High Efficiency Solutions.

CAREL

Marketing news

where

- Sausage factory, north Italy

what

- Cold room upgrade, from thermostatic valve (TEV) to electronic expansion valve (EEV)

why

- Energy saving and higher cold room performances, with low installation cost impact

Energy savings in cold rooms

Easy-installation, high-performances and fast-payback improvement, for one of the most common refrigeration application: cold rooms.

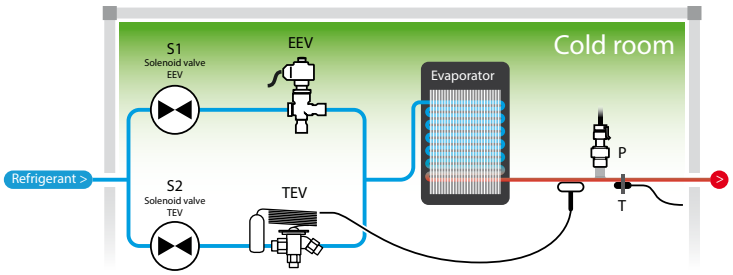
Cold room setup

The application is a 90m^3 cold room for meat storage:

- temperature inside the cold room -20°C;
- evaporator power 5,5kW, with 4 single-phase 200W fans and 5kW three-phase heaters for defrost;
- condensing unit with cooling capacity of about 5kW with an evaporation temperature of -25°C at an ambient temperature of 25°C;
- refrigerant gas used R404A;
- thermostatic valve for R404A.

Comparative test: TEV vs EEV

To set up a performance comparison between thermostatic valve (TEV) against electronic expansion valve (EEV) in the same conditions, it's needed to include both valves inside the same cooling circuit.
For EEV is needed also to add to the main cold room control, Ultracella, an electronic driver, called EVD module. This device can read the system conditions and manage directly the valve modulationto allow an optimal refrigerant flow through the evaporator.

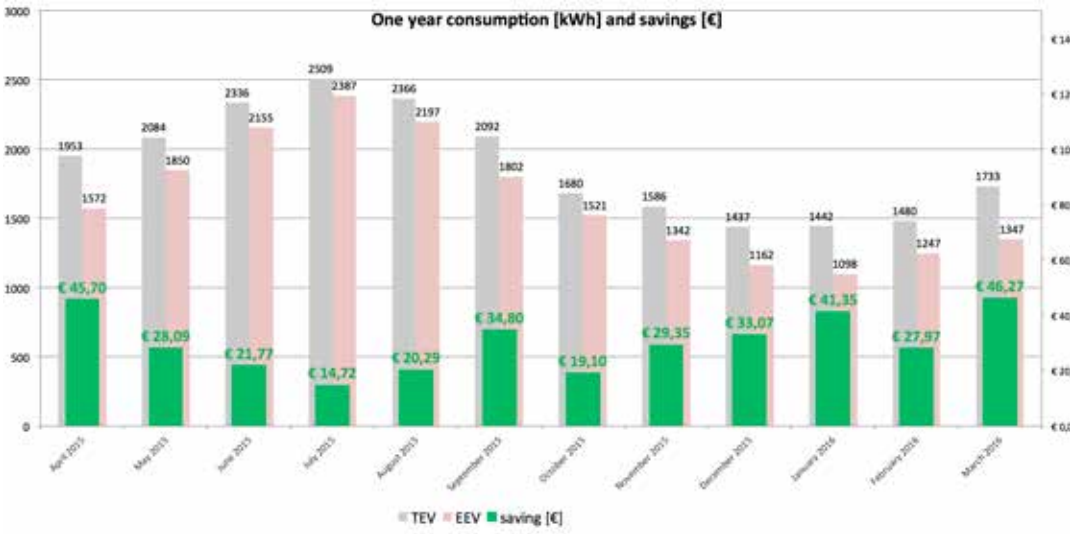


The diagram shows the installation. An external logic allows to switch the refrigerant flow alternatively through the two valves each 3 days. Energy consumption (kWh) is measured in both cases considering all cold room loads.

The results

The field test lasted from the beginning of November 2014 up to the end of June 2016.

In this document are displayed the consumption data in a whole year, from beginning of April 2015 up to the end of March 2016.



It is evident how the energy consumption values fluctuate during the whole year, due to the external temperature modifications (and since temperature inside the cold room is kept at a fixed -20°C).

Cold room driven by thermostatic valve (in gray) show an energy consumption of an average 7% more than Carel electronic stepper valve (in red) in the summer months and 25% more in the winter. The average energy saving in a whole year reaches 13% for Carel electronic expansion valve compared to the old thermostatic valve solution.

	Electronic expansion valve (EEV)	Thermostatic valve (TEV)
Total energy consumption/year	**19.678 kWh**	**22.699 kWh**
Total energy cost/year (@ 0,12€ /kWh)	**€ 2.361**	**€ 2.724**

Considering the actual energy cost (estimated for this test in 0,12 € / kWh), Carel EEV solution can bring a **saving of 362 € in a single year**, that means an **average of 30 € saving per month**. The technology cost difference (to the end user) between Carel EEV system and a traditional TEV system can be recovered in **one year only**.

Total energy saving/year
3.021 KWh
Total cost saving/year (0,12€ /kWh)
362 €

13%
Total saving

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