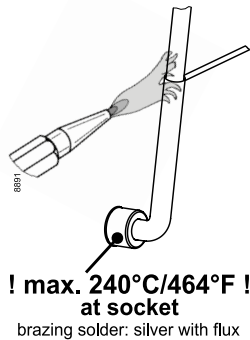
The new range of SCE compressors features a telescope inside the compressor on the suction tube to optimize energy consumption. These telescopes are made of rubber and are sensitive to high heat exposure.



Make sure when brazing a tube into the suction connector that the area with the telescope never exceeds 350 °C / 662 °F and do not braze longer than 30 seconds.

**4.7.3
Brazing on discharge
connector.
Temperature at socket
DELTA**

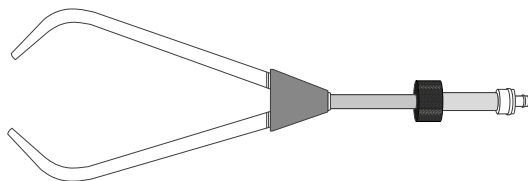
The DELTA compressor uses a special discharge connection element which is directly connected to the discharge tube to optimize power consumption. This element is made out of plastic and are sensitive to high heat exposure.



Make sure when brazing a tube into the discharge connector that the area with the telescope never exceeds 240 °C / 464 °F and do not braze longer than 10 seconds.

**4.7.4.
Heat protection**

Use a fork burner and/or a damp cloth, if necessary. A protective plate can also serve to protect the telescope from direct heat from a flame.



Telescope pipes or similar elements make it no longer possible to select the process connector as the suction connector or vice versa. You must choose the correct connector for the suction line. Please refer to the corresponding data sheets.



TLX compressor with copper connectors



NLU compressor copper-plated steel connectors



NLE compressor with copper connectors (NLV similar)



DLE compressor with copper connectors (DLX, DLV similar)



SCE compressor with copper connectors



XV compressor with copper connectors



DELTA compressor with copper (suction, process) and copper-plated steel (discharge) connectors

4.8 Brazing methods and requirements

The refrigeration and air conditioning industries depend on brazed copper tubes as a leak proof carrier for pressurized refrigerant. The common approach to brazing copper to copper or copper to steel is to use filler metal (copper alloy). Torch brazing with oxygen/fuel gas (acetylene in most cases) is standard practice in heating these connections.

Two brazing methods are used

- With filler metal and flux
- With filler metal only

Basic requirements to have a good brazing connection

- Filler metal flows easily when clearance uniform and tight, between 0.038 mm and 0.076 mm / 0.0015 inch and 0.003 inch
- The wide 0.5 mm / 0.02 inch clearance severely limits the flow.
- The overlap need to be about 4 to 9 times of the tube thickness and is a function of the tube thickness and required strength of the joint.

4.8.1 Filler Metal and Flux

Filler metal

Two types of filler rods are used for brazing copper tubes. These fillers are:

- Phosphorus – copper brazing alloys with melting point around 704 °C / 1300 °F and this temperature depends on the alloy composition.

When phosphorus content reaches 8.37%, the melting point is 710 °C / 1310 °F.

Lower phosphorus content is needed when the clearance is greater than 0.127 mm / 0.005 inch.

Caution: Alloys containing phosphorus should not be used to braze copper – steel joints.

These alloys should not be used on Secop compressors with steel copper coated connecting tubes.

The joint will not have sufficient ductility for high vibration application (compressor).

- High silver filler metal should be used to braze the copper-steel joints or other ferrous base metals. The best are 40%; 45% and 56% silver rods.
- With optimum clearance, many brazing filler metals are suitable. It is necessary to heat only the joint to suitable temperature above filler metal melting point.

Flux

- Fluxes are not designed for the removing oxides, coatings (in our case – painting tubes), oil, grease, dirt, or other foreign materials from the tubes to be brazed. Prior to brazing, all parts must be subjected to appropriate cleaning operation. The main function of flux is to make sure that the filler metal flows freely through the brazing joint.
- Oxides are the principal source of surface contamination. The dissolution and removal of oxides during brazing are also a function of a flux.
- The flux must also be fluid and displace readily by the molten brazing filler metal So as not to impair metal flow.
- Wetting ability and viscosity of a flux at brazing temperature, therefore, are important properties.
- Some filler metals such as silver and phosphorus are self-fluxing.
- Flux residue generally should be removed to avoid corrosion from the remaining active chemicals. The residue obtained from the flux, particularly when considerable oxide removal has occurred, is a form of glass. Less formation of glass makes for easier flux residue removal. Removing flux from properly cleaned, brazed tubes can usually be accomplished by washing in hot water accompanied by light brushing. Preferably, this rinse should be done immediately after brazing operation. drying is highly recommended after rinsing.

The type of corrosion affecting brazed joints are often similar to those acting upon the base metal and their alloys. Brazed joints experience corrosion caused by environment, geometric factors, microstructure, or composition of the brazed joint. The basic corrosions are:

- Galvanic corrosion
- High temperature corrosion
- Cracking complicated by corrosion

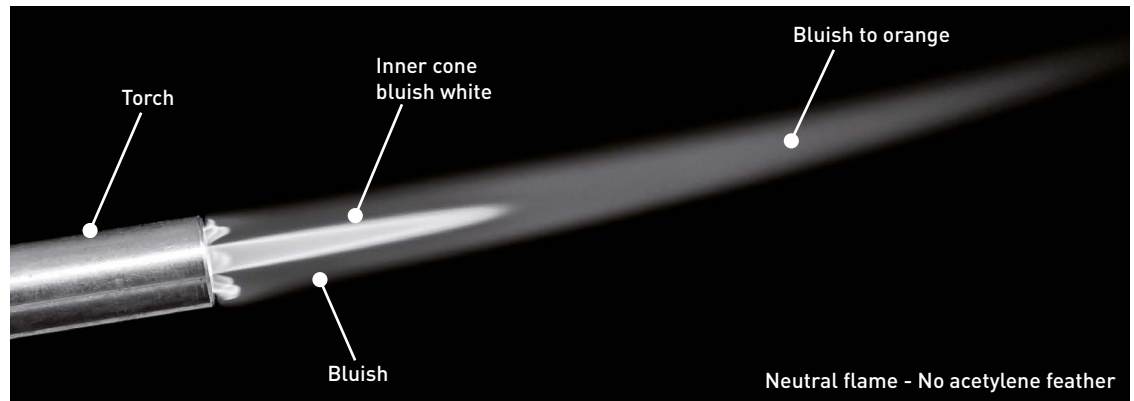
4.8.2 Corrosion

Galvanic corrosion can be a major concern because the brazed joints consists often a bond between dissimilar base and filler metal. If the braze is immersed in an electrolyte, galvanic corrosion may occur. The electrolyte may be as simple as water. If flux is used and the customer is using water to clean the joint, they create the electrochemical reaction. The distances between the anodic and cathodic reactions are on atomic scale. The worst case scenario is using acid for cleaning the surface. We should remember that water is also present in brazing fluxes either as water of hydration or separate addition for the purpose of making a paste or liquid.

4.8.3. Flame and heating

Flame

- The neutral flame should be used for copper-copper and copper – steel tubes.



When the oxygen addition reaches the ratio for the fuel gas to be completely combust, the feather that extended out from the bright inner cone disappears. This flame is used when the arc access of carbon in the reducing flame is detrimental to the base metals or when maximum flame temperature is required.

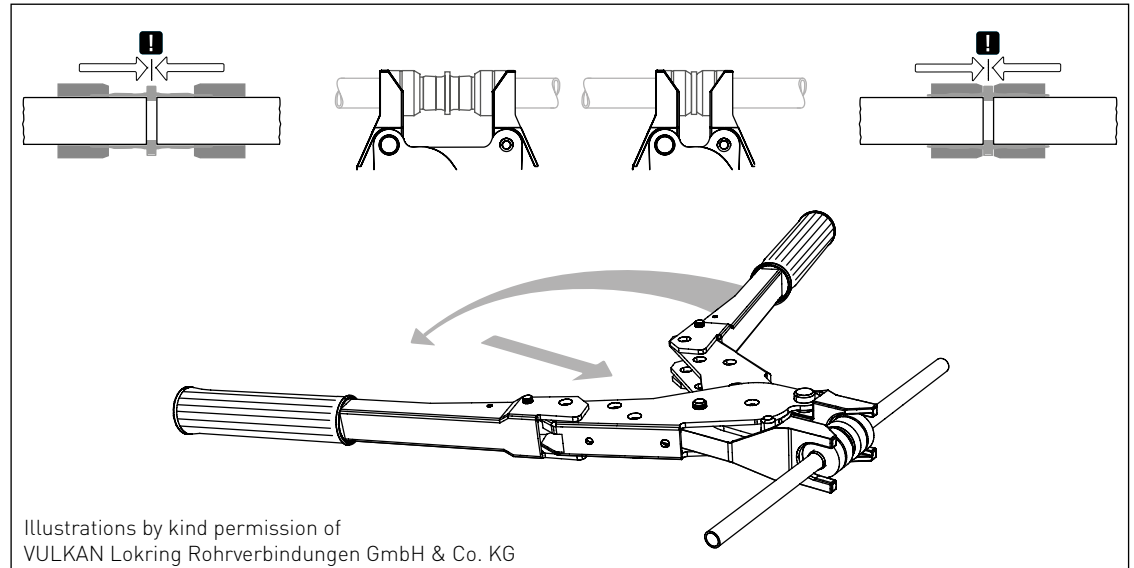
Heating:

When brazing tubes type joints follow these steps for best results.

- First, heat the inside tube. Copper is a very excellent heat conductor and will draw the heat down inside the joint.
- Then bring the torch to the fitting. Move the torch between the tube and fitting to ensure even heat, and apply the filler metal. The phosphorus – copper brazing material will flow toward the heat into capillary for a sound joint. Filler metal through the length of the capillary is desired.
- When copper is heated to the brazing temperature, surface oxides will flake off as the part cools. This flaking can be detrimental inside the tube. In this application an inert gas such as nitrogen is bled through the tube during and after brazing.

4.9 LOKRING® connections [VULKAN Lokring Rohrverbindungen GmbH & Co. KG]

Systems containing the flammable refrigerants R600a or R290 must not be brazed. In such cases, a LOKRING® connection as shown can be used.



Newly made systems can be brazed as usual, as long as they have not been charged with a flammable refrigerant. Charged systems are never to be opened by using a flame. Compressors from systems with a flammable refrigerant must be evacuated to remove the refrigerant residues from the oil.

Furthermore, those refrigeration systems must be opened with a pipe cutter. The brazing on HC-cooling circuits is only allowed if the existing refrigerant has been disposed according to regulations and if the high and low-pressure circuits are subsequently flushed separately with nitrogen. Even if the compressor is not to be replaced, the brazing is only allowed under flowing nitrogen as a protective gas. On all other occasions, the brazing close to flammable refrigerants is strictly forbidden.

When working on a system, the connections have to be established with pressure fitted connections. With a solderless connection, this can be established for aluminum, copper, or steel pipes. The connection consists of two rings and a connection piece to receive the two pipes, which is to be connected. Because of the conical internal contour of the rings and the special external contour of the connection piece, the radius of the connection piece will be reduced to the diameter of the pipes to generate a hermetic metal to metal compound.

Prior to assembly, the pipe ends have to be cleaned thoroughly with fine steel wool or abrasive sheets, using a rotating motion. This prevents scratches along the pipes, which could lead to an insufficient seal. To ensure a sealed connection, the pipe ends are treated with LOKPREP®. This evens out any irregularities on the pipe's surface and quickly hardens. After the insertion of the pipe end into the connection pieces, the pipes should be rotated by 360°, to guarantee the sealant spreads evenly. Afterwards, the two rings are compressed to the stop in the middle with a special pair of pliers for manual assembly. Depending on the material and the environmental temperature, the LOKPREP® hardens in three to four minutes, so that all necessary connections can be established alongside the replacement of the compressor and filter dryer as well as the filling process. Due to maximal precision in the manufacturing process, the connection can be established with minimal effort. It guarantees an absolutely clean, inseparable and purely mechanical pipe connection with high durability regarding the hermetical seal.

Service and repair for R600a and R290 systems is possible for skilled and well trained service technicians. Our video "Compressor Service for Isobutane (R600a) and Propane (R290) – Step by Step" can be used as a reference (<https://www.secop.com/solutions/compressor-qa-tools/compressor-service/>)

Local laws and regulations must also be taken into account. Very careful handling is required due to the flammability of the gas, which is a potential danger during work on the refrigeration system. The disposal of R290 and R600a does not include the filling of a recycling cartridge. Due to the low GWP, the flammable refrigerants are directed away from the workplace into the open through a tube. External ignition sources must be avoided During the process.

Good ventilation of the room is necessary and the discharge of the vacuum pump must be lead to open air. The equipment of the service technician must meet the requirements of R600a and R290 in terms of evacuation quality and refrigerant charge accuracy. An electronic scale is recommended to control refrigerant charge to within the needed accuracy.

The maximal filling capacity is 150 g / 5.3 oz. per system, which equates to approximately 8 g/m³ in a 20 m³ kitchen and thereby around 25 % of the lower flammability limit. These precautions minimize the risk of an ignition in case of a leakage. Exceeding these values is officially allowed under favorable conditions. All manufacturers of HC-systems have to follow these safety regulations. The customer service, as well as the repair of R600a and R290 applications, should only be accomplished by highly trained and experienced personnel.

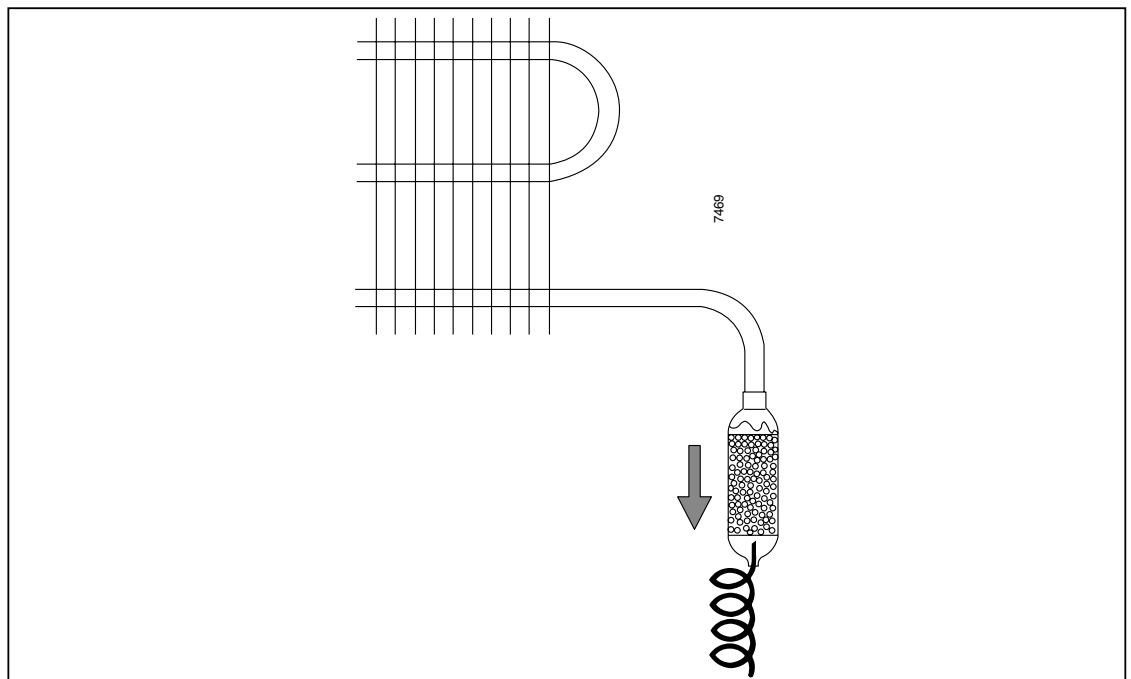
4.10 Driers

Secop compressors are expected to be used in well dimensioned refrigerant systems including a drier containing an adequate amount and type of desiccant and with a suitable quality. The refrigerating systems are expected to have a dryness corresponding to 10 ppm. As a max limit 20 ppm is accepted.

The drier must be placed in a way ensuring that the direction of flow of the refrigerant follows gravitation. Thus the MS beads are prevented from moving among themselves and therefore creating dust and possible blockage at the inlet of the capillary tube. For capillary tube systems this also ensures a minimal pressure equalizing time.

Pencil driers should be especially chosen carefully to ensure proper quality. In transportable systems only driers approved for mobile application are to be used.

A new drier must always be installed when a refrigeration system has been opened.



4.11
Driers and refrigerants

Water has a molecular size of 2.8 Ångström. Accordingly, molecular sieves with a pore size of 3 Ångström should be suitable for normally used refrigerants.

MS with a pore size of 3 Ångström can be supplied by the following:

UOP Molecular Sieve Division, USA (earlier Union Carbide)	4A-XH6	4A-XH7	4A-XH9
R12	x	x	x
R22, R502	x		x
R134a, R404A		x	x
HFC/HCFC blends			x
R290, R600a		x	x
Grace Davison Chemical, USA		574	594
R12, R22, R502		x	x
R134a			x
HFC/HCFC blends			x
R290, R600a			x
CECA S.A., France		NL30R	Siliporite H3R
R12, R22, R502		x	x
R134a		x	x
HFC/HCFC blends			x
R290, R600a			x

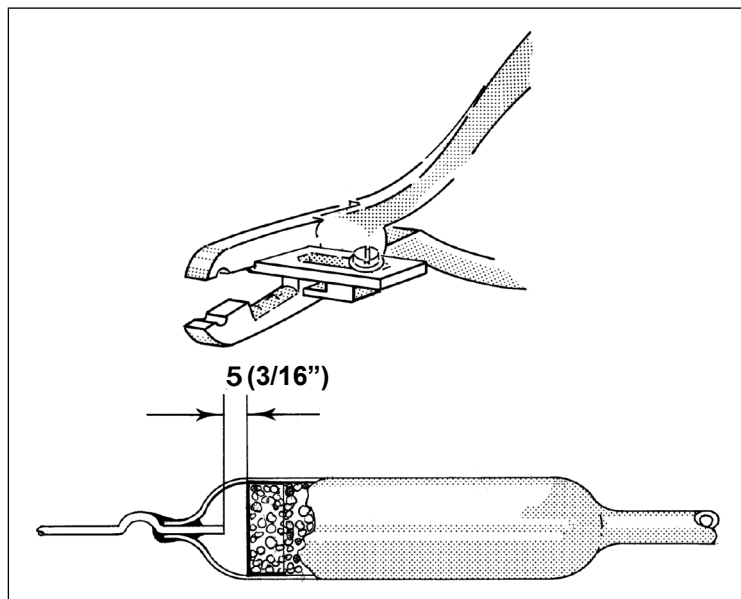
Driers with the following amount of desiccants are recommended:

Compressor	Filter drier
P and T	6 gram or more
F and N	10 gram or more
SC	15 gram or more

In commercial systems, larger solid core driers are often used. These are to be used for the refrigerants according to the manufacturers instructions. If a burn-out filter is needed in a repair case, please contact the supplier for more detailed information.

4.12
Capillary tube in drier

Special care should be taken when brazing the capillary tube. When mounting the capillary tube it should not be pushed too far into the drier, thus touching the gage or filter disc, causing a blockage or restriction. If, on the other hand, the tube is only partly inserted into the drier, blockage could occur during the brazing. This problem can be avoided by making a "stop" on the capillary tube with a pair of special pliers as shown:



5.

ELECTRICAL EQUIPMENT

The compressors are equipped with a single phase AC motor. The electrical equipment is classified as "normal tight" (IP20). The motor protector is built into the motor (winding protector). Exceptions include compressors with the denominations TF/TT, NF/NT, FF, some SCs and KAPPA and DELTA. Earth connections are located on the bracket around the current lead in of the compressor (exception KAPPA & DELTA).

No attempt must be made to start the compressor without a complete starting device.

Never use a starting device of an old compressor because this may cause a compressor failure. No attempt must be made to start the compressor without the complete starting equipment.

For information on the right starting devices, please see Data Sheets for the compressor.

For safety reasons the compressor must always be earthed or otherwise additionally protected. Keep inflammable material away from the electrical equipment. The compressor must not be started under vacuum.

R134a: With some exceptions, these compressors are designed with universal motors which means that they can obtain a high (HST) or low starting torque (LST) depending on the external electrical equipment used.

R600: Nearly all compressors for R600a are designed only for use with Low Starting Torque (LST).

R290: All compressors for R290 are designed for use with Low Starting Torque (LST) or High Starting Torque (HST).

R404A/R507 and R407C: All compressors for R404A/R507 and R407C are designed only for use with High Starting Torque (HST).

5.1 LST (RSIR) starting device

Compressors with the motor type Resistant Start Induction Run (RSIR) have a starting device for Low Starting Torque (LST). The design of the electrical equipment depends on the actual compressor design. The following designs of starting devices exist:

a) PTC + cord relief + cover, the motor protector is built into the motor (winding protector),

Mount the starting device on the current lead-in of the compressor. Pressure must be applied to the center of the starting device so that the clips are not deformed. Mount the cord relief on the bracket under the starting device.

Pressure must be applied to the center of the starting device when dismantling so that the clips are not deformed. Place the cover over the starting device and screw it to the bracket.

b) Relay housing incl. motor protector + cord relief + cover (alternative: terminal board with cord relief)

Terminal board with cord relief: The relay is mounted by applying pressure on the center of the relay. The cover is fixed with a clamp.

PTC with external protector: The protector is placed on the bottom terminal pin and the PTC on the 2 on the top. The cover is fixed with a clamp. No cord relief is available for this equipment.

The PTC starting device requires pressure equalization before each start. This starting device is normally used in well designed refrigerating systems with capillary tube as throttling device. The PTC needs a compressor standstill period of 5 minutes to cool down before each start.

5.2 LST (RSCR) starting device

Compressors with the motor type Resistant Start Capacitor Run (RSCR) have a starting device for Low Starting Torque (LST). This starting device consists of a PTC and a run capacitor.

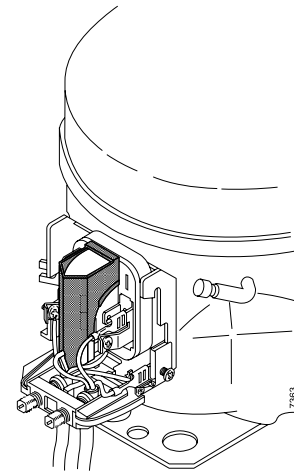
The PTC starting device requires pressure equalization before each start. This starting device is normally used in well designed refrigerating systems with capillary tube as throttling device.

The PTC needs a compressor standstill period of 5 minutes to cool down before each start.

5.3 PTC protection screen

To fulfil the requirements of EN 60355-2-34 the protection screen 103N0476 must be applied to the PTC starting device.

The PTC protection screen is not needed together with an ePTC (surface temp. < 82 °C / 180 °F).



5.4 HST (CSIR) starting equipment

Compressors with the motor type Capacitor Start Induction Run (CSIR) have a starting device for High Starting Torque (HST). This starting device consists of a starting relay and a starting capacitor. The following designs of starting devices are available:

a) Relay + starting capacitor + cord relief + cover

Mount the starting relay on the current lead-in on the compressor. Apply pressure to the center of the starting relay to avoid deforming the clips. Fasten the starting capacitor to the bracket on the compressor. Mount the cord relief in the bracket under the starting relay. Place the cover over the starting relay and screw it to the bracket or lock it in position with the integrated hooks.

b) Relay housing including motor protector + starting capacitor + cord relief (2x)

Mount the starting relay on the current lead-in on the compressor. Apply pressure to the center of the starting relay to avoid deforming the clips. Fasten the starting capacitor to the bracket on the compressor. Place the cover over the starting relay and lock it in position with the locking clamp.

c) Relay + starting capacitor (with bracket) + cover/ protector/ protector holder (parts of the compressor), used for compressors which have an external protector.

Fasten the starting capacitor to the bracket. Place the cover over the external protector and lock it in position with the locking clamp.

The starting device requires no pressure equalization before each start and is normally used in refrigerating systems with expansion valve as throttling device or in capillary tube systems where pressure equalizing is not obtained during standstill periods.

The starting capacitor is designed for short time cut in. "1.7% ED", which is stamped on the starting capacitor, means for instance max. 10 cut ins per hour each with duration of 6 seconds (normally shorter than 1 sec).

5.5 HST (CSR) starting equipment

Compressors with the motor type Capacitor Start Run (CSR) have a starting device for High Starting Torque (HST). The following designs of starting devices exist:

a) Relay + starting capacitor + run capacitor + terminal board + cord relief + cover

Mount the terminal box on the current lead-in. Note that the leads must face upwards. Mount the cord relief in the bracket under terminal box. Place the cover.

b) Relay + starting capacitor (with bracket) + run capacitor + cover/ protector/ protector holder (parts of compressor), used for compressors which have an external protector.

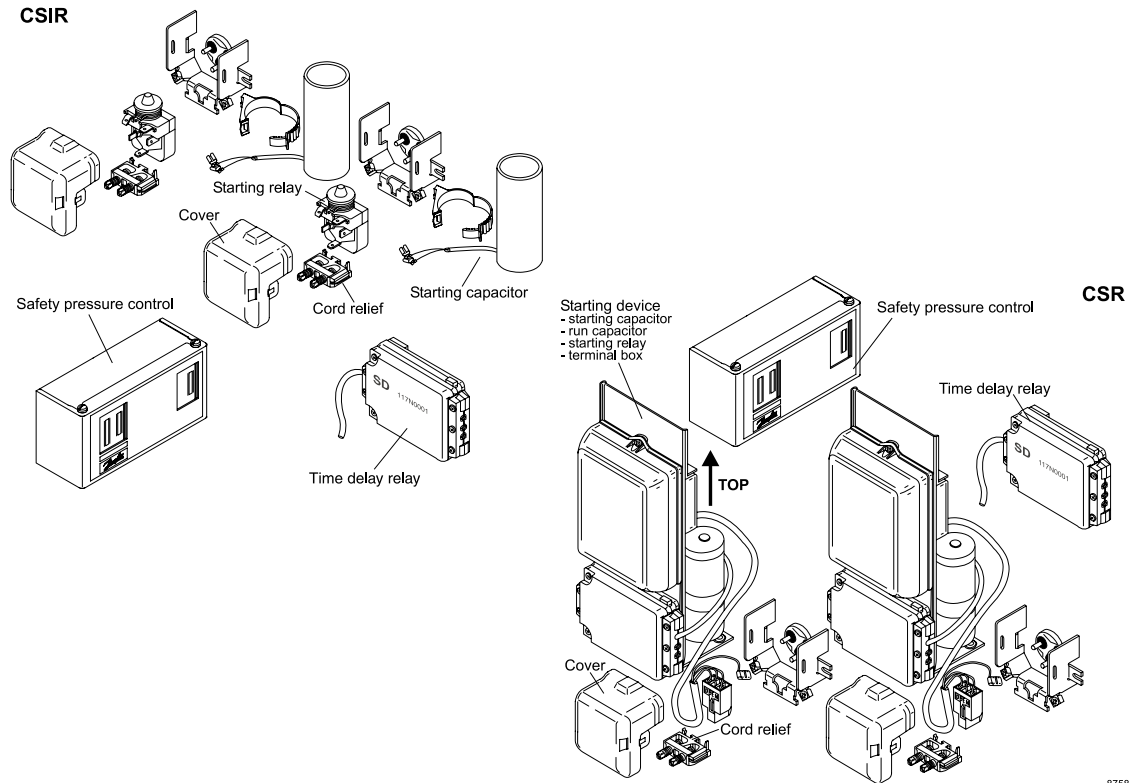
Fasten the starting capacitor to the bracket. Place the cover over the external protector and lock it in position with the locking clamp.

The starting capacitor is designed for short time cut in. "1.7% ED", which is stamped on the starting capacitor, means for instance max. 10 cut ins per hour each with a duration of 6 seconds.

5.6 Equipment for SC Twin compressors

To ensure optimum starting and the smallest possible mains load, we recommend that the compressors be equipped with a time delay relay for start of the second compressor. Twin compressors can operate with capacity regulation depending on the controls used. Depending on the motor type (CSR/CSIR) all accessories needed are illustrated in the drawing below.

The use of a time delay (e.g. 117N0001) is recommended for starting the second section (15 seconds time delay). If a time delay is used, the connection on the terminal board between L and 1 must be removed from the compressor no. 2 connection box. If thermostat for capacity control is used, the connection on the terminal board between 1 and 2 must be removed.



5.7 Connections

The electrical equipment is equipped with connectors depending on the ordered code number,

Starting relays: 6.3 mm / 1/4" spade connectors only

PTCs: 6.3 mm / 1/4" or 4.8 mm / 3/16" spade connectors and screws

The power supply must be connected as shown in the wiring diagrams for the chosen electrical equipment given in the actual data sheets or Single Pack Instructions.

The compressor application must factor in power supply from an electrical circuit with the appropriate fuse or circuit breaker. In addition, the use of a GFCI (Ground Fault Circuit Interrupter) or RCD (Residual Current Device) is recommended.

5.8 Further reading

Single Pack Instructions for all our AC compressors showing wiring diagrams, warnings and connector locations can be found in chapter 6.til 29. or on our website:

www.secop.com/products/technical-literature/instruction/single-pack-instructions/

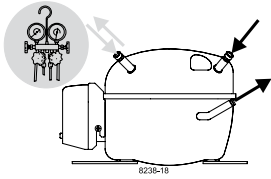
Electronic Units Instructions for our AC and DC compressors can be found here:

www.secop.com/products/technical-literature/instruction/electronic-units-instructions/

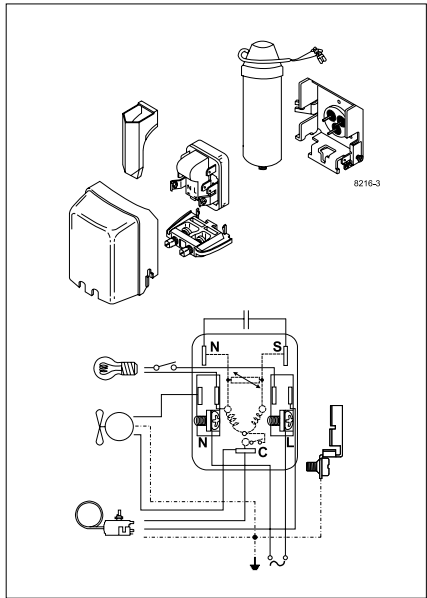
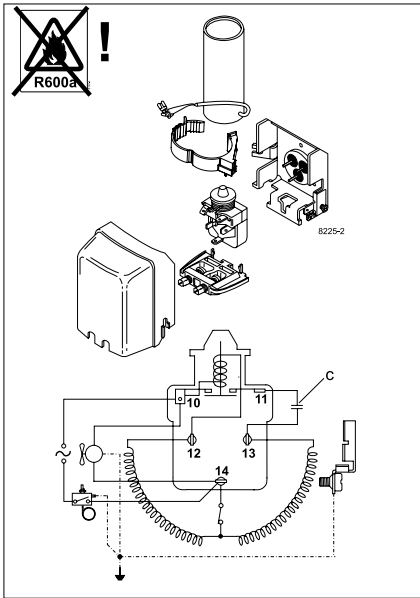
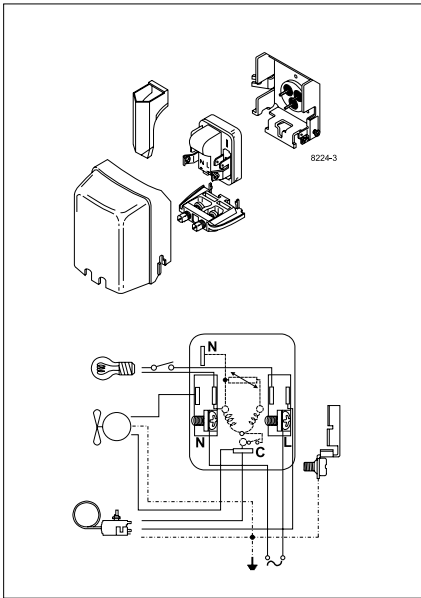
Operating Instructions for our variable speed compressor can be found here:

www.secop.com/products/technical-literature-operating-instructions/

6. PL COMPRESSORS



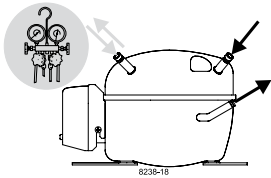
PL Compressors



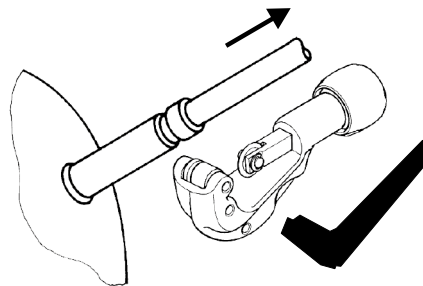
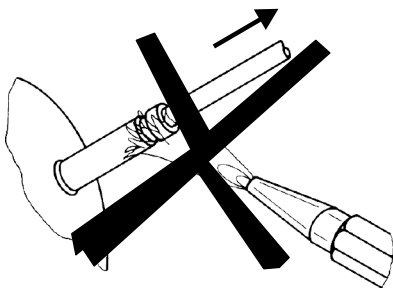
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PL Compressors Service/Repair – R600a



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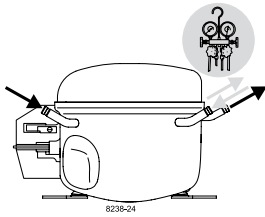
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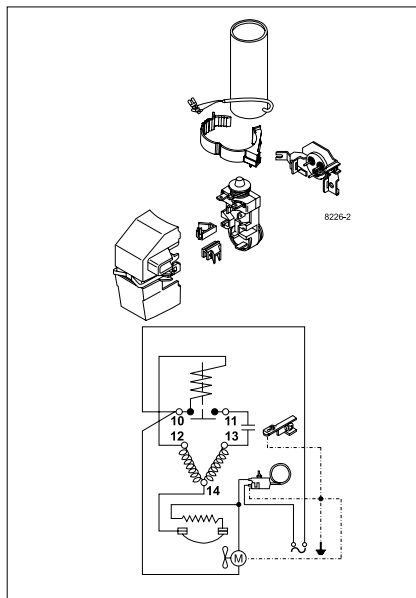
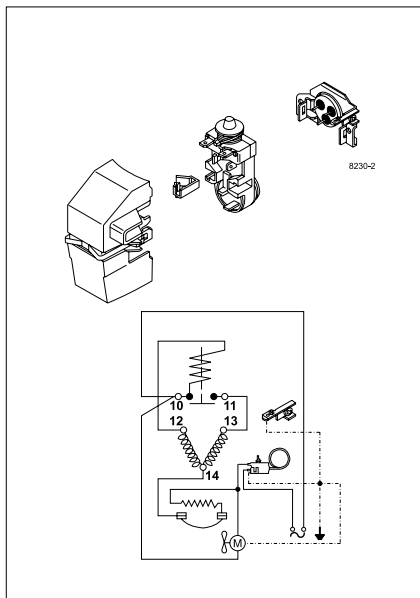
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7. TF COMPRESSORS



TF Compressors

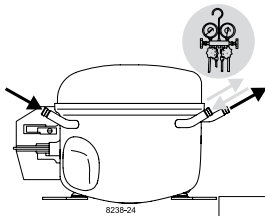
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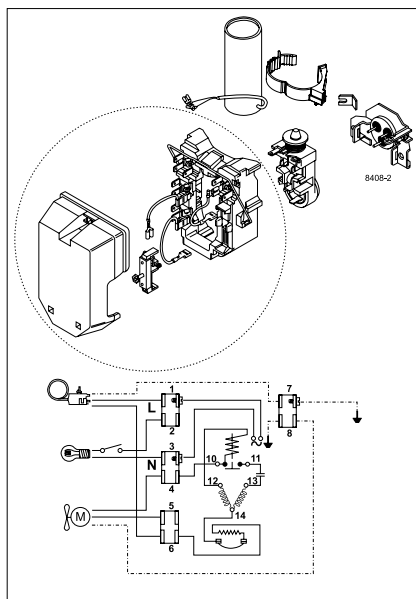
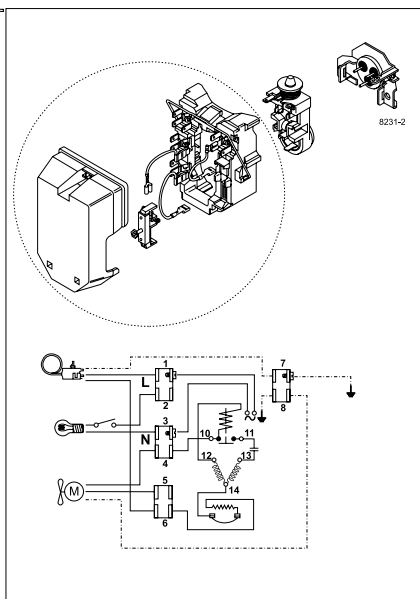
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TF Compressors

SECOP



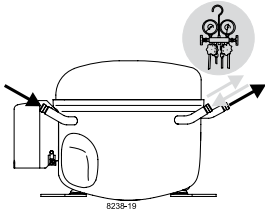
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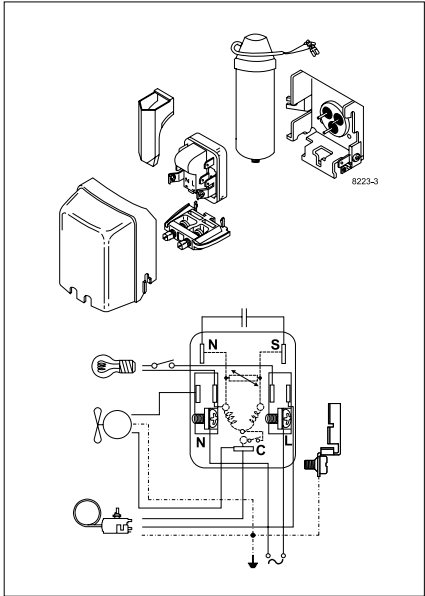
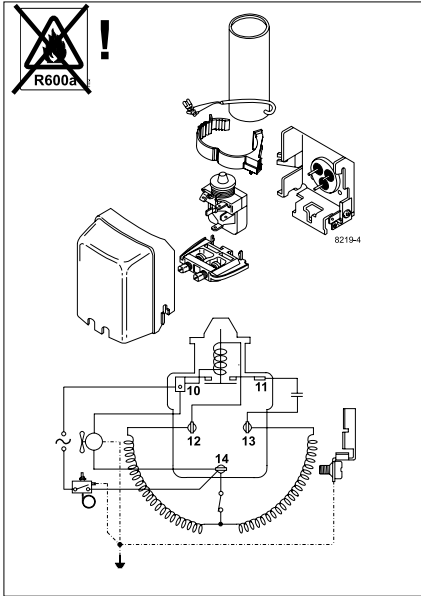
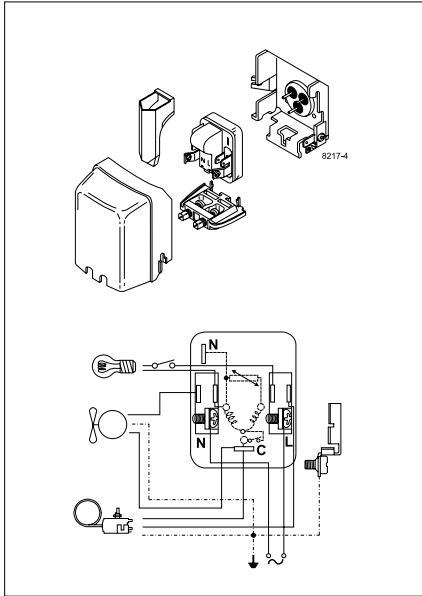
DES.I.200.J1.02 / 520N0372

February 2011

8. TL COMPRESSORS



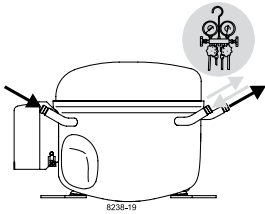
TL Compressors



December 2017

DES.I.200.I2.02 / 520N0371

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TL Compressors



Service/Repair – R600a, R290

R600a

R290

8545

8545

Brazing on Suction Connectors (Direct Intake)

representative image

**! max. 150°C/302°F !
at socket**

brazing solder: phosphor (LP7) or silver

Refer to Product Bulletin:
**Brazing on Suction Connectors
(Compressors with Direct Suction Intake)**

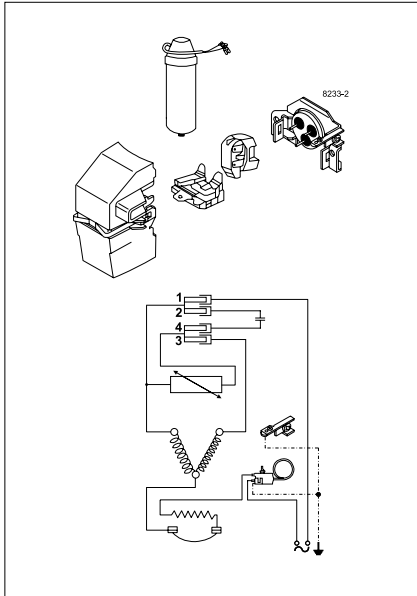
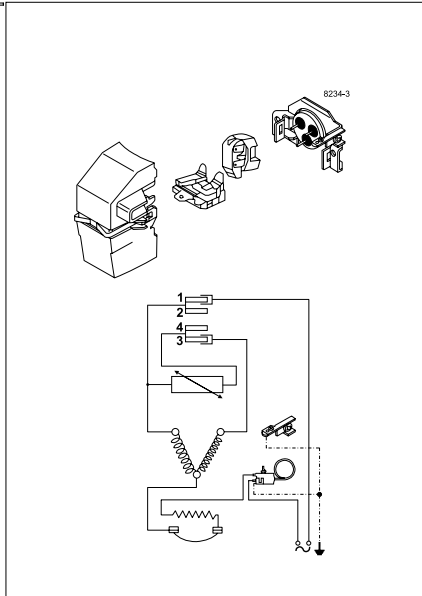
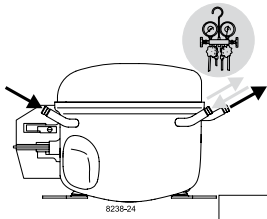
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9.

TT COMPRESSORS

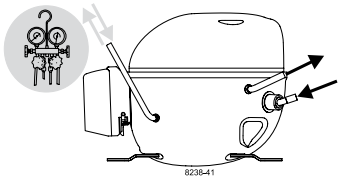
TT Compressors

SECO P



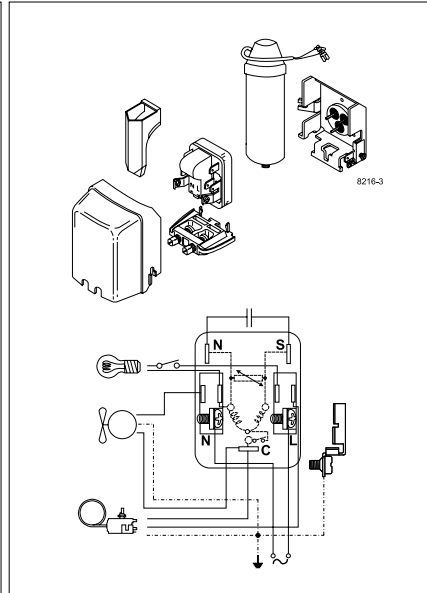
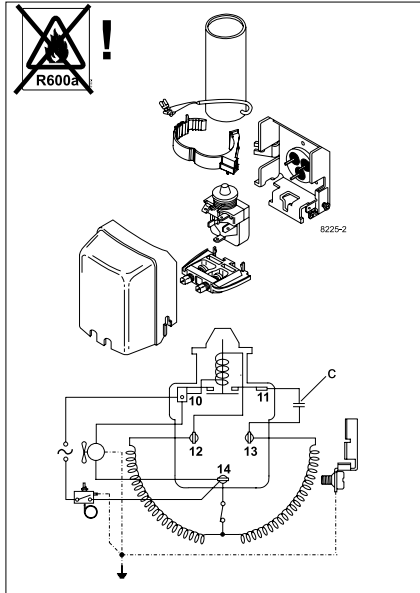
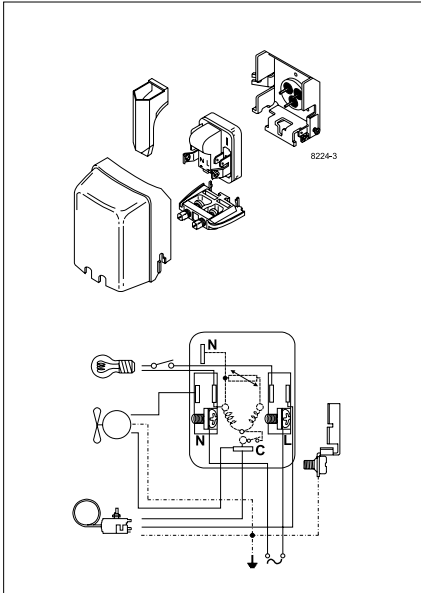
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10. DL COMPRESSORS



DL Compressors

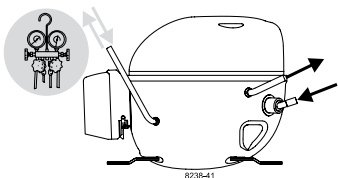
SECOP



December 2017

DES.1.200.N3.02 / 520N0375

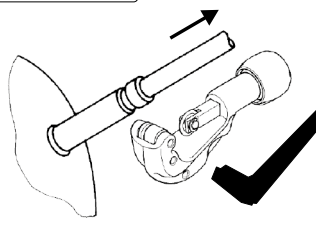
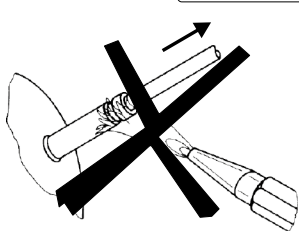
1/2



DL Compressors

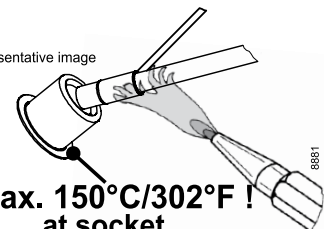
SECOP

Service/Repair – R600a, R290



Brazing on Suction Connectors (Direct Intake)

representative image



**! max. 150°C/302°F !
at socket**
brazing solder: phosphor (LP7) or silver

Refer to Product Bulletin:
Brazing on Suction Connectors
(Compressors with Direct Suction Intake)

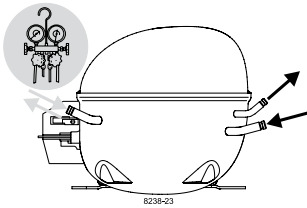
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2/2

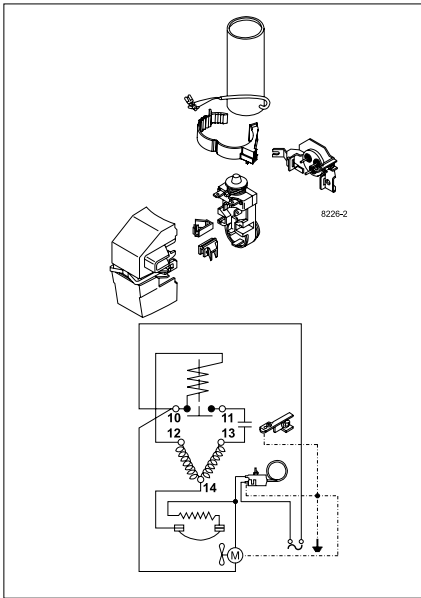
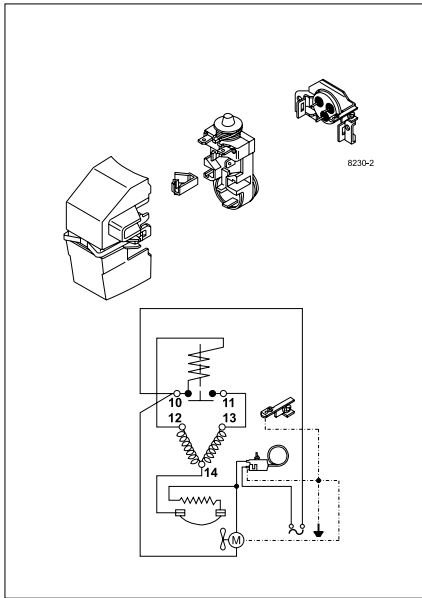
DES.1.200.N3.02 / 520N0375

December 2017

11. NF COMPRESSORS



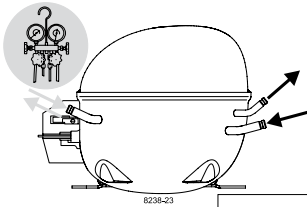
NF Compressors



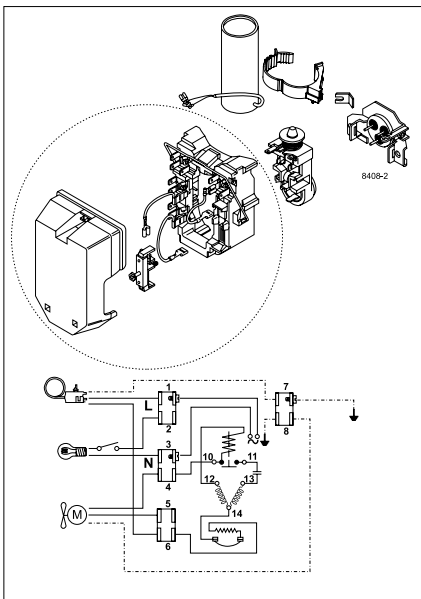
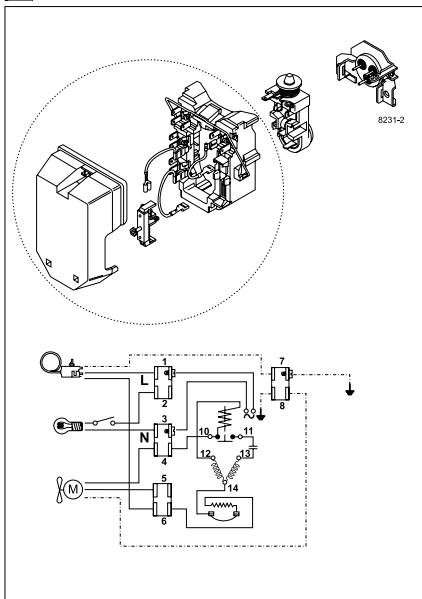
February 2011

DES.I.200.E1.02 / 520N0367

1/2



NF Compressors



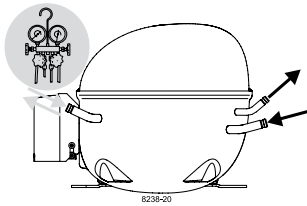
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2/2

DES.I.200.E1.02 / 520N0367

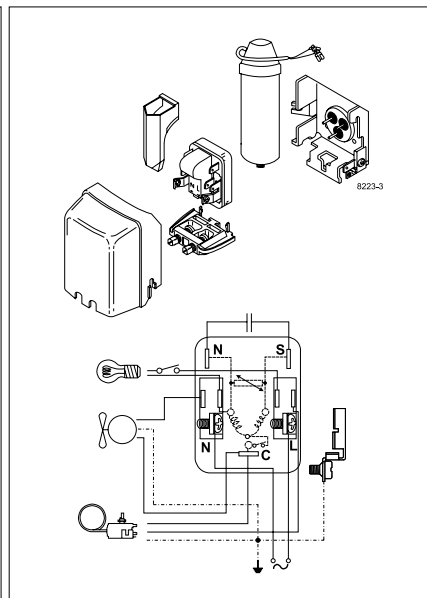
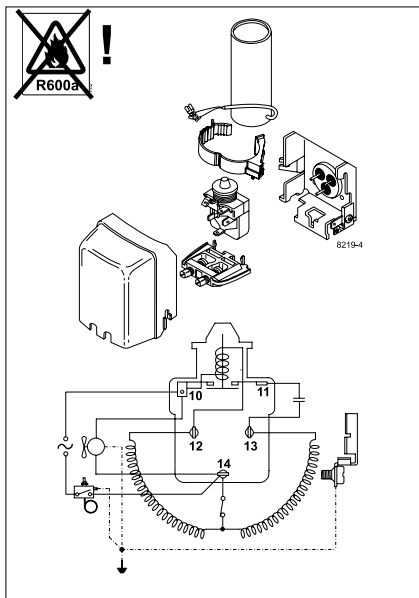
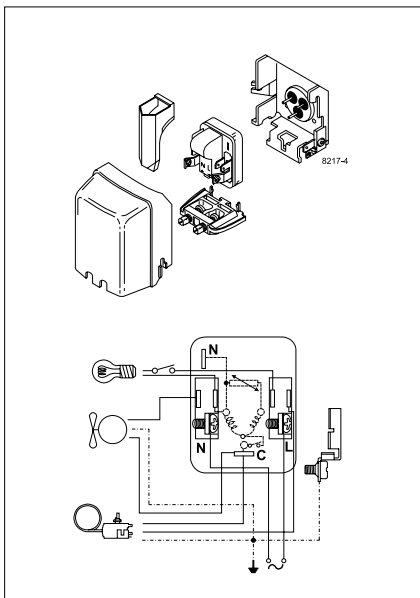
February 2011

12. NL COMPRESSORS



NL Compressors

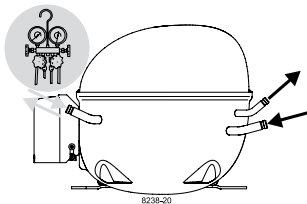
SECO P



December 2017

DES.I.200.F2.02 / 520N0368

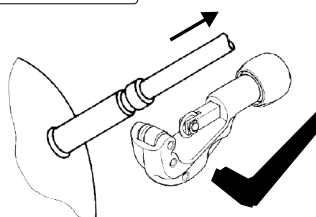
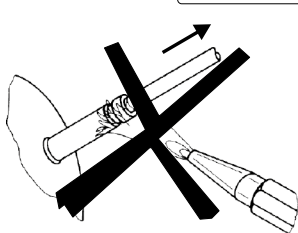
1/2



NL Compressors

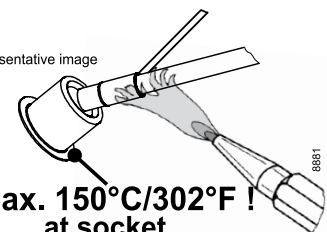
SECO P

Service/Repair – R600a, R290



Brazing on Suction Connectors (Direct Intake)

representative image



**! max. 150°C/302°F !
at socket**
brazing solder: phosphor (LP7) or silver

Refer to Product Bulletin:
**Brazing on Suction Connectors
(Compressors with Direct Suction Intake)**

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2/2

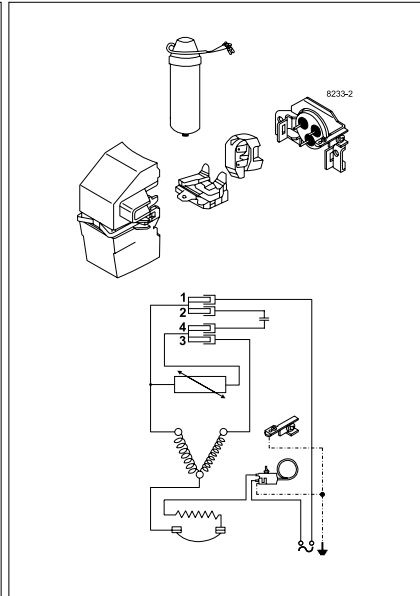
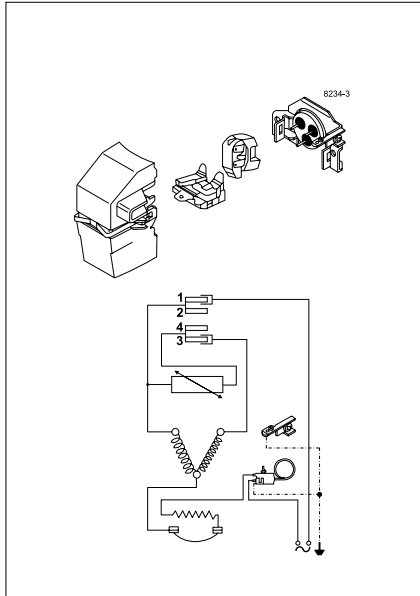
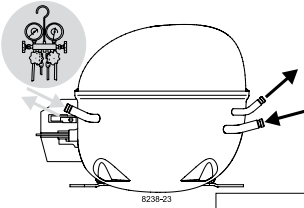
DES.I.200.F2.02 / 520N0368

December 2017

13. NT COMPRESSORS

NT Compressors

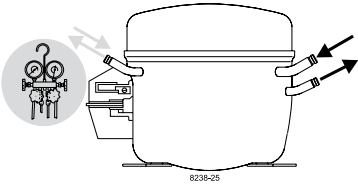
SECO P



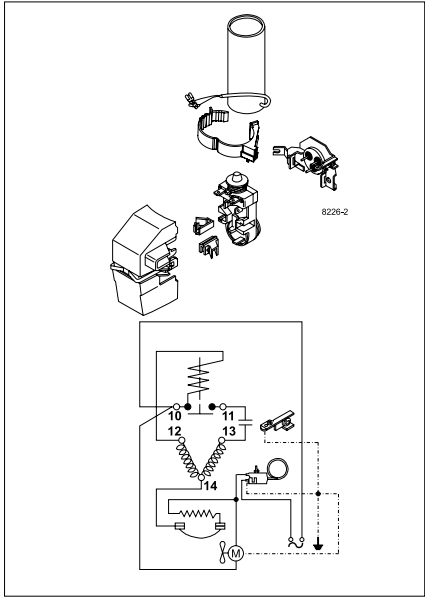
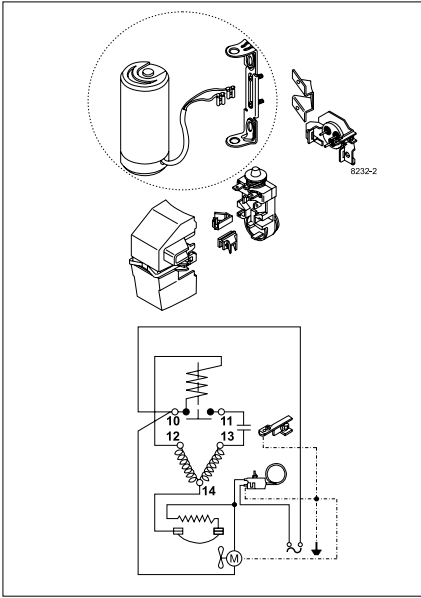
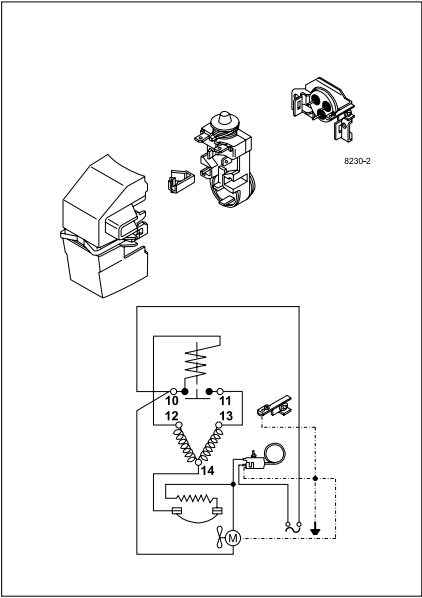
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14.

FF COMPRESSORS



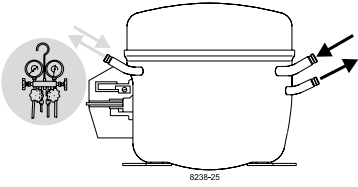
FF Compressors



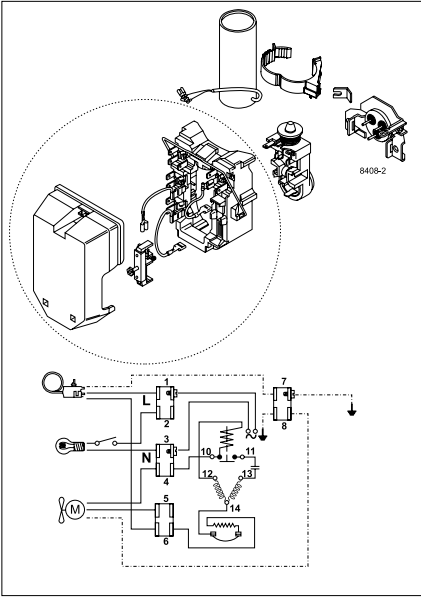
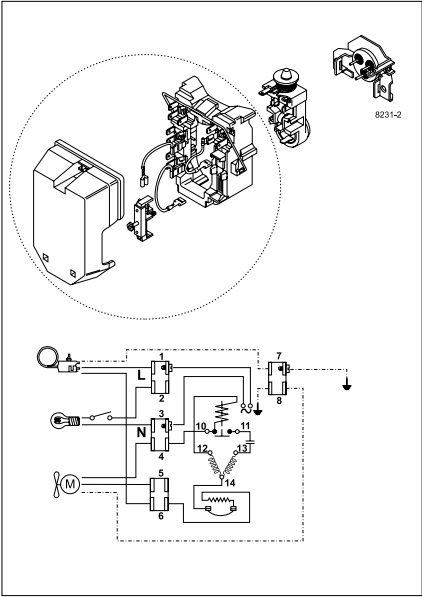
February 2011

DES.I.200.B1.02 / 520N0365

1/2



FF Compressors



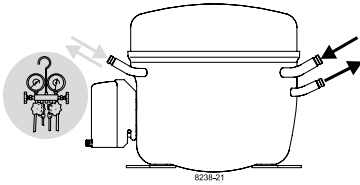
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2/2

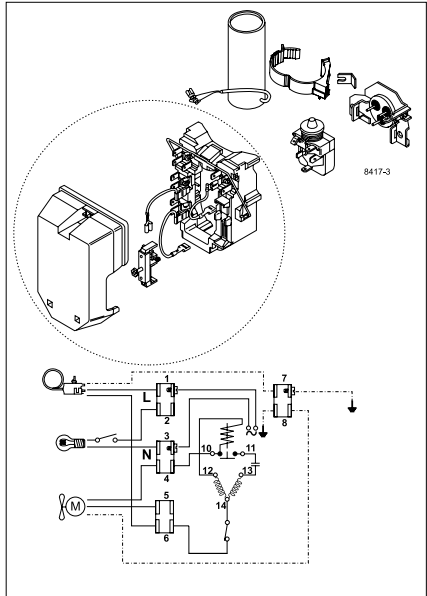
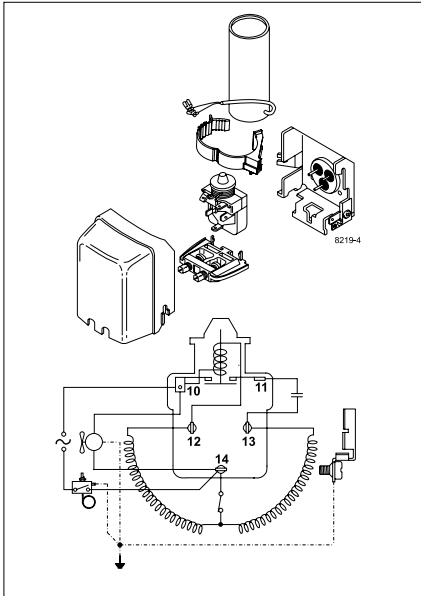
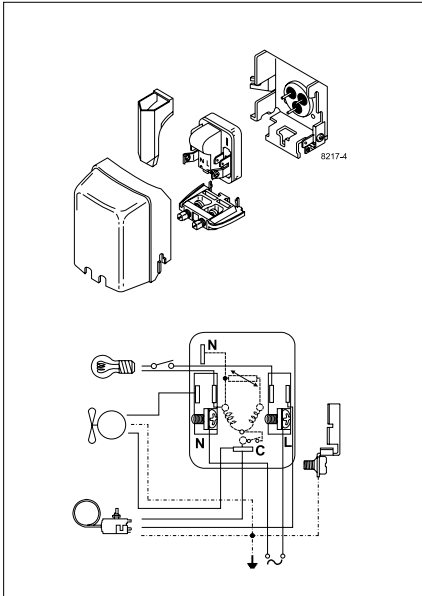
DES.I.200.B1.02 / 520N0365

February 2011

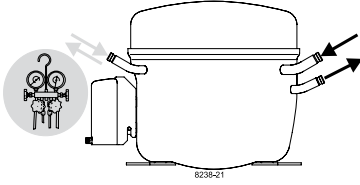
15. FR COMPRESSORS



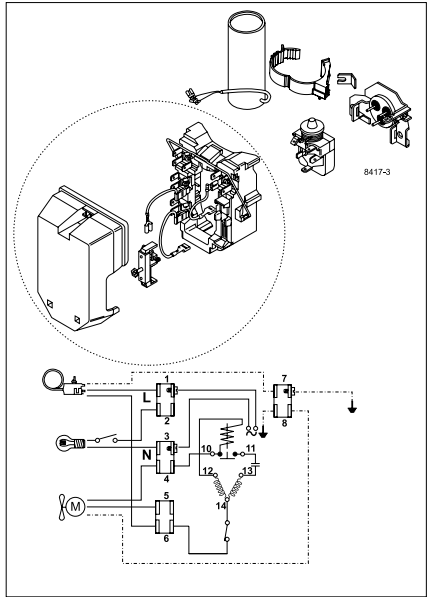
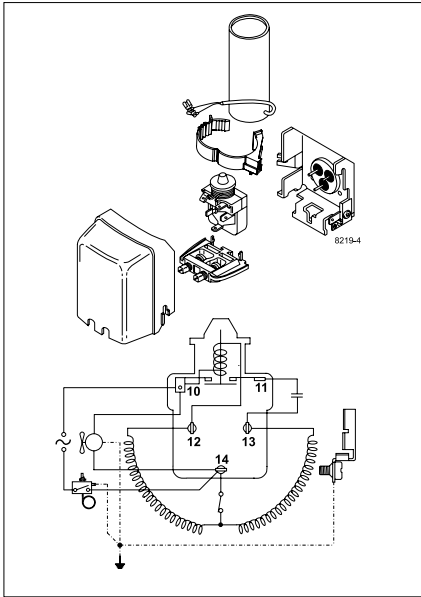
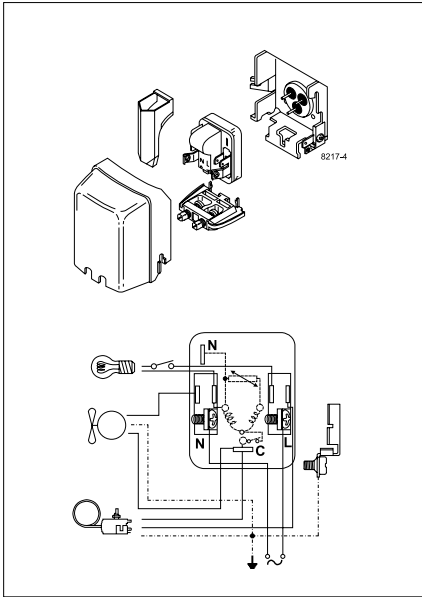
FR Compressors



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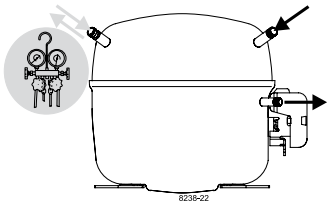


FR Compressors

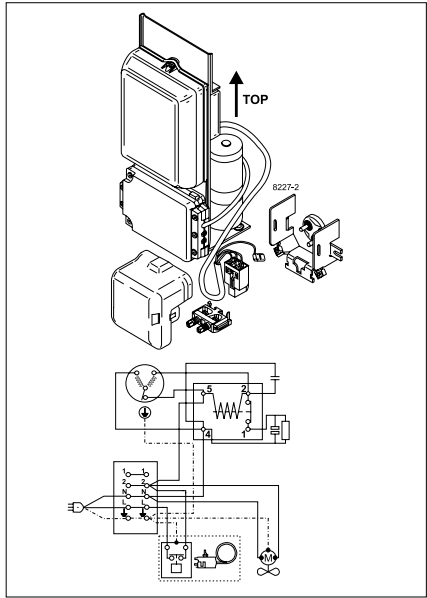
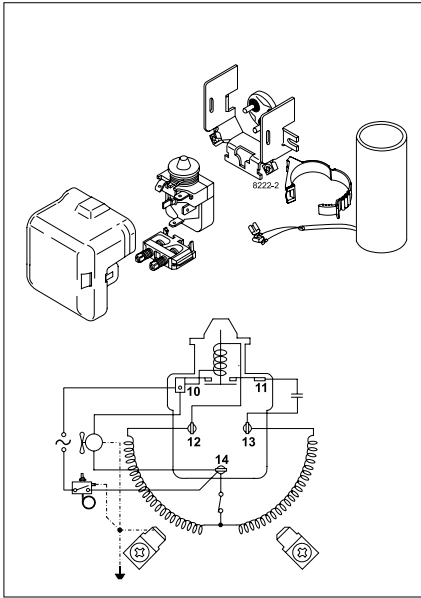
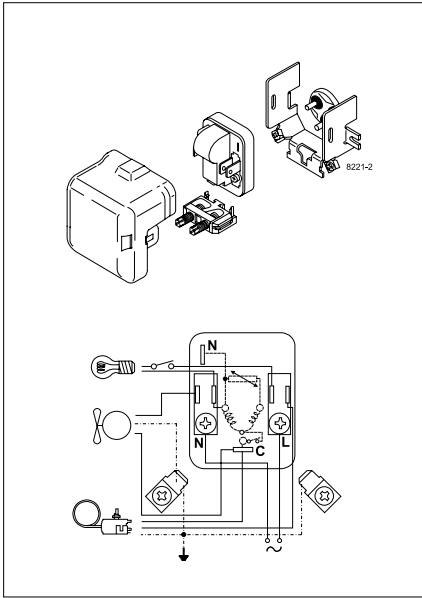


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16. SC COMPRESSORS



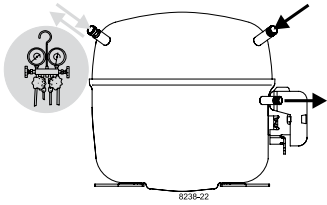
SC Compressors



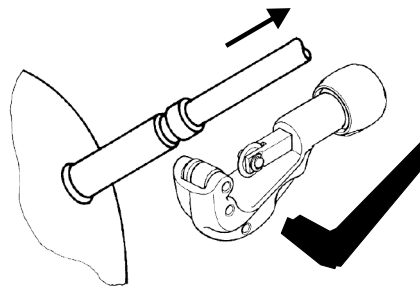
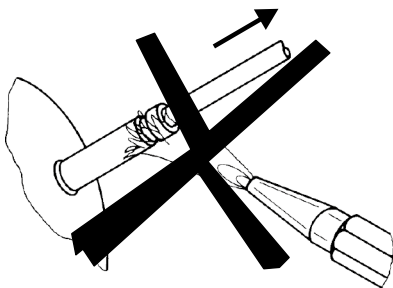
February 2011

DES.I.200.A1.02 / 520N0536

1/2



SC Compressors Service/Repair – R290



8545

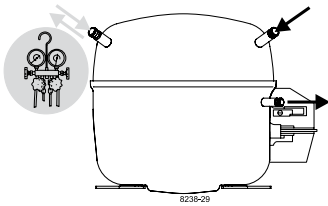
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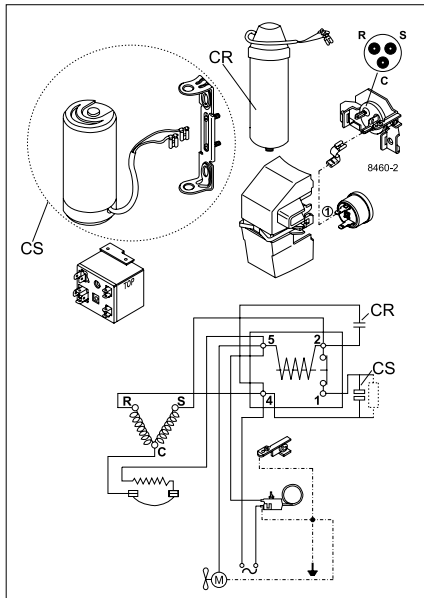
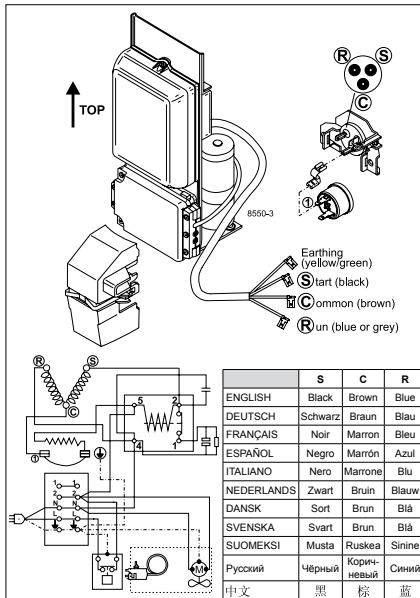
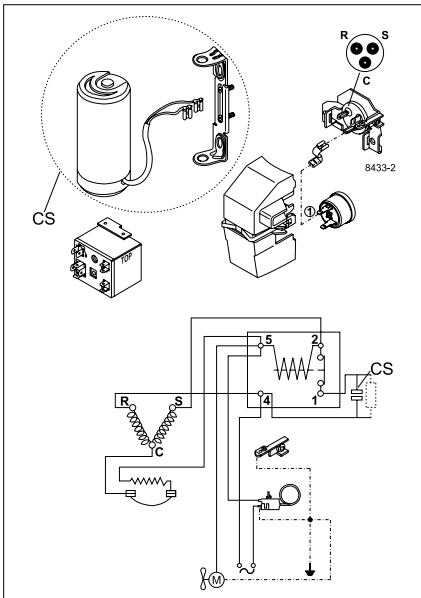
DES.I.200.A1.02 / 520N0536

February 2011

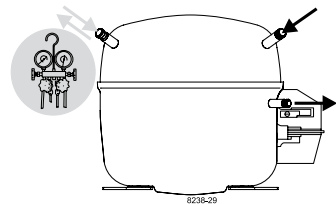
SC COMPRESSORS (EXTERNAL PROTECTOR)



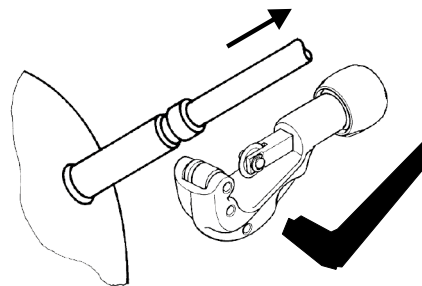
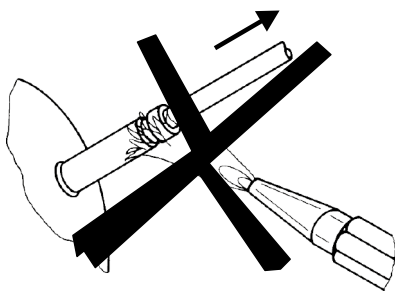
SC Compressors (External Protector)



	S	C	R
ENGLISH	Black	Brown	Blue
DEUTSCH	Schwarz	Braun	Blau
FRANÇAIS	Noir	Marron	Bleu
ESPAÑOL	Negro	Marrón	Azul
ITALIANO	Nero	Marrone	Blu
NEDERLANDS	Zwart	Bruin	Blauw
DANSK	Sort	Brun	Blå
SVENSKA	Svart	Brun	Blå
SUOMEKSI	Musta	Ruskea	Sininen
Русский	Чёрный	Коричневый	Синий
中文	黑	棕	蓝



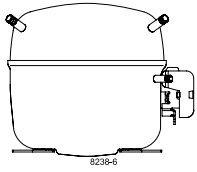
SC Compressors (External Protector) Service/Repair – R290



8545

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IP44 EQUIPMENT FOR SC COMPRESSORS

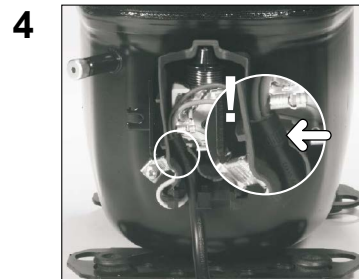
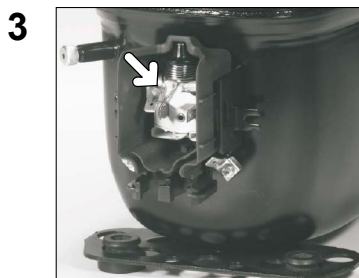
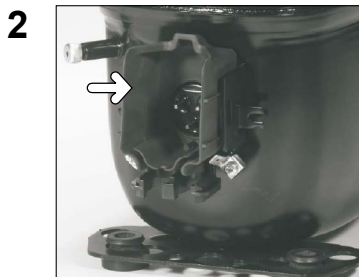
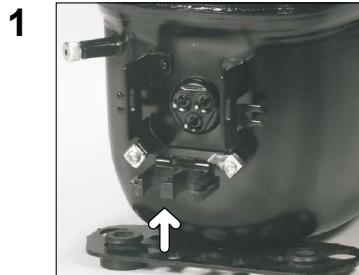
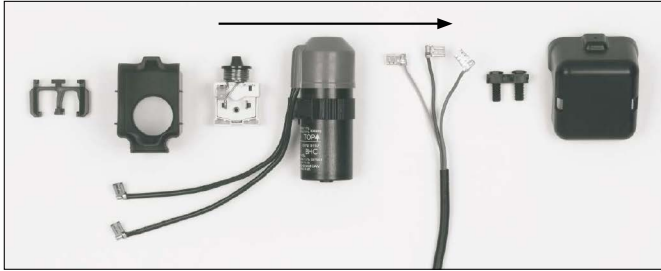


Instructions



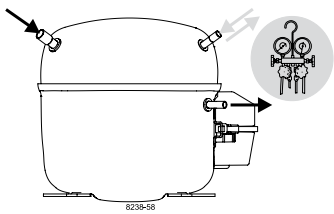
IP44 Equipment for SC Compressors

Back Cover 103N2020 + IP44 Starting Capacitor 80µF 117U5117

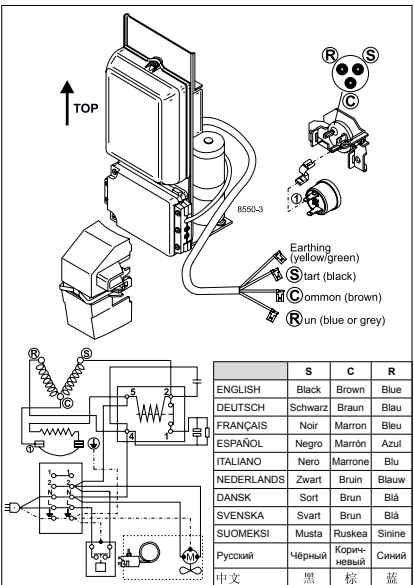
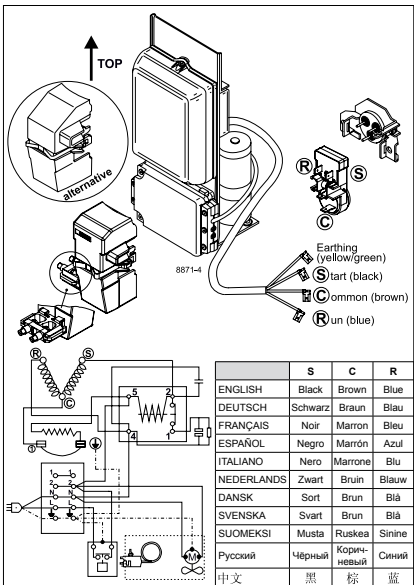
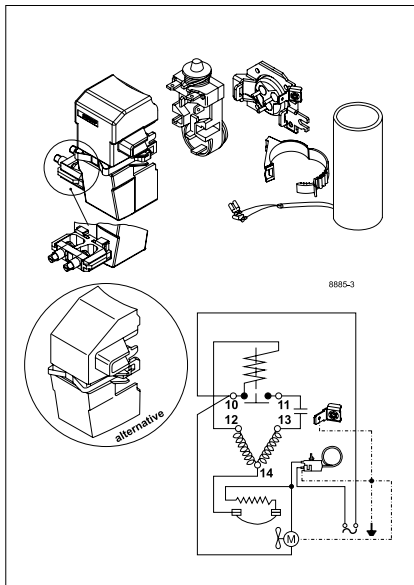


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19. SCE COMPRESSORS



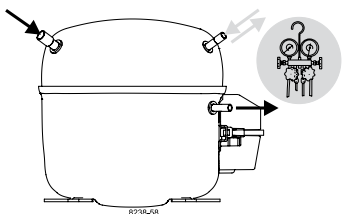
SCE Compressors (External Protector)



May 2018

DES.I.200.O4.02 / 520N0380

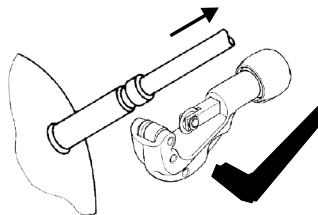
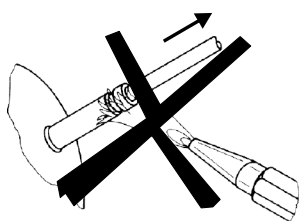
1/2



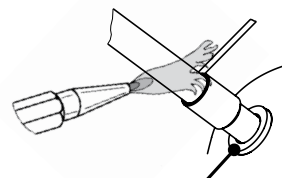
SCE Compressors (External Protector)



Service/Repair – R290



Brazing on Suction Connectors (Direct Intake)



**! max. 350°C/662°F !
at socket**
brazing solder: phosphor (LP7) or silver

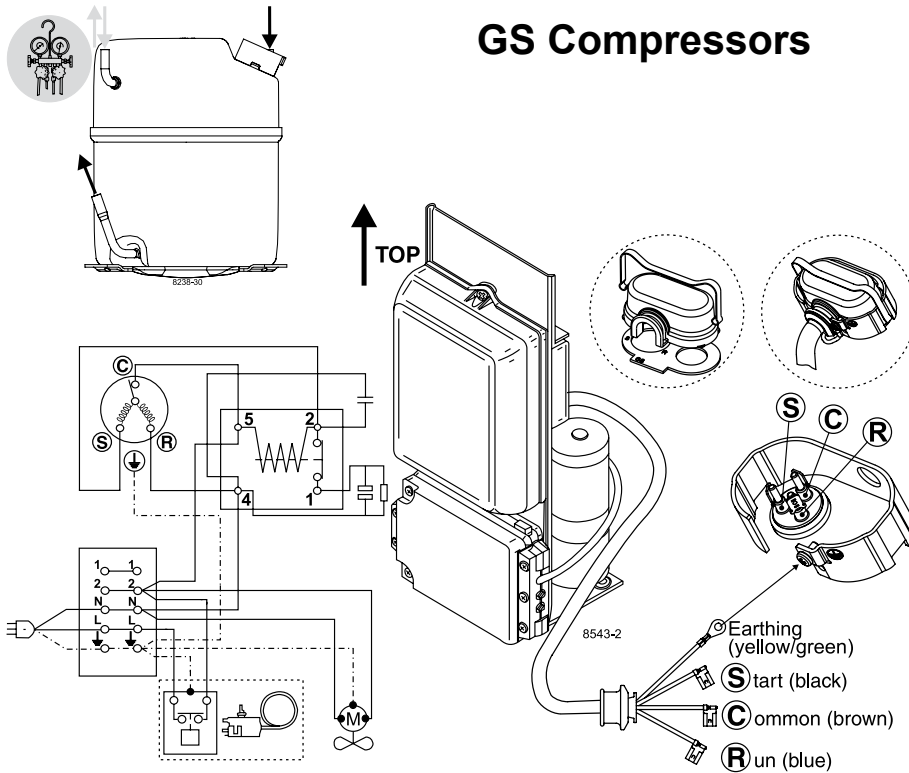
Refer to Product Bulletin:
Brazing on Suction Connectors
(SCE Compressors with Direct Suction Intake)

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20. GS COMPRESSORS

GS Compressors

SECOOP

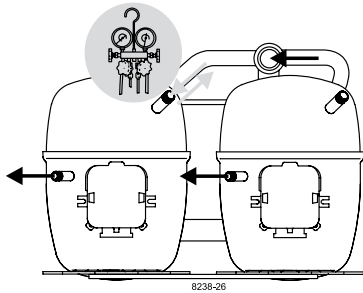


	S	C	R
ENGLISH	Black	Brown	Blue
DEUTSCH	Schwarz	Braun	Blau
FRANÇAIS	Noir	Marron	Bleu
ESPAÑOL	Negro	Marrón	Azul
ITALIANO	Nero	Marrone	Blu
NEDERLANDS	Zwart	Bruin	Blauw
DANSK	Sort	Brun	Blå
SVENSKA	Svart	Brun	Blå
SUOMEKSI	Musta	Ruskea	Sinine
Русский	Чёрный	Коричневый	Синий
中文	黑	棕	蓝

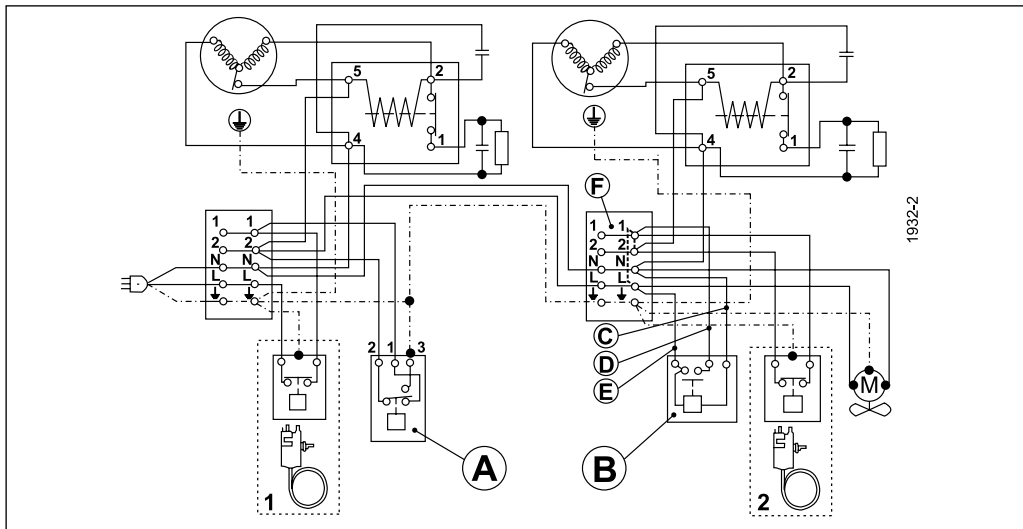
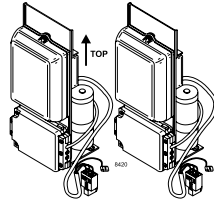
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21.

SC TWIN COMPRESSORS



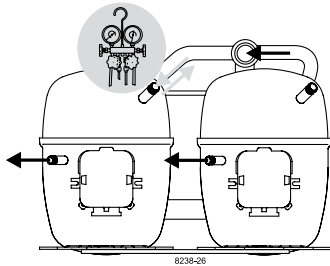
SC Twin Compressors



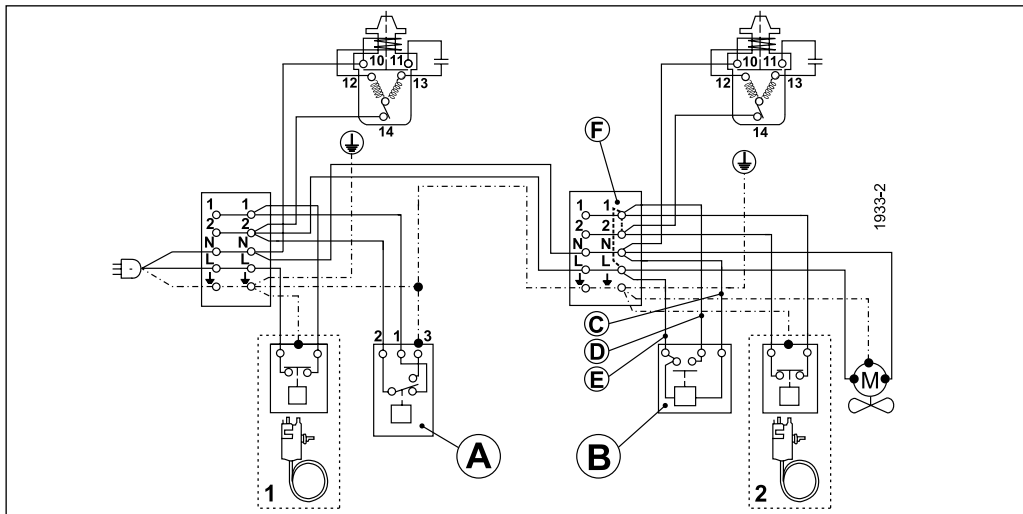
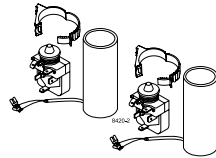
	A	B	C	D	E	F	
ENGLISH	Safety pressure control	Time delay relay	Blue	Black	Brown	Remove wire L-1 if time delay is used	Remove wire 1-2 if thermostat 2 is used
中文	安全压力控制	延时继电器	蓝	黑	棕	若延时继电器使用, 线L-1不使用	若温控器2使用, 线1-2不使用
Русский	Предохранительное реле давления	Реле задержки времени	Синий	Чёрный	Коричневый	Отсоедините провод L-1, если используется реле задержки времени	Отсоедините провод 1-2, если используется термостат 2
DEUTSCH	Sicherheitsdruckschalter	Zeitrelais (verzögert)	Blau	Schwarz	Braun	Bei Benutzung der Anlaufverzögerung Brücke L-1 entfernen	Bei Benutzung von Thermostat 2 Brücke 1-2 entfernen
FRANÇAIS	Pressostat	Relais de temporisation	Bleu	Noir	Marron	Supprimer la connection L-1 si le relais de temporisation est utilisé	Supprimer la connection 1-2 si thermostat 2 est utilisé
ESPAÑOL	Presostato de seguridad	Relé de retardo	Azul	Negro	Marrón	Quitar cable L-1, si se utiliza un relé de retardo	Quitar cable 1-2, si se utiliza el termostato 2
ITALIANO	Pressostato	Relè di ritardo avviam.	Blu	Nero	Marrone	Eliminare il cavo L-1 se è utilizzato il ritardatore	Eliminare il cavo 1-2 se è utilizzato il termostato 2
NEDERLANDS	Pressostaat	Tijdvertraging-relais	Blauw	Zwart	Bruin	Verwijder draad L-1 indien tijdvertraging wordt toegepast	Verwijder draad 1-2 indien thermostaat wordt toegepast
DANSK	Sikkerhedspressostat	Tidsforsinkelsesrelæ	Blå	Sort	Brun	Ved tidsforsinkelse fjernes ledning L-1	Ved termostat 2 fjernes ledning 1-2
SVENSKA	Säkerhetspressostat	Tidsfördröjningsrelä	Blå	Svart	Brun	Vid anslutning av tidfördröjningsrelä avlägsnas bygling L-1	Vid anslutning av termostat 2 avlägsnas bygling 1-2

21.

SC TWIN COMPRESSORS



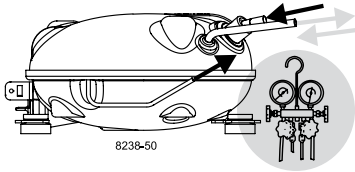
SC Twin
Compressors



	A	B	C	D	E	F
ENGLISH	Safety pressure control	Time delay relay	Blue	Black	Brown	Remove wire L-1 if time delay is used
中文	安全压力控制	延时继电器	蓝	黑	棕	若延时继电器使用, 线L-1不使用
Русский	Предохранительное реле давления	Реле задержки времени	Синий	Чёрный	Коричневый	Отсоедините провод L-1, если используется реле задержки времени
DEUTSCH	Sicherheitsdruckschalter	Zeitrelais (verzögernd)	Blau	Schwarz	Braun	Bei Benutzung der Anlaufverzögerung Brücke L-1 entfernen
FRANÇAIS	Pressostat	Relais de temporisation	Bleu	Noir	Marron	Supprimer la connection L-1 si le relais de temporisation est utilisé
ESPAÑOL	Presostato de seguridad	Relé de retardo	Azul	Negro	Marrón	Quitar cable L-1, si se utiliza un relé de retardo
ITALIANO	Pressostato	Relè di ritardo avviam.	Blu	Nero	Marrone	Eliminare il cavo L-1 se è utilizzato il ritardatore
NEDERLANDS	Pressostaat	Tijdvertraging-relais	Blauw	Zwart	Bruin	Verwijder draad L-1 indien tijdvertraging wordt toegepast
DANSK	Sikkerhedspressostat	Tidsforsinkelsesrelæ	Blå	Sort	Brun	Ved tidsforsinkelse fjernes ledning L-1
SVENSKA	Säkerhetspressostat	Tidsfördröjningsrelä	Blå	Svart	Brun	Vid anslutning av tidfördröjningsrelä avlägsnas bygling L-1

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XV COMPRESSORS

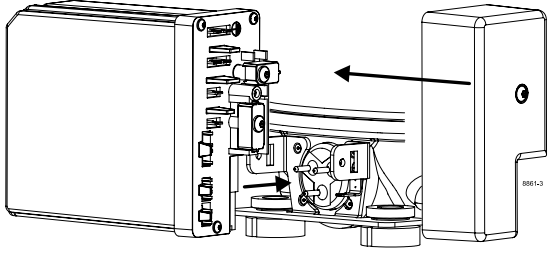


Instructions

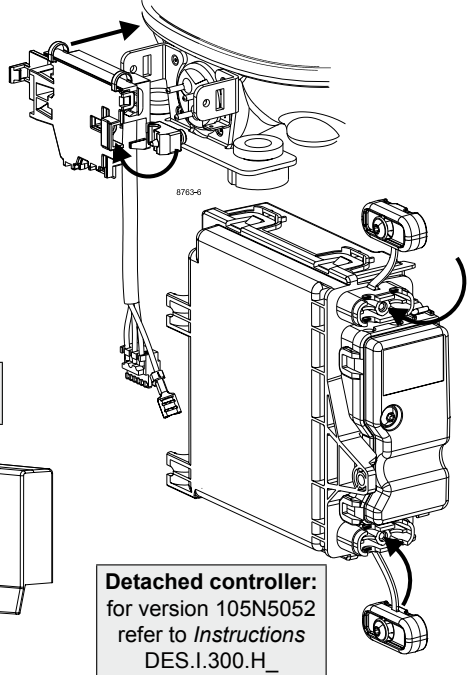
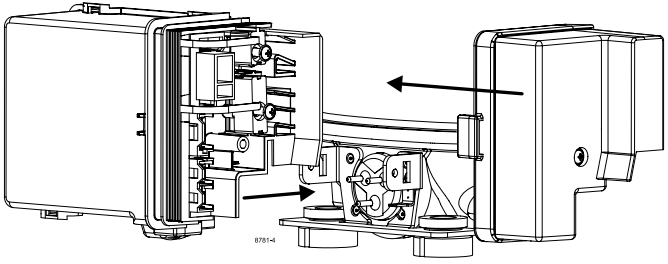
XV Compressors
160-264V, 50/60Hz
with 105N5xxx
Series Controllers



Attached controller (PFC):
for version 105N5320 refer to *Instructions DES.I.300.V_*



Attached controller:
for version 105N5022 refer to *Instructions DES.I.300.G_*



Detached controller:
for version 105N5052
refer to *Instructions DES.I.300.H_*

Operating Instructions <https://www.secop.com/products/technical-literature-operating-instructions/>

Connectors:
C = Suction
D = Process
E = Discharge

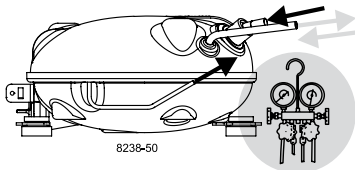
Recommended tool: 102B8950

max. 20°, 2x

max. 20°, 2x

!

XV COMPRESSORS



Instructions
 XV Compressors
 160-264V, 50/60Hz
 with 105N5xxx
 Series Controllers



Factory/OEM	Service/Repair
<p>C</p> <p>! max. 150°C/302°F ! at socket</p> <p>brazing solder: phosphor (LP7) or silver</p>	<p>R600a</p>
<p>D</p> <p>Ultrasonic tool</p>	<p>C</p>
<p>E</p> <p>min. 12 mm</p> <p>brazing solder: phosphor (LP7) or silver</p>	<p>D</p>
	<p>E</p> <p>LokRing® 8768</p>

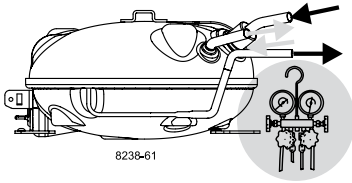
	Max. pressure	Max. pressure is 20 bar. Abrupt pressure drop > 3 bar/sec is not permitted.
	Evacuation	Two-sided evacuation (suction and discharge side) is essential.
	Supply voltage	230 V (+15 % / - 30 %), 50/60 Hz, only with electronic controller Refer to XV controller <i>Instructions</i> for wiring diagrams.
	Oil charge	The compressor is already charged with 115 ml oil (5 cSt mineral). No oil should be removed or refilled.
	Mounting instructions Compressor service	https://www.secop.com/products/technical-literature-guidelines/ https://www.secop.com/solutions/compressor-qa-tools/compressor-service/

Shipment positions of refrigeration appliances					
Horizontal	Connectors up	Electrical lead-in up	Connectors down	Electrical lead-in down	Base plate up

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23.

XV COMPRESSORS

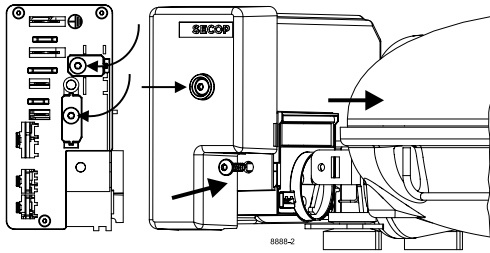


Instructions
 XV Compressors
 100-127V, 50/60Hz
 with 105N5xxx
 Series Controllers

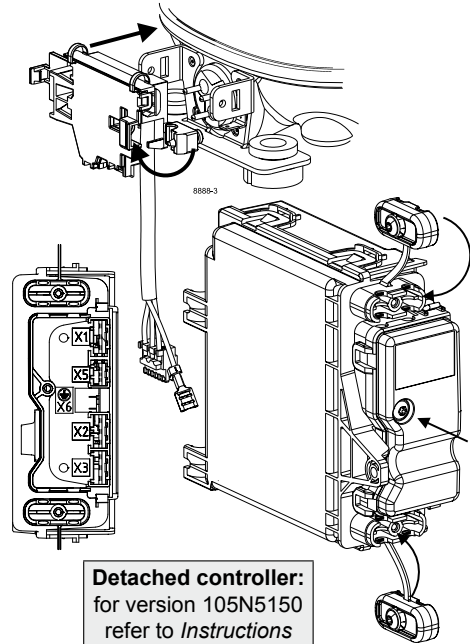
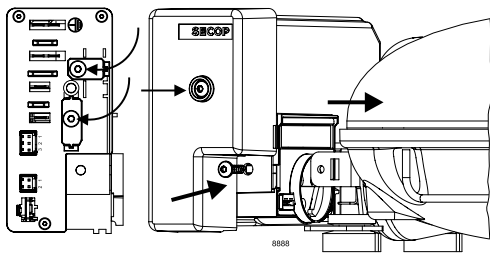
SECOP

TOOL4COOL®
 Flexible control settings

Attached controller:
 for version 105N5312 refer to *Instructions DES.I.300.Y_*



Attached controller:
 for version 105N5310 refer to *Instructions DES.I.301.A_*

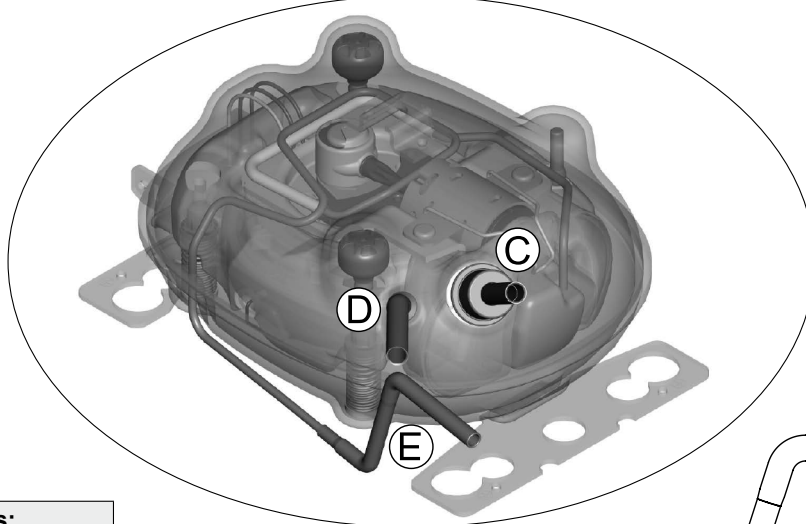


Detached controller:
 for version 105N5150
 refer to *Instructions*
 DES.I.300.K_

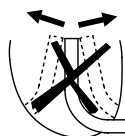


Operating Instructions

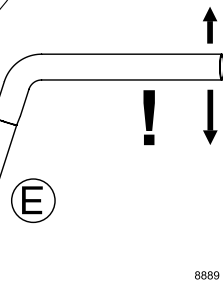
<https://www.secop.com/products/technical-literature-operating-instructions/>



Connectors:
 C = Suction
 D = Process
 E = Discharge

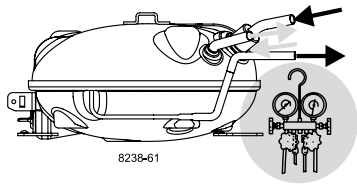


max. 20°, 2x



8889

XV COMPRESSORS



Instructions
 XV Compressors
 100-127V, 50/60Hz
 with 105N5xxx
 Series Controllers



Factory/OEM	Service/Repair
<p>C !</p> <p>D ✓</p> <p>E !</p>	<p> !</p> <p>C ✓</p> <p>D ✓</p> <p>E ✓</p> <p style="text-align: right;">LokRing® 8890</p>

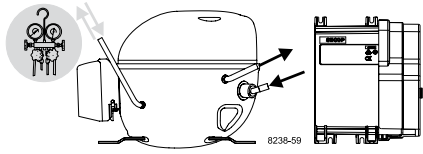
	Max. pressure	Max. pressure is 20 bar / 290 PSI. Abrupt pressure drop >3 bar/sec / >43.5 PSI/sec. is not permitted.
	Evacuation	Two-sided evacuation (suction and discharge side) is essential.
	Supply voltage	115 V (±15 %), 50/60 Hz, only with electronic controller. Refer to XV controller <i>Instructions</i> for wiring diagrams.
	Oil charge	The compressor is already charged with 115 ml / 3.89 fl oz oil (5 cSt mineral). No oil should be removed or refilled.
	Mounting instructions Compressor service	https://www.secop.com/products/technical-literature-guidelines/ https://www.secop.com/solutions/compressor-qa-tools/compressor-service/

Shipment positions of refrigeration appliances					
Horizontal	Connectors up	Electrical lead-in up	Connectors down	Electrical lead-in down	Base plate up

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24.

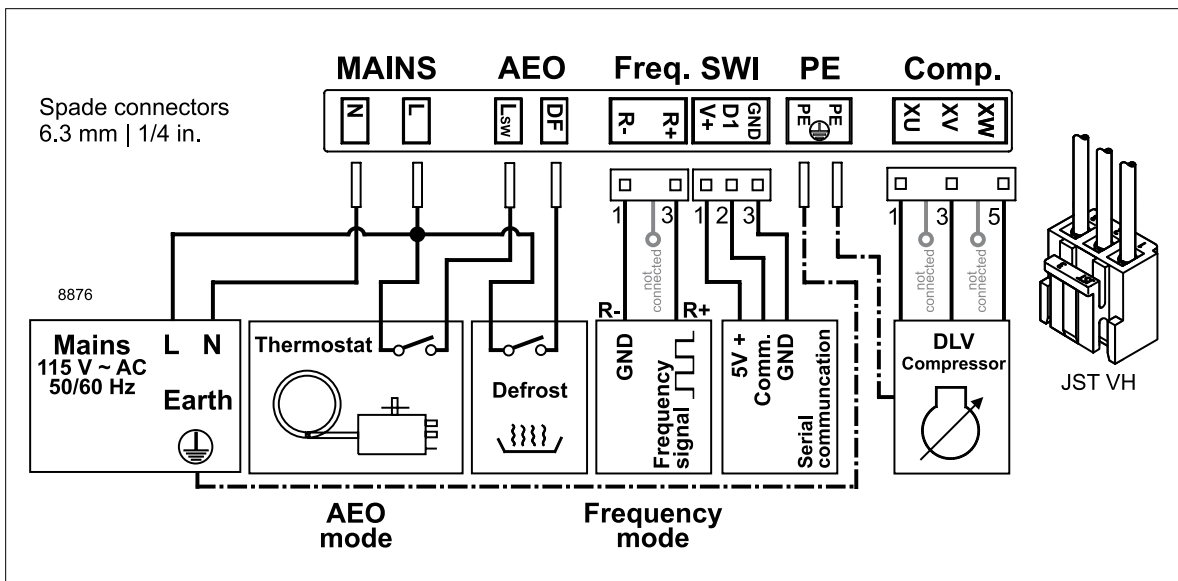
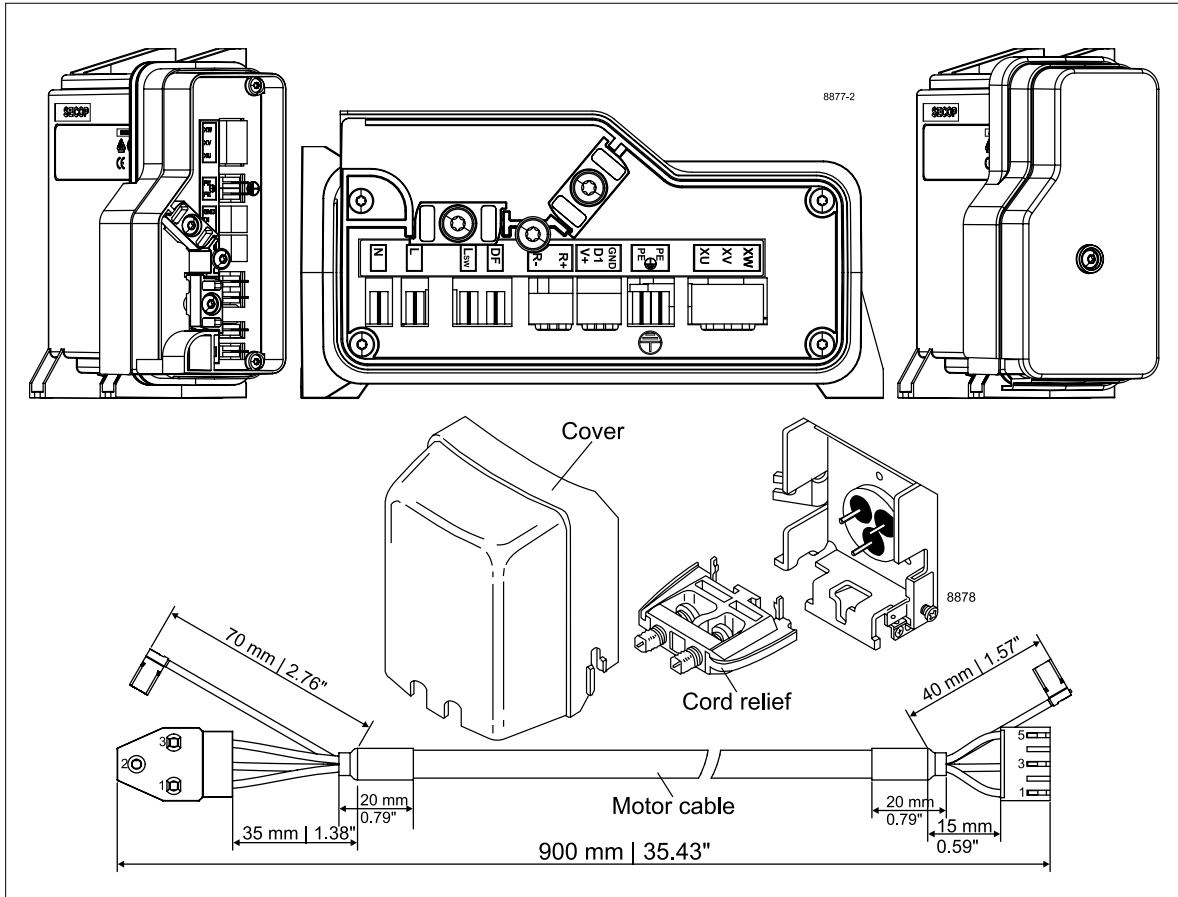
DLV COMPRESSORS



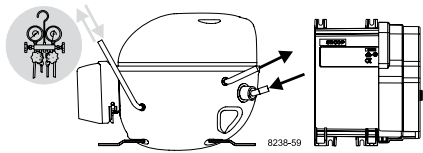
Instructions

DLV Compressors
100-127V 50/60Hz
105N446x
Series Controllers

SECOOP



DLV COMPRESSORS



Instructions

DLV Compressors
100-127V 50/60Hz
105N446x
Series Controllers



Service/Repair R290

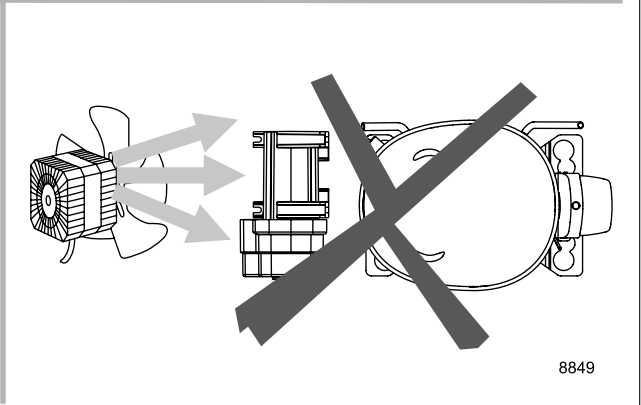
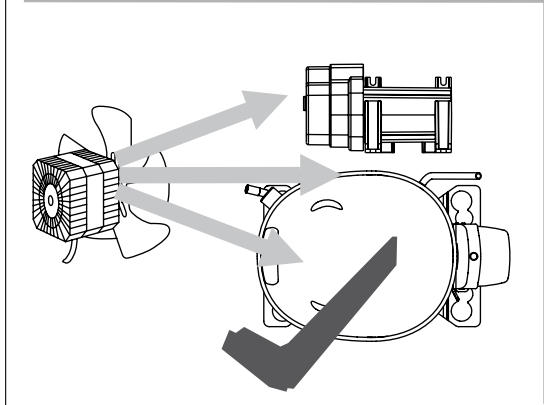
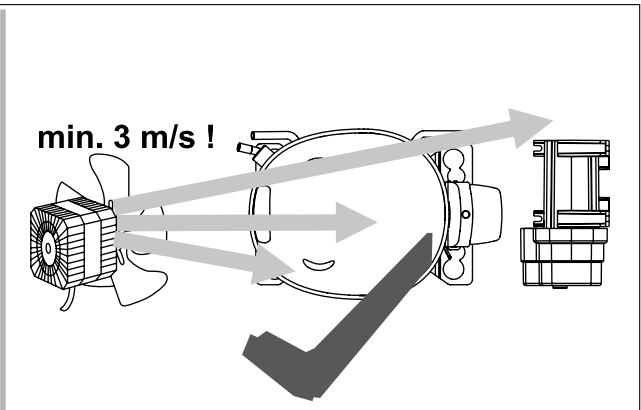
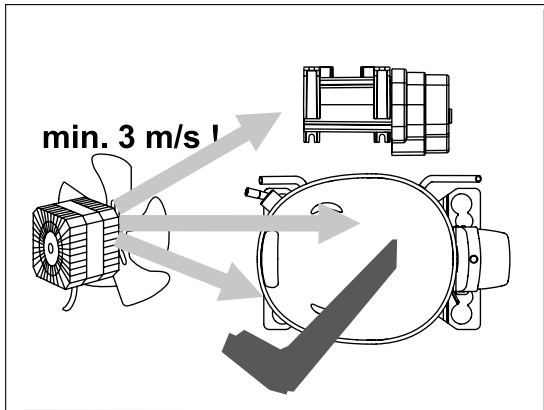
Brazing on Suction Connectors (Direct Intake)

representative image

**! max. 150°C/302°F !
at socket**

brazing solder: phosphor (LP7) or silver

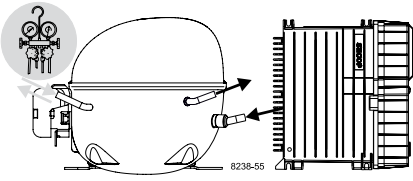
Refer to Product Bulletin: **Brazing on Suction Connectors**
(Compressors with Direct Suction Intake)



Airflow	3 m/s
Operating conditions 105N4460	+ 5 °C to 43 °C - humidity < 90 % rH non condensing
Storage conditions	-25 °C to 70 °C - humidity < 90 % rH non condensing
Supply voltage	100-127 V (± 10 %)
Frequency	50/60 Hz
Input power rating	450 W

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25. NLV COMPRESSORS

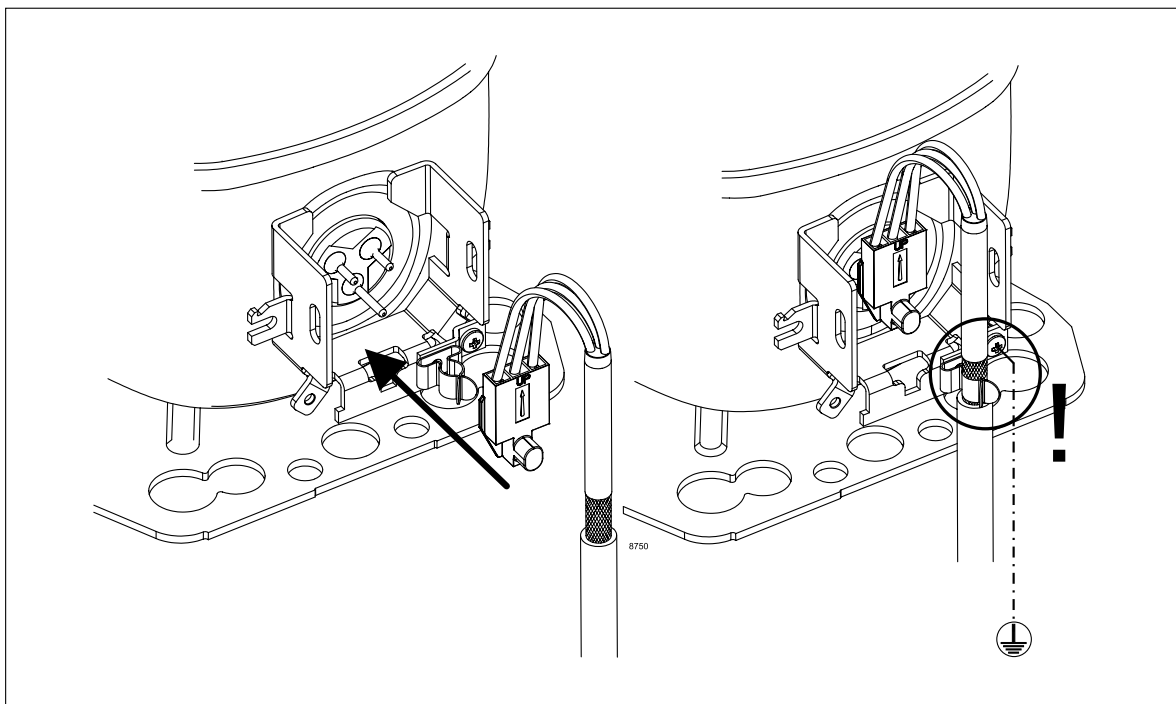
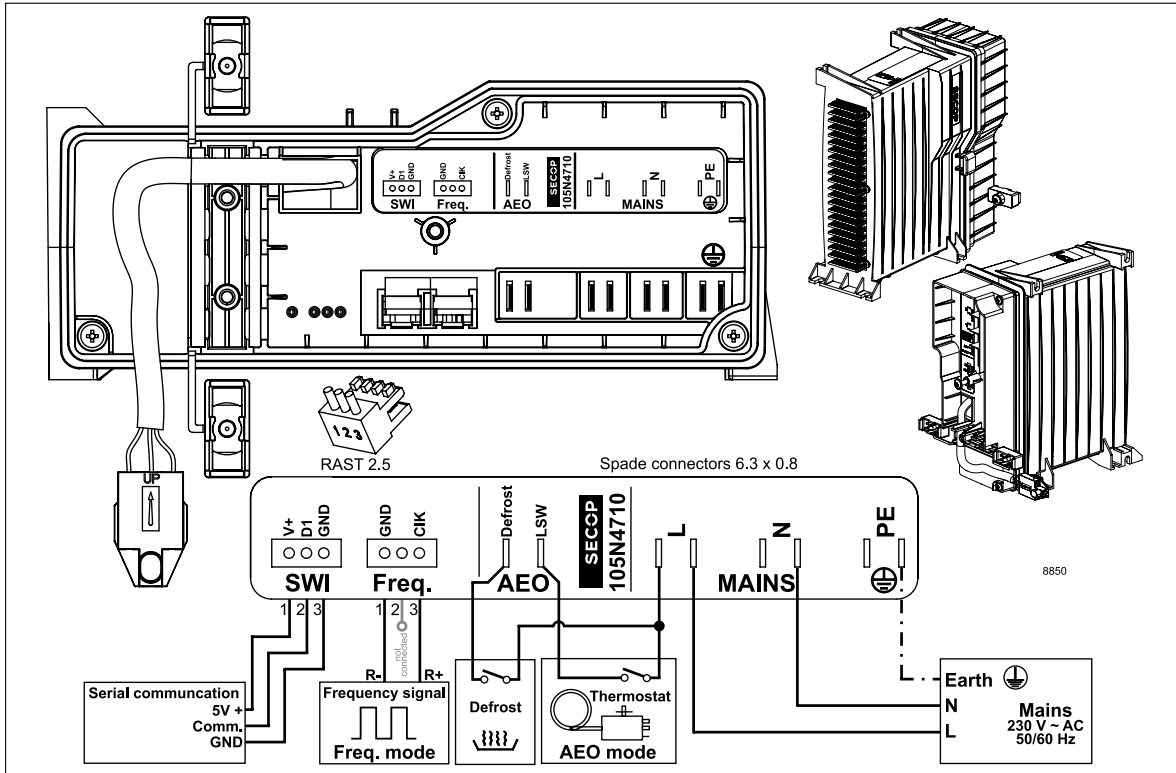


Instructions

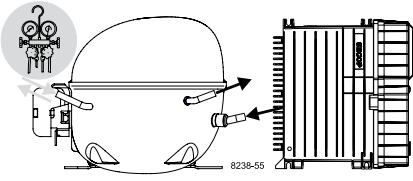
NLV Compressors
220-240V 50/60Hz
105N47xx
Series Controllers

SECOP

TOOL4COOL[®]
Flexible control settings



NLV COMPRESSORS



Instructions

NLV Compressors
220-240V 50/60Hz
105N47xx
Series Controllers

SECOP



Service/Repair R290

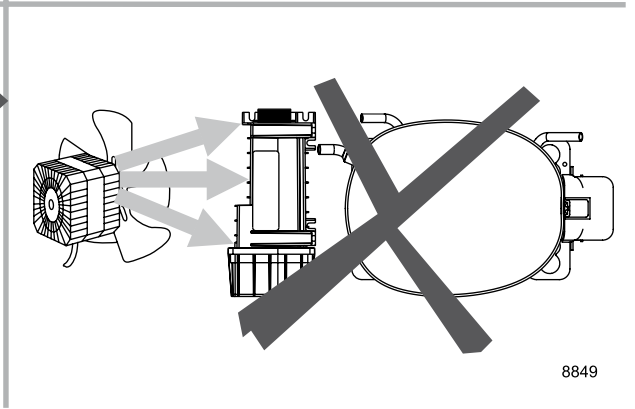
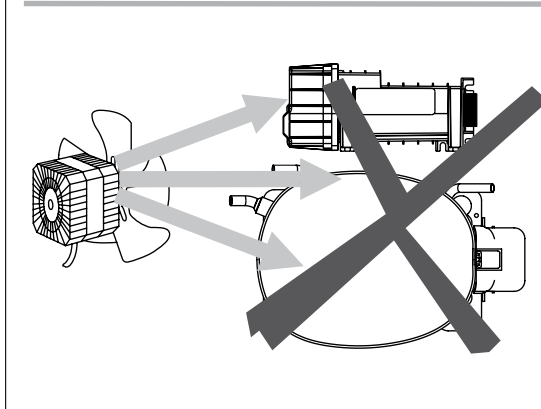
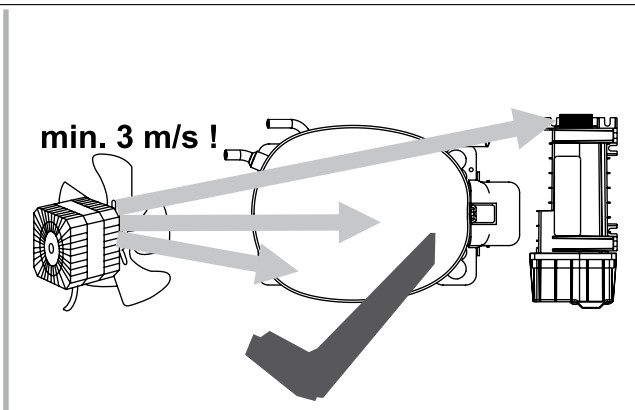
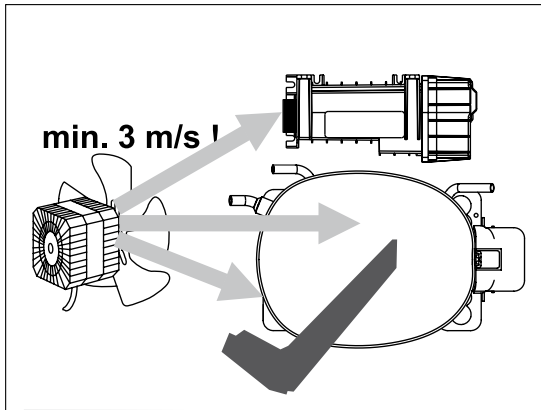
Brazing on Suction Connectors (Direct Intake)

representative image

**! max. 150°C/302°F !
at socket**

brazing solder: phosphor (LP7) or silver

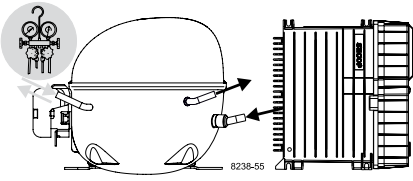
Refer to Product Bulletin: **Brazing on Suction Connectors (Compressors with Direct Suction Intake)**



Airflow	3 m/s
Operating conditions	+ 5 °C to 43 °C - humidity < 90 % rH non condensing
Storage conditions	-25 °C to 70 °C - humidity < 90 % rH non condensing
Supply voltage	230 V (+15 % / - 20 %)
Frequency	50/60 Hz
Input power rating	1000 W at 230 V (+15 % / - 20 %)

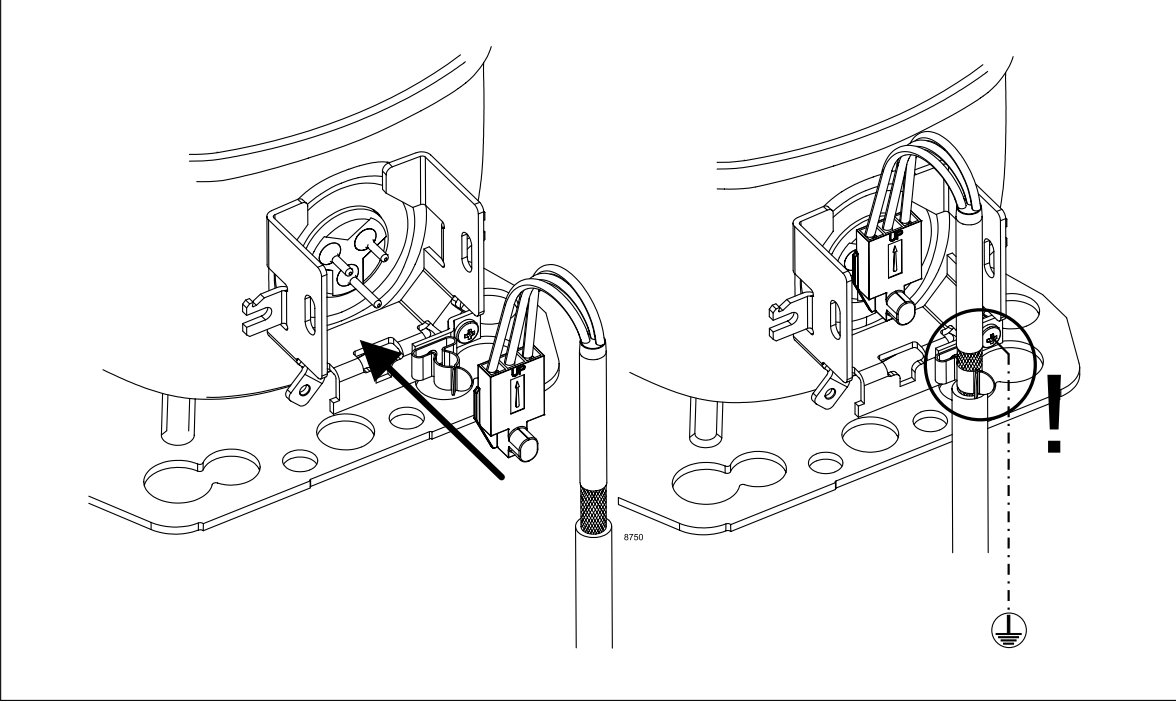
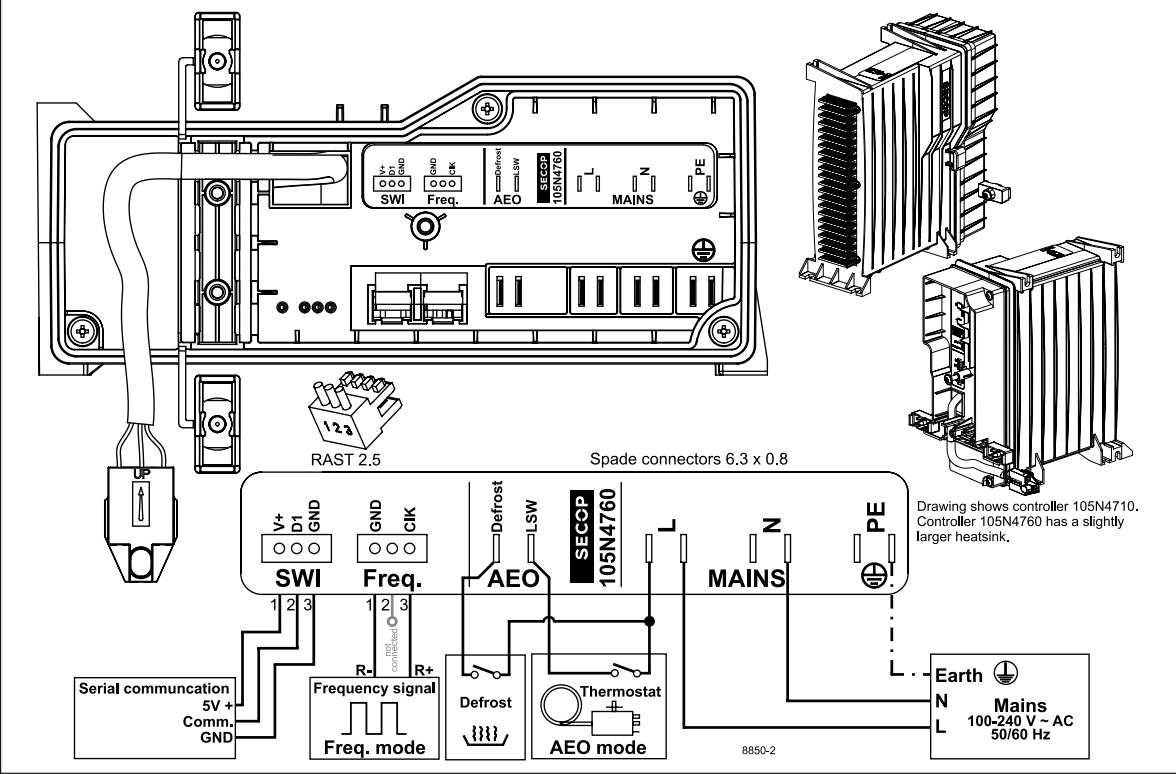
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NLV COMPRESSORS

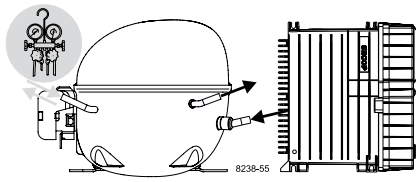


Instructions

NLV Compressors
 100-240V 50/60Hz
 105N476x
 Series Controllers



NLV COMPRESSORS



Instructions

NLV Compressors
100-240V 50/60Hz
105N476x
Series Controllers

SECOP



Service/Repair R290

Brazing on Suction Connectors (Direct Intake)

representative image

**! max. 150°C/302°F !
at socket**

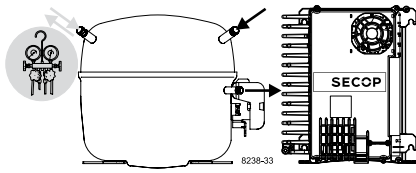
brazing solder: phosphor (LP7) or silver

Refer to Product Bulletin: **Brazing on Suction Connectors**
(Compressors with Direct Suction Intake)

Airflow	3 m/s
Operating conditions	+ 5 °C to 43 °C - humidity < 90 % rH non condensing
Storage conditions	-25 °C to 70 °C - humidity < 90 % rH non condensing
Supply voltage	100-240 V (± 10 %)
Frequency	50/60 Hz
Input power, max.	1000 W

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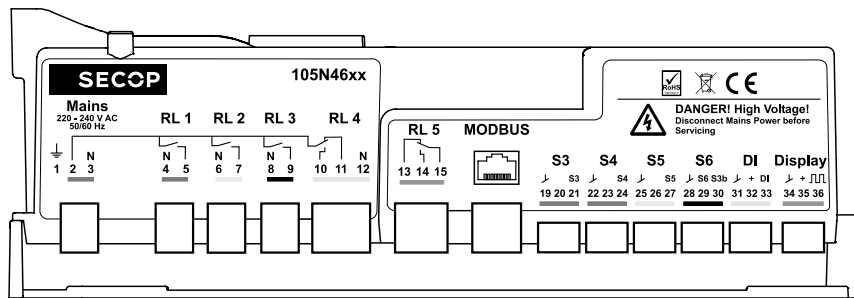
27. SLV COMPRESSORS



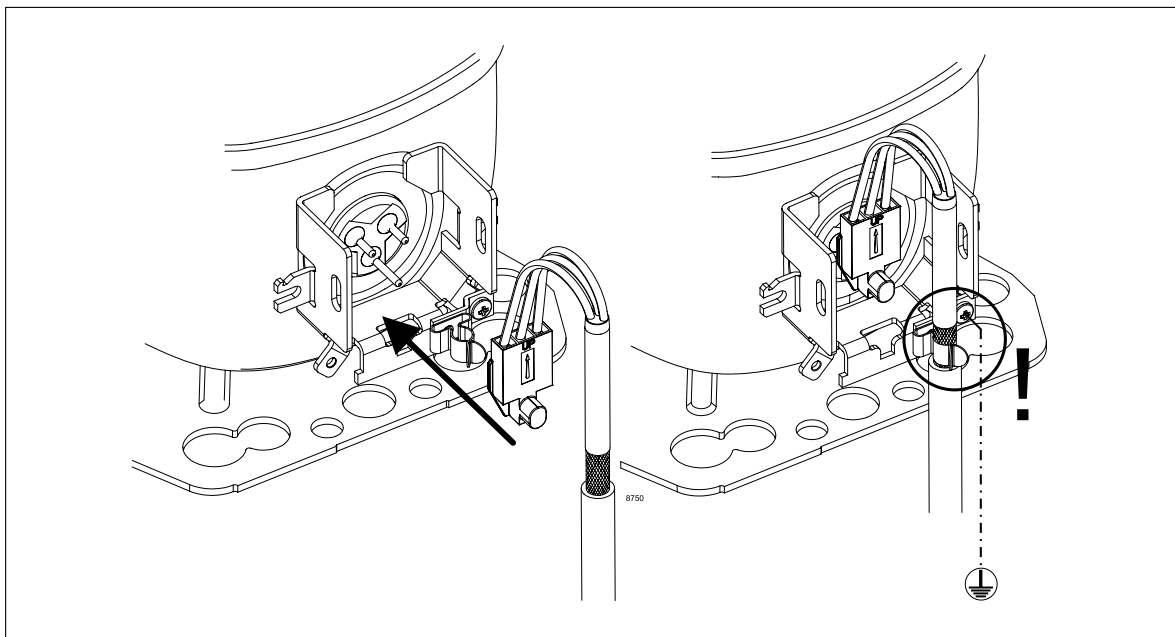
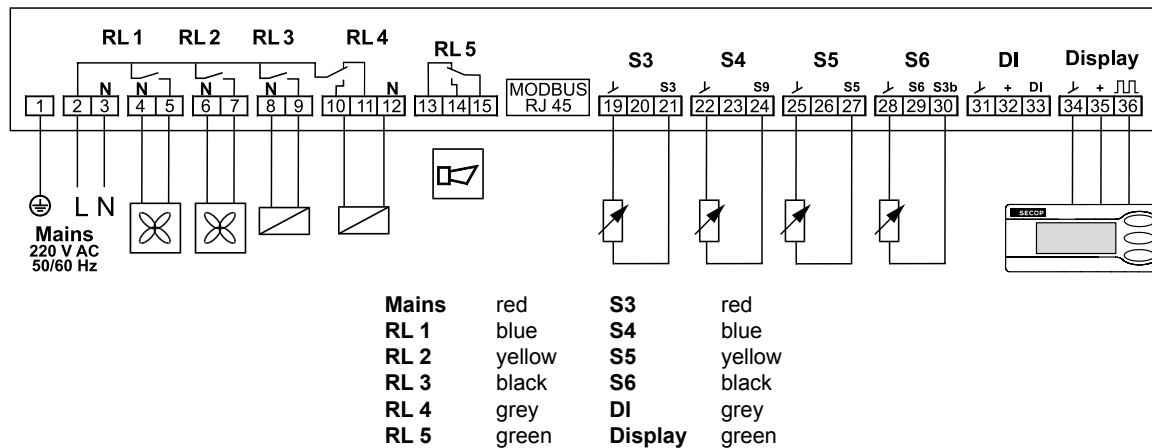
Instructions

SLV Compressors
220-240V 50/60Hz
105N46xx
Series Controllers

SECOP

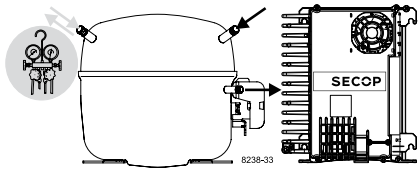


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8750

SLV COMPRESSORS



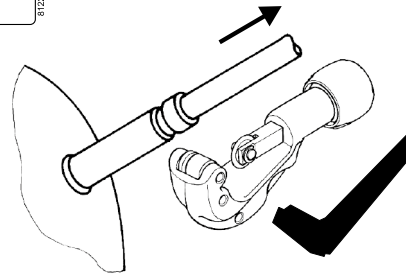
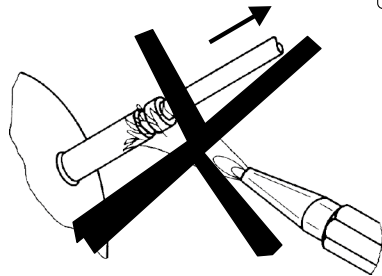
Instructions

SLV Compressors
220-240V 50/60Hz
105N46xx
Series Controllers

SECOP

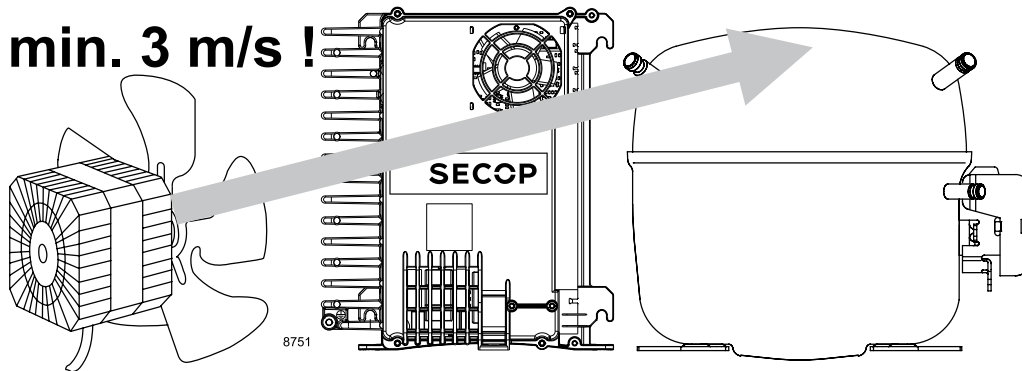


Service/Repair – R290



8545

min. 3 m/s !

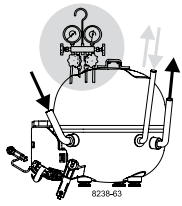


8751

Airflow	3 m/s
Operating conditions	-10 °C to 43 °C - humidity < 90 % rH non condensing
Operating conditions 105N4630	+ 5 °C to 43 °C - humidity < 90 % rH non condensing
Storage conditions	-20 °C to 70 °C - humidity < 90 % rH non condensing
Supply voltage	230 V (+15 % / - 20 %)
Frequency	50/60 Hz
Input power rating	1000 W at 230 V (+15 % / - 20 %)

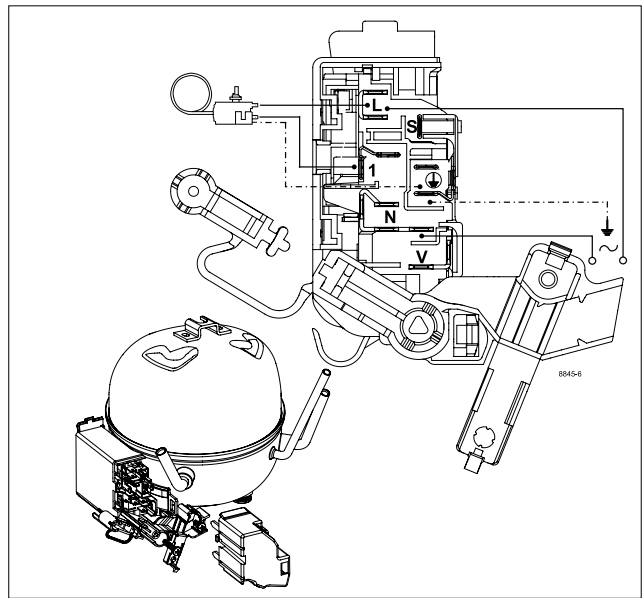
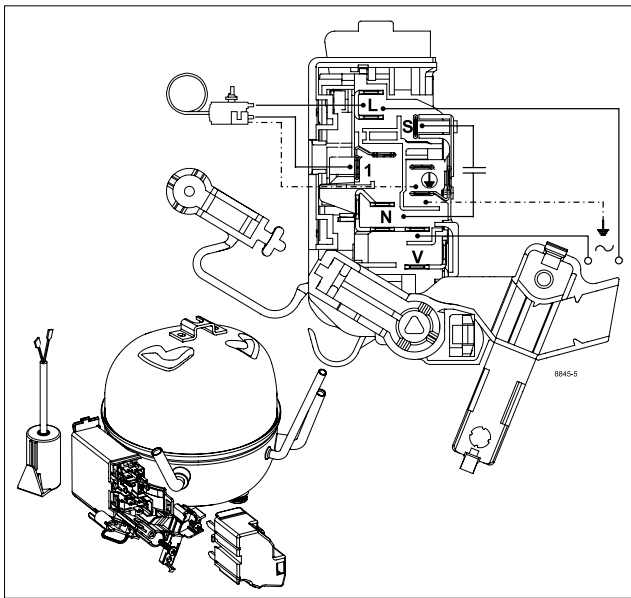
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28. DELTA COMPRESSORS



DELTA Compressors

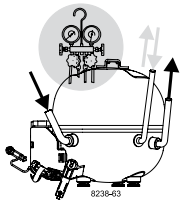
SECOP



April 2018

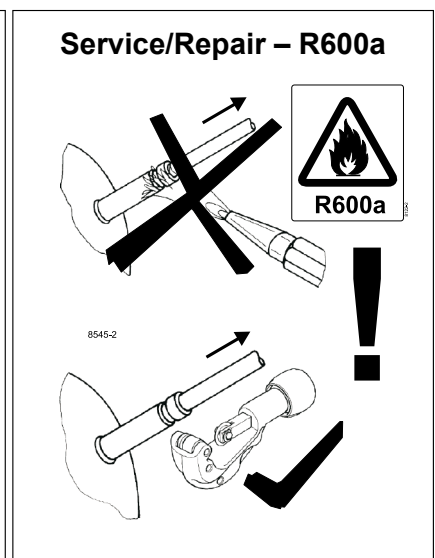
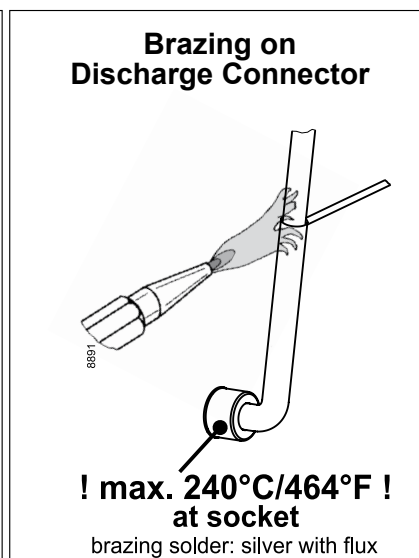
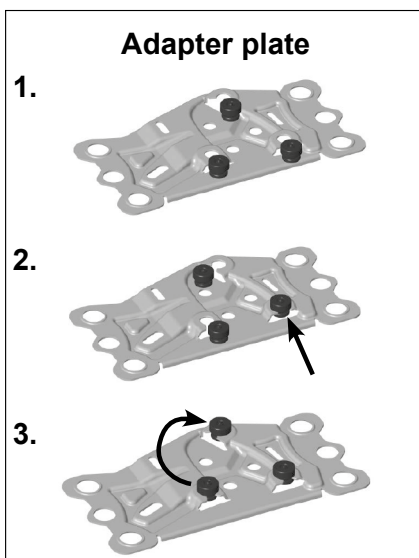
DES.I.200.Q1.02 / 520N0383

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DELTA Compressors

SECOP



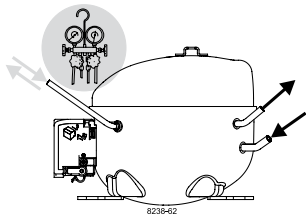
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2/2

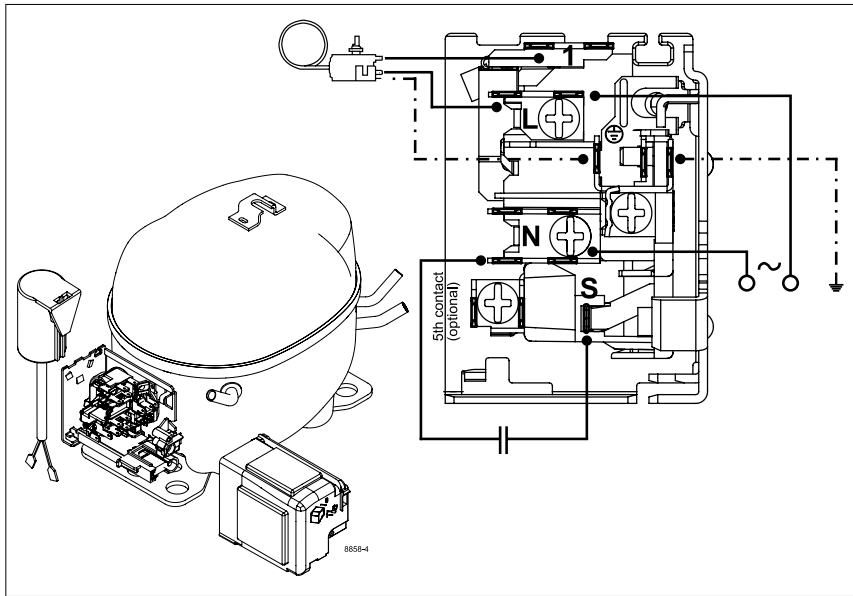
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April 2018

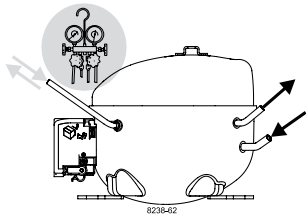
KAPPA COMPRESSORS



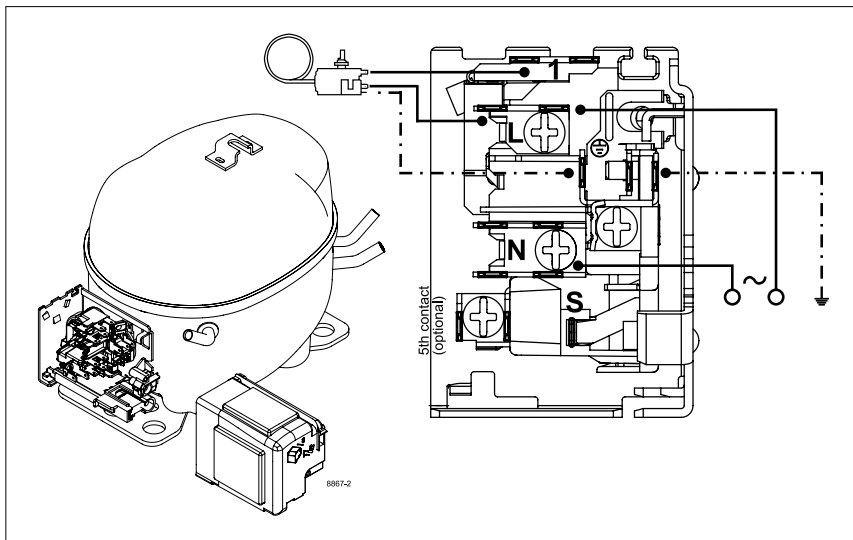
KAPPA Compressors



Service/Repair – R600a



KAPPA Compressors



Service/Repair – R600a

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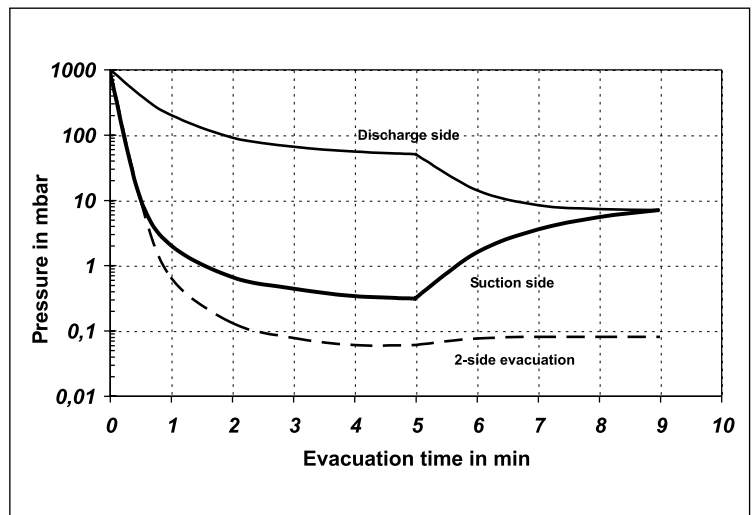
30. EVACUATION

After brazing, evacuation of the refrigeration system begins. When a vacuum below 1 mbar is achieved, the system is pressure equalized before the final evacuation and charging of refrigerant. If a pressure test has been performed directly before evacuation, the evacuation process is to be started smoothly, with low pumping volume, to avoid oil loss from the compressor. Many opinions exist on how evacuation can be carried out in the best way. Depending on the volume conditions of the suction and the discharge side in the refrigeration system, it might be necessary to choose one of the following procedures for evacuation. One-sided evacuation with continuous evacuation until a sufficiently low pressure in the condenser has been obtained. One or more short evacuation cycles with pressure equalization in between is necessary. Two-sided evacuation with continuous evacuation until a sufficiently low pressure has been achieved. These procedures naturally require a good uniform quality (dryness) of the components used.

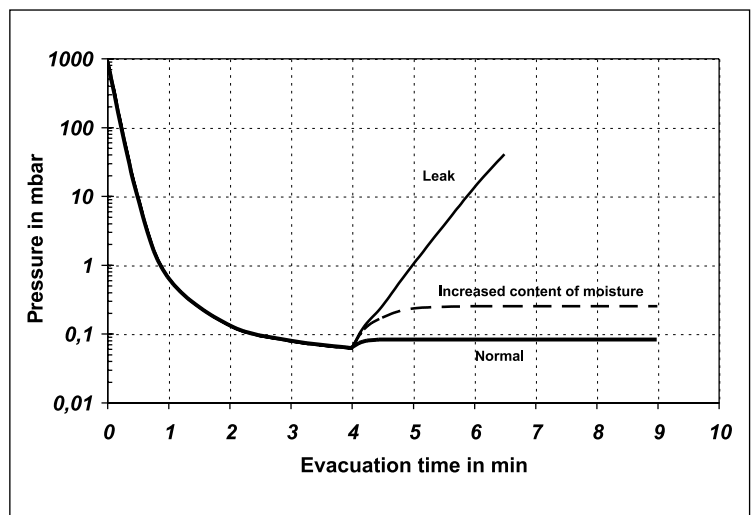
The first figure shows a typical course of a one-sided evacuation from the process tube of the compressor. It also shows a pressure difference measured in the condenser. This can be remedied by increasing the numbers of pressure equalizations. The dotted line shows a procedure where two sides are evacuated simultaneously.

If time is limited, the final vacuum to be obtained is only dependent on the capacity of the vacuum pump and the content of non condensable elements or refrigerant residues in the oil charge.

The advantage of a two-sided evacuation is that it is possible to obtain a considerably lower pressure in the system within a reasonable process time. This implies that it will be possible to build a leak check into the process in order to sort out leaks before charging the refrigerant.



The second figure is an example of a pre-evacuation process with built-in leak test. The level of vacuum obtained depends on the process chosen. Two-sided evacuation is recommended.



30.1 Vacuum pumps

An explosion safe vacuum pump must be used for systems with the flammable refrigerants R600a and R290. The same vacuum pump can be used for all refrigerants if it is charged with Ester oil.

31.

CHARGING OF REFRIGERANT

Always charge the system with the type and amount of refrigerant recommended by the manufacturer. In most cases the refrigerant charge is indicated on the type label of the appliance. Charging can be done according to volume or weight. Use a charging glass for charging by volume. Flammable refrigerants must be charged by weight.

31.1 Maximum refrigerant charge

If the max refrigerant charge is exceeded the oil in the compressor may foam after a cold start and the valve system could be damaged. The refrigerant charge must never be too large to be contained on the condenser side of the refrigeration system. Only the refrigerant amount necessary for the system to function must be charged.

Compressor type	Max. refrigerant charge			
	R134a	R600a	R290	R404A
P	300 g / 10.6 oz.	120 g / 4.2 oz.	-	-
T	400 g / 14.1 oz.*	150 g / 5.3 oz.	150 g / 5.3 oz.	600 g / 21.2 oz.
DELTA	-	150 g / 5.3 oz.	-	-
X	-	150 g / 5.3 oz.	-	-
D, DLV	-	150 g / 5.3 oz.	150 g / 5.3 oz.	-
TL ... G	600 g / 21.2 oz.	150 g / 5.3 oz.	150 g / 5.3 oz.	-
KAPPA	-	150 g / 5.3 oz.	-	-
N, NLV	400 g / 14.1 oz.*	150 g / 5.3 oz.	150 g / 5.3 oz.	-
F	900 g / 31.2 oz.	150 g / 5.3 oz.	-	850 g / 30 oz.
S, SLV	1300 g / 45.9 oz.	-	150 g / 5.3 oz.	300 g / 45.9 oz.
G	2000 g / 70.5 oz.	-	-	2000 g / 70.5 oz.
SC Twin	2200 g / 77.6 oz.	-	-	2200 g / 77.6 oz.

* Single types with higher limits available, see data sheets

For the refrigerants R600a and R290 the closing of the process tube can be done using a LOKRING® connection. Brazing is not allowed on systems with flammable refrigerants.

32. TESTING

Hermetic refrigerating systems must be tight. If a household appliance is to function over a reasonable lifetime, it is necessary to have leak rates below 1 gram per year. High quality leak testing equipment is thus required. All connections must be tested for leaks with leak testing equipment. This can be done using electronic leak testing equipment.

The discharge side of the system (from discharge connector to the condenser and to the drier) must be tested with the compressor running. The evaporator, the suction line, and the compressor must be tested during idle periods and equalized pressure.

If refrigerant R600a is used, leak testing should be done by means other than the refrigerant, e.g. helium, as the equalizing pressure is low, so often below ambient air pressure. Thus, leaks would not be detectable.

32.1 Testing of the appliance

Before leaving a system it must be checked that cooling down of the evaporator is possible and that the compressor operates satisfactory on the thermostat. For systems with a capillary tube as a throttling device, it is important to check that the system is able to pressure equalize during standstill periods. The low starting torque compressor must also be able to start the system without causing trips on the motor protector. In a situation where the whole system has to be tested with high pressure, we recommend a test with nitrogen, dry air or helium. You should not exceed pressure of 10 bar on the low pressure side of the compressor. For the high pressure side, 32 bar is the limit. Ensure that all parts of the cooling system withstand the pressure. We can only take assigned responsibility for the compressor.

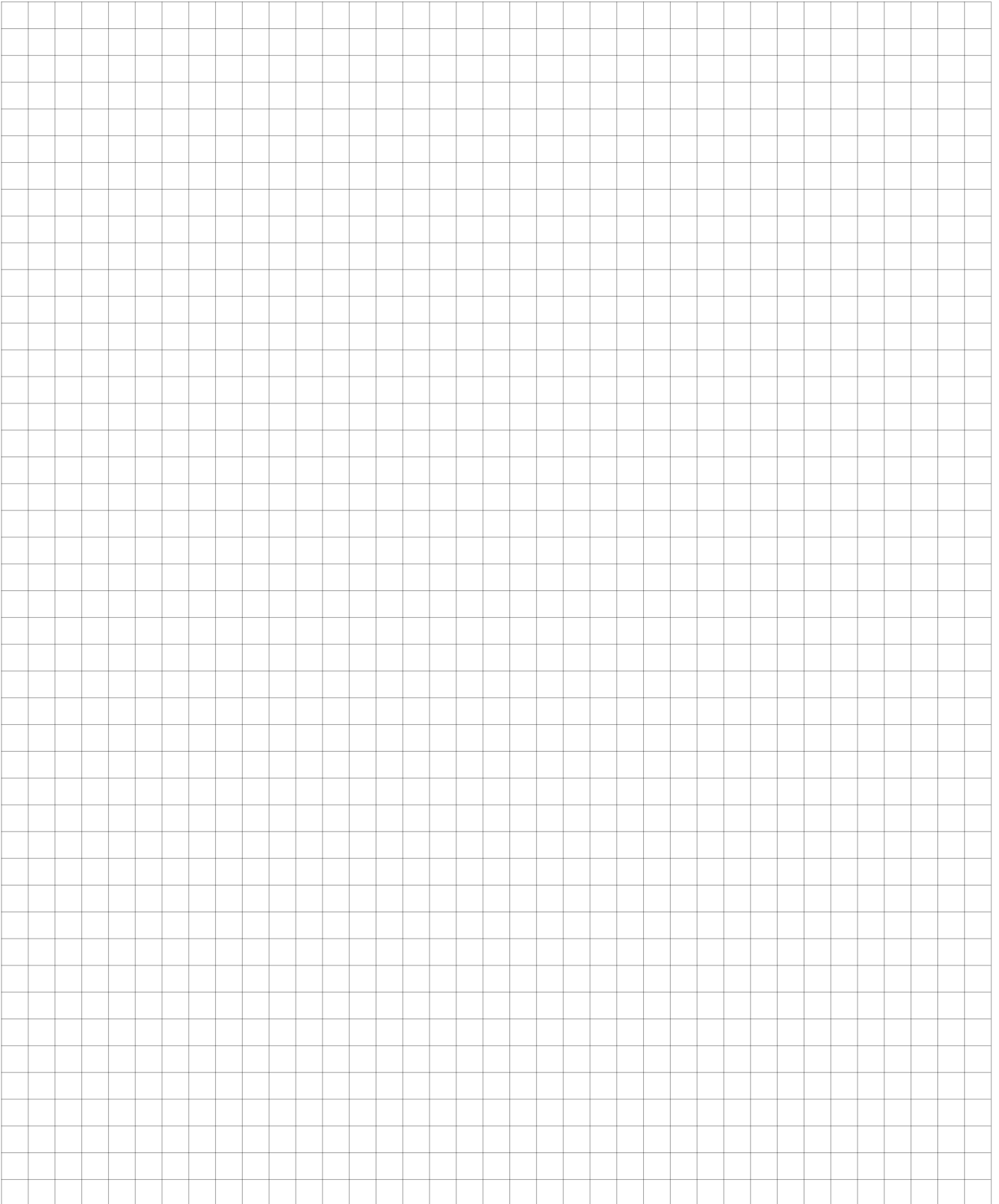
33.

MOUNTING ACCESSORIES

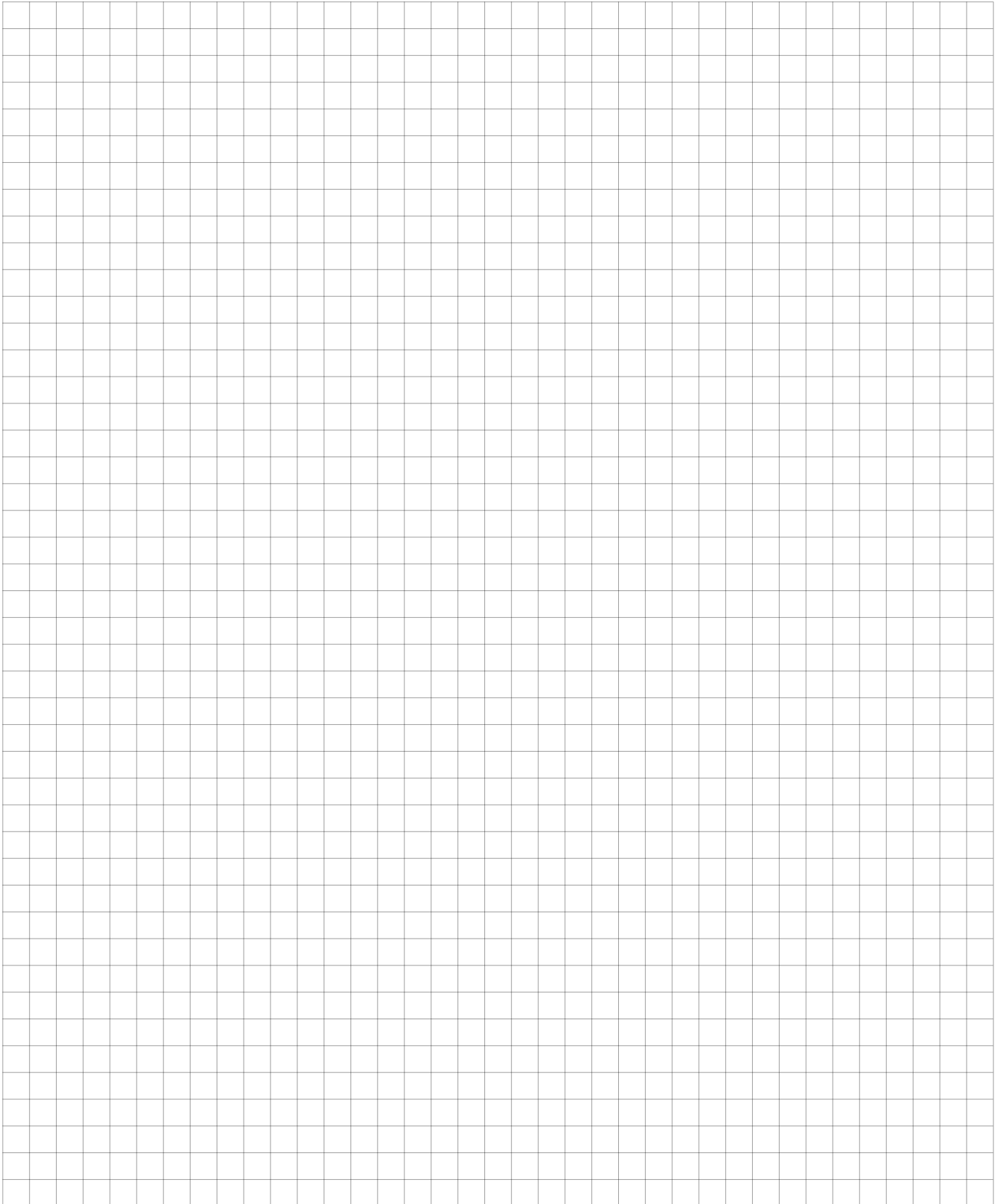
Mounting	Code number	Bolt / pin dimension	Comp. base hole	Type of packaging	Compressor series	Parts list
Bolt joint	118-1917	M6 metric	16 mm	Single pack for one compressor	BD- / P- / T- / X- / D- / N- / F- / S-Series	I
Bolt joint	118-1918	M6 metric	16 mm	Industrial pack in any quantity	BD- / P- / T- / X- / D- / N- / F- / S-Series	I
Bolt joint	107B9150	M8 metric	19 mm	Single pack for one compressor	G-Series	II
Bolt joint	118-1946	1/4 inch	16 mm	Single pack for one compressor	BD- / P- / T- / X- / D- / N- / F- / S-Series	III
Bolt joint	118-1949	1/4 inch	19 mm	Single pack for one compressor	all with 19 mm base holes (except G-Series)	IV
Snap-on	118-1947	Ø 7.3 mm	16 mm	Single pack for one compressor	BD- / P- / T- / X- / D- / N- / F- / S-Series KAPPA / DELTA	V
Snap-on	118-1919	Ø 7.3 mm	16 mm	Industrial pack in any quantity	BD- / P- / T- / X- / D- / N- / F- / S-Series KAPPA / DELTA	V

Parts list [4 pcs. per compressor needed]				Symbol drawings
I	Sleeve Ø 8 mm x 6.4 mm x 0.8 mm	112-2052		
	Washer Ø 20 mm x Ø 6.7 mm x 1 mm	112-2053		
	Bolt M6 x 25 mm	681X1130		
	Nut M6	118-3659		
	Rubber grommet 16 mm	118-3661		
II	Sleeve Ø 11 mm x 8.6 mm x 1.2 mm	107B9152		
	Washer Ø 20 mm x Ø 8.8 mm x 1.2 mm	107B9155		
	Bolt M8 x 40 mm	107B9153		
	Nut M8	107B9154		
III	Sleeve Ø 8.3 mm x 6.7 mm x 0.8 mm	112-2088		
	Washer Ø 20 mm x Ø 6.7 mm x 1 mm	112-2053		
	Bolt 1/4 x 1 inch, 20 UNC	119-3002		
	Nut 1/4 inch, 20 UNC	119-3031		
IV	Sleeve Ø 9.5 mm x 7.9 mm x 0.8 mm	112-2085		
	Washer Ø 20 mm x Ø 6.7 mm x 1 mm	112-2053		
	Bolt 1/4 x 1 1/4 inch, 20 UNC	119-3002		
	Nut 1/4 inch, 20 UNC	119-3031		
V	Steel pin	118-3586		
	Washer Ø 21 x Ø 8.1 mm x 0.9 mm	118-3588		
	Clip	118-3585		
	Rubber Grommet 16 mm	118-3661		

NOTES



NOTES



OUR IDENTITY

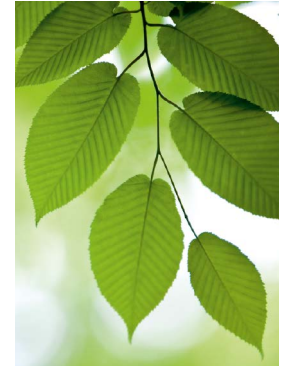
At Secop we are committed to our industry and are genuinely passionate about the difference we are able to make for our customers. We understand their business and objectives and the challenges of today's world of refrigeration and cooling systems.

We work in a straightforward way, being open, direct and honest because we want to make things clear and easy. Our people are committed to increasing value for our customers and constantly strive for better performance, knowing that our own progression and success is dependent on theirs.

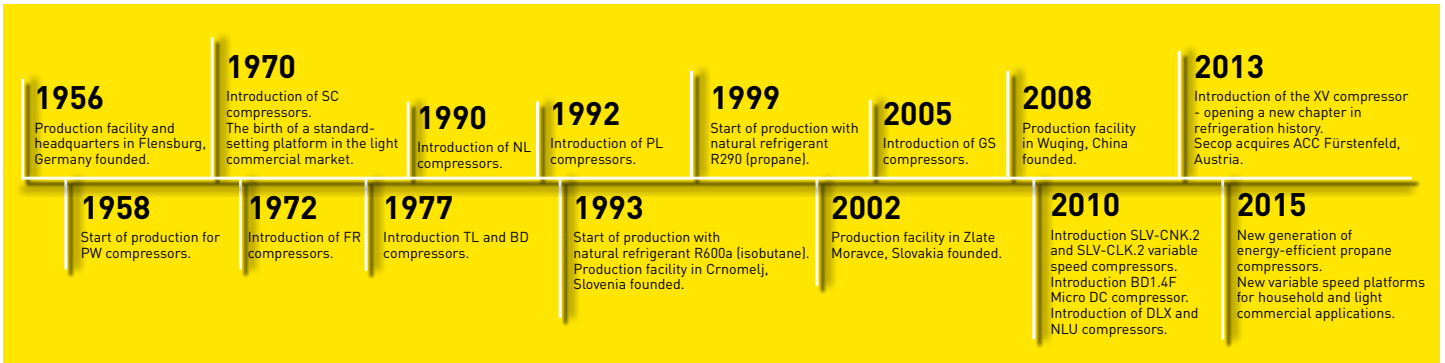
A NEWCOMER WITH 60 YEARS OF EXPERIENCE

Formerly known as Danfoss Compressors, Secop is one of the founding fathers of modern compressor technology with an experience that goes back to the beginning of the 1950s.

For more than 25 years, Secop has been setting the standard in compressor technology by developing highly efficient variable speed compressors and by compressors working with hydrocarbons.



OUR JOURNEY SO FAR



Low Cooling Capacity High

HOUSEHOLD

LIGHT COMMERCIAL

AC



DC



DC-POWERED