

APPLICATION NOTE

TEMPERATURE CONTROL SOLUTIONS FOR ACTIVE PHARMACEUTICAL INGREDIENTS



LAUDA develops customized multiloop systems for an internationally operating pharmaceutical corporation

For a leading chemical and pharmaceutical corporation, LAUDA has designed and built two heating and cooling systems that provide temperature control for multi-step production, individually and specifically adapted to customer requirements.

Industry background

The pharmaceutical industry is characterized by continuous process optimization and the implementation of innovative technologies. Especially in the development and production of active ingredient intermediates and active pharmaceutical ingredients (API = Active Pharmaceutical Ingredient), precise temperature control solutions are indispensable. The long-standing collaboration with leading technology partners, such as LAUDA, enables the development of customized solutions for demanding chemical processes.

Requirements

For multi-step production at a major customer's headquarters, LAUDA has already provided a customized system in the past. For expansion, two additional systems were requested to enable pilot production of APIs. The requirements catalog included the following conditions:

- Flow rate from 2 to 12 m³/h
- Temperature range from -9 to 90 °C
- Output of 1 kW heating capacity and 65 kW cooling capacity
- Environment: an integrated multi-step production with high hazard potential
- Solutions are needed for two different process steps

Successful collaboration and individual solutions

In addition to the technical requirements, other factors come into play. What distance does the system have to the application, at what height must the connections be, how much space is available, and are there heating or cooling sources on site? These and other parameters are considered alongside the customer and factored into system planning. This results in customized systems that are precisely adapted to the specific situation and application. The successful collaboration on the first heating and cooling system from LAUDA was so convincing that two additional multiloop solutions have now been implemented.

Multiloop – the modular compact system

Depending on requirements, LAUDA offers a range of heating and cooling solutions for pilot production, from process thermostats to complete systems. The multiloop system is characterized by **the free combination possibilities of various heating, cooling, and deep-freezing modules, as well as a space-saving, customized design.** In the present case, the required temperature range is -9 to 90 °C. However, since the customer can provide cooling brine at -9 °C themselves, only heat-transfer modules are required in both systems. Alternatively, LAUDA could install process cooling systems, such as SUK units, as additional modules.



Figure 1:
Multiloop 8 ML 350 with eight individually controllable temperature control circuits

For the two process steps, a Multiloop 8 ML 350 and a 4 ML 350 were created, respectively, equipped with eight and four separate temperature control circuits and able to provide the individually required flow rate, temperature level, and output. In the case of the Multiloop 8 ML 350, two modules each were built on top of each other, and four module rows in total. This reduces space requirements by approximately 35 percent compared to eight individual units. All temperature control circuits share a central cooling line, which is split to the individual temperature control units as needed, depending on requirements. This contributes to better system performance, in this case, to lower cooling demand, compared to eight individual units.

In addition to the cooling or heating units, the touchpanel for controlling and parameterizing the individual temperature-control units is the central element of the multiloop systems. The system was connected to the customer's process control system via an OPC UA interface.

Ideal for integrated multi-step production with high hazard potential

The scaling of chemical processes often increases hazard potential, as larger batch sizes can lead to more strongly exothermic reactions or greater release of toxic substances. The eight- or four-channel system allows operation of small flow reactors, each connected individually to a temperature control circuit. This way, the batch quantities in the individual reactor can be kept small, and the hazard potential for people and the environment is minimized, while the larger production quantity is nevertheless achieved through 24/7 operation of the system. In this modular way, larger production quantities can be safely realized. Production capacities are optimally utilized.

Conclusion

Based on the individual engineering system planning at LAUDA, the heating and cooling systems can be designed and implemented precisely to customer specifications. This creates systems optimized for process engineering and energy technology, directly tailored to process or customer requirements, which, for example, enable better production results, improved safety, and higher yields.

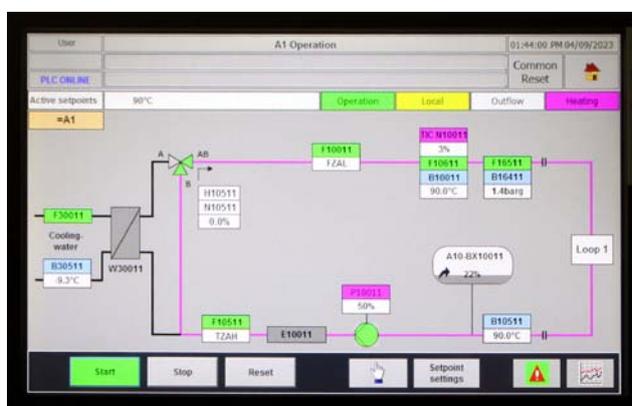


Figure 2:
Touchpanel for controlling the temperature control units with OPC UA connection