

EasyClean 400

For highest demands – the fully automated cleaning and calibration system for pH measuring loops.

Technical Data



EasyClean 400

Short description

EasyClean 400 in combination with the transmitter M 700 and an InTrac retractable housing provides the optimal solution for automated cleaning and calibration of pH-electrodes. The multiple control possibilities and the extremely flexible programming of every single program allow an optimal adaptation of the EasyClean 400 to various processes. A special version is available for applications in explosive environments.

Features

- Flexible program sequences by freely programmable step sequences
- Minimum consumption of buffer and cleaning solution
- Optionally applicable for continuous processes or batch measurement
- Various program intervals or weekly program possible
- Various system integrations possible
- EasyClean 400X: for explosion hazardous environments
- EasyClean 400S: stainless steel, hygienic design
- EasyClean 400C: coated, stainless steel housing

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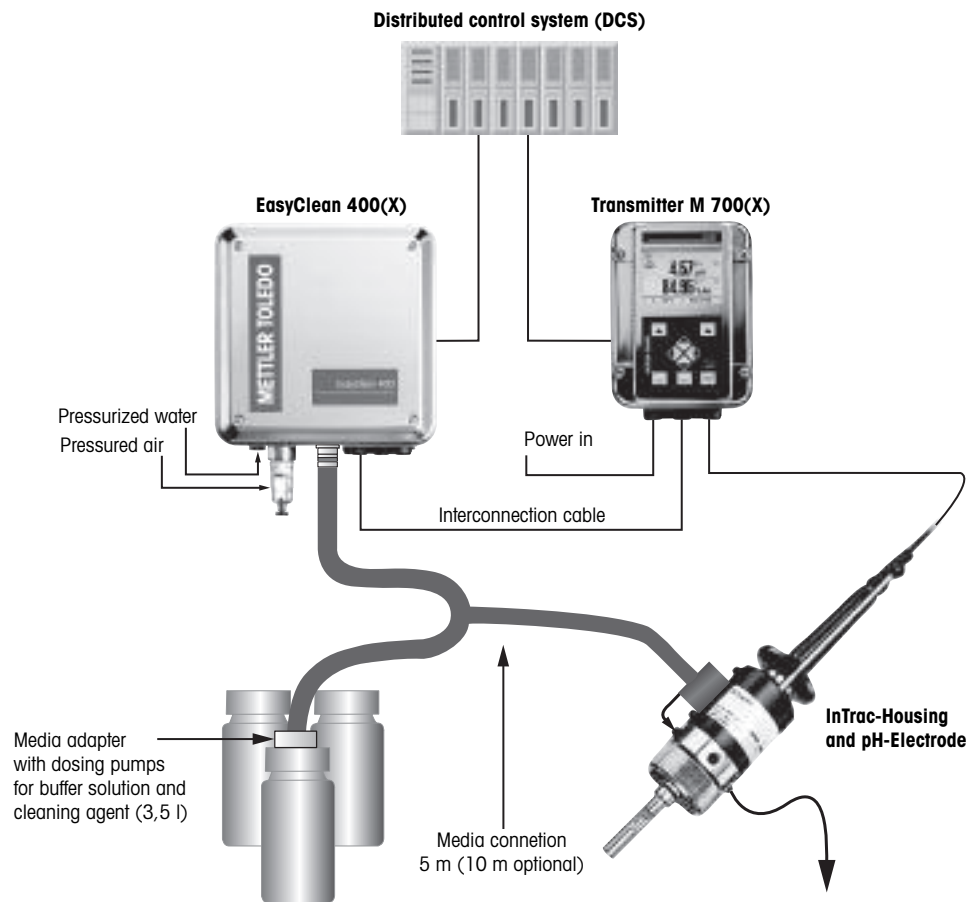
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EasyClean 400

EasyClean 400 automation system

The complete automation system always consists of the following components:

- EasyClean 400
- Transmitter M 700 with the appropriate module EC 700
- Housing with pneumatic indicators
- pH sensor with cable



The module EC 700 includes the pH measuring module and controls the EC 400. For detailed information about the transmitter M 700, the appropriate InTrac retractable housing, and the respective pH sensor, please refer to the appropriate data sheet. When using a non-glass ISFET pH sensor, an additional pH 2700 module is required.

The EasyClean 400 includes the following components:

- Basic unit with controller, connections and valves
- Media connection, 5 m
- Media adapter, 3.5 liter reservoirs (3), assembled with 3 pumps (2 for buffer solution, 1 for cleaning solution)
- Connection kit for housing
- All connection cables

EasyClean 400 Standard devices	Type	Order no.
EasyClean 400, coated	EC 400 C	52 403 596
EasyClean 400, coated, Ex	EC 400 XC	52 403 597
EasyClean 400, stainless steel	EC 400 S	52 403 598
EasyClean 400, stainless steel, Ex	EC 400 XS	52 403 599

Transmitter M 700 Modules	Type	Order no.
Module pH and EC 400	EC 700	52 121 259
Module pH and EC 400, Ex	EC 700 X	52 121 260

EasyClean 400 Configurator

In addition to the 4 standard devices, there is a possibility to configure a device for cases where a 10 m media connection is required or if only 2 pumps are needed.

Basic unit*	
	Explosion protection
N	without
X	ATEX for Ex Zone
	Housing
C	stainless steel, coated
S	stainless steel, polished
	Media connection
3	5 m hose
4	10 m hose
	Media adapter slot 3
2	with pumps and empty bottle 3.5 l
0	blank (without pumps and bottle)
E C 4 0 0	
1 2 3 4 5 6 7 8 9 10	

Basic unit* including:

Media adapter slot 1: Pump and empty bottle 3.5 l
 Media adapter slot 2: Pump and empty bottle 3.5 l

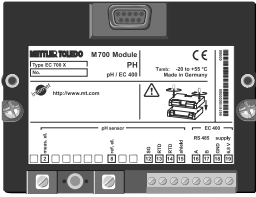
Accessories	Order no.
Emergency shut-off switch	52 402 317
Additional external valve Aux 2	52 403 751
Post mounting kit EC 400	52 403 747
Post mounting kit media adapter to EC 400	52 403 750

Spare parts	Order no.
Media connection 5 m	52 403 724
Media connection 5 m, Ex	52 403 725
Media connection 10 m	52 403 726
Media connection 10 m, Ex	52 403 727
Interface for InTrac	52 403 728
Interface for InTrac, Ex	52 403 729
Pump	52 403 730
Pump, Ex	52 403 731
Media adapter	52 403 732
Media adapter, Ex	52 403 733

Pressured air	Air quality according to ISO 8573-1	
	– Particles class	class 5
	– Water content	
	... for temperatures $\geq 15\text{ °C}$ (59 °F):	class 4
	... for temperatures 5 ... 15 °C (41 ... 59 °F):	class 3
	– Oil content	class 3
	Accept. pressure range	4 ¹⁾ ... 10 bar (145 psig)
Pressure monitoring	Internal automatic monitoring, alarm notification	
Connection	thread 1/4" female	
<hr/>		
	Note:	For pressured air during operation – as well as for heated outdoor applications applies: temperature range + 5...+ 55 °C (41...131 °F) – for Ex applications + 5 ... + 50 °C (41...122 °F)
<hr/>		
Flushing water	filtered	100 µm
	Accept. Pressure range	2 ... 6 bar (29...87 psig)
	temperature range	5 ... 65 °C (41 ... 149 °F)
	Pressure monitoring	Internal automatic monitoring, alarm notification
	Connection	thread 1/4" female / thread 3/4" male
<hr/>		
Media adapter	three plug-in connections for dosing pump	
	Protection class	IP 65
	Mounting	wall or post mounting (optional)
<hr/>		
Dosing pump	for buffer solution or cleaner	
	Bottle	3.5 liters max.
	Pump height	10 m approx.
	Feed rate	25 cm ³ /stroke
	Level monitoring	EC 400 net diagram and NAMUR messages: Maintenance requirements and failure
	Protection rating	IP 65
	<hr/>	
Wetted parts	EPDM, PP, PE, PVDF, Glass, Hastelloy	
<hr/>		
Power (EEx ia IIC)	Power supply via M 700 (X) Module EC 700 (X) 6.8 V (±10 %) / 15 mA	
Connection	Terminals, wire gauge max 2.5 mm ² (furnished connection cable to M 700 (X), length 10 m)	
RS 485 (EEx ia)	Communication with module M 700 (X) and EC 700 (X) or external control computer (e.g. PLC)	
	Transmission Protocol	1200 Baud/8 Data Bit/1 Stop Bit/ parity odd HART® Rev. 5
<hr/>		

¹⁾ increased minimum pressure 5 bar for probe required in case of high process pressure or difficult process media.

DCS-input (passive) Measuring / Service (EEx ia IIC)	Measuring/Service Switching voltage Connection	$U_i = 30$ V, potential-free, galvanic isolation up to 60 V 0 ... 2 V AC/DC inactive (Measuring) 10 ... 30 V AC/DC active (Service) terminals, wire gauge max. 2.5 mm ²
DCS-input (passive) Auto / Manual (EEx ia IIC)	Automatic disabled Switching voltage Connection	$U_i = 30$ V, potential-free, galvanic isolation up to 60 V 0 ... 2 V AC/DC inactive (Automatic intervals enabled) 10...30 V AC/DC active (Automatic intervals disabled) terminals, wire gauge max. 2.5 mm ²
DCS-inputs (passive) Bin1 ... 3 (EEx ia IIC)	Program start 1 ... 6 Switching voltage Connection	$U_i = 30$ V, potential-free, inter-connected, galvanic isolation up to 60 V 0 ... 2 V AC/DC inactive 10 ... 30 V AC/DC active terminals, wire gauge max. 2.5 mm ²
DCS-outputs (passive) Program runs, Service, Measuring (EEx ia IIC)	Voltage drop Connection	feed-backs program is running, Service, Measuring electronic switch contacts, potential-free, inter-connected $U_i = 30$ V $I_i = 100$ mA $P_i = 800$ mW, galvanic isolation up to 60 V < 1.2 V terminals, wire gauge max 2.5 mm ²
Explosion protection	ATEX FM	II 2(1) GD EEx ia IIC T4 T 70 °C (158 °F) Class 1, Divison 1 (pending)
EMV Lightning protection	DIN EN 61326 DIN EN 61000-4-5, Installation class 2	
Protection against electric shock	according to EN 61010	
Ambient conditions Ambient temperature	+5 ... +55 °C (41...131 °F) (Ex: +5 ... +50 °C, 41...122 °F) (different temperature range upon request) transport/storageTemp. -20 ... +70 °C (-4...158 °F) Relative humidity 10 ... 95 %, non-condensing	
Housing	Housing surface S Housing surface C Mounting Dimensions (W x H x D)	stainless steel A2, polished stainless steel A2, coated wall or post mounting (optional) approx. 310 mm x 410 mm x 135 mm
Protection rating Cable grommets Weight	IP 65/NEMA 4X 6 cable glands M20x1.5 approx. 8.5 kg	



pH/ORP input
(EEx ia IIC)

Simultaneous measurement of pH and ORP		
Input glass electrode, Input reference electrode		
Input redox electrode (ORP) or aux. electrode		
Measurement range (MR)	pH value	-2.00 ... +16.00
	ORP value	-2000 ... +2000 mV
	rH value	0.0 ... 42.5
Permissible voltage	ORP + pH [mV]	2000 mV
Permissible cable capacitance	< 2 nF	
Glass electrode input ¹⁾	Input resistance	> 1 x 10 ¹² Ω
	Input current ³⁾	< 1 x 10 ⁻¹² A
	Impedance range	0.5 ... 1000 MΩ
Reference electrode input ¹⁾	Input resistance	> 1 x 10 ¹⁰ Ω
	Input current ³⁾	< 1 x 10 ⁻¹⁰ A
	Impedance range	0.5 ... 200 kΩ
Measurement error ²⁾ (display)	pH value	< 0.02 TC: 0.001 pH/K
	ORP value	< 1 mV TC: 0.05 mV/K

Temperature input*)
(EEx ia IIC)

Pt100/Pt1000/NTC 8.55 kΩ/NTC 30 kΩ, 2-wire connection, adjustable		
Measurement range	-50 ... +150 °C / -58 ... +302 °F (Pt100/Pt1000)	
	-20 ... +150 °C / -4 ... +302 °F (NTC 30 kΩ)	
	-10 ... +130 °C / +14 ... +266 °F (NTC 8.55 kΩ, Mitsubishi)	
Resolution	0.1 °C / 1 °F	
Measurement error ²⁾	0.2 % meas. val. + 0.5 K (< 1 K at NTC > 100 °C)	

Temperature compensation
(media dependent)

Reference temperature 25 °C	
- Linear temperature coefficient, user-defined -19.99 ... +19.99 %/K	
- Ultrapure water 0 ... 150 °C	
- Table 0 ... 95 °C, user-defined in 5 K steps	

Power output
(EEx ia IIC)

For the operation of EasyClean 400		
U ₀ = +7,2 V	I ₀ = 200 mA	R _i = 20 Ω
Operating data: 6,8 V (±10%)/15 mA		

ORP*)

Automatic conversion to standard hydrogen electrode SHE when type of reference electrode is entered	
ORP calibration*)	Zero adjustment -200 ... +200 mV

Sensocheck

Automatic monitoring of glass and reference electrode, can be switched off

Sensor monitor

Direct display of measured values from sensor for validation pH input/
ORP input/glass electrode impedance/reference electrode impedance/temperature

ServiceScope

Noise level monitoring of the pH input signal, representation on display

Sensoface

Provides information on the sensor condition: Zero point/slope, response time, calibration interval, Sensocheck, CalCheck, can be switched off

*) user-defined
 1) according to IEC 746 Part 1, at nominal operating conditions
 2) ± 1 count, plus sensor error
 3) at 20 °C, doubles every 10 K

Adaptive calibration timer *)	Automatic adjustment of the calibration interval (Sensoface information) dependent on the process variables		
Sensor network diagram	Graphic representation of the current sensor parameters in a network diagram on the display: slope, zero point, reference impedance, glass impedance, response time, calibration timer, deviation from calibration range (CalCheck)		
CalCheck	Checks the distance between calibration buffers and measured values. German patent DE 195 36 315 C2		
Tolerance band recorder	Records zero point and slope of the electrode and the selected tolerance bands, graphical presentation on the display		
Sensor standardization *)	Operating modes	<ul style="list-style-type: none"> – 1-/2-/3-point calibration (best fit line) – Calimatic automatic buffer recognition – Input of individual buffer values – Product calibration – Data entry of pre-measured electrodes 	
	Drift check	Fine/standard/coarse, adjustable	
	Calimatic buffer sets *)	<ul style="list-style-type: none"> – Fixed buffer sets: 1 METTLER TOLEDO: 2.00/4.01/7.00/9.21 2 Merck/Riedel: 2.00/4.00/7.00/9.00/12.00 3 DIN 19267: 1.09/4.65/6.79/9.23/12.75 4 NIST Standard: 4.006/6.865/9.180 5 Technical buffers to NIST: 1.68/4.00/7.00/10.01/12.46 – Manually selectable buffer set with max. three buffer tables (with option SW 700-002) 	
	Nom. zero point*)	pH 0 ... 14, admissible span $\Delta\text{pH} = \pm 1$	
	Nom. slope*)	25 ... 61 mV/pH (25 °C), admissible span 80 ... 103%	
	V_{is} *)	–1000 ... +1000 mV	
Calibration protocol/statistics	Recording of: Zero point, slope, V_{is} , response time, calibration process with date statistics and time of the last three calibrations and the first calibration		
RS 485 (EEx ia IIC)	$U_0/U_i = +5\text{ V}$	$I_0/I_i = 250\text{ mA}$	$R_i = 20\ \Omega$
Transfer rate	1200 Bd for EasyClean 400 (X)		
Protokoll	8 data bits/1 stop bit/no parity HART Rev. 5		
EasyClean 400 (X) controller	Manual, interval and time-controlled activation of calibration and rinsing programs		
Programs	7 programs can be called up		
	<ul style="list-style-type: none"> – 4 programs with fixed sequences, modifiable – 2 freely configurable programs, 1 service program 		
Diagnostics	EasyClean 400 (X) network diagram, graphical representation of EasyClean status		
Maintenance	Control of the individual valves and pumps with status indicators		
Explosion protection (Module EC 700X only)	see rating plate: KEMA 04 ATEX 2056 II 2 (1) GD EEx ib [ia] IIC T4		

*) user-defined

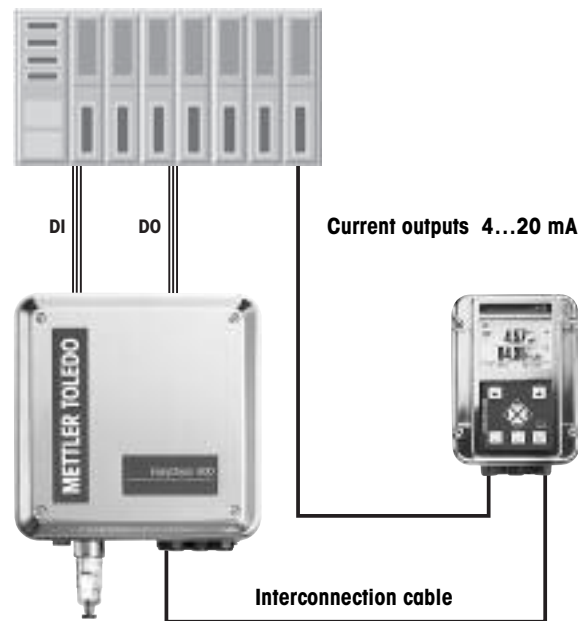
Integration with distributed control system

The EasyClean 400 and M700 system can be controlled by a distributed control system. Integration with the process control system can be performed either conventionally (digital inputs and outputs) or via a Profibus PA network.

Version 1: Conventional (digital inputs and outputs and current outputs)

The EasyClean 400 is controlled by the digital inputs and outputs of the distributed control system and the measured values are transmitted via the current outputs of the M 700. In addition, four alarm outputs of the transmitter M 700 can be integrated in the process control system. For a description of the inputs and outputs, please refer to specifications.

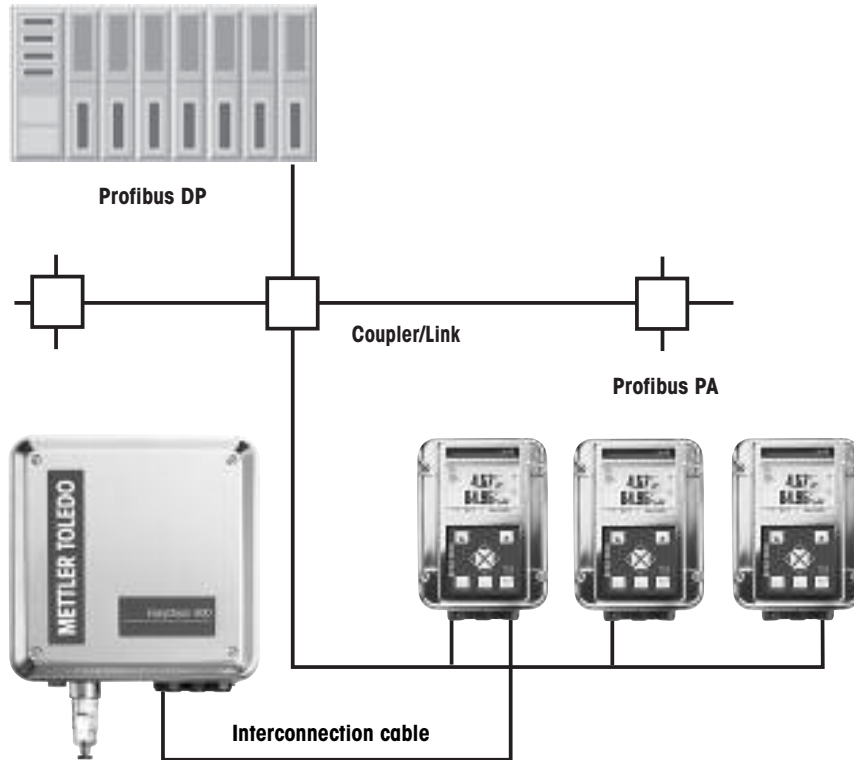
Distributed control system (DCS)



Version 2: Profibus PA

The EasyClean 400 is integrated into a distributed control system via a Profibus PA network. This version greatly reduces the wiring requirements, offers an enhanced diagnosis of the measuring point and allows configuration of the system from the control stand. This version requires an additional Profibus PA communication module in the transmitter M 700.

Distributed control system (DCS)

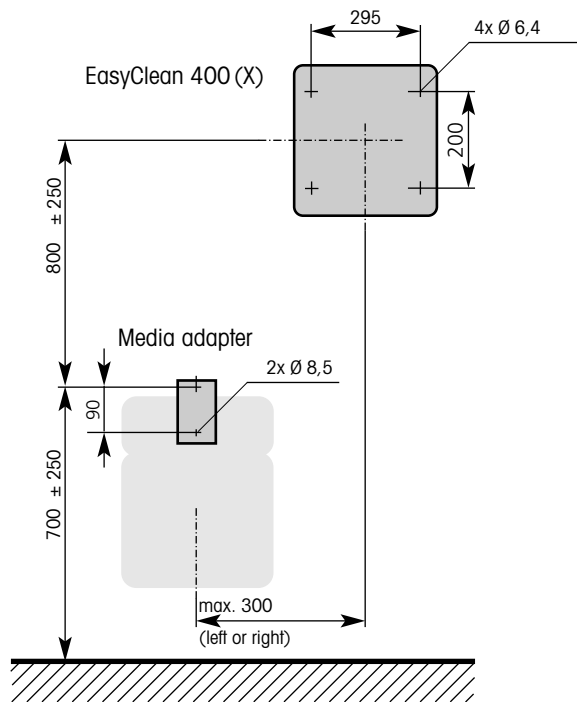


Mounting arrangement EasyClean 400 (x) and media adapter

Arrangement of components: acceptable distances and pump heights.

Arrangement of components

The installed location must have sufficient stability and must be free of vibration, as much as possible. The specified ambient temperature must be observed and may not fall below +5 °C (41 °F). For outdoor installation, special measures may need to be taken since direct solar radiation may raise the temperature above specified limits.



Unit of measurement: (mm)

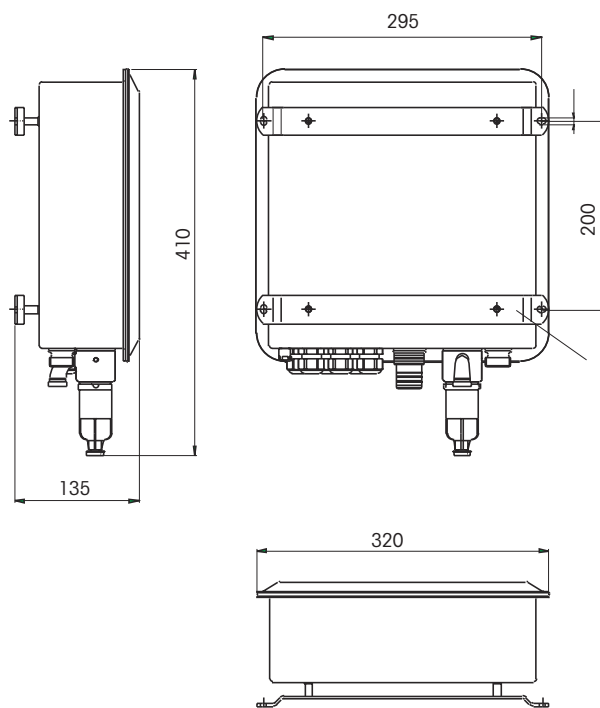
Distances and pump height

Cable lengths:

- EC 400 (x) - M 700 (x): 10 m
- EC 400 (X) - Retractable housing: 5 m or 10 m (optional)

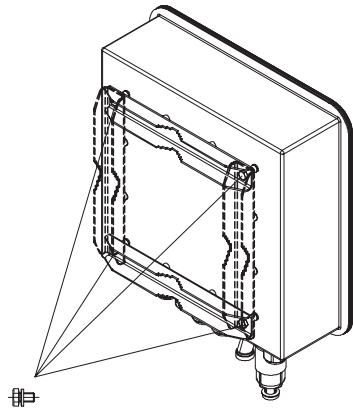
Max. Pump height of pumps: 10 m

Wall mounting

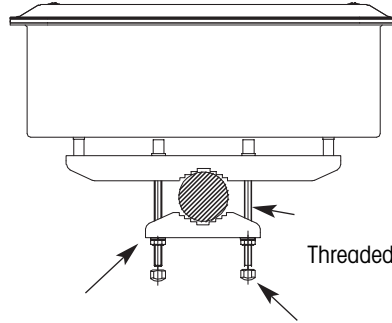


Unit of measurement: (mm)

EasyClean 400 (X) post mounting



Hexagon bolts M6x10 (4 pcs)
Washers M6 (4 pcs)

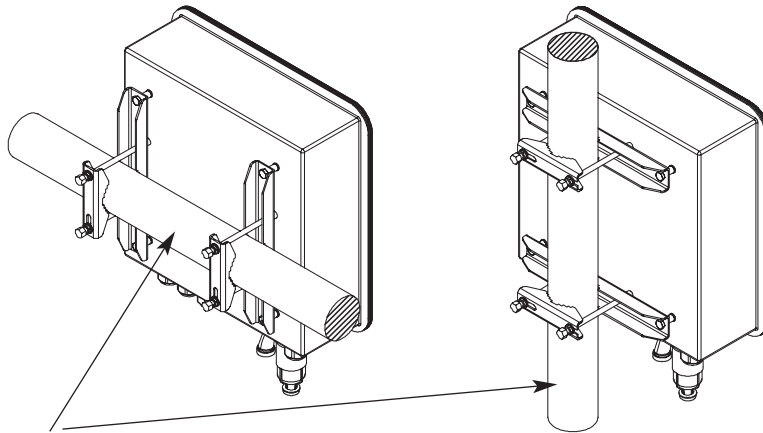


Washers M6 (4 pcs)
Hexagonal nuts M6 (4 pcs)

Threaded bolts M6x10 (4pcs)

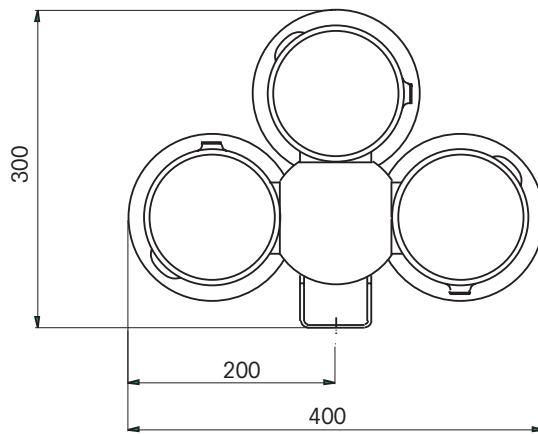
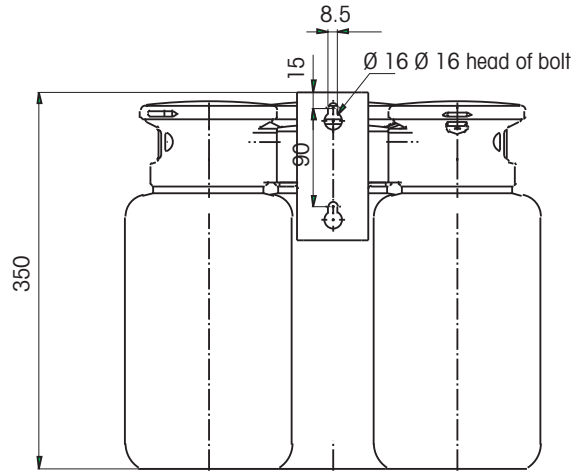
Cap nuts M6 (4 pcs)

Vertical or horizontal post mounting



Diameter of post: 30...65 mm

Media adapter



Unit of measurement: (mm)

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