

# *SRC-W & SW series compressors*

## *Economiser*

*(WA-12-03-E)*

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## 12. ECONOMISER

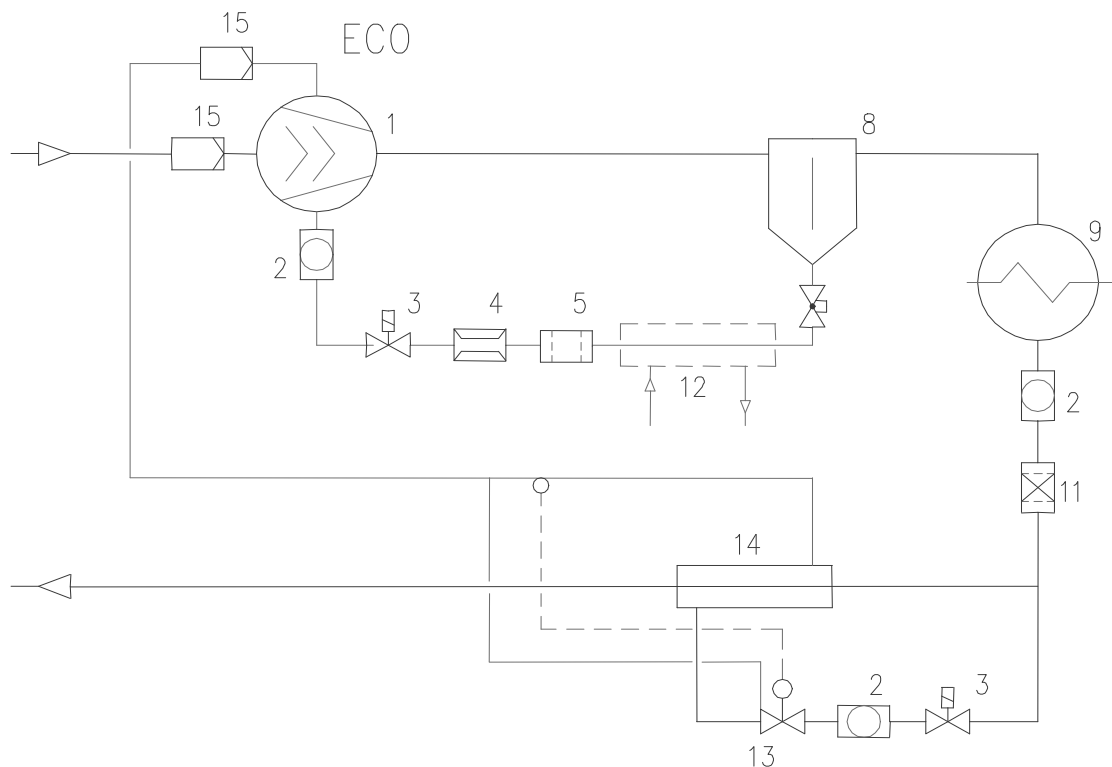
The use of the subcooling economiser circuit (ECO) increases the cycle efficiency (COP). The performance data with ECO are available on request. For the subcooling heat exchanger sizing consult RefComp.

### 12.1 Working principle

The special features of the compression process (volume reduction of a compression chamber moving along the rotors in one direction) make it possible to fit an additional suction port, positioned so that the suction phase is complete and the gas pressure in the chamber has slightly increased.

It is therefore possible to transport an additional gas flow rate without relevant effects on the suction volume, and an additional subcooling circuit can be added to the refrigerant system. This results in a strong increase of the cooling capacity, due to the higher subcooling, with a small increase of the power input caused by the transport of an additional mass flow rate; the increase of the system efficiency can be explained considering that the additional compression work takes place from a higher suction pressure, therefore with a higher efficiency.

In Picture 12-A an economiser circuit is shown. A heat exchanger (pos. 14) subcools the liquid leaving the condenser (pos. 9) with the heat rejected in counterflow by the refrigerant that is drawn out from the liquid line and expanded in an expansion valve (13) to the intermediate injection pressure. The superheated vapour leaving the exchanger is injected through the economiser port and is mixed to the suction gas, already slightly compressed, which comes from the evaporator.



**Picture 12-A: Economiser circuit with subcooling system**

#### Key

- |                    |                     |
|--------------------|---------------------|
| 1) Compressor      | 9) Condenser        |
| 2) Sight glass     | 11) Drier filter    |
| 3) Solenoid valve  | 12) Heat exchanger  |
| 4) Oil flow switch | 13) Expansion valve |
| 5) Oil filter      | 14) Heat exchanger  |
| 8) Oil separator   | 15) Filter          |

## 12.2 Economiser Performance

Starting from the performance without economiser given in RefComp catalogue or CD ROM is possible to understand the cooling capacity and input power increase just using the economiser, by means of the selection software LEONARDO

## 12.3 Selection of components

### Sub-cooler

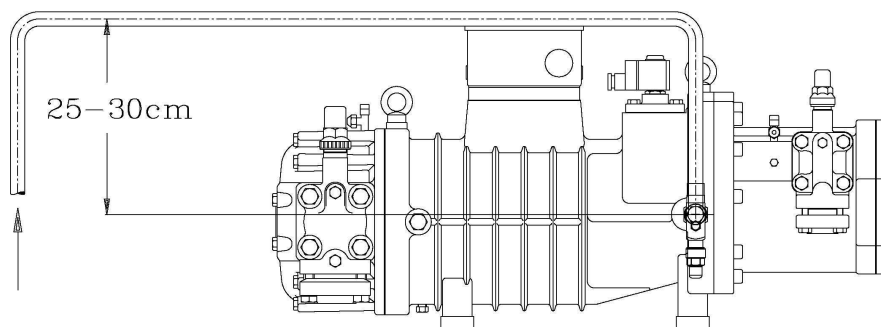
Shell and tube, coaxial and plate heat exchangers can be used. The sub-cooler capacity is given by the difference between the cooling capacity with and without economiser. The sub-cooled liquid temperature should be at least 10 K above the saturated temperature at intermediate pressure.

### Expansion valve

To avoid wet operation when the subcooling circuit is switched on, it is recommended to use expansion valves designed for liquid injection with a superheat setting of approx. 10 K.

## 12.4 Further recommendations

Refrigerant sub-coolers should be preferably installed below the compressor to avoid the compressor flooding with oil or liquid during standstill periods. Since the compressor can push out a certain amount of oil through the ECO port, until the operating conditions are not stable or when the subcooling circuit is switched off, the injection line should be provided with a bend as shown in the Picture 12-B. The ECO port leads directly to the rotor profiles, therefore it is recommended to install a fine filter (mesh 25  $\mu\text{m}$ ). Diameters of the ECO injection line should be selected according to the picture. The compressor should be equipped with an economiser connection adapter (special accessory - contact RefComp). The diameter of the injection pipe should be selected according to Table A.



**Picture 12-B: Economiser line lay out**

Compressor Models	SRC-WL	SRC-WS	SW-1L	SW-1H
	30	40	3000	4000
	40	50	4000	5000
	50	60	5000	6000
		70	6500	7500
		80	8000	9000
			9500	10500
			10500	11500
			11500	12500
			13000	14000
			15000	16000
			17000	19000
			20000	21000
			22000	24000
		23000	25000	
Diameter [mm]	22	22	22	22

**Table A: Economizer injection pipes diameters**

The following kit must be used for connecting the ECONomiser to its port on the compressor:

- Models SW1H4000/.../SW1H9000 and SW1L3000/.../SW1L8000: kit n° 303150;

Components: Injection fitting n° 517740  
 Teflon gasket n° 592360  
 Aluminium washer n° 613840  
 Shut off valve n° 614475

- Models SRC-WS 040/.../080 and SRC-WL 030/040/050, SW1H10500/.../SW1H12500 and SW1L9500/.../SW1L11500: kit n° 303156;

Components: Injection fitting n° 517740  
 Teflon gasket n° 592360  
 Aluminium washer n° 613840  
 Shut off valve n° 614484

- Models SW1L13000/.../SW1L17000 and SW1H14000/.../SW1H19000: kit n° 303151;

Components: Flange connection n° 519085  
 oval flange gasket n° 591030  
 Teflon gasket n° 592360  
 Cosval shut off valve n° 614476

- Models SW1L20000/.../SW1L23000 and SW1H21000/.../SW1H25000 : kit n° 303319;

Components: shut off valve n° 500900  
 self-adhesive label for spare parts n° 585600  
 kit assembly diagram n° 585899  
 shut off valve gasket n° 590790  
 shut off valve gasket int. n° 591010  
 screw grower washer M12 n° 610960  
 screw 10.9 M12x80 n° 613520

### 12.5 Operating limits

Due to the compression of the additional mass flow (tapping of liquid leaving the condenser) and the consequent overloading of the motor, the operating limits with the economizer are partially more restricted than the standard conditions for the normal operation of the compressor (see chapter WA-10: “*Application ranges*”).

For further information, in case of low condensation temperatures, please consult RefComp. For high condensing temperatures the electrical motor should be oversized (consult RefComp).

**Attention!**

- ✓ The subcooling circuit can be used only when the compressor is at full load.
- ✓ During the starting phase (pull down) the subcooling circuit should remain closed until the operating conditions are stable (the use of a time relay is recommended to switch on the ECO circuit).