



CUMULUS® FTC system Process cooling equipment



The CUMULUS® PX5, PX20 and PX100 modules are shown above. The CUMULUS PX50 and XLT50 modules are not shown, but have the same exterior design as the CUMULUS PX100 module.

Precision Cooling of Processes

The CUMULUS Fluid Temperature Control (FTC) system from Linde provides a fast and accurate cooling of heat transfer fluids (HTFs). The CUMULUS PX modules are developed for cooling temperatures down to -100 °C. For cooling down to -120 °C, the CUMULUS XLT50 module is available.

Pressure Vessel Approval

The CUMULUS FTC system complies with the Pressure Equipment Directive (PED) 97/23/EC. The nitrogen side is protected by a pressure relief valve.

Materials of Construction

Materials wetted by HTFs are of stainless steel 1.4401 and 1.4404 (corresponding to Types 316 and 316L), copper and PTFE. The compact plate-type heat exchangers, which provide quick response and unique process dynamics, are made of stainless steel 1.4401 and brazed with copper.

The heat exchanger package is mounted in a cold box insulated with CFC-free polyurethane foam. The cold box is made from stainless steel 1.4301 (corresponding to Type 304) in order to minimize on-site maintenance requirements.

Electrical Safety

The CUMULUS FTC system complies with the ATEX Directive 94/9/EEC, for installation in an area classified as Ex-Zone 1, IIC, T5. This is achieved by using intrinsically safe signal loops (EExia). The instrument cabinet with operator panel is to be installed in a non-classified area. The CUMULUS FTC system also complies with the Low Voltage Directive (LVD) 73/23/EEC and the Electromagnetic Compatibility Directive (EMC) 89/336/EEC.

Installation

The unit can be installed outdoors, but the control cabinet needs to be installed with weather protection and at temperatures of 0 to +50 °C.

Documentation

Each CUMULUS FTC unit is delivered with complete documentation. This includes instructions for installation, maintenance, safety and operation. There are also component data sheets, electrical and dimensional drawings, and manufacturing control documentation, such as welding documents, material certificates and test protocols.

Technical Data

	CUMULUS® PX5	CUMULUS® PX20	CUMULUS® PX50	CUMULUS® PX100	CUMULUS® XLT50
Cooling duty [kW] ¹	5	20	50	100	50
HTF flow rate [m ³ /h] ¹	2	5	10	20	10
Pressure drop					
HTF [bar] ²	1	1	3	1.5	3
N ₂ [bar]	3	3	3	3	3
Volume HTF [l] ³	2	6	15	39	70
Min./max. pressure ⁴					
HTF [bar (g)]	0/16	0/19	0/19	0/19	0/10
N ₂ [bar (g)]	3/16	3/19	3/19	3/19	3/19
Min./max. temperature ⁵					
HTF [°C]	-100/+50	-100/+50	-100/+50	-100/+50	-120/+50
N ₂ [°C]	-196/+50	-196/+50	-196/+50	-196/+50	-196/+50
Dimensions					
Width [mm]	900	730	1,500	1,500	1,500
Depth [mm]	700	1,000	1,350	1,350	1,350
Height [mm]	660	1,150	1,500	1,500	1,750
Weight [kg]	60	270	570	690	900
Control system					
PLC	Siemens PLC Simatic S7 with CPU314				
Operator panel	OP77B	OP177B	OP177B	OP177B	OP177B
Connections					
HTF					
Inlet flange	DN20	DN25	DN25	DN50	DN50
Outlet flange	DN20	DN25	DN25	DN50	DN50
N ₂					
Inlet flange	DN20	DN25	DN25	DN25	DN25
Outlet flange	1/2" NPT ⁶	DN25	DN25	DN40	DN25
Utilities					
Electricity	120/230 V (50/60 Hz). 10A, 1P+N				
Compressed air					
Pressure [bar(g)]	5-7	5-7	5-7	5-7	5-7
Dew point [°C]	< -20	< -20	< -20	< -20	< -20

HTF = Heat Transfer Fluid side

N₂ = Nitrogen side

¹ These values are nominal values. For most applications, the system can handle loads that range anywhere from 5 % to the full 100 % of these nominal values. In some cases, however, the upper load limit can even exceed 100 %.

² HTF pressure drops are at the nominal flows using methanol at -80 °C. Pressure drop is strongly dependent on HTF type, flow rate and operating temperatures.

³ Volume of HTF system inside the unit.

⁴ Minimum/maximum allowable pressure for which the equipment, with its internal components, is designed.

⁵ Minimum/maximum allowable temperature for which the equipment, with its internal components, is designed. Valid for standard units. Option for maximum temperature of +100 °C available. Minimum temperatures listed are dependent on selection of appropriate HTF with acceptable viscosity and freezing point characteristics.

⁶ Internal threaded fitting.

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