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*134-XS and 134-S series compressors*

*ECONomizer*  
*(EA-12-03-E)*

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## 12 ECONomizer

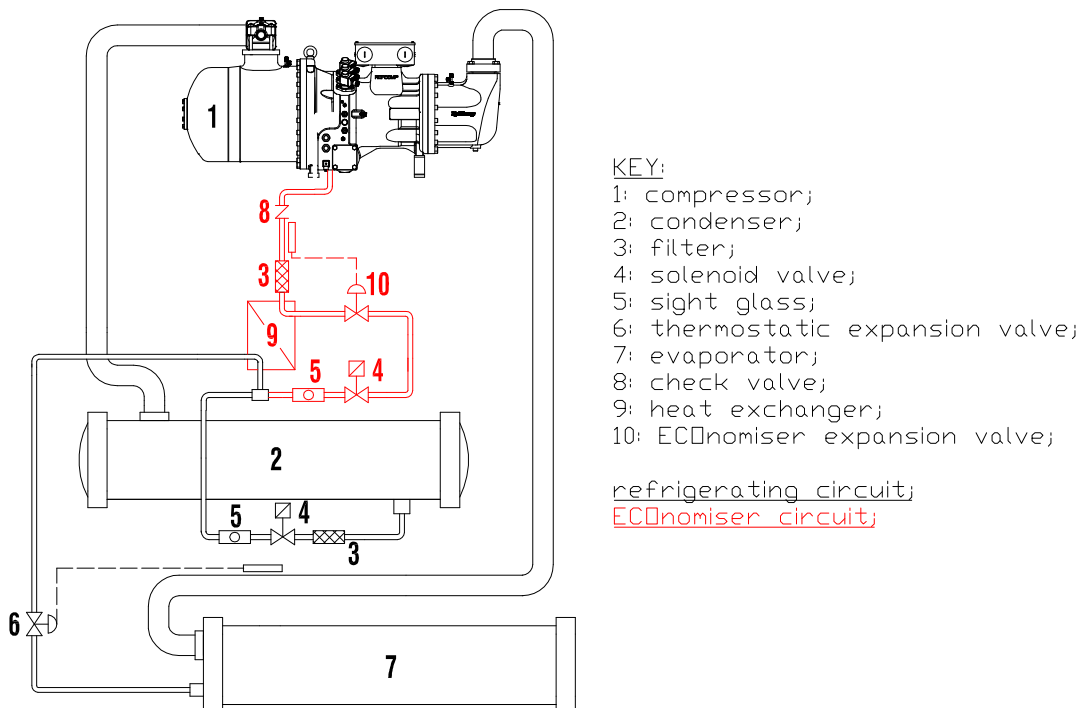
### 12.1 Operating principle

The economizer, which is an external heat exchanger, sub-cools the liquid leaving the condenser so as to increase the efficiency of the refrigerant cycle. Indeed, with this sub-cooling process the mass flow, that is sent to the evaporator after the expansion, has a lower vapour rate than what would be the case in a normal refrigerating cycle. This entails an increase in the cooling capacity and just a small increase in the power input of the compressor for it has to process the additional mass flow of the economizer circuit. Then an increase in the coefficient of performance is achieved (see picture 12-A<sup>1</sup>).

Referring to the same picture, the ECONomizer heat exchanger sub-cools the liquid leaving the condenser with the heat transferred to a flow of refrigerant that is tapped from the liquid line and expanded in a thermostatic valve to the intermediate injection pressure. The superheated vapour leaving the ECO-exchanger is then injected onto the rotors through the economizer port in the compressor, where it mixes with the suction gas, already slightly compressed, coming from the evaporator. The expansion of the tapped liquid flow occurs in the thermostatic valve which, using the bulb located on the ECO-exchanger outlet, controls the correct degree of superheat.

While in the 134-XS series compressors the economizer port has a fixed position on the cylindrical chambers of the rotors, in the 134-S series compressors the economizer port is located on the slide valve. In this way, only for the 134-S series compressors, the economizer could be used from 50% to 100% load, see paragraph 12-4.

The mentioned port on the rotors is located in a position such as the suction phase is just terminated and the compression is starting.



**Picture 12- A<sup>1</sup>: economizer circuit;**

<sup>1</sup> This is simply a schematic drawing; refer to the drawing of each model of compressor for the position of the vapour injection port on the compressor (ECONomizer port).

## 12.2 Components selection

### ECO-heat exchanger

Shell and tube, coaxial tube and brazed plate heat exchangers can be used. The data for sizing the exchanger are given by the RefComp LEONARDO selection software; if this software is not available, please contact RefComp. To avoid injecting liquid onto the rotors, it is recommended to work with the superheat set to around 10 K.

### 12.3 Additional suggestions

The sub-coolers should be installed below the compressor in order to avoid possible backflows of oil or liquid refrigerant to the compressor during standstill periods. As the compressor may expel a certain quantity of oil through the economizer port when the operating conditions have not yet stabilised or alternatively when the sub-cooling circuit is disabled, the injection pipe should be fitted with an elbow as illustrated in picture 12-B<sup>1</sup>. The economizer port leads directly to the rotors, therefore a fine mesh filter (max 25 µm) should be installed. The diameter of the injection pipe should be selected according to Table A.

134-XS/S	40	50	60	71	81	91	101	110	120	140	160	180	210	220	240	270	300
Diameter [mm]	22							28						42			

**Table A: economizer injection pipes diameters;**

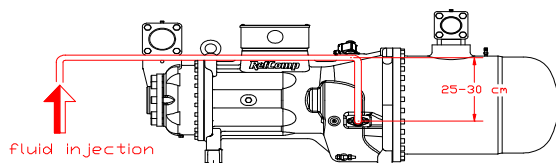
The following kit must be used for connecting the ECONomiser to its port on the compressor:

- 134-XS series compressor: kit n° 303156;
 

Components:	Injection fitting	n° 517740
	Teflon gasket	n° 592360
	Aluminium washer	n° 613840
	Cosval shut off valve	n° 614484
- 134-S series compressors 134-S-71/.../210 303572;
 

Components:	Rotalock shut off valve	n° 501480
	Flange connection	n° 511620
	kit assembly diagram	n° 585920
	Teflon gasket	n° 591020
	Shut off valve oval flange gasket	n° 591030
- 134-S series compressors 134-S-240/.../300: kit n° 303883
 

Components:	Rotalock shut off valve	n° 614621
	Flange connection	n° 511620
	Teflon gasket	n° 591020
	Shut off valve oval flange gasket	n° 591030



**Picture 12- B: Economizer line lay out;**


<sup>1</sup> This is simply a schematic drawing; refer to the drawing of each model of compressor for the position of the vapour injection port on the compressor (ECONomiser port).

## 12.4 Working 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 EA-10: "Application ranges").

For further information, in case of low condensation temperatures, please consult RefComp.

For the 134-S series compressors the economiser can be used starting from 50% up to 100% compressor load. Below 50% the economiser use does not bring any benefit. On the contrary, for the 134-XS series compressors the economiser use brings a cooling power increase only at 100% load.

	<p><b>Warning!</b></p> <ul style="list-style-type: none"> <li>✓ For what concerns the 134-XS series compressors, the sub-cooling circuit can be used only on full load conditions;</li> <li>✓ For what concerns the 134-S series models the economiser use is allowed from 50% to 100% load;</li> <li>✓ During start up, the economiser circuit has to remain disconnected until the working conditions are not stable (the use of a timer to turn on the ECO is recommended).</li> </ul>
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