

New Capacity Regulation Device RSH

Introduction

In refrigeration, the best way to develop environmentally friendly solution is to optimize the system design in order to reduce energy consumption.

The cooling load of many applications can be extremely variable in different moments and the systems must adapt to the variable demand.

The easiest method for adapting the capacity is to switch the system on and off at rated maximum and minimum evaporating pressures.

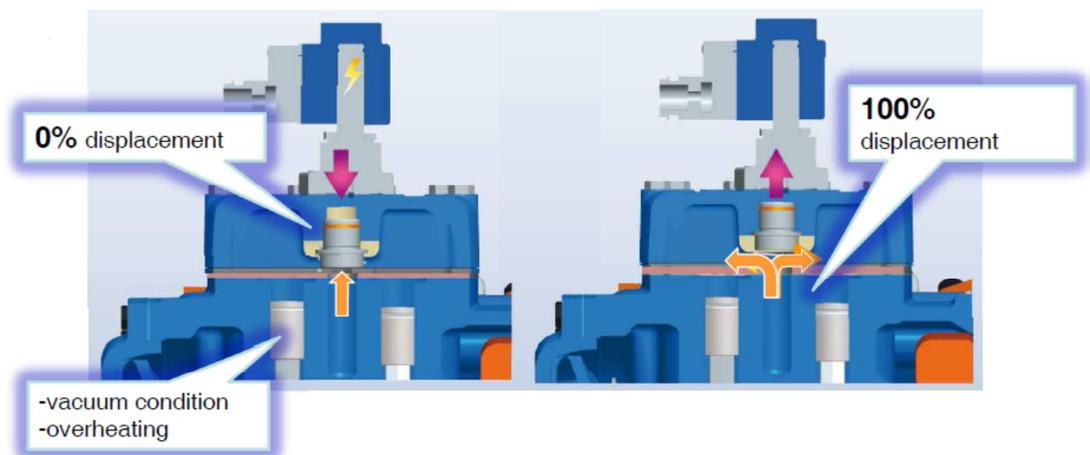
There is a limit on the maximum number of switching cycles per hour and there is a limit for the minimum running time for any compressor, the combination of the two limits determines the difference between maximum and minimum evaporating pressures and the wider is this difference, the higher is the quantity of energy wasted.

Capacity Control head

4, 6, 8 cylinders semi-hermetic reciprocating compressors can be equipped with one or more Capacity Control heads that, blocking refrigerant inlet to one head (two cylinders), permit to reduce the cooling capacity of the compressor with the following steps:

- 0% - 50% - 100% (4 cylinders)
- 0% - 33% - 66% - 100% (6 cylinders)

0% - 50% - 75% - 100% (8 cylinders)



The advantages of this system is the possibility to reduce the number of switching cycles and to increase the number of regulation steps, very important especially on single compressor systems or small racks.

The disadvantages of this system are:

- the vacuum conditions that are created inside the cylinder during suction cycle because the suction port is closed
- the overheating caused by the continuous compression and expansion of the same amount of gas inside the two cylinders with blocked suction port.

Advantages of the new solution are:

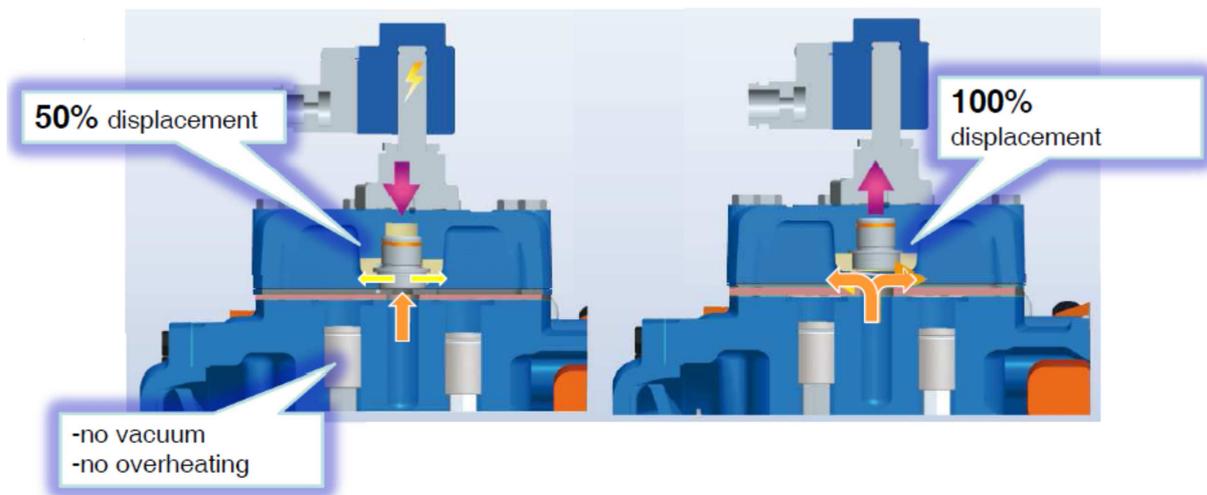
- Improved system efficiency
- 4 regulation steps for four cylinder compressors
- 2 regulation steps for two cylinder compressors
- Reduced vibrations
- Unlimited running time

New RSH system

The new patented RSH system permits to further increase the capacity regulation steps on a single compressor (and consequently on a multi compressor system).

The device works reducing the suction flow to one compressor head, and therefore the cooling capacity of the cylinder head where RSH is mounted is reduced by 50%.

This means that, with this simple and reliable mechanical device, the capacity of a refrigeration system can be even more finely tuned to the variable cooling request with improved system efficiency due to the more stable suction pressure.



Compared with a traditional Capacity Control head (CC), this new device shows the following advantages:

CC

Suitable for 4, 6, 8 cyl. compressors

The 2 pistons in the head don't work

Unbalanced load on the shaft

Vibration due to unbalancing

Valve plate overheating

Limitations on application time

RSH

Suitable also for 2 cyl. compressors

D, Q, S available; V, Z under testing

All pistons are working

Vibration similar as full load operation

No valve plate overheating

No limitation on running time

Unique on the market

The possible regulation steps becomes:

- **2 cylinder compressor, 0% - 50% - 100% (1 RSH) NEW!!!**
- 4 cylinders compressor, 0% - **25%** - 50% - **75%** - 100% (1 RSH + 1 CC)
- 6 cylinders compressor, 0% - **16%** - 33% - **50%** - 66% - **83%** - 100% (1 RSH + 2 CC)

Applications

Here are a few applications which are possible thanks to the RSH device.

Application 1

50% capacity control on a 2-cylinder compressors

In this case the system is applicable as a traditional capacity control system and, when the solenoid valve is energized, reduces the compressor capacity by 50%. Furthermore a sensible reduction of vibration and pulsation has been measured during tests.

- ✓ Simple and reliable system for capacity regulation
- ✓ Unique solution for small capacity compressors
- ✓ 2 step capacity control (100%-50%)
- ✓ Better stability of suction pressure
- ✓ Reduction of on-off cycle
- ✓ Better efficiency and reliability of the system .
- ✓ Reduction of vibration when RSH is activated
- ✓ No running time limitations



Application 2

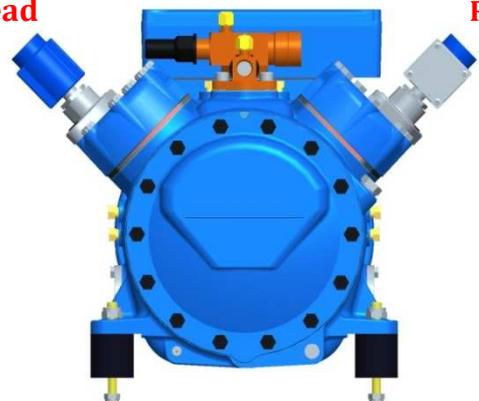
4 step capacity control on 4 cylinder compressors

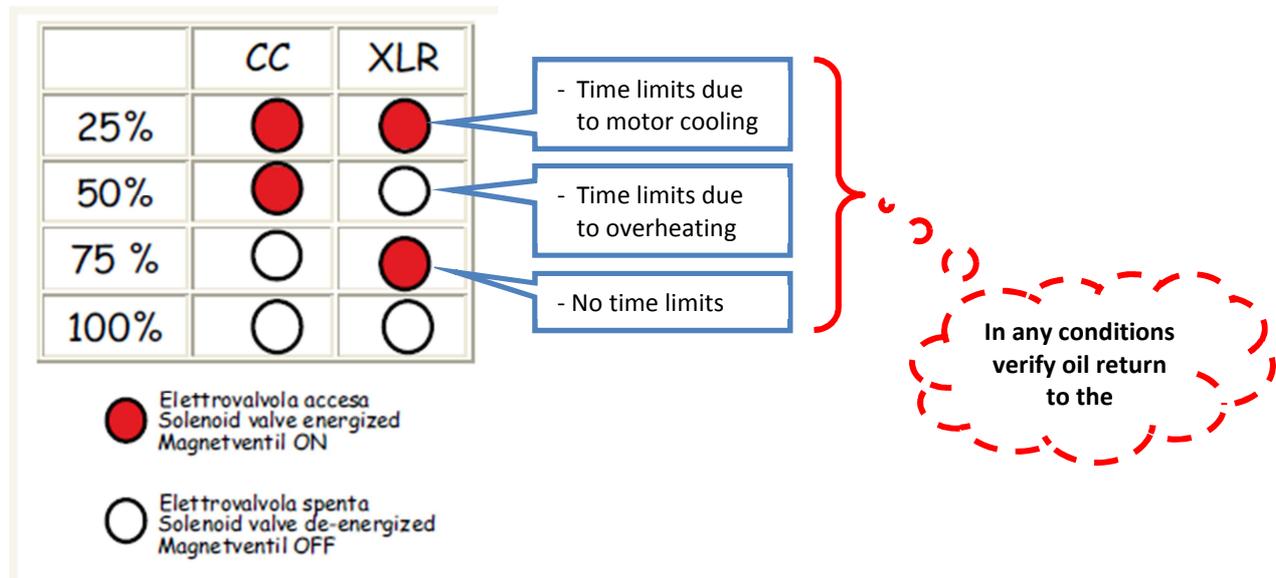
In this case the RSH system in combination with a traditional capacity control system allows to have 4 regulation steps.

- ✓ Simple and reliable system for capacity regulation
- ✓ 4 step capacity control on 4 cylinders compressors (100%-75%-50%-25%)
- ✓ Available for, Q and S compressors
- ✓ V and Z under testing
- ✓ Better stability of suction pressure
- ✓ Reduction of on-off cycle
- ✓ Better efficiency and reliability of the system

CC Head

RSH Head





Application 3

3 step capacity control on 4 cylinder compressors

In this case the installation of 2 RSH systems on the same compressor allows 3 regulation steps but with advantages in terms of efficiency, noise, vibrations, discharge temperatures and, more than others, no limitation on running time at 50% and 75% of the load.

- ✓ With 2 RSH heads possibility of 3 step capacity regulation (50% - 75% - 100%)
- ✓ Reduction of vibration compared to traditional 50% capacity control
- ✓ No valve plate overheating
- ✓ No vacuum in the cylinders
- ✓ Balanced running
- ✓ No running time limits
- ✓ Better stability of suction pressure
- ✓ Reduction of on-off cycle
- ✓ Better efficiency and reliability of the system

RSH Head

RSH Head



Products codes and availability

The new patented RSH device can be installed also on existing systems. For this reason it can be supplied already mounted on the compressor, or as separate accessory.

The actual product code for orders are:

Product code	Description	STD Voltage	Availability	Notes
T000SK220330	RSH "D" type	230/1/50-60	09/2013	Special voltages available on request
T000SK220310	RSH "Q" type	230/1/50-60	09/2013	Special voltages available on request
T000SK220360	RSH "S" type	230/1/50-60	09/2013	Special voltages available on request
	RSH "V", "Z" type	230/1/50-60	12/2013	Under development

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