

ECP4X and ECP5X

Peltier Gas Cooler Series ECP®

Versions ECP4X and ECP5X

Special Features

- **Modular cooling concept: can be upgraded from a 1-channel to a 4-channel device**
- **Cooling capacity up to 4 x 450 kJ/h**
- **High availability thanks to a modular independent cooling architecture**
- **Resistive color touchscreen**
- **Jet-Stream heat exchanger (HE) available in various materials**
- **ECP4X: gas flow rate 150 Nl/h per HE**
- **ECP5X: gas flow rate 250 Nl/h per HE**
- **Ambient temperature up to +50 °C [122 °F]**
- **Outlet dew point adjustable from +2 to +45 °C [35.6 to 113 °F]**
- **Dew point stability ±0.1 °C [±0.18 °F]**
- **Low-maintenance and easy to service due to straightforward replacement of cooling modules**

Application

The Peltier gas coolers ECP4X and ECP5X are used in gas analysis to lower the dew point of humid gas to prevent condensation in the analyzer. By setting an extremely stable gas outlet dew point, the effects of water vapor cross-sensitivity and volumetric errors are minimized.

The high cooling capacity of the ECP4X and ECP5X devices are particularly well-suited for use in process and emissions analysis, even in locations where compressor coolers were previously the only option due to high ambient temperatures.

Description

Modular, retrofittable, user-friendly, low-maintenance, and self-monitoring are some features of the M&C gas coolers. The smart design solutions ensure optimum cooling of the measured gas with minimal washout effects and guarantee reliable separation of the condensate.

Since the individual cooling modules operate independently of one another and the HMI (Human Machine Interface) is used only for display and configuration rather than for control, the cooler's basic function remains intact even if the HMI is out of order.

The Peltier gas coolers ECP4X and ECP5X can be equipped with up to four cooling modules. The modular design enables easy and cost-effective retrofitting of the devices in the field.

The modular cooler architecture allows for the installation of heat exchangers made of glass, PVDF or stainless steel, depending on the application. The required heat exchangers are available separately (see table of heat exchanger options).

The accumulated condensate can be collected using the optionally integrated peristaltic pump(s) SR25.2.

By default, the ECP4X features five potential-free alarm relays (NO) with four individual cooling module alarms and one collective alarm. The setpoints and control types (absolute or ΔT) can be configured individually for each cooling module.

The standard CAN bus with CANopen protocol enables easy integration into the existing analysis system.

Four configurable analog outputs (mA or V output) per unit are available as an option. Up to four LA1 or LA1S liquid alarm sensors can be connected to the Peltier gas cooler.

The individual cooling modules can also be retrofitted with an optional thermocouple module for informative temperature measurement in the heat exchanger.

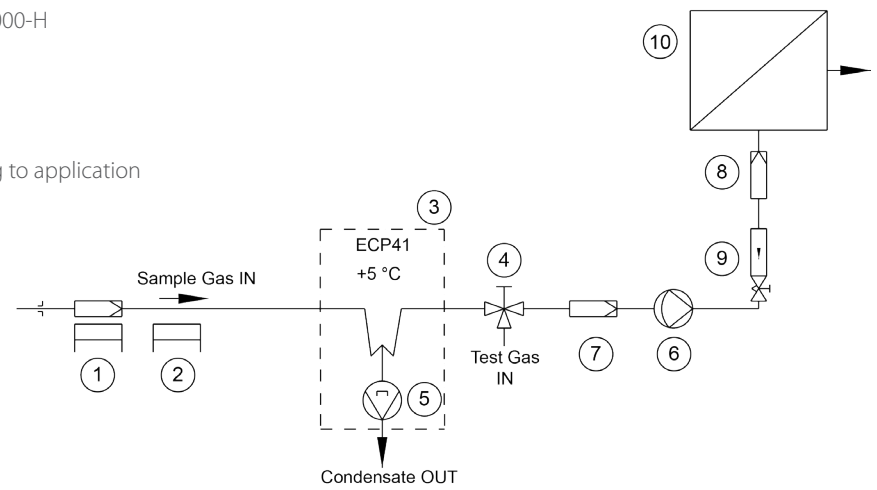
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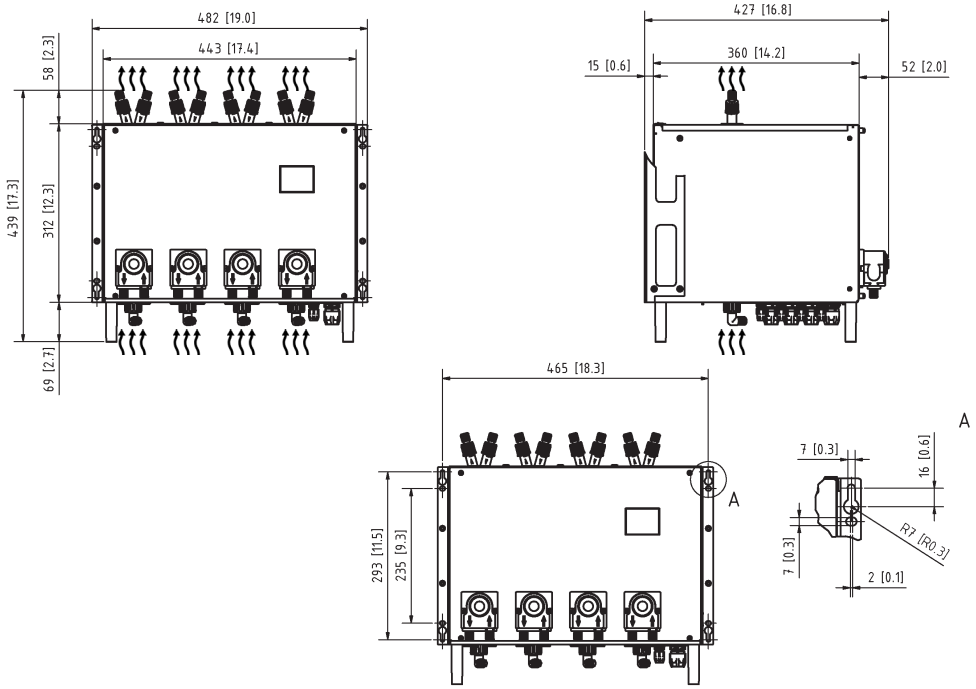
Application Example for ECP41 with one cooling module

1 Heated gas sample probe SP180-H or SP2000-H
2 Heated sample line 4M4/6
3 Peltier gas cooler ECP41
4 3-way ball valve 3L/PV-1
5 Peristaltic pump SR25.2
6 Sample gas pump, e.g. MP-F10
7 Fine filter FP-2T-D with liquid alarm LA1
8 Aerosol filter CLF-5/W optionally according to application
9 Flow meter FM10 or FM40, 25-250 Nl/h
10 Analyzers, e.g. GenTwo PMA1000

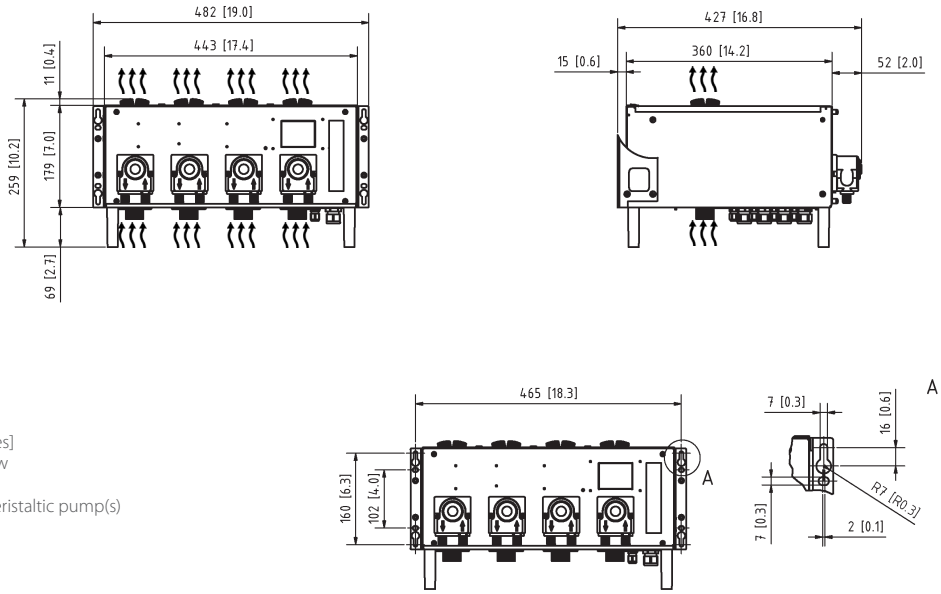


Dimensions

ECP5X



ECP4X



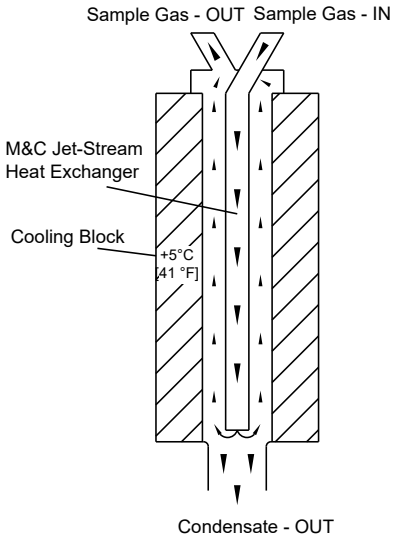
Dimensions in mm [Inches]
Direction of the air flow

Heat exchanger(s) and peristaltic pump(s) to be ordered optionally.

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Operating Principle of the M&C Jet-Stream Heat Exchanger inside the ECP4X



Cooling Capacity and Max. Gas Inlet Dew Point

Conditions:
Heat exchanger material: glass, gas inlet: connection of a heated sample line (heated to 180 °C) which ends 20 cm in front of the heat exchanger for thermal decoupling, gas outlet dew point TP_{OUT}: 8 °C

ECP4X per cooling module (up to 4 cooling channels are possible)

Ambient temperature [°C]	Gas flow rate [Nl/h]	Cooling capacity [kJ/h]	Max. inlet dew point TP_{IN} [°C]
25	50	160	86
25	150	100	62
50	50	20	50
50	150	20	30

ECP4X with 2 cooling modules in series* (up to 2 cooling channels are possible)

Ambient temperature [°C]	Gas flow rate [Nl/h]	Cooling capacity [kJ/h]	Max. inlet dew point TP_{IN} [°C]
25	50	320	92
25	150	320	82
50	50	160	86
50	150	160	70

*When connected in series with different setpoints.

ECP5X per cooling module (up to 4 cooling channels are possible)

Ambient temperature [°C]	Gas flow rate [Nl/h]	Cooling capacity [kJ/h]	Max. inlet dew point TP_{IN} [°C]
25	50	450	94
25	250	140	58
50	50	160	86
50	250	70	40

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Technical Data

Gas cooler type	ECP4X	ECP5X
Part No. base unit	01K4100	01K4200
Max. number of possible cooling modules	4	
Sample gas flow per heat exchanger	150 Nl/h	250 Nl/h
Ambient temperature	+5 up to +50 °C [+41 to +122 °F]	
Max relative humidity	80 % at ambient temperatures up to 50 °C, non-condensing	
Storage temperature	-20 to +60 °C [-4 to +140 °F]	
Sample gas outlet dew point	Range of adjustment: +2 to +45 °C [+35.6 to +113 °F], factory setting: +5 °C [+41 °F]	
Dew point stability	At constant conditions ±0.1 °C [±0.18 °F]	
Sample inlet temperature*	Max. 180 °C [356 °F]	Max. 180 °C [356 °F]
Gas inlet water vapor saturation*	Max. 86 °C [186.8 °F]	Max. 94 °C [201.2 °F]
Max. total cooling capacity (@ +25 °C [+77 °F] ambient temperature and 50 Nl/h gas flow rate)	4 x 160 kJ/h (4 cooling channels) 2 x 320 kJ/h (2 cooling channels each with 2 cooling modules in series)	4 x 450 kJ/h (4 cooling channels)
Power consumption	120 VA per cooling module (max. 480 VA)	240 per cooling module (max. 960 VA)
Main power connection	230 V ±10 %, 50-60 Hz or 115 V ±10 %, 50-60 Hz	
Cable glands	5 x M 12, 4 x M 20	
Ready for operation	< 3 min (@ 25 °C [77 °F] ambient temperature and without load applied)	
Electrical connections	Power supply: pluggable via PCB connectors Alarm relay: pluggable via PCB connectors Analog output: pluggable via PCB connectors LA: pluggable via PCB connectors CAN bus: pluggable via PCB connectors	
Status alarm	5 x NO contacts, potential-free (4 x cooling module alarms plus 1 x collective alarm) standard setting: ±3 °C	
Relay specifications	250 V AC/24 V DC, 2 A, load 500 Ω, minimum switching capacity: 1.2 W (@ min.12 V and min. 100 mA)	
Analog output	mA output: 0-20 or 4-20 mA, adjustable, maximum load 500 Ω or V output: 0-10 V or 0-1 V	
Electrical device standard	EN 61010	
Installation sites	The cooler is intended for indoor use. The maximum altitude is 2,000 m above sea level.	
System of protection	IP20 EN 60529	
EMC standard	EN 61326	
Overvoltage category	OVC II	
Pollution degree	2	
Method of mounting	Wall-mounting, 19" -rack or tabletop	
Case color	RAL 9003 (white)	
Dimensions without HE(s) and without peristaltic pump(s) with device feet (W x H x D)	482 x 248 x 360 mm [≈ 19" x 9.8" x 14.2"]	482 x 381 x 360 mm [≈ 19" x 15" x 14.2"]
Weight of the device without HE(s) and without peristaltic pump(s) with 1 cooling module	9.7 kg [≈ 21.4 lbs]	13.9 kg [≈ 30.6 lbs]
2 cooling modules	12.6 kg [≈ 27.8 lbs]	19.2 kg [≈ 42.3 lbs]
3 cooling modules	15.4 kg [≈ 34.0 lbs]	24.3 kg [≈ 53.6 lbs]]
4 cooling modules	18.7 kg [≈ 41.2 lbs]	30.6 kg [≈ 67.5 lbs]

* Maximum values in technical data must be rated in consideration of total cooling capacity at 25 °C [77 °F] ambient temperature and 5 °C [41 °F] outlet dew point.
Nl/h and Nl/min refer to the German standard DIN 1343 and are based on these standard conditions: 0 °C, 1013 mbar.

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Heat Exchanger Options for ECP4X

	Heat Exchanger for ECP4X				
Heat exchanger type	ECM-2/ ECP(1/2)000C/ ECC-1 G, HE	ECM-2/ ECP(1/2)000C/ ECC-1 PV, HE	ECM-2/ ECP(1/2)000C/ ECC-1 SS, HE	ECM-2/ ECP(1/2)000C/ ECC-1 SS/NPT, HE	ECM-2/ ECP(1/2)000C/ ECC-1 G/GL14, HE
Part No.	97K0100	97K0110	97K0115	97K0115NN	97K0101
Material of heat exchanger	Duran® glass	PVDF	Stainless steel 316Ti	Stainless steel 316Ti	Duran® glass
Max. gas flow rate	150 Nl/h				
Max. gas pressure	Max. 3 bar abs.[1] (2 bar abs.[2])	Max. 3 bar abs. (2 bar abs.[2])	Max. 10 bar abs. (2 bar abs.[2])	Max. 10 bar abs. (2 bar abs.[2])	Max. 3 bar abs.[1] (2 bar abs.[2])
ΔP per heat exchanger	1 mbar @ 150 Nl/h				
Stagnant space heat exchanger	50 ml				
Sample gas connections	GL 18 for Ø 6 mm OD tube	Tube Ø 6 mm	Tube Ø 6 mm	1/4" Tube	GL 18 for Ø 6 mm OD tube; GL 14 for sensor
Condensate connection	GL 25 for Ø 12 mm tube, Ø 8 mm* or Ø 10 mm*	G 3/8" f	G 3/8" f	3/8" NPT	GL 25 for tube Ø 12 mm, Ø 8 mm* or Ø 10 mm*

Heat Exchanger Options for ECP5X

	Heat Exchanger for ECP5X			
Heat exchanger type	EC-G, WT	EC-PV, WT	EC-SS, WT	EC-SS/NPT, WT
Part No.	02K9100	02K9300	02K9200	02K9250
Material of heat exchanger	Duran® glass	PVDF	Stainless steel 316Ti	Stainless steel 316Ti
Max. gas flow rate	250 Nl/h			
Max. gas pressure	Max. 3 bar abs.[1] (2 bar abs.[2])	Max. 3 bar abs. (2 bar abs.[2])	Max. 10 bar abs. (2 bar abs.[2])	Max. 10 bar abs. (2 bar abs.[2])
ΔP per heat exchanger	1 mbar @ 250 Nl/h			
Stagnant space heat exchanger	70 ml			
Sample gas connections	GL 18 for Ø 6 mm OD tube	G 1/4" f	G 1/4" f	1/4" NPT
Condensat connection	GL 25 for Ø 12 mm tube, Ø 8 mm* or Ø 10 mm*	G 3/8" f	G 3/8" f	3/8" NPT

* Optional
1) With GL connecting adapter.
2) With SR25.2 max. 2 bar abs
GL adapters and tube fittings for connecting different tube diameters at the heat exchanger see data sheets „Fittings for GL Glass Connections" and „Flexible and rigid tube fittings, plugs and connectors with barbed fitting".
Duran® glass is a brand name for borosilicate glass produced by the German company Duran Group GmbH.

Additional Options

Options for ECP4X and ECP5X		Part No.
ECP4X cooling module	ECP4X cooling module, 150 Nl/h, without heat exchanger, for ECP4X base unit with integrated power supply and a gas outlet dew point adjustable from +2 to +45 °C (factory default: 5 °C), max. cooling capacity 160 kJ/h	01K4150
ECP5X cooling module	ECP5X cooling module, 250 Nl/h, without heat exchanger, for ECP5X base unit with integrated power supply, independently adjustable pre-cooling zone and adjustable gas outlet dew point from +2 to +45 °C (factory default: 5 °C), max. cooling capacity 450 kJ/h	01K4250
Analog output	1 x mA output respectively 1 x V output module (per cooling module)	01K4300
Thermocouple (TC)	1 x thermocouple inclusive thermocouple module and installation (per cooling module)	01K4320
LA1S	Typ LA1S: LA sensor with cable break detection Note: the evaluation is performed inside the Peltier gas cooler by default, LA1S for M&C universal filter with "D" connection	01K9260
LA1	Type LA1: LA sensor without cable break detection Note: the evaluation is performed inside the Peltier gas cooler by default, LA1 for M&C universal filter with "D" connection	01K9270
SR25.2	Option: peristaltic pump type SR25.2, installed in the front of the cooler ECM, peristaltic pump head accessible from outside, completely tubed and electrically wired, material: PV, Novoprene, condensate outlet: DN 4/6, weight: 0.4 kg [≈ 0.9 lb]	01P9125

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