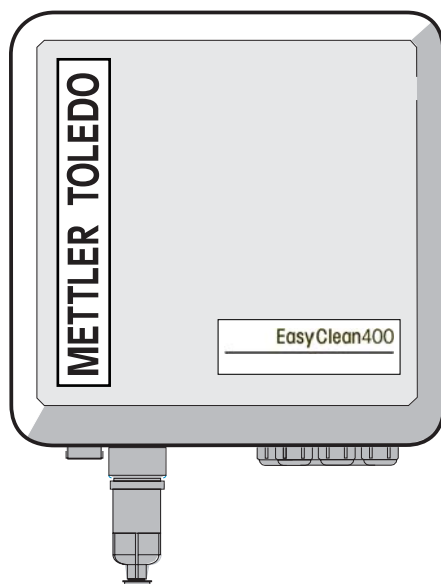


EasyClean® 400(X) Probe Controller

For Fully Automated Measurement,
Cleaning and Calibration



Installation Instructions



METTLER TOLEDO

Warranty

Defects occurring within 1 year from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender). Sensors, fittings, and accessories: 1 year.

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Return of Products Under Warranty

Please contact our Service Team before returning a defective device. Ship the cleaned device to the address you have been given. If the device has been in contact with process fluids, it must be decontaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

Disposal

Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

Trademarks

The following registered trademarks are used in this instruction manual without further marking

SMARTMEDIA®

is a registered trademark of Toshiba Corp., Japan

FOUNDATION FIELDBUS™

is a trademark of Fieldbus Foundation, Austin, USA

Mettler-Toledo AG,
Process Analytics, Industrie Nord, CH-8902 Urdorf,
Tel. +41 (44) 729 62 11 Fax +41 (44) 729 26 36
Subject to technical changes.



Declaration of conformity
Konformitätserklärung
Déclaration de conformité



We/ Wir/Nous **Mettler-Toledo GmbH, Process Analytics**
Im Hackacker 15
8902 Urdorf
Switzerland

declare under our sole responsibility that the product,
erklären in alleiniger Verantwortung, dass dieses Produkt,
déclarons sous notre seule responsabilité que le produit,

Description
Beschreibung/Description **EasyClean EC400**
to which this declaration relates is in conformity with the following
standard(s) or other normative document(s).
auf welches sich diese Erklärung bezieht, mit der/den folgenden Norm(en)
oder Richtlinie(n) übereinstimmt.
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou
au(x) document(s) normative(s).

EMC Directive/
EMV-Richtlinie/
Directive concernant la CEM **89/336/EWG**

Place and Date of issue/
Ausstellungsort/ - Datum
Lieu et date d'émission **Urdorf, July 6th, 2005**

Mettler-Toledo GmbH, Process Analytics

Waldemar Rauch
General Manager PO Urdorf

Thomas Hösli
Head of Operations and R&D

Norm/ Standard/ Standard **EN 61326 / VDE 0843 Teil 20**

METTLER TOLEDO

Adresse Im Hackacker 15 (Industrie Nord), CH-8902 Urdorf, Schweiz
Briefadresse Postfach, CH-8902 Urdorf
Telefon 01-736 22 11
Telefax 01-736 26 36
Internet www.mt.com
Bank Credit Suisse First Boston, Zürich (Acc. 0835-370501-21-90)

Declaration of conformity
Konformitätserklärung
Déclaration de conformité



We/ Wir/Nous

Mettler-Toledo GmbH, Process Analytics

Im Hackacker 15
8902 Urdorf
Switzerland

declare under our sole responsibility that the product,
erklären in alleiniger Verantwortung, dass dieses Produkt,
déclarons sous notre seule responsabilité que le produit,

Description

Beschreibung/Description

EasyClean EC400X

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au(x) document(s) normative(s).

Explosion protection/

Explosionsschutzrichtlinie/

Prot. contre les explosions EMC

94/9/EG

KEMA 04 ATEX 1134

NL-6812 AR Arnhem, KEMA 0344

EMC Directive/

EMV-Richtlinie/

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EN 61326 / VDE 0843 Teil 20

EN 50014 EN 50020

EN 50281-1-1 EN 50284

METTLER TOLEDO

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Notice

These installation instructions do NOT describe

- how to operate the retractable housing
- how to control the programs via Premium Transmitter M 700(X).

The instruction manuals for the retractable housing, for the M 700(X) Premium Transmitter as well as the EC 700(X) module are available for download at www.mt.com/pro.

Short description

The EasyClean 400(X) is a probe controller for fully automated measurement, cleaning, and calibration.

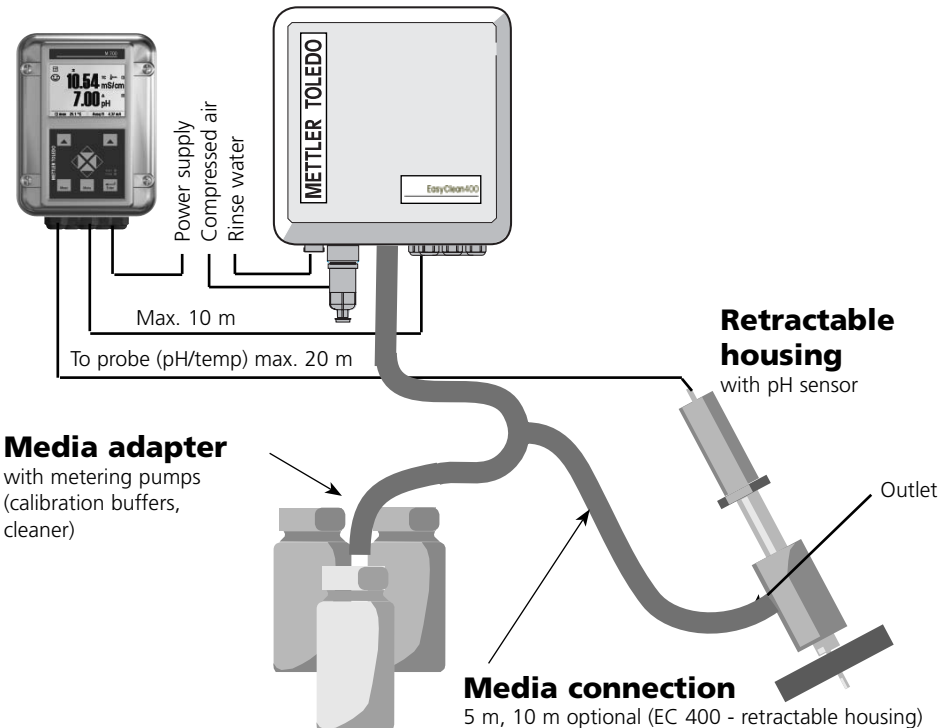
The device is modular and functionally structured. The enclosure contains the electronic controller, filters and valves. An external media adapter is provided for calibration buffers and cleaning solution.

The manufacturer offers the following components which form an optimally matched, fully automated process analysis system:

- M 700(X) (Modular process analysis system)
- EasyClean 400(X) (Automatic control of retractable probes)
- Retractable housing, cable, and pH sensor

M 700(X)

EasyClean 400(X)



Short Description

Media Adapter and Metering Pumps

Up to 3 separate wear-resistant and maintenance-free metering pumps with a very long service life are used for calibration buffers and cleaning agent. The metering pumps are located in the “head” of a 3.5 liter bottle. Each fluid is guided through a separate tube to the sensor lock-gate. A multiplug at the probe which is provided with check valves prevents contamination or mixing of the different fluids. The displaced volume of a metering pump is approx. 25 mliter / stroke, the maximum lifting height is 10 m.

Rinsing and Cleaning

In addition to water rinsing, a cleaner pump can be connected to port III of the media adapter (e.g. for diluted acids, diluted alkaline solutions, or solvents, see table in appendix).

Be sure to take account of the chemical resistance of the process-wetted materials of the media adapter, media connection, and pump.

Monitoring Functions

- Water stop
- Compressed-air monitoring (with pressure switch)
- Sensor dismount guard (by air current monitoring)
- Media monitoring
The process value or temperature of each each medium can be monitored in the calibration chamber of the probe. False media or a faulty pumping function are recognized.
- Level monitoring
generates the NAMUR messages “maintenance request” and “failure”.
- A “wear counter” monitors the number of probe movements and generates a message when a critical value is reached.

Short Description

Measurement Procedures

- **Continuous measurement:**

With continuous measurement the pH electrode is located in the process medium and is retracted for calibration or cleaning.

- **Short-time measurement:**

(interval measurement, sampling, sample mode ...)

The pH electrode is only momentarily moved into the process medium. This method is applied when measuring aggressive or thermally demanding process media which require short measurement times with long rest periods.

Example:

After cleaning / calibration the probe remains in the calibration chamber and only moves into the process for measurement upon request (or time-controlled).

Connection to Process Control / Process Evaluation

The EasyClean 400(X) probe controller can be connected to a superordinated control system, a DCS (Digital Control System).

Retractable Housing

Most of the available types of retractable housings with electrical limit switches can be used. Inductive limit position switches are not supported.

Intended Use

The EC 400(X) probe controller allows fully automated pH measurement including calibration and cleaning.

The EC 400X is approved for operation in hazardous locations.

The sturdy enclosure (IP 65) can be wall or pipe mounted. The version with hygienic, polished stainless steel enclosure allows application in the field of biotechnology, food processing, and in the pharmaceutical industry. The version with coated steel enclosure – extremely corrosion resistant – has been developed for application in the chemical industry, environmental engineering, water and waste-water treatment, and for application in power plants.

The EC 400(X) evaluates electric check-back signals from retractable probes / housings. Separate wear-resistant and maintenance-free metering pumps with a very long service life are used for calibration buffers and cleaner. Each fluid is guided through a separate tube to the probe. A multiplug at the probe which is provided with check valves prevents contamination or mixing of the different fluids. Buffer consumption is extremely low.

The manufacturer recommends to use the EC 400(X) in combination with the M 700(X) process analysis system and an InTrac 77x/ InTrac 79x retractable housing.

This combination ensures optimal media monitoring (pH value and temperature) as well as traceability according to FDA 21 CFR Part 11 (AuditTrail). The M 700(X) Premium Transmitter allows easy adaptation of the calibration and cleaning programs to the process.

Safety Information

Application in Hazardous Locations

Application in Hazardous Locations

The EC 400X probe controller is intended for operation in specific environments and specific fields of application. These are listed in the instruction manual as specifications for environment, installation and commissioning, intended use (= application), assembly and dismantling, and maintenance.

Observe the influences of humidity, ambient temperature, chemicals, and corrosion. If the specifications in the instruction manual are not sufficient for assessing the safety of operation, e.g. because your specific applications are not described, please contact the manufacturer to make sure that the application is possible and safe.

Prerequisite to safe use of the equipment is the observance of the specified ambient conditions and temperature ranges.

When using the EC 400X probe controller, the stipulations for electrical installations in hazardous areas (EN 60079-14) must be observed.

When installing the device outside the range of applicability of the 94/9/EC directive, the appropriate standards and regulations in the country of use must be observed.

The EC 400X probe controller has been developed and manufactured in compliance with the applicable European guidelines and standards. Compliance with the European Harmonized Standards for use in hazardous locations is confirmed by the EC-Type-Examination Certificate. Compliance with the European guidelines and standards is confirmed by the EC Declaration of Conformity.

The EC Declaration of Conformity and the EC-Type-Examination Certificate are included in the instruction manual.

There is no particular direct hazard caused by the operation of the device in the specified environment.

Safety Information

Application in Hazardous Locations: Installation Precautions

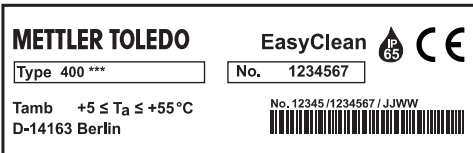
Be sure to observe the following precautions:

Installation:

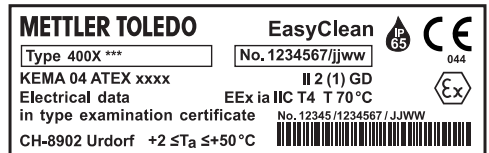
The EasyClean 400(X) is supplied through the M 700(X). Power supply to the M 700(X) must be disconnectable near the device by a two-poled switch incorporated in the building installation. This switch must meet the requirements of EN 60947-1 and EN 60947-3, be marked as disconnect device for EasyClean 400(X), and be easily accessible by the user.

- In a Zone 20 or 21 dust explosion hazardous area the bottles for buffer and cleaning liquids must be installed in a way that there is no explosion risk due to electrostatic discharge. For example, the bottles should be mounted within a grounded, electrostatically conductive container / cabinet or be sheathed with grounded, electrostatically conductive material.
- The EasyClean 400X may be opened during operation.

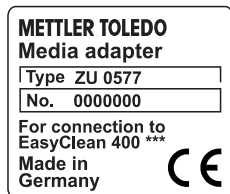
Rating Plates



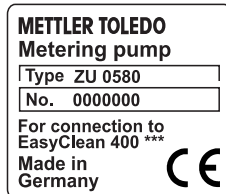
EasyClean 400



EasyClean 400X



Media adapter



Metering pump

Assembly

EasyClean 400(X) - wall mounting

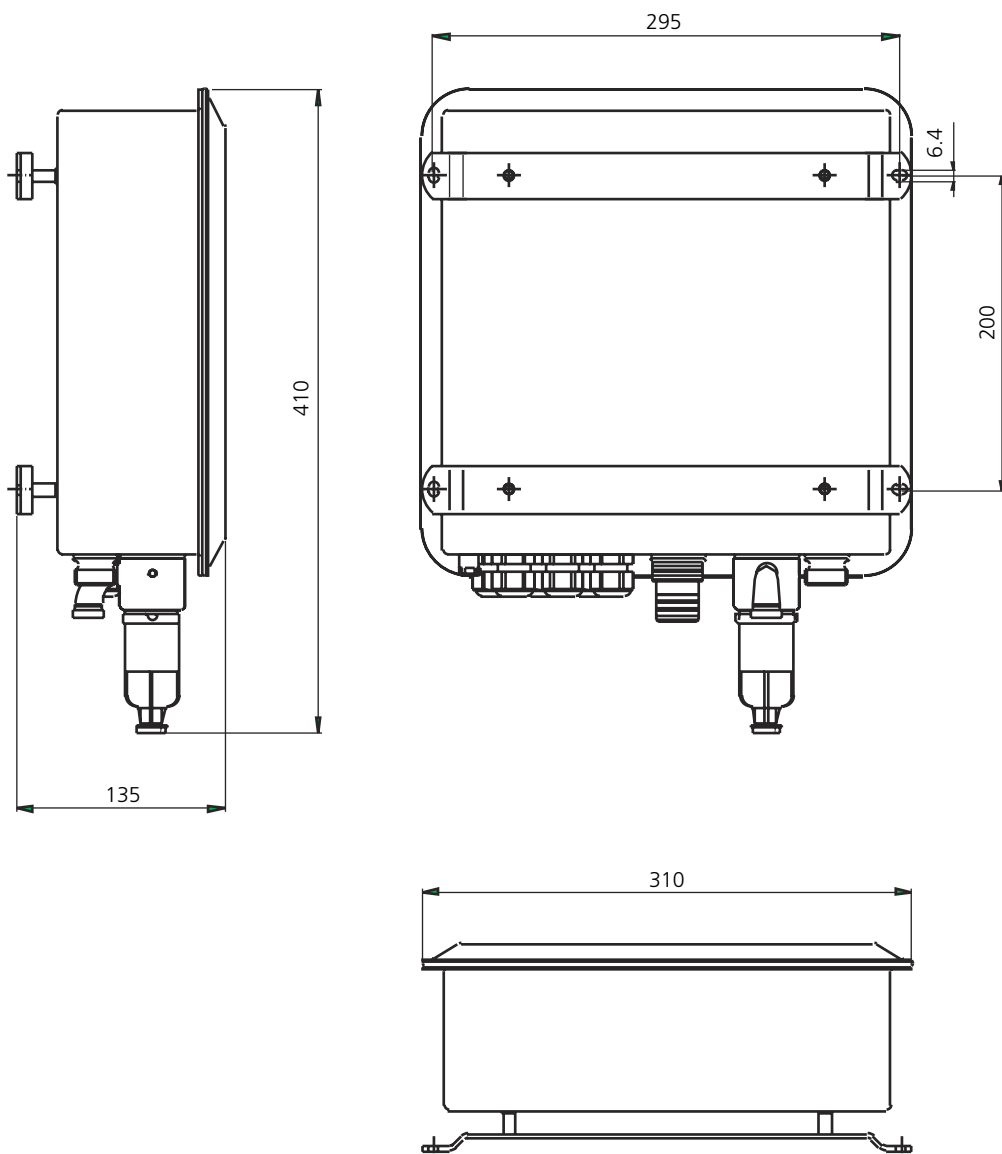
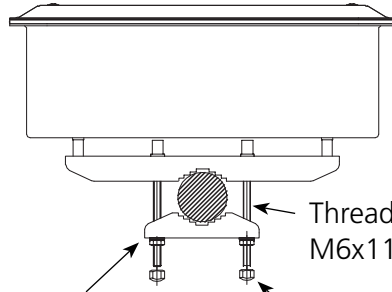
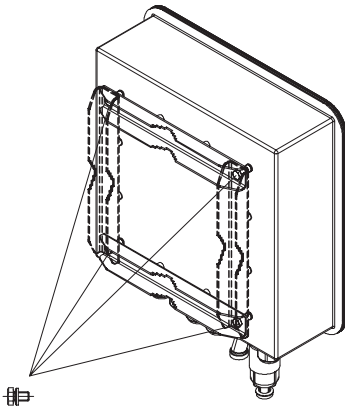


Fig.: EasyClean 400(X), mounting dimensions [mm]

Assembly

EasyClean 400(X) - pipe mounting



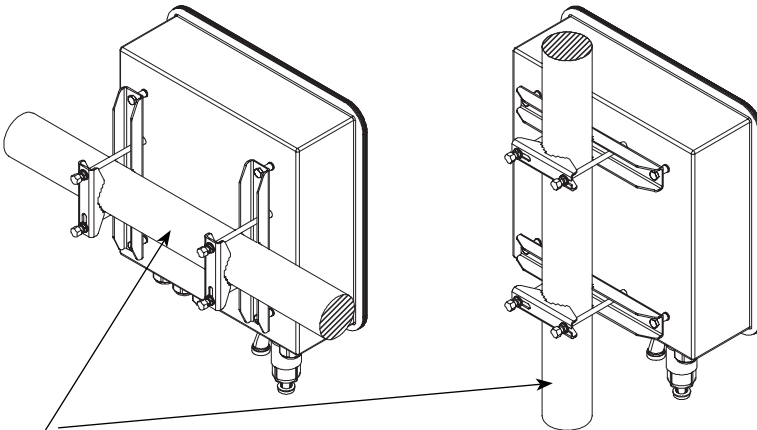
Washers M6 (4x)
Hexagon nuts M6 (4x)

Threaded bolts
M6x110 (4x)

Cap nuts M6 (4x)

Hexagon head screws M6x10 (4x)
Washers M6 (4x)

Vertical or horizontal pipe mounting:



Pipe diameter: 30 ... 65 mm

Assembly

Media Adapter

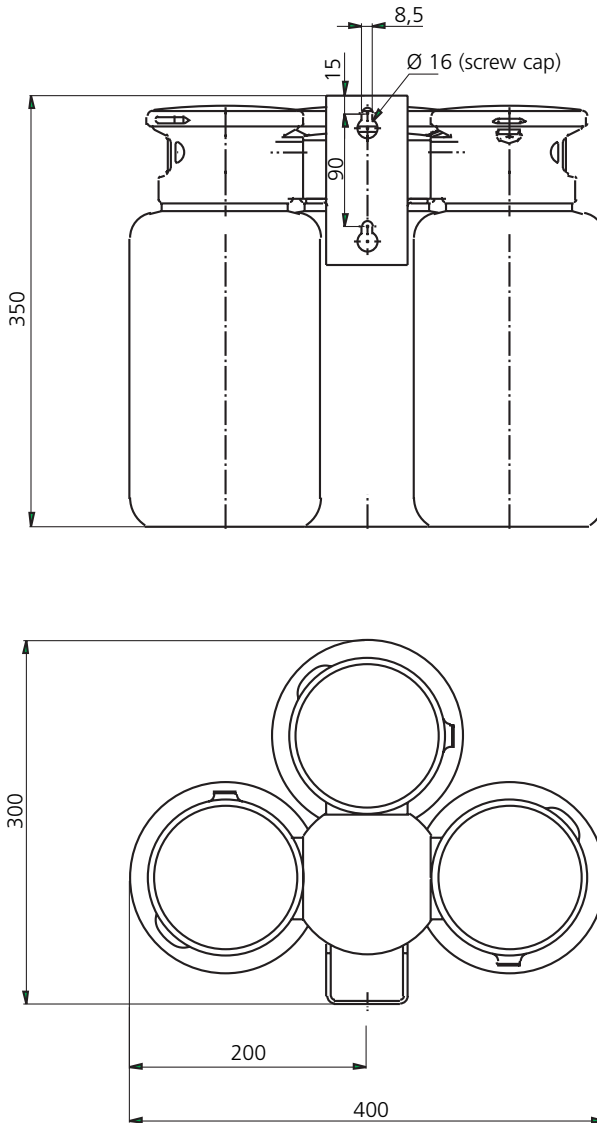


Fig.: Media adapter, mounting dimensions

Media Supply: EasyClean 400(X)

Compressed Air, Water, Purge Air

Compressed-Air Supply

The EasyClean 400(X) is operated with an air pressure of 4* ... 10 bars. Adjust the pressure regulator so that the internal operating pressure is kept within 4 and 7 bars. The air must be condensate- and oil-free. Maximum air consumption during probe activation is 300 L/min. The compressed air supply is connected via a 1/4" internal thread, nominal width: 6 mm (preferably flexible).

* Increased minimum pressure required for probe in the case of high process pressure or difficult process media



Warning!

- If water has entered the pneumatic system, the device must be put out of service immediately!
Please contact the technical service department.

Water Supply

The EasyClean 400(X) is operated with a water pressure of 2 ... 6 bars.

Water: filtered 100 µm, temperature 5 ... 65°C.

The water supply lines shall not contain a check valve.

The water supply is connected via a 1/4" internal thread or 3/4" external thread (coupling), preferably flexible tube, 1/2".

We recommend the ZU 0656 connection kit.

Arrangement of Functional Elements

Compressed Air, Water, and Auxiliary Media at the EasyClean 400(X)

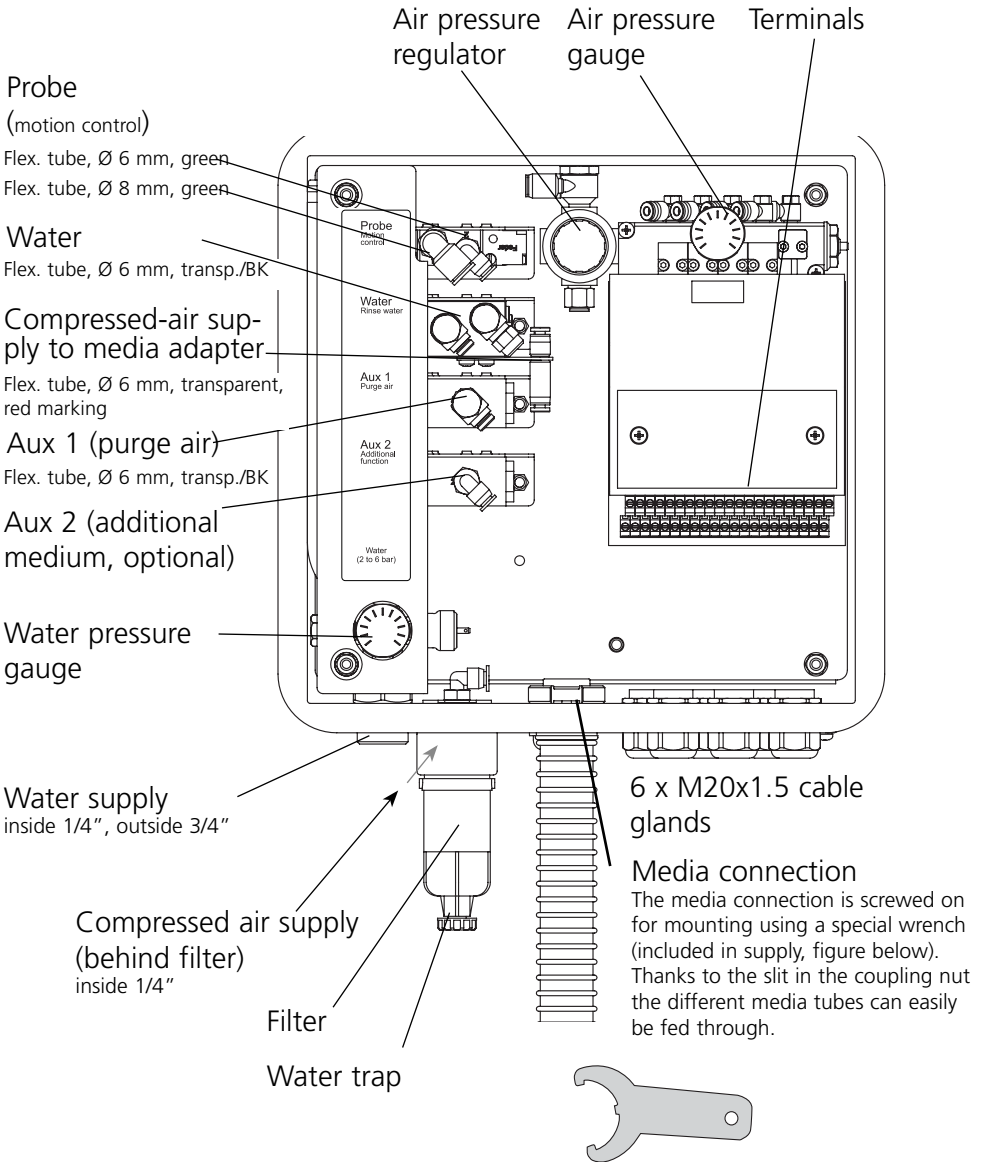


Fig.: Arrangement of the functional elements in the EasyClean 400(X)

Media Supply with Media Adapter

Calibration Buffers, Cleaning Agent

The media adapter provides 3 ports for connection of metering pumps (2 ports for calibration buffers and one port for cleaning agent).

The M 700(X) automatically recognizes and monitors the port equipment of the media adapter.

Caution

Ports which are not used must be closed with a blind plate! As delivered, the ports of the media adapter are closed with blind plates. To store blind plates which are not used, both sides of the mounting bracket are provided with fixing pins.

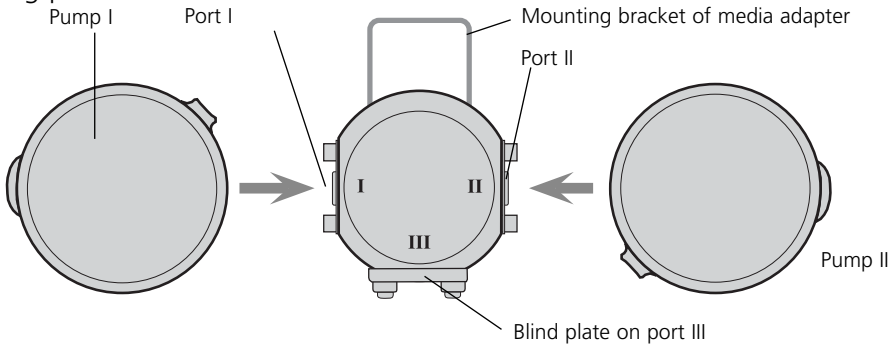


Fig.: Top view of media adapter. Metering pumps are simply plugged on and fixed with two captive screws.

Port I and Port II

These ports are designed for connection of metering pumps. Here, the calibration buffers should be connected to the media adapter. Be sure to take account of the chemical and thermal resistance of the process-wetted materials (see bills of materials for media adapter and media connection).

The EC 400(X) software supports one- and two-point calibrations. As default, port I is assigned to buffer I (pH 7.00) and port II to buffer II (pH 4.01).

Port III

This port allows connection of a further metering pump for rinsing or cleaning agent. It is designed for the use of aggressive media (diluted acids, diluted alkaline solutions, solvents – cf table in the appendix).

Media Adapter and Metering Pump

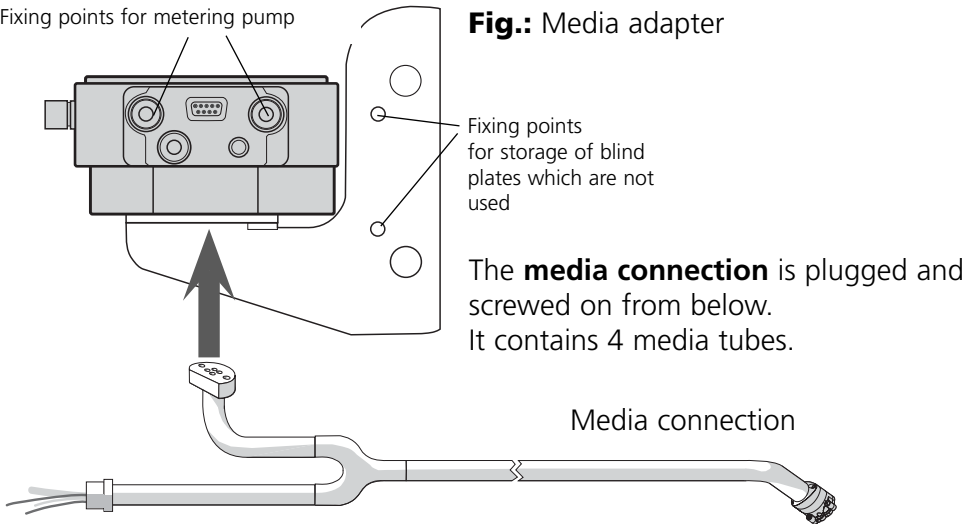
Plug-in Connection

Attaching the Media Connection to the Media Adapter

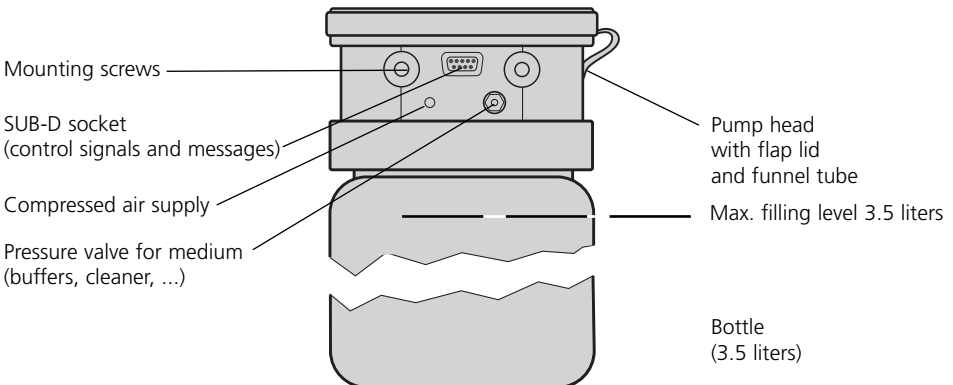
Carefully plug the "media adapter" connector of the media connection into the media adapter with the flat side facing the wall (or mounting pipe/post). The ends of the tubings must meet the O-rings of the media adapter. Then tighten the two fixing screws.

Fixing points for metering pump

Fig.: Media adapter



Metering Pump: Plug-in Connection for Media and Control Signals

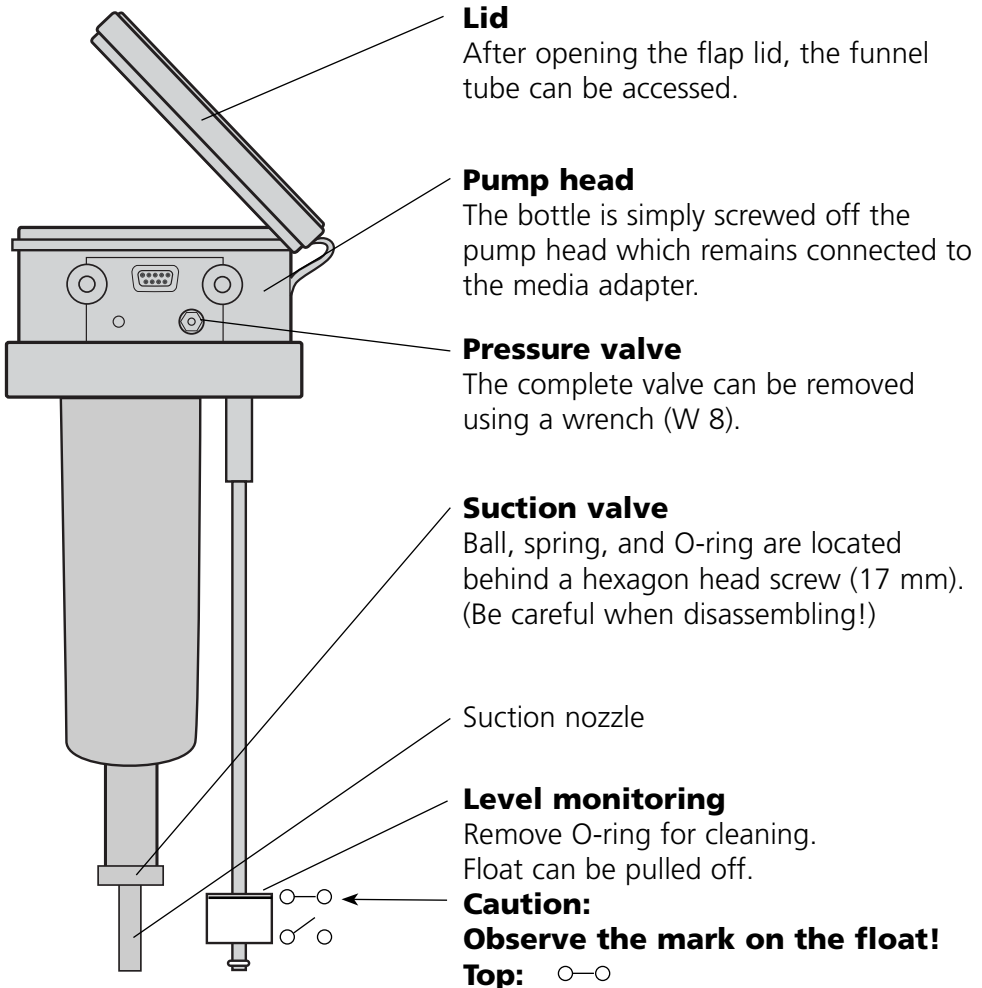


Metering Pump

Function Description

The metering pump is a wear-resistant and maintenance-free bellows-type pump without dynamic seals. It provides an integrated pneumatic valve and a level monitoring device.

If required, the bottle can be screwed off the pump head for cleaning. Also the check valves can be easily removed and cleaned:



Media Adapter and Metering Pump

Bill of Material

Bill of Material for Media Adapter

Component	Material
Blind plate	PP-GF (not wetted)
Molded seal	EPDM
Housing	PP-H
Gasket for media connection	EPDM

Bill of Material for Metering Pump

Component	Material
Pump lid	EPDM
Pump membrane	EPDM
Pump housing	PP-GF
Pump head	PP-GF
Float	PP
Float tube	PVDF
Bottle	PE-HD
Check valves	
Ball	Glass
Spring	Hastelloy
Sealing	EPDM

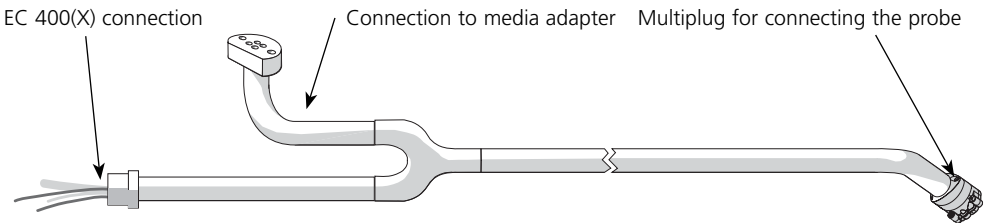
Media Connection

Variants, Assembly

The media connection is available in 5 m (optionally 10 m) length. It consists of a Ø 30 mm corrugated hose with a metal coil.

Connections

The connections for media adapter and probe are of a plug-in design. They are mechanically fixed by screwing. All media are guided separately through the corrugated hose. Check valves in the multiplug minimize contamination and prevent mixing of the calibration fluids.



Connection to EasyClean 400(X)

The corrugated hose is screwed to the joining piece of the EasyClean 400(X). Thanks to a slitted coupling nut the different media tubes can easily be fed through. The different tube lengths and diameters provide for a clear assignment. See Pg 24 for color codes.

Connection to Media Adapter

This connection is plugged and screwed to the media adapter. It includes three connections for media and one connection for compressed air.

Multiplug for Connecting the Retractable Housing

The multiplug is screwed on the media interface for InTrac 7xx. It includes the media tubing (5x, all with check valves), limit position control, and compressed air supply.

Media Connection

Bill of Material

Bill of Material for Media Connection with Calibration Function

Media connection	Tubings	Outer Ø	Material	Color
Probe compressed-air	2	6, 8	PA	Green
Rinse water	1	6	FEP	Transparent
Purge air	1	6	FEP	Transparent
Buffer solution (port I and II)	2	6	PE-LD	Black
Cleaning agent (port III)	1	6	FEP	Transparent
Air supply	1	6	FEP	Transp., red marking

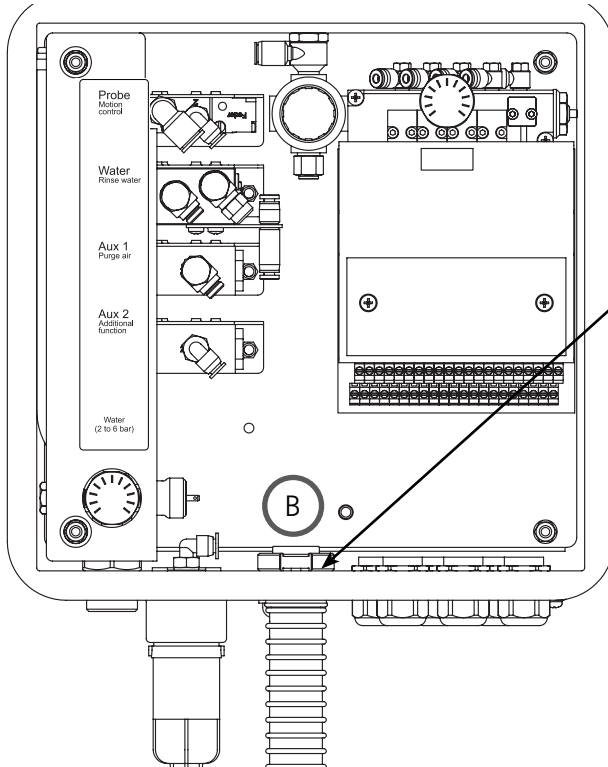
EC 400 joining piece	1.4571
Corrugated hose Ø 30	PVC and metal coil
Hose termination at probe Ø 28	EPDM
Hose manifold	PP-H
Media adapter joining piece	PP-H
Multiplug	PVDF (wetted: PEEK)

Check valve of multiplug	Material
Ball 5	Glass
Spring 5	Hastelloy (2.4610)
Gaskets	EPDM

Attaching the Media Connection

Attaching the Media Connection to the EasyClean 400(X)

Loosen the slotted nut (A). Insert this end of the hose into the EasyClean 400(X) and tighten the nut again (B).



Media connection

The media connection is screwed on using a special wrench (included in supply, figure below).

Thanks to the slit in the coupling nut the different media tubes can easily be fed through.

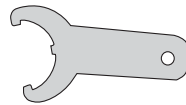


Fig.: EasyClean 400(X) without cover

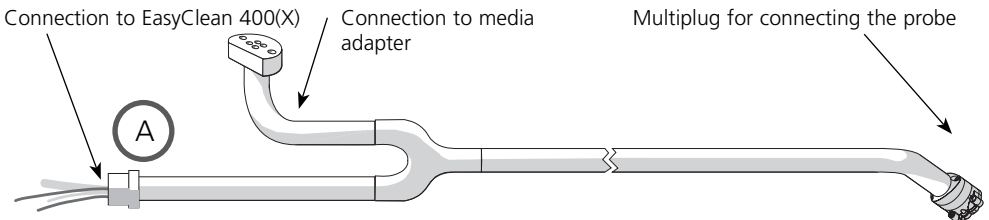


Fig.: Media connection

Pneumatic Couplings

on the EasyClean 400(X)

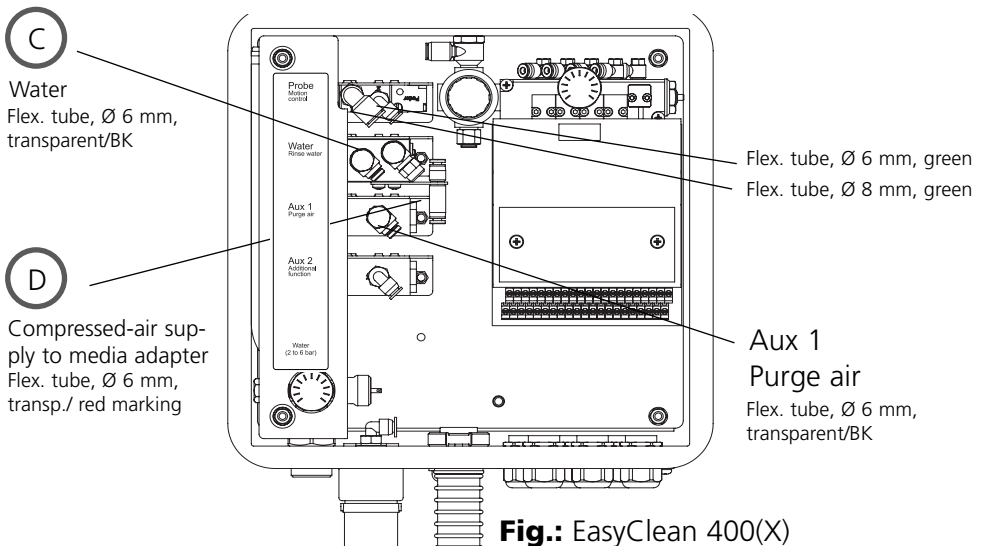
Connecting the Tubes of the Media Connection to the EasyClean 400(X)

The tubes of the media connection can now be connected to the EasyClean 400(X) together with the electrical connections (for interrogation of limit position). The tubes must be inserted until the stop is reached (overcoming an initial resistance).

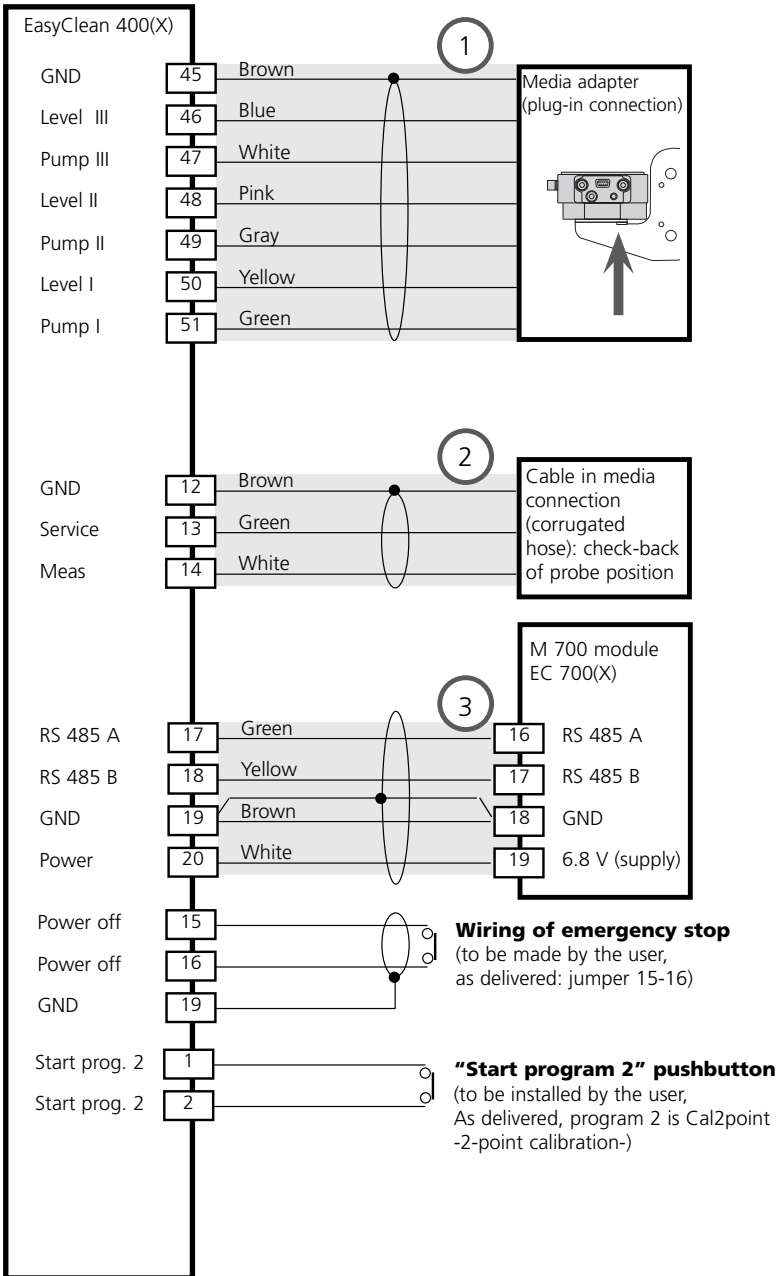
- 1) The tubes for water and purge air are identical. When connecting them to the valves, tighten the coupling nut until the stop. To increase the water flow rate, you can connect both tubes to the water valve. To do so, unscrew the sealing cap from the right outlet of the water valve and screw it to the outlet of the air valve if appropriate.
- 2) Push the tube with the red marking into the pneumatic connection block (D) located next to the water valve.

To detach a pneumatic coupling

- Press the blue ring against the coupling using two fingers.
- At the same time, slightly push the tube into the coupling and then pull it out.



Electrical Installation

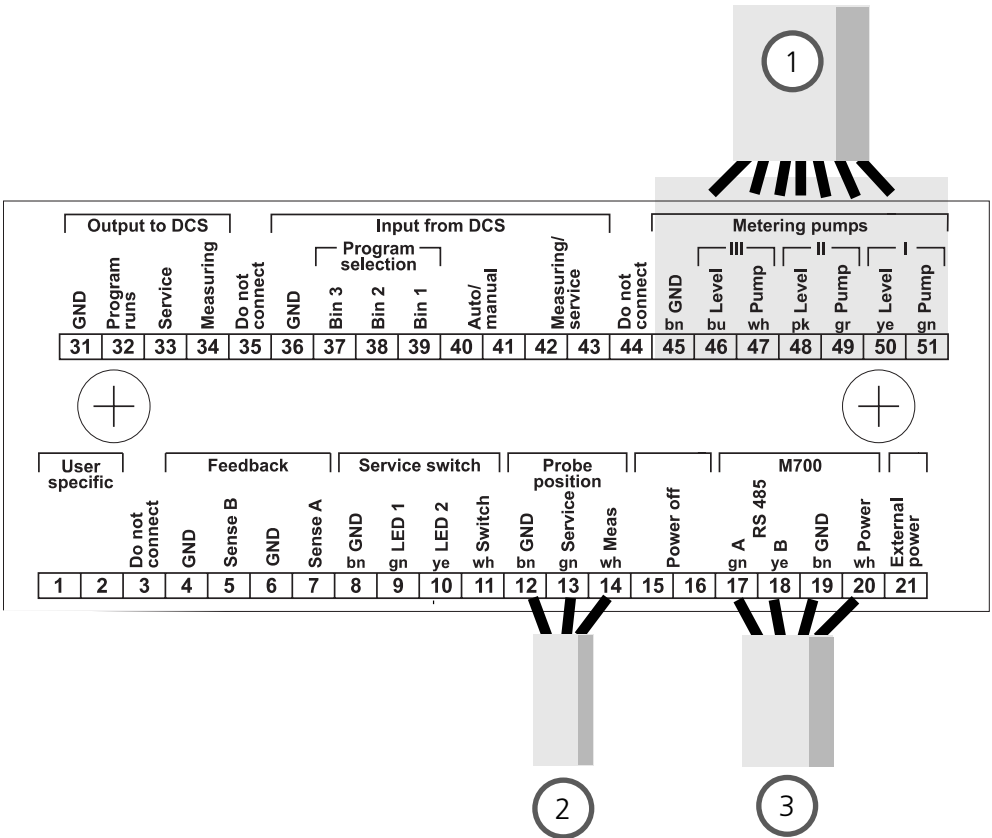


Cable Connection

Electrical Connections to EasyClean 400(X)

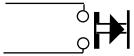
Screw off the cover of the EasyClean 400(X), pull off ground connection. Connect preassembled cables:

- Cable no. 1: EC 400 – Media adapter
- Cable no. 2: EC 400 – Probe (in media connection)
- Cable no. 3: EC 400 – M 700 module EC 700(X)



Electrical Connection

Terminal Assignments EasyClean 400(X)

No.	Wire color	Terminal	Function
1			Manual start of program 2 (default: Cal2point) via external pushbutton
2			
3		Do not connect	Do not connect!
4		GND	External sense B GND*
5		Sense B	External sense B*
6		GND	External sense A GND*
7		Sense A	External sense A*
8	Brown	GND	Service switch GND
9	Green	LED1	Service switch LED 1
10	Yellow	LED2	Service switch LED 2
11	White	Switch	Service switch
12	Brown	GND	Probe: Sense GND
13	Green	Service	Probe: Sense service (SERVICE)
14	White	Meas	Probe: Sense measurement (PROCESS)
15		Power Off	Power Off (emergency stop)
16		Power Off	Power Off (emergency stop)
17	Green	A RS 485	RS 485 interface
18	Yellow	B RS 485	RS 485 interface
19	Brown	GND	Power supply GND
20	White	Power	Power supply from EC 700
21		Ext. power	External power supply

* Sense signal under development

Electrical Connection

Terminal Assignments EasyClean 400(X)

No.	Wire color	Terminal	Function
31		GND	DCS Message GND
32		Program runs (DCS out)	EC 400 program running
33		Service (DCS out)	Probe in SERVICE position
34		Measuring / alarm	Probe in PROCESS position (or alarm output)
35		Do not connect	Do not connect!
36		GND	DCS program GND
37		Bin 3 (DCS in)	Start programs 1 ... 6
38		Bin 2 (DCS in)	
39		Bin 1 (DCS in)	
40		Auto/man. (DCS in)	Enable / lock automatic program start
41		Auto/man. (DCS in)	
42		M/S (DCS in)	DCS Measuring/Service
43		M/S (DCS in)	DCS Measuring/Service
44		Do not connect	(6 mm clearance)
45	Brown	GND	Pump 1-3 GND
46	Blue	Level III	Pump 3 level monitoring
47	White	Pump III	Pump 3 control valve
48	Pink	Level II	Pump 2 level monitoring
49	Gray	Pump II	Pump 2 control valve
50	Yellow	Level I	Pump 1 level monitoring
51	Green	Pump I	Pump 1 control valve

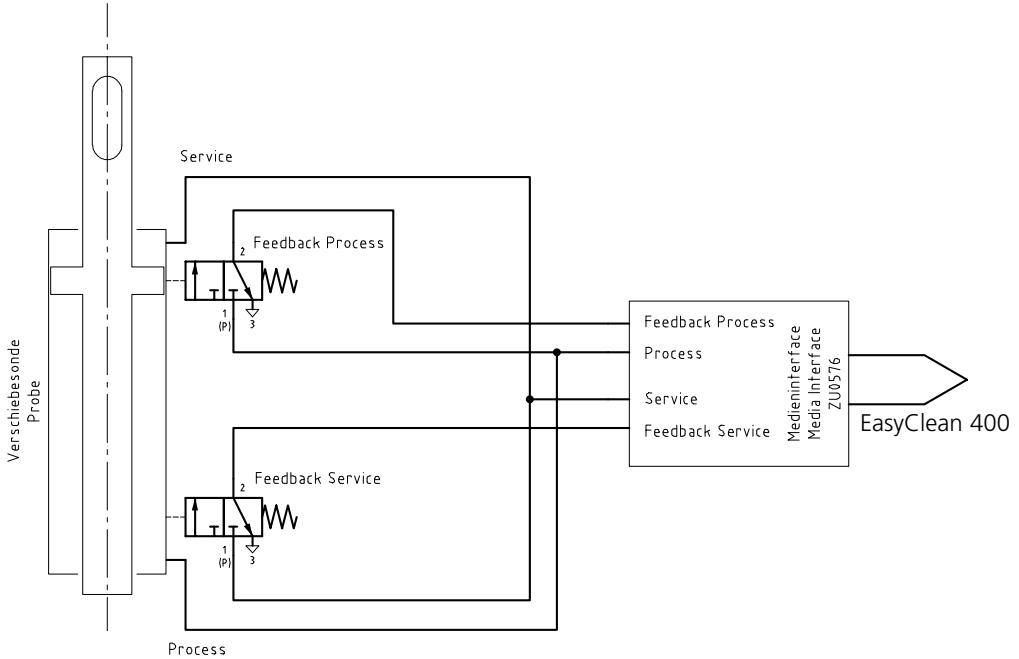
Electrical Connection

Terminal Assignments of EasyClean 400(X) - Beneath Terminal Cover -
These contacts are factory prewired.

Valves												Monitoring									
GND	Reserve	GND	Auxiliary 2	GND	Auxiliary 1	GND	Water	GND	Probe	GND	Safety	GND	Sense pressure (air)	Sense reserve	GND	Sense water	GND	Sense electrode	GND	Sense water stop	
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	

No.	Wire color	Terminal	Function
61		GND	Do not connect!
62		Reserve	Do not connect!
63		GND	Auxiliary valve 2 GND
64		Auxiliary 2	Auxiliary valve 2
65		GND	Auxiliary valve 1 GND
66		Auxiliary 1	Auxiliary valve 1
67		GND	Water GND
68		Water	Water valve
69		GND	Probe GND
70		Probe	Probe control valve
71		GND	Safety valve GND
72		Safety	Safety valve
73		GND	Safety valve GND
74		Sense pressure (air)	Compressed-air monitoring
75		Sense Reserve	Reserve liquid monitoring
76		GND	Water monitoring GND
77		Sense water	Water monitoring
78		GND	Dismount guard GND
79		Sense electrode	Dismount guard
80		GND	Water stop GND
81		Sense water stop	Water stop

Recommended Connection of Retractable Housing



Explanation:

The compressed air used for the probe motion (e.g. Process) is also used to provide the air pressure for the next expected feedback valve (i.e., Feedback Process) to generate the feedback signal for the EasyClean 400(X).

Be sure to use the hoses and connections from the enclosed connection kit (small-parts bag).

Connection of Retractable Housing

The retractable housings of the InTrac 7xx series provide pneumatic limit switches. The media interface shown here converts these pneumatic feedback signals into electric signals for the EasyClean 400(X) retractable probe controller. The interface is screwed directly to the media connection and only has to be connected to the InTrac 7xx retractable housing by a flexible tube.

Process:

Control air for "MEASURE" position and supply for "MEASURE" position feedback unit

Media supply (to rinsing chamber)

Feedback Service:

Sense "Service" position

Service:

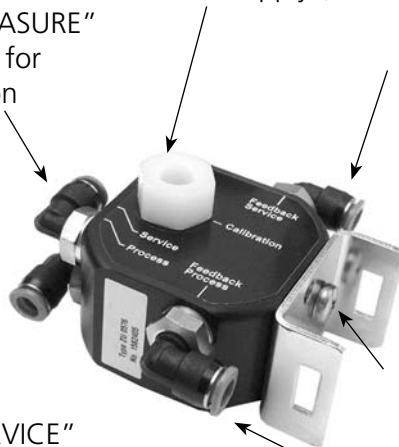
Control air for "SERVICE" position and supply for "Service" position feedback unit

Fixing screw

(PZ-2)

Feedback Process:

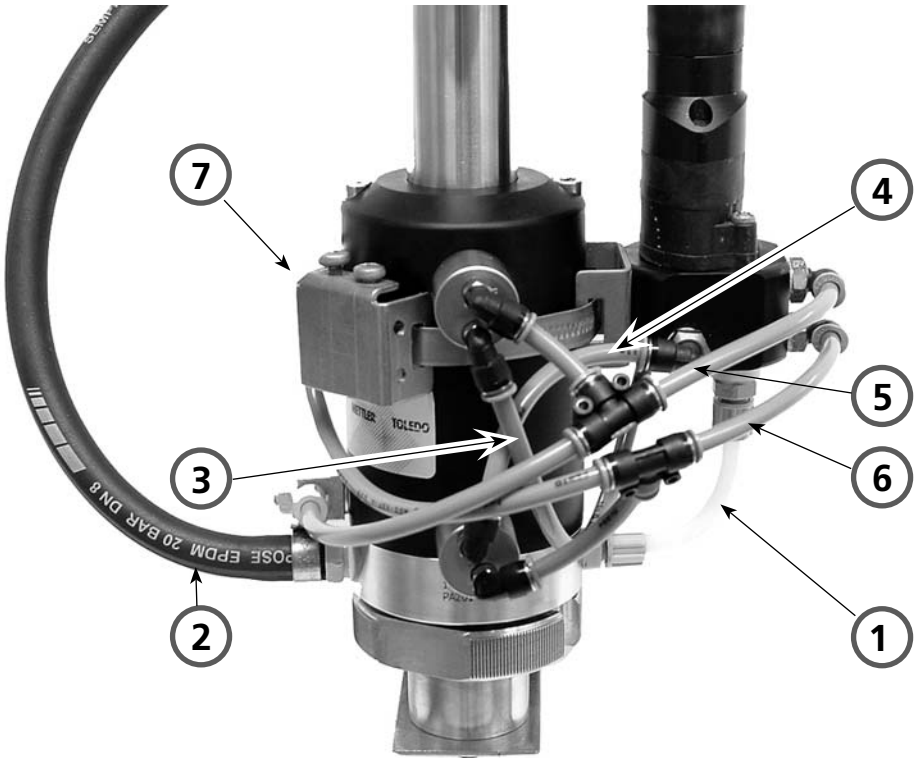
Sense "MEASURE" position



The interface is mounted to the retractable housing using the included hose clamp. To turn the interface into the required position, you can loosen the fixing screws. The holding bracket providing strain relief for the media connection can be fastened with the same or a separate hose clamp – as required. Use the included connection kit for connecting the InTrac 7xx retractable housing. All connections to the EasyClean 400(X) are made by screwing on the multiplug.

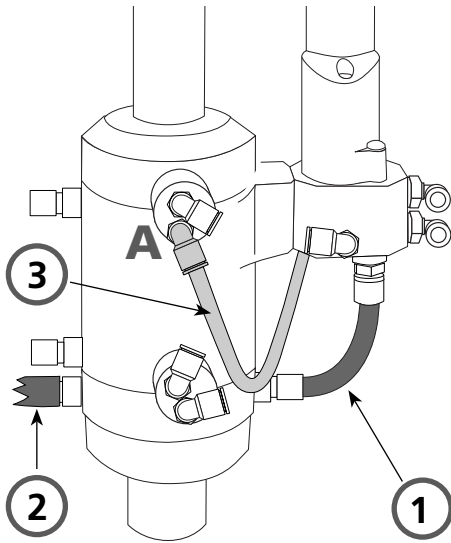
To finish the installation, hang the media connection into the holding bracket (strain relief) and secure it by tightening the screws.

Recommended Connection of Retractable Housing



- 1 Media connection to rinsing chamber - transparent, FEP
- 2 Rinsing chamber outlet - black, EPDM
- 3 Check-back of "SERVICE" position - blue, PA
- 4 Check-back of "MEASURE" position - blue, PA
- 5 Control air for "Service" position and supply for "Service" position feedback unit - blue, PA
- 6 Control air for "Measure" position and supply for "Measure" position feedback unit - blue, PA
- 7 Holding bracket for strain relief of media connection

Connection of Retractable Housing

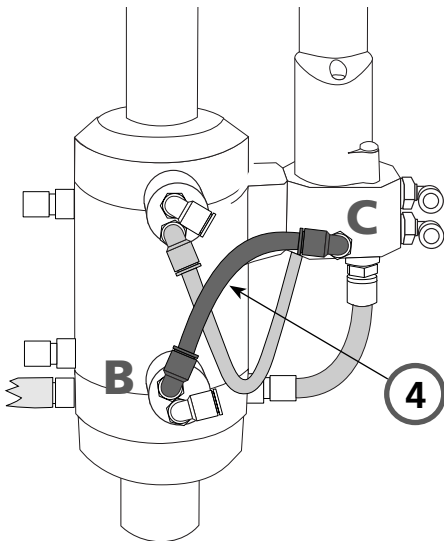


1 Media connection to rinsing chamber

2 Rinsing chamber outlet
Connect outlet here.

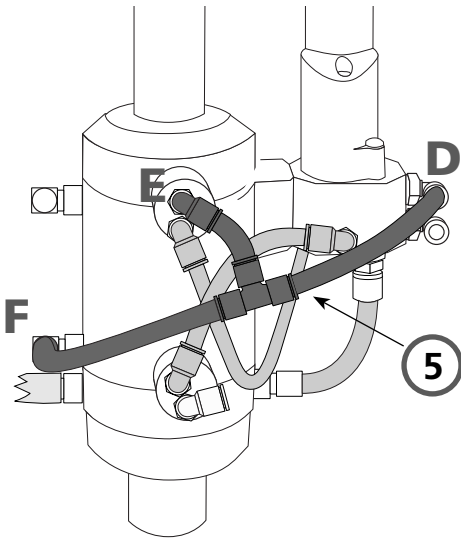
3 Check-back of "SERVICE" position

Connect the "Service" feedback unit of the probe (A)
– unlabeled connecting port –
with the "Feedback Service" port on the adapter by a flexible tube (on back of adapter, not visible in the figure).

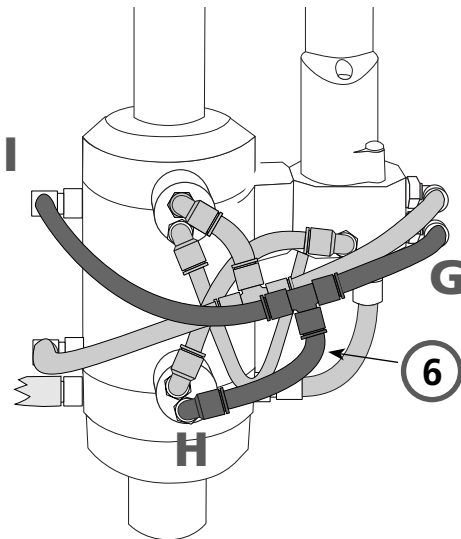


4 Feedback "MEASURE" position
Connect the "MEASURE" feedback unit of the probe (B)
– unlabeled connecting port –
with the "Feedback Process" port on the adapter (C) by a flexible tube.

Connection of Retractable Housing



- 5 Control air for "Service" position and supply for "Service" position feedback unit
Place flexible tube between "SERVICE" port at adapter (D) (control air), "SERVICE" position feedback supply (E)
– connecting port labeled "p / 1" – and "SERVICE" port (F) at probe.



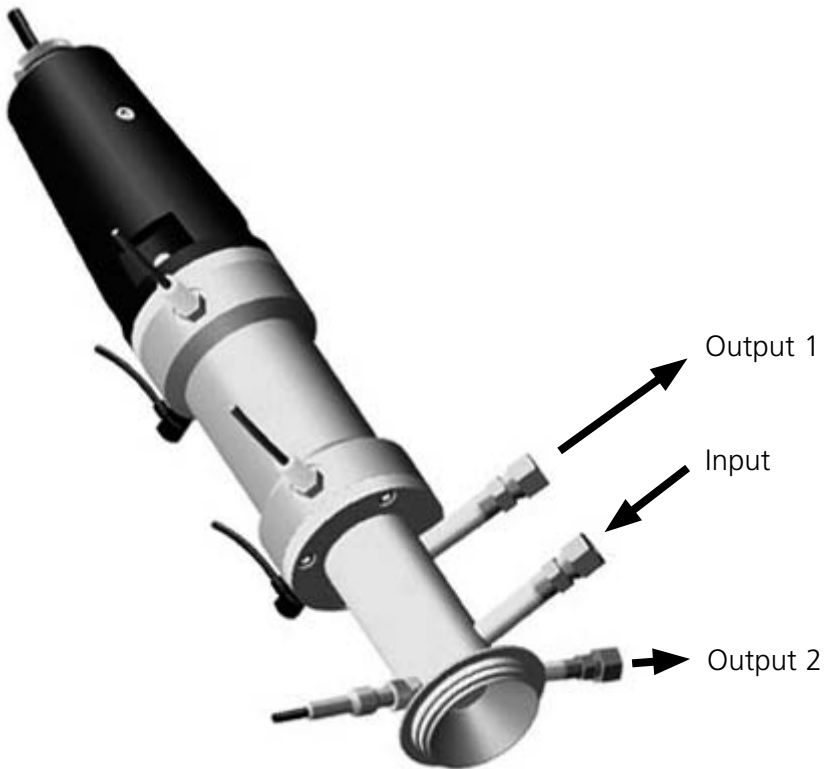
- 6 Control air for "Measure" position and supply for "Measure" position feedback unit
Place flexible tube between "Process" port at adapter (G) (control air), "MEASURE" position feedback supply (H)
– connecting port labeled "p / 1" – and "MEASURE" port (I) at probe.

InTrac 798e Retractable Housing

Please observe for InTrac798e housing:

Connect the rinsing chamber as follows:

- Be sure to insert output 1 and output 2 separately into the outlet (do not use a T-piece).
- Connect the pneumatic couplings and feedback units as described above.



Checklist of Connections

1. EasyClean 400(X): Media supply

(See Page 17)

Compressed air supply

Water supply

2. EasyClean 400(X):

Connecting the tubes of the media connection

(See Page 18)

Compressed air (probe)

Water

Purge air (with supplementary air purging kit only)

Additional medium 1 (with supplementary ext. valve control kit only)

3. EasyClean 400(X):

(See Page 27)

Electrical connection of EC 700(X) module

4. Premium Transmitter M 700(X):

- see instruction manual for M 700(X) -

Electrical connection of M 700(X)

Connection of electrode

5. Media adapter:

(See Page 23)

Connection of media connection and signal lines

Connection and correct screwing of metering pumps

6. Probe housing:

(See Page 51)

Connection of multiplug to media interface for InTrac 7xx

Connection of electrode cable from M 700(X)

Connection of media interface to InTrac 7xx

Outlet hose

Control via Process Control System (DCS)

Inputs/outputs of EasyClean 400(X)

No.	Designation	I / O	Level	Function
42	Measuring/ Service	E	0	Probe moves to meas. position *
43			1	Probe moves to service position
40	Auto/manual	E	0	Automatic interval control from M 700 *
41			1	Automatic lock intervals
37	Bin 3	E		Program selection and start, manual / DCS * **
38	Bin 2			(Program 1 ... 6 - see Page 42)
39	Bin 1			
34	Measuring/ alarm *** *	A	0	
			1	Probe moves to "MEASURE" pos. (or alarm)
33	Service	A	0	
			1	Probe in "Service" position *
32	Program runs	A	0	
			1	Program running *

*) Passive contacts,
24 V must be supplied externally or via DCS

**) Signal duration at least 2 sec (passing contacts)

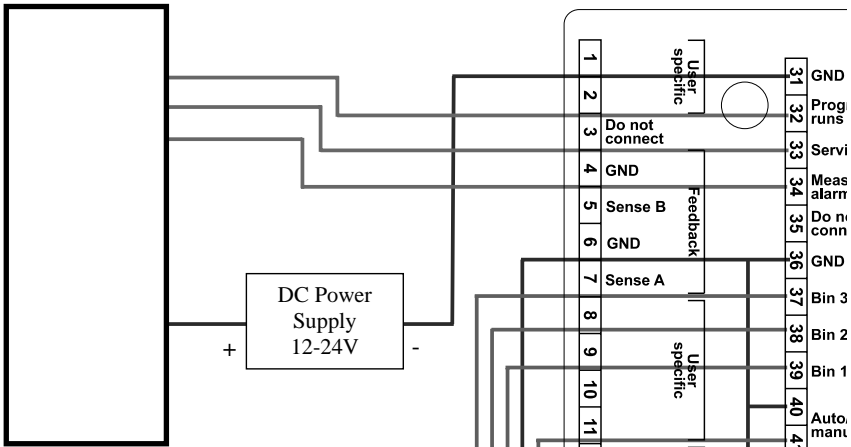
***) As delivered, the signal output DCS 34 serves for probe position feedback – as shown. However, you can also program this output as "Alarm". Then it sends a signal to the DCS in the event of calibration errors or faulty probe movement. The "Alarm" output can also be applied to a relay contact of the M 700 BASE module.

Gray The DCS 32 ... 34 contacts are connected to GND

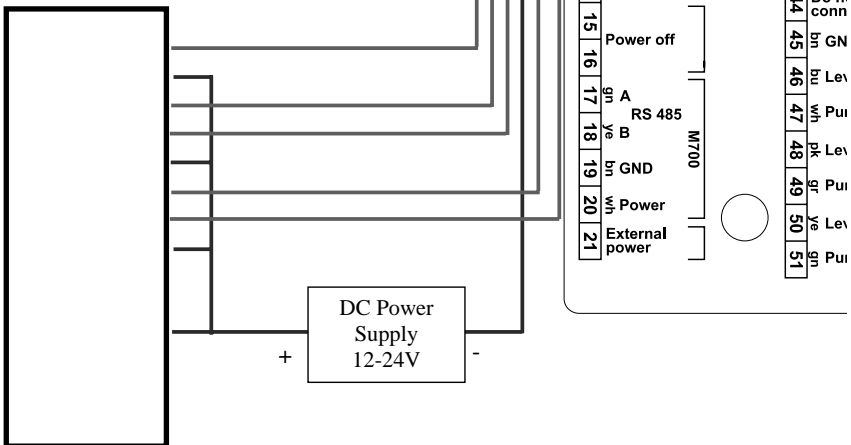
Connection of EC 400 to DCS

EasyClean 400(X) to DCS Wiring

Input Module



Output Module

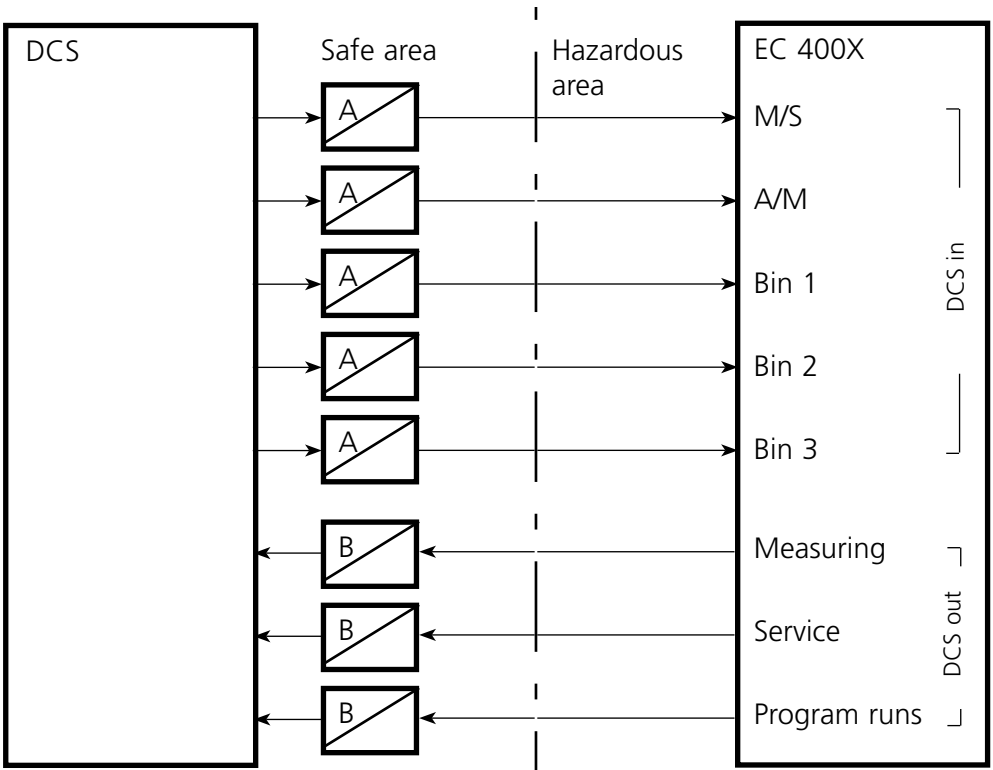


IS Connection to DCS

(DCS: Digital Control System)

With the valve control modules / switch amplifiers listed below, a process control system can be used for communication with a EC 400X in a hazardous location.

Hazardous-area control modules (examples)



A/B	Designation	Model	Manufacturer
A	Valve control module	KFD2-SL-Ex 1.48****	Pepperl + Fuchs
	Valve control module	MK 72-S17-Ex0/24VDC	TURCK
B	Switch amplifier	KF**-SR2-Ex1.W.**	Pepperl + Fuchs
	Switch amplifier	MK1-22Ex0-R/**	TURCK

Control Programs and Measurement Procedures

Factory Settings

Control Programs for EC 700(X)

6 programs and one service program can be called up. Four program flows are preset. Three further programs can be entered by the user.

The programs are called up ...

- for manual operation via M 700(X)
- passive inputs Bin 1, Bin 2, Bin 3 (for DCS or switch, 24 V must be externally supplied, see specifications)

Program	Description	Bin 3	Bin 2	Bin 1
1	Cleaning	0	0	1
2	Two-point calibration (Cal 2point)	0	1	0
3	One-point calibration (Cal 1point)	0	1	1
4	Parking	1	0	0
5	User-programmable (User 1)	1	0	1
6	User-programmable (User 2)	1	1	0
7	Service program	Request via M/S		

The service program (7) stops all other running programs (1 - 6) immediately and erases stored requests. For programs 1-6 the following applies: When you start a new program, the remaining steps of a currently running program are executed first. Further requests are stored and executed subsequently. When you control the EC 400 via M 700(X), you can block the Bin 1, Bin 2, Bin 3 signal lines as well as M/S and A/M to prevent conflicts (Parameter setting / EC 700 / Installation / Ext. control (DCS): Off).

Measurement Procedures

- Continuous measurement:
- After cleaning / calibration the probe moves into the process for measurement
- Short-time measurement (interval measurement, sampling, sample mode ...)
- After cleaning / calibration the probe remains in the calibration chamber and only moves into the process for measurement upon request.

SERVICE Position, Service Program

Service Program: Request and End

After a service request the sensor lock-gate executes the service program steps. The sensor lock-gate moves into SERVICE position. A currently running program (e.g. calibration) is immediately stopped. All other accesses are blocked. The service program defines steps for moving the retractable housing as well as rinsing and cleaning procedures (see instruction manual of EC 700(X) module).

The user can edit the program. The SERVICE position is held pneumatically and is electrically monitored. It is used for maintenance work on the probe.

Termination of Service

Service is only terminated after all service requests have been executed.

Specifications EasyClean 400(X)

Compressed air	Compressed air quality to ISO 8573-1:2001 Quality class 5.3.3
Solid contaminants	Class 5 (max 40 µm, max. 10 mg/m ³)
Water content	
... for temperatures ≥ 15 °C:	Class 4 With operating temperatures > 15 °C a pressure dew point of max 3 °C is permitted
... for temperatures 5 ... 15 °C:	Class 3 Pressure dew point - 20 °C (or below)
Oil content	Class 3 (max. 1 mg/m ³)
Perm. pressure range	4 ¹⁾ ... 10 bars
Pressure monitoring	Automatic monitoring, message.
Connection	1/4" internal thread
Air consumption	Max. 300 L/min during probe movement
Min. air temperature	5 °C
Rinse water	Filtered 100 µm
Perm. pressure range	2 ... 6 bars
Temperature range	5 ... 65 °C
Pressure monitoring	Automatic monitoring, message.
Connection	1/4" internal thread / 3/4" external thread

* Increased minimum pressure of 5 bars required for probe in the case of high process pressure or difficult process media

Specifications EasyClean 400(X)

Media adapter	Three ports for metering pump
• Port I and II:	Calibration buffer
• Port III:	Cleaner
Material	See bill of material
Ingress protection	IP 65
Assembly	Wall or pipe mounting (Option)
Metering pump	For buffer solution or cleaner
Bottle	3.5 l
Max. lifting height	10 m
Displacement volume	Approx. 25 cm ³ /stroke
Level monitoring	EC 400 network diagram as well as NAMUR messages: Maintenance request and failure
Material	See bill of material
Ingress protection	IP 65
Dimensions	See dimension drawing

Specifications EasyClean 400(X)

Power (EEx ia IIC)	Supplied via EC 700 module or external power supply source 15 ... 30 V / 20 mA (see EC-Type-Examination Certificate for hazardous-area application!) EC 700(X): 6.8 V ($\pm 10\%$) / 15 mA
Connection	Terminals, conductor cross-section max 2.5 mm ² (pre-assembled connecting cable to M 700, length 10 m)
RS 485 (EEx ia)	Communication with M 700 module EC 700(X): external host computer (e.g. DCS) (see EC-Type-Examination Certificate for hazardous-area application!)
Transmission	1200 bauds / 8 data bits / 1 stop bit / parity odd
Record	HART Rev. 5
Connection	Terminals, conductor cross-section max 2.5 mm ² (pre-assembled connecting cable to M 700, length 10 m)
DCS input (passive)	
Measuring /Service (EEx ia IIC)	Measuring / Service Vi = 30 V, floating, galvanic isolation up to 60 V
Switching voltage	0 ... 2 V AC/DC inactive (measuring) 10 ... 30 V AC/DC active (service)
Connection	Terminals, conductor cross-section max. 2.5 mm ²
DCS input (passive)	
Auto / Manual (EEx ia IIC)	Automatic blocked Vi = 30 V, floating, galvanic isolation up to 60 V

Specifications EasyClean 400(X)

Switching voltage	0 ... 2 V AC/DC inactive (automatic intervals enabled) 10 ... 30 V AC/DC active (automatic intervals blocked))
Connection	Terminals, conductor cross-section max. 2.5 mm ²
DCS inputs (passive)	
Bin1 ... 3	Program start 1 ... 6
(EEx ia IIC)	Vi = 30 V, floating, inter-connected, galvanic isolation up to 60 V
Switching voltage	0 ... 2 V AC/DC inactive 10 ... 30 V AC/DC active
Connection	Terminals, conductor cross-section max. 2.5 mm ²
DCS outputs (passive)	
(Program runs, Service, Measuring / alarm)	Check-back signals Program running, service, measuring Electronic relay contacts, floating, inter-connected
(EEx ia IIC)	Vi = 30 V li = 100 mA Pi = 800 mW, galvanic isolation up to 60 V
Voltage drop	< 1,2 V
Connection	Terminals, conductor cross-section max. 2.5 mm ²
Explosion protection	ATEX: II 2(1) GD EEx ia IIC T4 T 70°C FM: Class 1, Div. 1, Zone 1 / IIC
EMC	EN 61326
Lightning protection	EN 61000-4-5, Installation Class 2
Protection against electric shock	according to EN 61010

Specifications EasyClean 400(X)

Ambient conditions

Ambient temperature	+5 ... +55 °C (Ex: +5 ... +50 °C)
Transport/Storage temp	-20 ... +70 °C
Relative humidity	10 ... 95 % not condensing

Enclosure

Enclosure surface S	Stainless steel A2, polished
Enclosure surface C	Stainless steel A2, coated, Color: pigeon blue
Assembly	<ul style="list-style-type: none">• Wall mounting• Pipe mounting (Option)
Dimensions	W x H x D approx. 310 mm x 410 mm x 135 mm
Ingress protection	IP 65 / NEMA 4X
Cable glands	6 M20x1.5 cable glands
Weight	Approx. 8,5 kg

Appendix

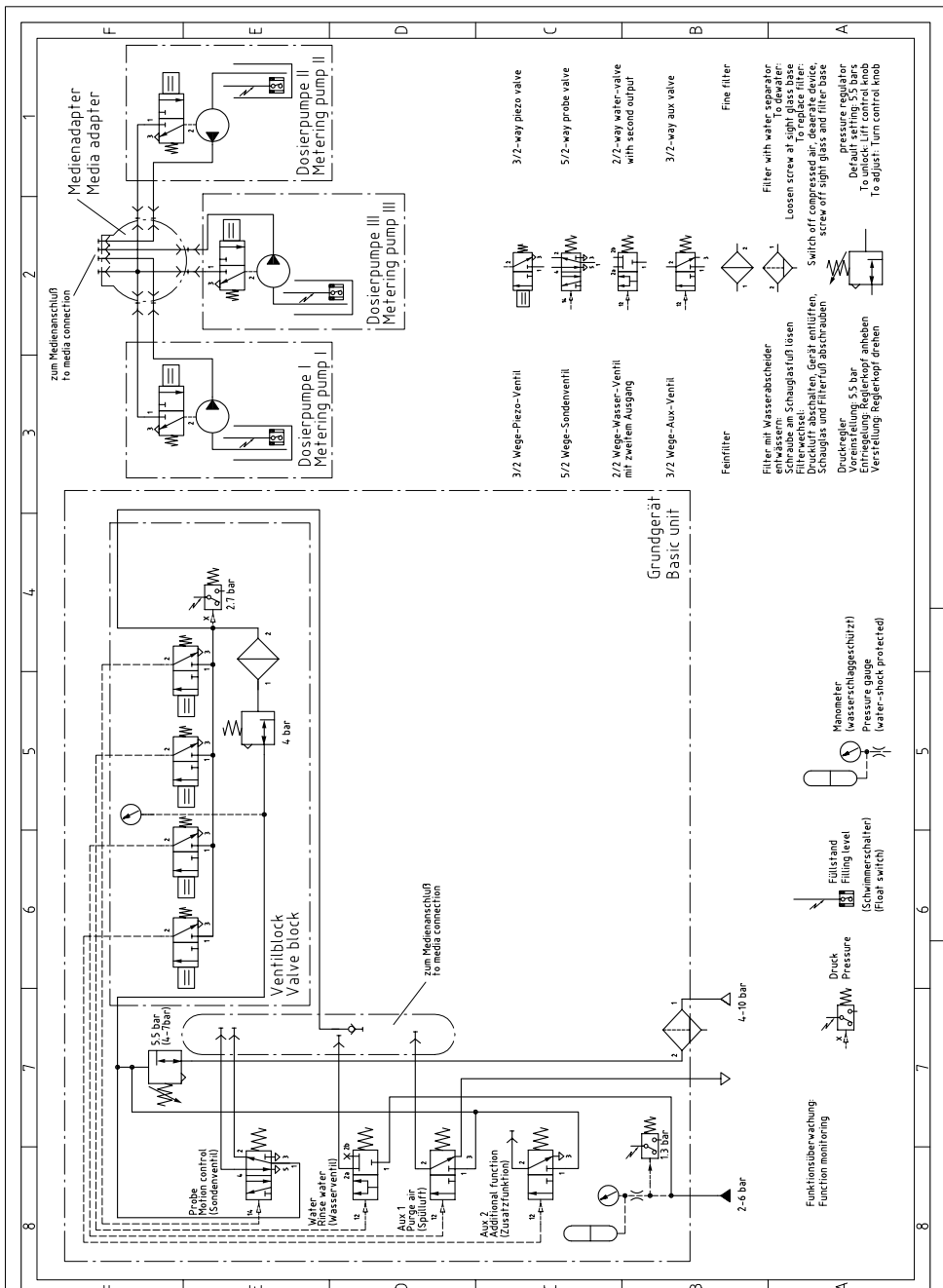
The following detail drawings are found in the appendix:

- Pneumatic diagram EasyClean 400(X)
- Media connection
- Connection of standard probes using standard probe adapter (ZU 0576)
- Table for selecting a cleaning agent

For enlarged printouts of the drawings, these installation instructions can be downloaded from: www.mt.com/pro.

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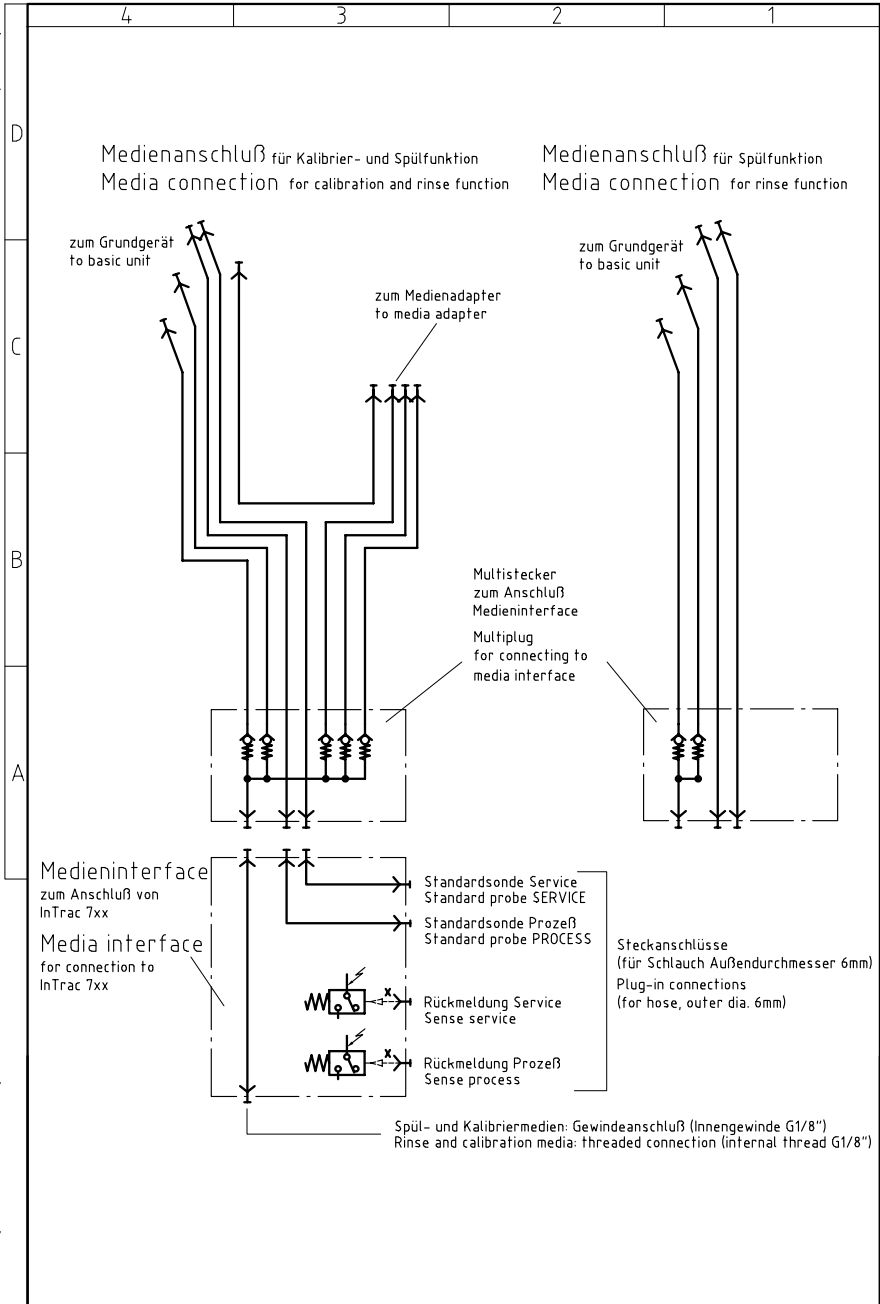
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- Filter mit Wasserabscheider
Schwamm / Schaumgabschlöß lösen
Filterwechsel:
Druckluft abschalten, Gerät entlüften,
Schauglas und Filterluft abschrauben
- Druckregler, 5,5 bar
Entregulung / Reglerkopf abheben
Verstellung / Reglerkopf drehen
- Filter with water separator
Loosen foam / silt
To replace filter:
Switch off compressed air, deaerate device,
screw off sight glass and filter base
- pressure regulator
Deflick / lift control knob
To adjust: Turn control knob

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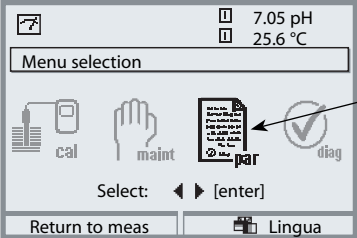

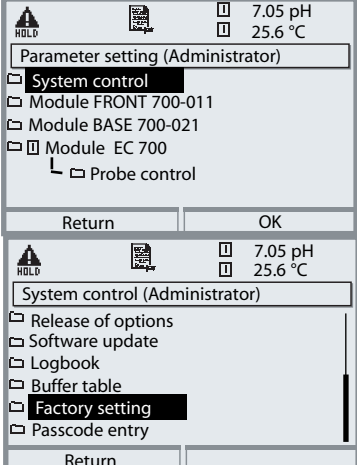
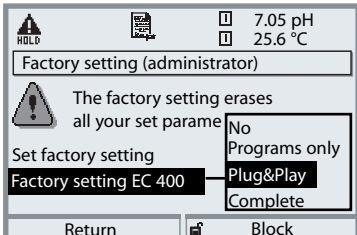
Start-up: "Plug and Play"

Automatic hardware recognition

(Parameter setting/System control/Factory setting/Factory setting EC 400...)

First select "Plug and Play" in the Parameter Setting menu:

The EasyClean 400(X) probe controller automatically recognizes the hardware installed and sets the corresponding installation parameters.

Menu	Display	Plug and Play
	 <p>7.05 pH 25.6 °C</p> <p>Menu selection</p> <p>cal maint par diag</p> <p>Select: ◀ ▶ [enter]</p> <p>Return to meas Lingua</p>	<p>Call up parameter setting</p> <p>From the measuring mode: Press menu key to select menu. Select parameter setting using arrow keys, confirm with enter.</p>
	 <p>HOLD 7.05 pH 25.6 °C</p> <p>Parameter setting (Administrator)</p> <p>System control</p> <ul style="list-style-type: none"> Module FRONT 700-011 Module BASE 700-021 Module EC 700 <ul style="list-style-type: none"> Probe control <p>Return OK</p> <p>HOLD 7.05 pH 25.6 °C</p> <p>System control (Administrator)</p> <ul style="list-style-type: none"> Release of options Software update Logbook Buffer table Factory setting Passcode entry <p>Return</p>	<p>Parameter setting: Select "System control".</p> <p>Select "Factory setting".</p>
	 <p>HOLD 7.05 pH 25.6 °C</p> <p>Factory setting (administrator)</p> <p>The factory setting erases all your set parameters</p> <p>Set factory setting</p> <p>Factory setting EC 400</p> <ul style="list-style-type: none"> No Programs only Plug&Play Complete <p>Return Block</p>	<p>First select "Factory setting EC 400" then select "Plug and Play". The hardware installed is automatically recognized.</p>

Start-up Program

Parameter Setting: The Start-up Program

At the end of the parameter-setting procedure, a "Start-up" line appears in the "Installation" menu. When you are sure to have set all parameters, select "Yes" to confirm.

Now the pumps perform the number of stroke movements required for filling the media tubes completely.

The necessary rinsing cycles are automatically started.

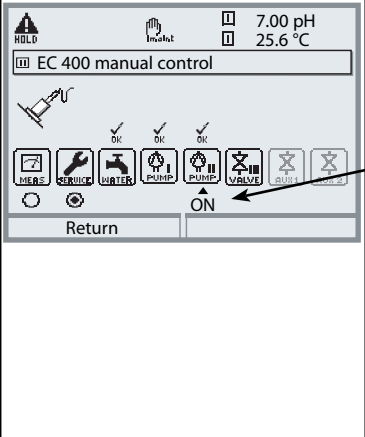
The buffer pumps require approx. 1 stroke to fill the pump and approx. 9 strokes to fill the tubing.

Notice:

When the media connection is longer than 10 m, three further pump strokes are required to fill the tubings.

Manual Control via M 700(X)

“Maintenance / EC 400” menu

Menu	Display	Maintenance
		<p>Manual control (requires access code: specified in the “Parameter setting / Installation” menu) Select function using arrow keys. Symbol flashes, activate with enter – “ON” appears below the icon. End with enter. (“ON” disappears again.)</p>



Warning for Use of Manual Control!

With manual control via M 700(X) the EasyClean 400(X) probe controller can be actuated for servicing.

Rinsing water, media supply, and valve functions can be tested individually.

Spare Parts and Accessories

Spare parts

- 52403724 Media connection 5 m
- 52403726 Media connection 10 m
- 52403728 Interface for InTrac
- 52403730 Metering pump
- 52403731 Metering pump Ex
- 52403732 Media adapter
- 52403733 Media adapter Ex

Accessories

- 52403747 Pipe-mount kit EC 400
- 52403750 Pipe-mount kit for media adapter EC 400
- 52403751 Supplementary kit AUX 2, optional valve
- 52402317 Emergency stop for EC 400

Selected Cleaning Agents for EasyClean 400 and their Applications

Cleaner	Chemical formula	Concentration	Application
Diluted acids:			e.g. against limy deposits
Hydrochloric acid	HCl	Max. 5 %	
Sulfamic acid	H ₃ NO ₃ S		Food industry
Acetic acid	CH ₃ COOH		
Nitric acid	HNO ₃	Max. 5 %	

Cleaner	Chemical formula	Concentration	Application
Diluted alkaline solutions:			Proteins, starch, fats, ZIP
Sodium hydroxide solution	NaOH	Max. 5 %	
Organic solvents:			e.g. against limy deposits
Ethyl alcohol	C_2H_5OH		Food industry
Isopropyl alcohol	C_3H_8OH		
Other cleaning agents:			
Pepsine solution			Starch

EC-Type-Examination Certificate

KEMA 



translation

original language: German

(1) **EC-TYPE EXAMINATION CERTIFICATE**

- (2) Equipment or protective system intended for use in potentially explosive atmospheres - Directive 94/9/EC
- (3) EC-Type Examination Certificate Number: **KEMA 04ATEX1134**
- (4) Equipment or protective system: **Control System for Retractable Probes
Type Easy Clean 400 X...**
- (5) Manufacturer: **Mettler Toledo GmbH, Process Analytics**
- (6) Address: **Im Hackacker 15, CH-8902 Urdorf, Switzerland**
- (7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- (8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.
- The examination and test results are recorded in confidential report no. 2074343.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 50014 : 1997
EN 50281-1-1 : 1998**

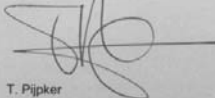
**EN 50020 : 2002
EN 50284 : 1999**

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment or protective system according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.
- (12) The marking of the equipment or protective system shall include the following:



II 2(1) GD EEx Ia IIC T4 T 70 °C

Arnhem, 19 May 2004
KEMA Quality B.V.



T. Pijpker
Certification Manager

* This Certificate may only be reproduced in its entirety and without any change

KEMA Quality B.V.
Ulrichsweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 5185, 6802 ED Arnhem, The Netherlands
Telephone +31 26 3 56 20 08, Telefax +31 26 3 52 58 00

ACCREDITED BY THE
DUTCH COUNCIL FOR
ACCREDITATION



Page 1/

EC-Type-Examination Certificate



SCHEDULE

(13)

(14)

to EC-Type Examination Certificate KEMA 04ATEX1134

(15) **Description**

The Control System for Retractable Probes Type Easy Clean 400 X ... is mainly intended for control of Retractable housings and is controlled by the Modular Transmitter Type M 700 X **** or similar measuring system or by a DCS. The Control System for Retractable Probes consists of a control cabinet with built-in control electronics and the associated pneumatic/hydraulic circuits, the process connection for operation of the retractable probe, the external media adapter for a maximum of three dosing pumps with containers for the buffer and cleaning solutions and the external Service Switch for service and measurement.

Ambient temperature range: +2 °C to +50 °C.

Degree of ingress protection: IP 65 according to EN 60529.

The maximum surface temperature of the housing T 70 °C is based on a maximum ambient temperature of +50 °C.

Electrical data

Auxiliary external power supply:
(KL19, KL21)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to intrinsically safe circuits, with the
following maximum values:

$$\begin{aligned}U_i &= 30 \text{ V} \\P_i &= 1 \text{ W} \\C_i &= \text{negligibly small} \\L_i &= \text{negligibly small}\end{aligned}$$

or

Auxiliary power supply:
(KL19, KL20)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to the certified Protos Module Type
EC 700 X

Emergency Shutdown circuit:
(KL15, KL16)

in type of explosion protection intrinsic safety EEx ia IIC,
with the following maximum values:

$$\begin{aligned}U_o &= 30 \text{ V} \\I_o &= 146 \text{ mA} \\P_o &= 1 \text{ W} \\C_o &= 66 \text{ nF} \\L_o &= 1 \text{ mH}\end{aligned}$$

Interface RS485:
(KL17, KL18, KL19)

in type of explosion protection intrinsic safety EEx ia IIC,
with the following maximum values:

$$\begin{aligned}U_i/U_o &= 5 \text{ V} \\I_i/I_o &= 257 \text{ mA} \\R_i &= 19,5 \text{ } \Omega \\C_i &= \text{negligibly small} \\L_i &= \text{negligibly small} \\C_o &= 3,5 \text{ } \mu\text{F} \\L_o &= 1,2 \text{ mH}\end{aligned}$$

or

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to the certified Protos Module Type
EC 700 X

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EC-Type-Examination Certificate



SCHEDULE

(13)

(14)

to EC-Type Examination Certificate KEMA 04ATEX1134

DCS Outputs ML1, ML2, ML3:
(KL31, KL32, KL33, KL34)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to intrinsically safe circuits, with the
following maximum values per circuit:

$$\begin{aligned}U_i &= 30 \text{ V} \\I_i &= 100 \text{ mA} \\P_i &= 800 \text{ mW} \\C_i &= 12 \text{ nF} \\L_i &= \text{negligibly small}\end{aligned}$$

DCS Inputs:
PRG1, PRG2, PRG3 (KL36...KL39)
A/M (KL40, KL41)
M/S (KL42, KL43)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to intrinsically safe circuits, with the
following maximum values per circuit:

$$\begin{aligned}U_i &= 30 \text{ V} \\C_i &= \text{negligibly small} \\L_i &= \text{negligibly small}\end{aligned}$$

Peak voltage value in case of voltage addition: 60 V.
No current addition.

Leakage circuit:
(KL1, KL2)

in type of explosion protection intrinsic safety EEx ia IIC,
with the following maximum values:

$$\begin{aligned}U_o &= 5 \text{ V} \\I_o &= 8 \text{ mA} \\P_o &= 10 \text{ mW} \\C_o &= 5 \text{ }\mu\text{F} \\L_o &= 2 \text{ mH} \\&\text{Linear characteristic}\end{aligned}$$

Service Switch circuit:
(KL8, KL9, KL10, KL11)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to the Service Switch, which is part of
the Retractable Probe Control Unit
Type Easy Clean 400 X ...
Cable length < 100 m.

Pump circuits:
(KL45, KL46, KL47, KL48
KL49, KL50, KL51)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to the media adapter / dosing pumps,
which are part of the Retractable Probe Control Unit
Type Easy Clean 400 X ...
Cable length < 100 m.

Probe circuits:
(KL12, KL13, KL14)

in type of explosion protection intrinsic safety EEx ia IIC,
only for connection to process connections which are
part of the Retractable Probe Control Unit
Type Easy Clean 400 X ...
Cable length < 100 m.

The external auxiliary power supply circuit, the auxiliary power supply circuit, the emergency
shutdown circuit, the interface RS485, the service switch circuit, the pump circuits and the probe
circuits are connected with each other and to the potential equalization PE.

The DCS outputs ML1, ML2 and ML3 are connected with each other.

The DCS inputs PRG1, PRG2 and PRG3 are connected with each other.

The DCS inputs PRG1, PRG2, PRG3 are functionally galvanically separated from the DCS
input A/M and from the DCS input M/S, but are connected from an intrinsic safety point of view.

The DCS outputs and the DCS inputs and the leakage circuit are infallibly galvanically
separated from each other and from all other circuits up to a peak voltage of 60 V.

EC-Type-Examination Certificate



SCHEDULE

(13)

(14)

to EC-Type Examination Certificate KEMA 04ATEX1134

Installation instructions

In areas endangered by the presence of combustible dust, the containers for the buffer and cleaning solutions are to be installed such, that a risk of explosion by electrostatic discharge is avoided. The containers are e.g. to be installed inside an earthed, electrostatically conductive vessel or cabinet or must be surrounded by earthed, electrostatically conductive materials.

Routine tests

Each transformer TR2, TR3, TR4 and TR5 must be tested according to EN 50020, clause 11.2, with a test voltage according to Table 9 during 10 seconds.

(16) **Report**

KEMA No. 2074343.

(17) **Special conditions for safe use**

None

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at (9).

(19) **Test documentation**

1. EC-Type Examination Certificates KEMA 04ATEX1036

dated

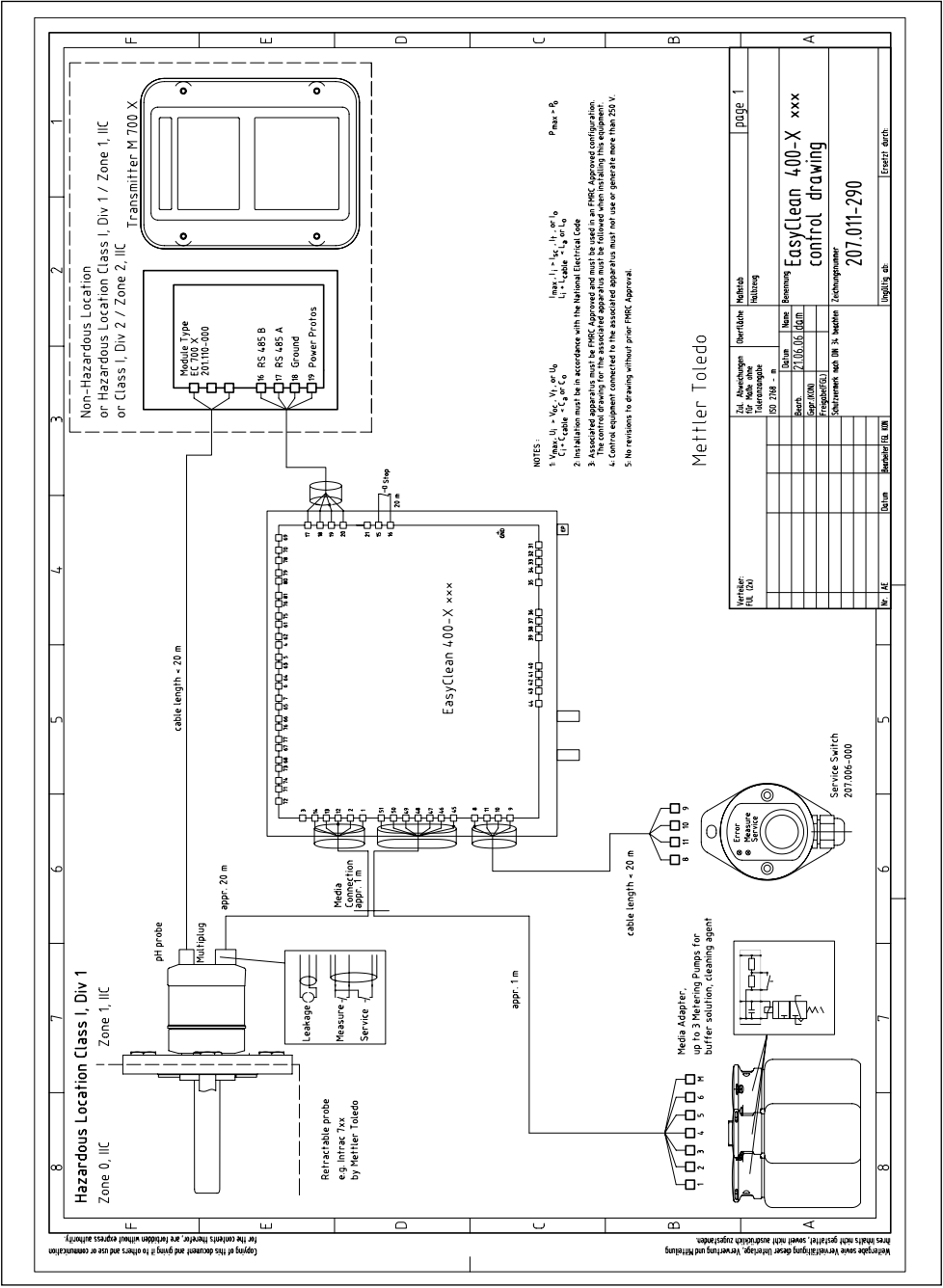
2. Description No. 207.001-022MT (3 pages)

03.05.2004

3. Drawing Nr. 207.011-230

03.05.2004

FM Control Drawing



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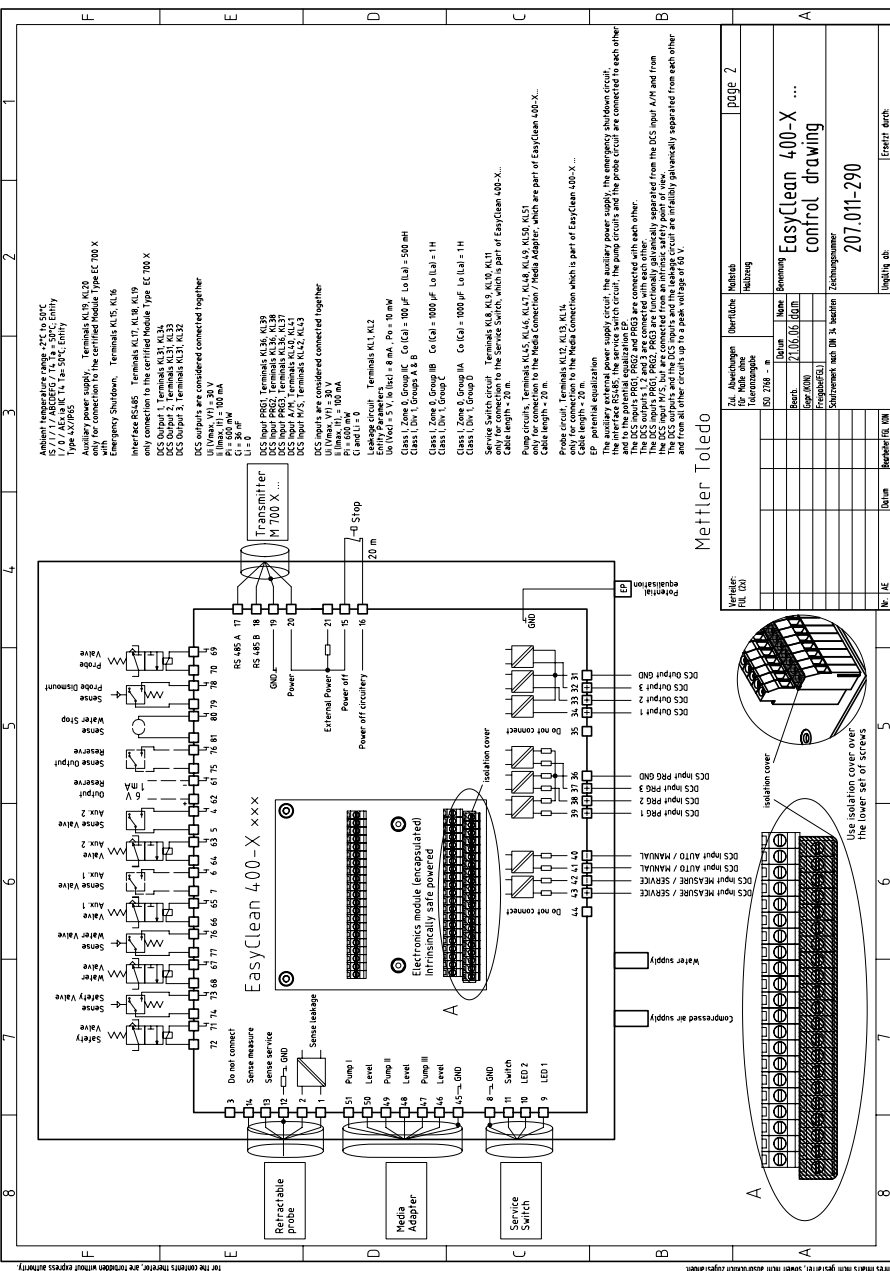
- $P_{max} = U_L \cdot I_{sc} \cdot \eta$ or $U_L \cdot I_{sc}$
- Installation must be in accordance with the National Electrical Code
- Associated apparatus must be FMRC Approved and must be used in an FMRC Approved configuration. The control drawing for the associated apparatus must be followed when installing this equipment.
- Control equipment connected to the associated apparatus must not use or generate more than 250 V.
- No revisions to drawing without prior FMRC Approval.

$I_{max} = I_{sc} \cdot \eta$
 $P_{max} = \eta \cdot U_L \cdot I_{sc}$

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ISO 7188 - 8	Metallsch. Halbleitung	page 1	
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Bereit.	Datum	Benennung	
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Zustimm. (NEN 10100)	Zustimm. (NEN 10100)	Zustimm. (NEN 10100)	
Schaltkreis nach DIN 43.700 Teil 1, Zeichnungsnummer			
207.011-290			
Übersicht über			
Vorbereitet: HIL (70)	Datum	Bearbeitet: HIL	Übersicht über
Prüft: HIL	Datum	Übersicht über	Übersicht über

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FM Control Drawing



MetHter sware Verkeering deer Uderlegge, Verewring punt Hittingen
 Prens makts geen presatij, sөөel met aanduiding, zucht en dellen
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EasyClean 400-X control drawing

207.011-290

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