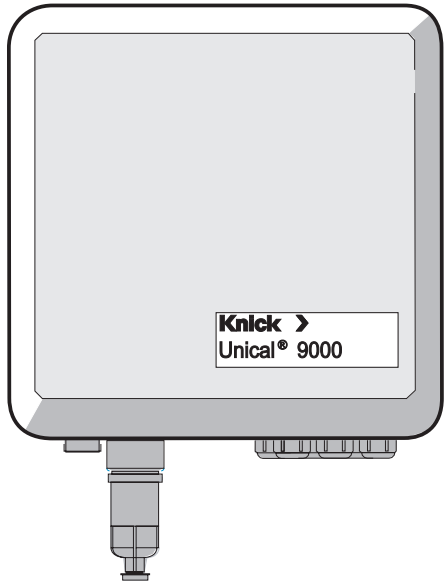
Unical® 9000(X) Probe Controller

For Fully Automated Measurement, Cleaning, and Calibration



Installation Instructions

78983

Knick

Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender). Sensors, fittings, and accessories: 1 year.

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 manual without further marking:

CalCheck®, Calimatic®, Protos®, Sensocheck®, Sensoface®, ServiceScope®, Unical®, VariPower®, Ceramat®, SensoGate®, ComFu®
are registered trademarks of Knick Elektronische Messgeräte GmbH & Co. KG, Germany

SMARTMEDIA®
is a registered trademark of Toshiba Corp., Japan

ZigBee™
is a trademark of Zigbee Alliance

EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration de Conformité CE

Knick
Elektronische Messgeräte
GmbH & Co. KG
Beuckestr. 22
D-14163 Berlin

Dokument-Nr. / Document No. / No. document	**EG70731A**

Aufbewahrung / Keeping / Garde en dépôt
Jürgen Cammin (KB)

Wir, die / We, / Nous,	**Knick Elektronische Messgeräte GmbH & Co. KG** **Beuckestr. 22, D-14163 Berlin**
	erklären in alleiniger Verantwortung, daß dieses Produkt / diese Produkte, declare under our sole responsibility that the product / products, déclarons sous notre seule responsabilité que le produit / les produits,
Produktbezeichnung / Product identification / Désignation du produit	**Unical® 9000**

auf welche(s) sich diese Erklärung bezieht, mit allen wesentlichen Anforderungen der folgenden Richtlinien des Rates übereinstimmen:
to which this declaration relates is/are in conformity with all essential requirements of the Council Directives relating to:
auquel/auxquels se réfère cette déclaration est/sont conforme(s) aux exigences essentielles de la Directives du Conseil relatives à: *)

EMV-Richtlinie / EMC directive / Directive CEM	**2004/108/EG**
Norm / Standard / Norme	**DIN EN 61326 /** **VDE 0843 Teil 20: 2004-05**

Jahr der Anbringung der CE-Kennzeichnung / Year in which the CE marking was affixed / L'année d'apposition du marquage CE: **2004**

*) Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten. Bei einer mit dem Hersteller nicht abgestimmten Änderung des Gerätes und/oder bei Nichtbeachtung der Sicherheitshinweise verliert diese Erklärung ihre Gültigkeit. /
The safety instructions contained in the documentation accompanying the product have to be observed. If the apparatus is modified without having obtained manufacturer's prior consent and/or the safety instructions are not followed, this declaration becomes void. /
Il est impératif de respecter les instructions de sécurité dans la documentation fournie avec le produit.. En cas de modification de l'appareil sans l'accord du fabricant et/ou en cas de non-respect des instructions de sécurité, cette déclaration perd sa vigueur.

Ausstellungsort, -datum / Place and date of issue / Lieu et date d'émission	**Berlin, 31.07.2007**

Knick Elektronische Messgeräte GmbH & Co. KG

ppa.
Wolfgang Feucht
(Vice President Engineering, R&D)

ppa.
Bernhard Kusig
(Vice President Marketing/Sales)

EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration de Conformité CE

Knick
Knick
Elektronische Messgeräte
GmbH & Co. KG
Beuckestr. 22
D-14163 Berlin

Dokument-Nr. / Document No. / No. document	**EG70731B**

Aufbewahrung / Keeping / Garde en dépôt
Jürgen Cammin (KB)

Wir, die / We, / Nous,	**Knick Elektronische Messgeräte GmbH & Co. KG** **Beuckestr. 22, D-14163 Berlin**
	erklären in alleiniger Verantwortung, daß dieses Produkt / diese Produkte, declare under our sole responsibility that the product / products, déclarons sous notre seule responsabilité que le produit / les produits,
Produktbezeichnung / Product identification / Désignation du produit	**Unical® 9000 X**

auf welche(s) sich diese Erklärung bezieht, mit allen wesentlichen Anforderungen der folgenden Richtlinien des Rates übereinstimmen:
to which this declaration relates is/are in conformity with all essential requirements of the Council Directives relating to:
auquel/auxquels se réfère cette déclaration est/sont conforme(s) aux exigences essentielles de la Directives du Conseil relatives à: *)

ATEX 100 Richtlinie / ATEX 100 directive / Directive ATEX 100	**94/9/EG**	EG-Baumusterprüfbescheinigung / EC Type Examination Certificate / Attestation d'examen CE de type **KEMA Quality B.V.,** **NL-6812 AR Arnhem, ExNB-No. 0344** **KEMA 04ATEX1036**
Harmonisierte Normen / Harmonised Standards / Normes harmonisées	**EN 50014: 1997+A1+A2** **EN 50020: 2002** **EN 50281-1-1: 1998+A1** **EN 50284: 1999**	Kennzeichnung / Designation / Marquage **CE 0044 Ex II 2(1) GD Ex ia IIC T4 T 70°C**
EMV-Richtlinie / EMC directive / Directive CEM	**2004/108/EG**	Jahr der Anbringung der CE-Kennzeichnung / Year in which the CE marking was affixed / L'année d'apposition du marquage CE: **2004**
Norm / Standard / Norme	**DIN EN 61326 /** **VDE 0843 Teil 20: 2004-05**	

*) Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten. Bei einer mit dem Hersteller nicht abgestimmten Änderung des Gerätes und/oder bei Nichtbeachtung der Sicherheitshinweise verliert diese Erklärung ihre Gültigkeit. /
The safety instructions contained in the documentation accompanying the product have to be observed. If the apparatus is modified without having obtained manufacturer's prior consent and/or the safety instructions are not followed, this declaration becomes void. /
Il est impératif de respecter les instructions de sécurité dans la documentation fournie avec le produit.. En cas de modification de l'appareil sans l'accord du fabricant et/ou en cas de non-respect des instructions de sécurité, cette déclaration perd sa vigueur.

Ausstellungsort, -datum / Place and date of issue / Lieu et date d'émission	**Berlin, 31.07.2007**

Knick Elektronische Messgeräte GmbH & Co. KG

ppa.
Wolfgang Feucht
(Vice President Engineering, R&D)

ppa.
Bernhard Kusig
(Vice President Marketing/Sales)

Table of Contents

Probe Controller for Fully Automated Measurement, Cleaning, and Calibration

Table of Contents

Probe Controller for Fully Automated Measurement, Cleaning, and Calibration

Notice

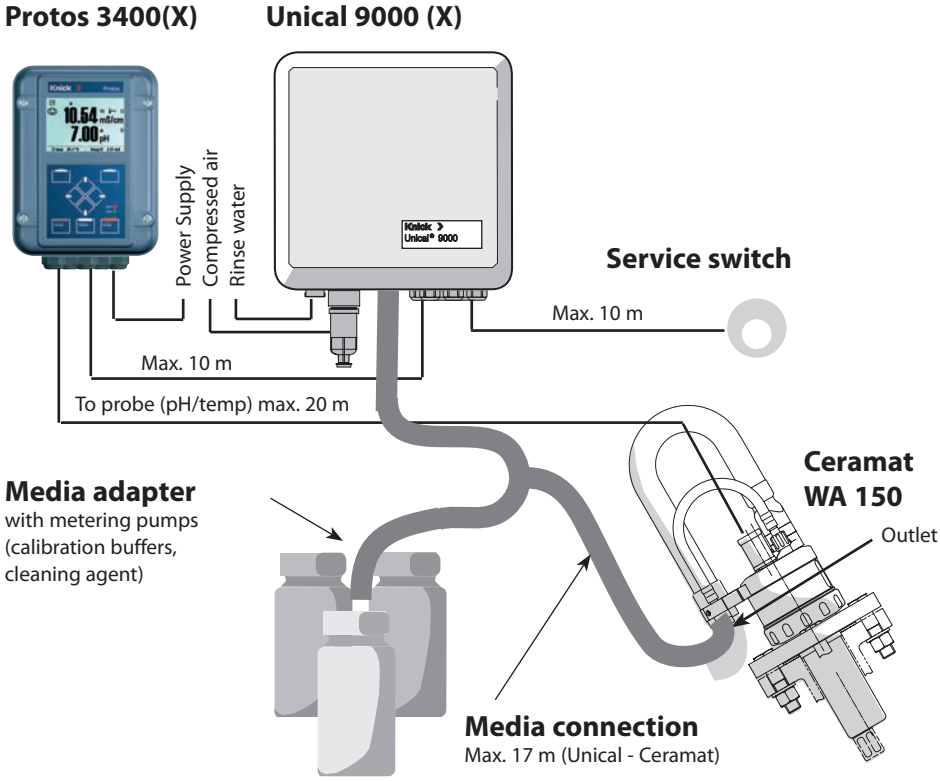
These installation instructions do NOT describe
- how to operate the sensor lock-gate
- how to control the programs via Protos 3400(X).

The user manuals for sensor lock-gates such as SensoGate WA 130(X), Ceramat WA 150(X), Ceramat WA160(X) and the user manuals for Protos 3400(X) as well as the PHU 3400(X)-110 module are available for free download at www.knick.de.

Short Description

The Unical 9000 (X) is a probe controller for fully automated measurement, cleaning, and calibration.
The Unical 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:
- Protos 3400(X) (Modular process analysis system)
- Unical 9000(X) (Automatic control of retractable probes)
- Ceramat WA 150(X) (Sensor lock-gate with ceramic sealing to the process)



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 cleaner.
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.
When hot vapor or aggressive cleaning agents are to be used, an adapter for additional media (ZU 0654, ZU 0655) is available for the sensor lock-gates of the Ceramat Series.

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 Unical 9000(X) probe controller can be connected to a superordinated control system, a DCS (Digital Control System).

Retractable Fittings / Sensor Lock-Gates

Most of the available types of retractable fittings / sensor lock-gates with pneumatic or electric limit switches can be used. Inductive limit position switches are not supported. We recommend the Ceramat WA 150 / WA 160 with ceramic seal to the process.

Intended Use

The Unical 9000(X) probe controller allows fully automated pH measurement including calibration and cleaning.

The Unical 9000X 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 Unical 9000(X) evaluates pneumatic and electric check-back signals from retractable probes / sensor lock-gates. 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. An 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 Unical 9000(X) in combination with the Protos 3400(X) process analysis system and the Ceramat WA 150(X) sensor lock-gate.
This combination ensures optimal media monitoring (pH value and temperature) as well as traceability according to FDA 21 CFR Part 11 (AuditTrail).
The Protos 3400(X) process analysis system allows easy adaptation of the calibration and cleaning programs to the process.

Application in Hazardous Locations

The Unical 9000X probe controller is intended for operation in specific environments and specific fields of application. These are listed in the user manual as specifications for environment, for installation and commissioning, intended use (= application), assembly and dismantling, and for maintenance.

Observe the influences of humidity, ambient temperature, chemicals, and corrosion. If the specifications in the user 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 Unical 9000X 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 Unical 9000X 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 user manual.

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

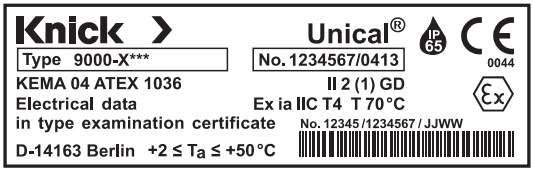
Safety Information

Application in Hazardous Locations: Installation Precautions

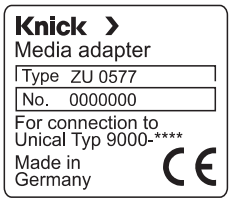
Be sure to observe the following precautions:
Installation:
The Unical 9000(X) is supplied through the Protos 3400(X). Power supply to the Protos 3400(X) must be disconnectable near the device by a two-poled switch incorporated in the building installation. This switch must meet the requirements of EN 60947-1 and EN 60947-3, be marked as disconnect device for Unical 9000(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 Unical 9000X may be opened during operation.

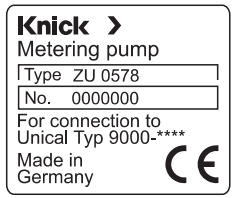
Rating Plates



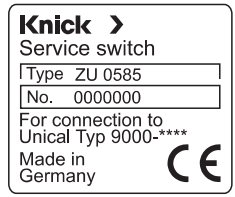
Unical 9000



Media adapter



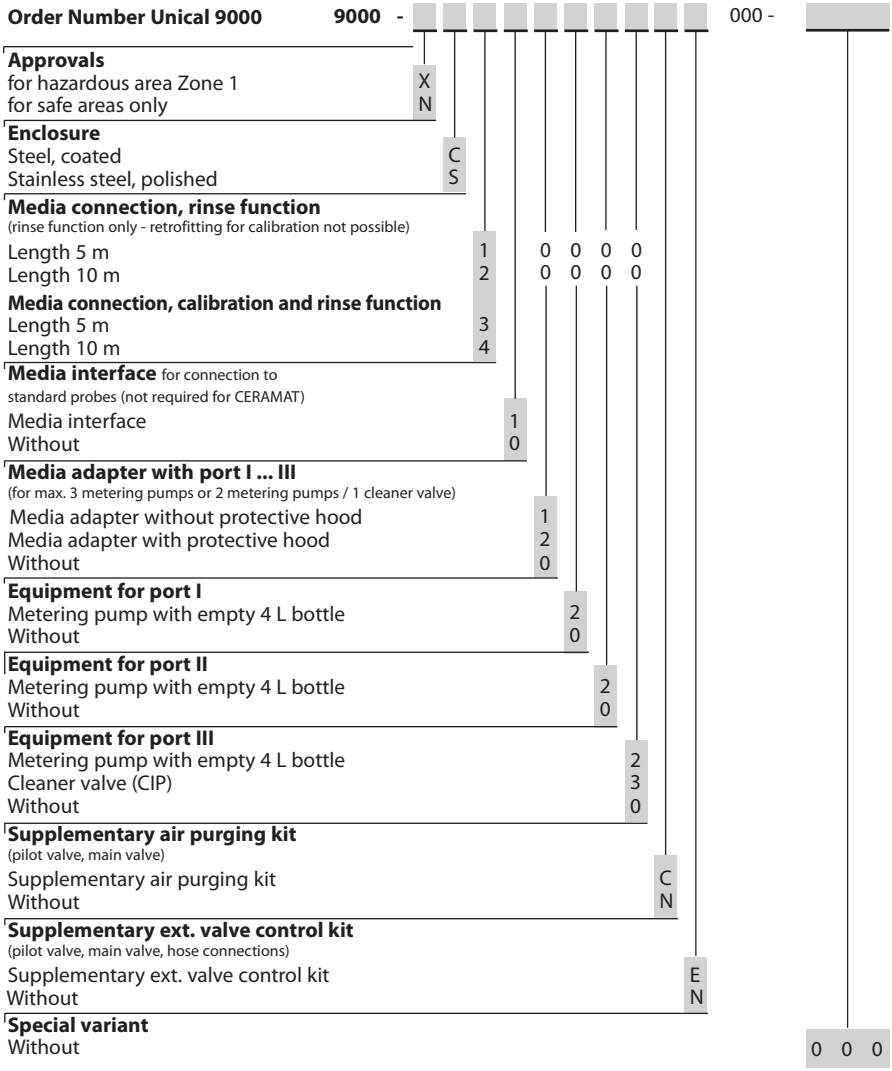
Metering pump



Service switch

Product Coding

Unical 9000(X) Probe Controller



Product Line Accessory No.

- Basic unit
- Media connection for rinse function
  - FKM, 5 m ..... ZU 0572 / 1
  - EPDM, 5 m ..... ZU 0572 / 2
  - FKM, 10 m ..... ZU 0573 / 1
  - EPDM, 10 m ..... ZU 0573 / 2
  - FKM, 15 m ..... ZU 0652 / 1
  - EPDM, 15 m ..... ZU 0652 / 2
- Media connection for calibration and rinse function
  - FKM, 5 m ..... ZU 0574 / 1
  - EPDM, 5 m ..... ZU 0574 / 2
  - FKM, 10 m ..... ZU 0575 / 1
  - EPDM, 10 m ..... ZU 0575 / 2
  - FKM, 17 m ..... ZU 0653 / 1
  - EPDM, 17 m ..... ZU 0653 / 2
- Media adapter
  - without protective hood, FKM / EPDM ..... ZU 0577 / 1
  - without protective hood, EPDM ..... ZU 0577 / 2
- Metering pump FKM ..... ZU 0580 / 1
- Metering pump EPDM ..... ZU 0580 / 2

Supplementary air purging kit ..... ZU 0587
- Pilot valve and
- Main valve for air as a medium

Supplementary ext. valve control kit ..... ZU 0588
- Pilot valve
- Main valve
- Tube connections

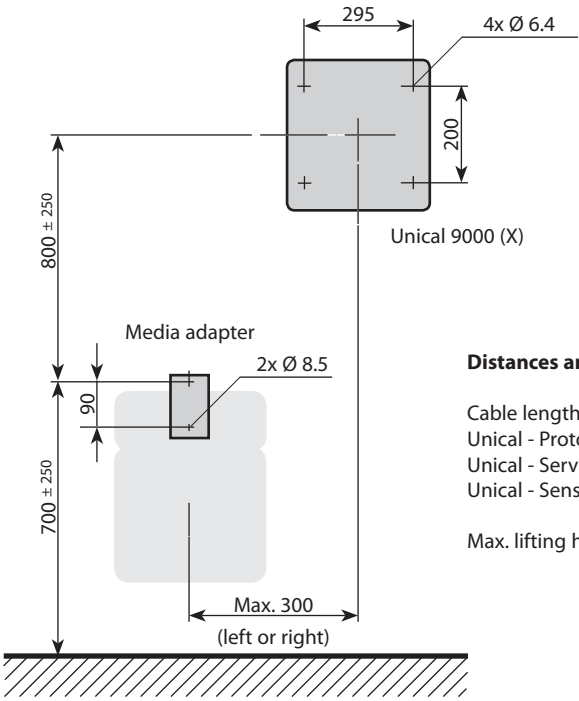
- Media interface for connection to standard probes ..... ZU 0576
  (not required for Ceramat)
- Adapter for additional media
  - stainless steel 1.4571, FKM ..... ZU 0654 / 1
  - stainless steel 1.4571, EPDM ..... ZU 0654 / 2
  - PEEK, FKM ..... ZU 0655 / 1
  - PEEK, EPDM ..... ZU 0655 / 2
- Connection kit ..... ZU 0656

Assembly

Arrangement of Components: Permissible Distances and Lifting Heights

Arrangement of Components

The mounting site must have sufficient mechanical strength and be free of vibrations. Be sure to observe the permissible ambient temperature.
It must never sink below +5 °C.
Special measures must be taken for outdoor installation:
Direct sun light can cause an impermissible temperature increase.



Distances and lifting height

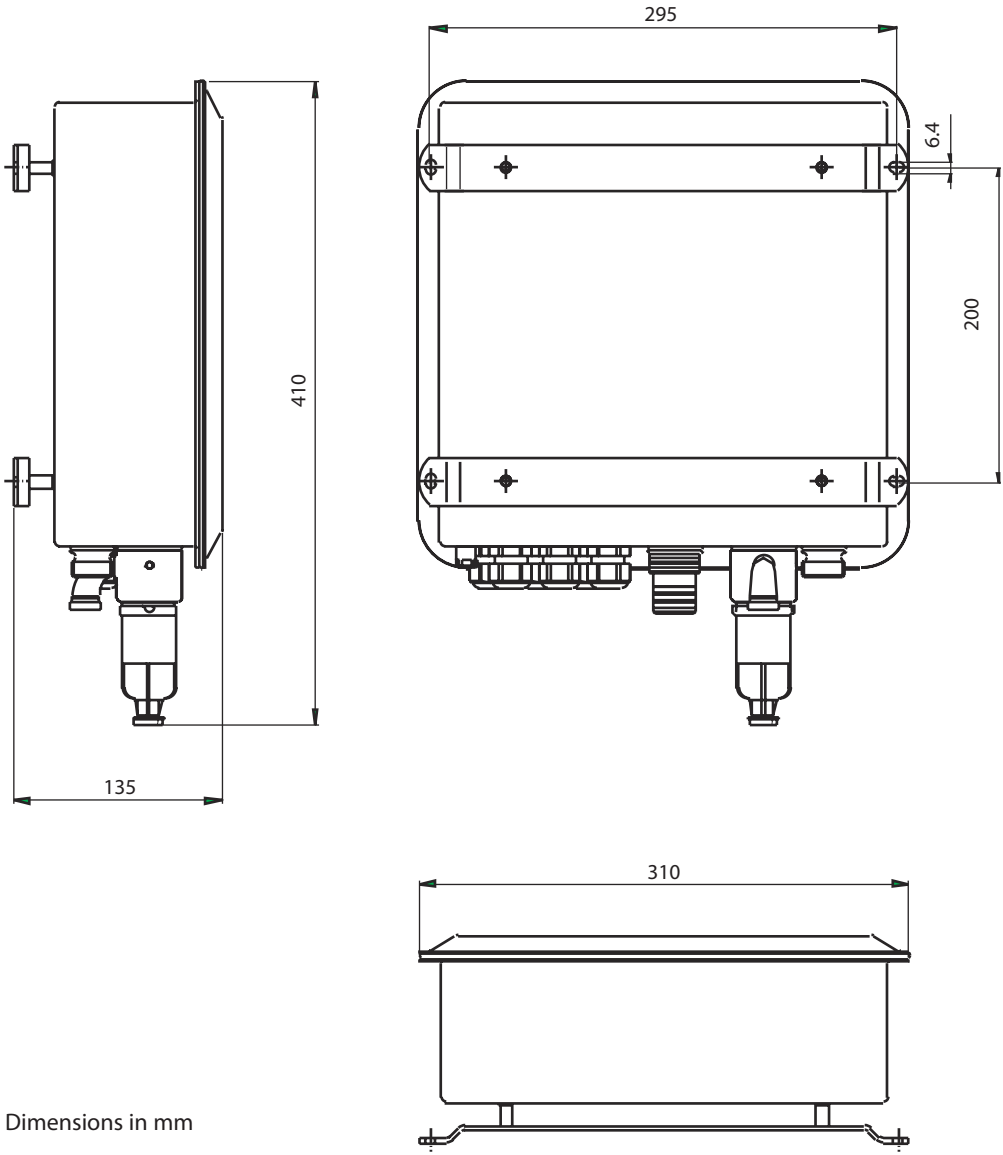
Cable lengths:	
Unical - Protos 3400(X):	10 m
Unical - Service switch:	10 m
Unical - Sensor lock-gate:	5m, 10 m, or 17 m
Max. lifting height of pumps:	10 m

Dimensions in mm

Fig.: Mounting arrangement Unical 9000, media adapter

Assembly

Unical 9000(X) - Wall Mounting

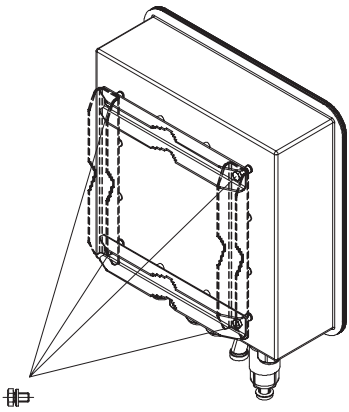


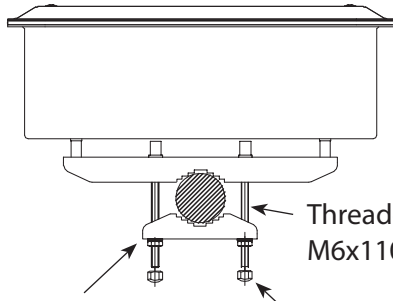
Dimensions in mm

Fig.: Unical 9000(X), mounting dimensions

Assembly

Unical 9000(X) - Pipe Mounting

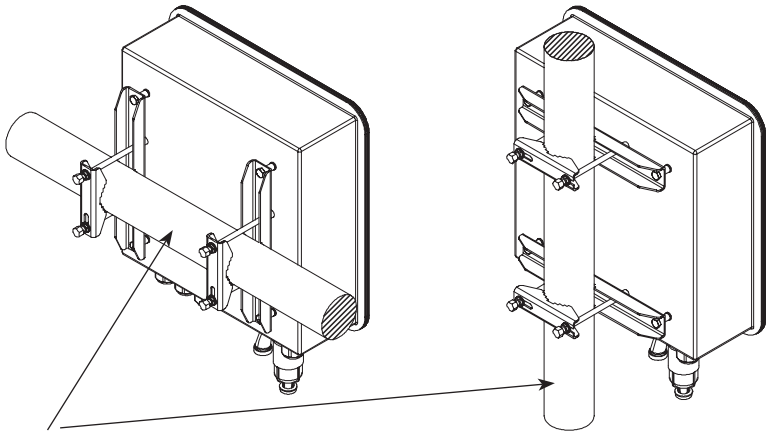




Washers M6 (4x)
Hexagon nuts M6 (4x)

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

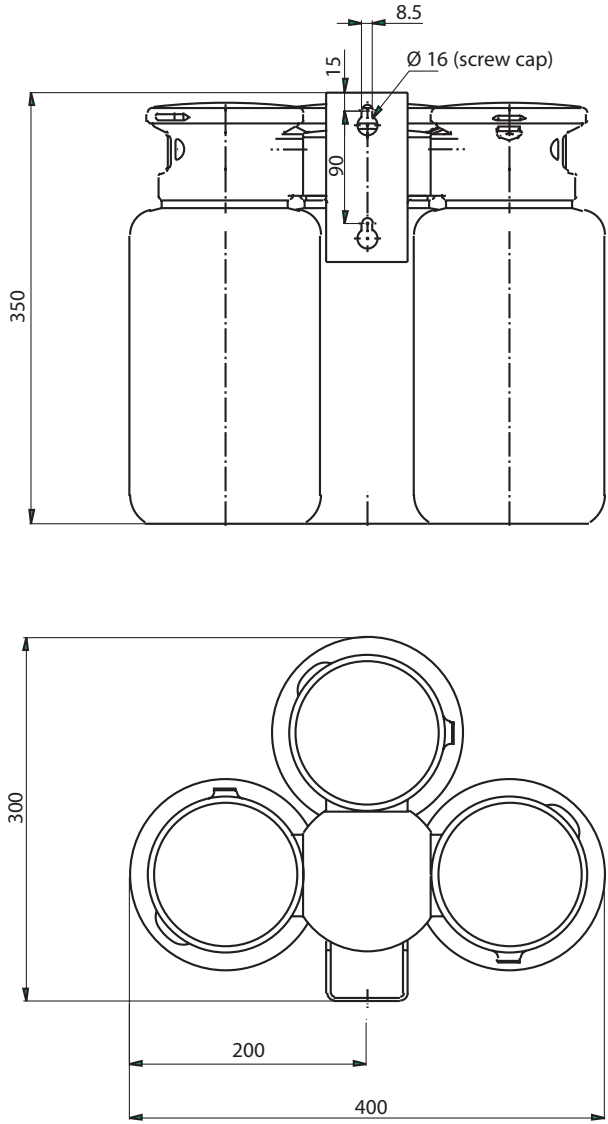
Vertical or horizontal pipe mounting:



Pipe diameter: 30 ... 65 mm

Assembly

Media Adapter



Dimensions in mm

Fig.: Media adapter, mounting dimensions

Media Supply: Unical 9000(X)

Compressed Air, Water, Purge Air, Auxiliary Media

Compressed-Air Supply

The Unical 9000(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 Unical 9000(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 Unical 9000(X)

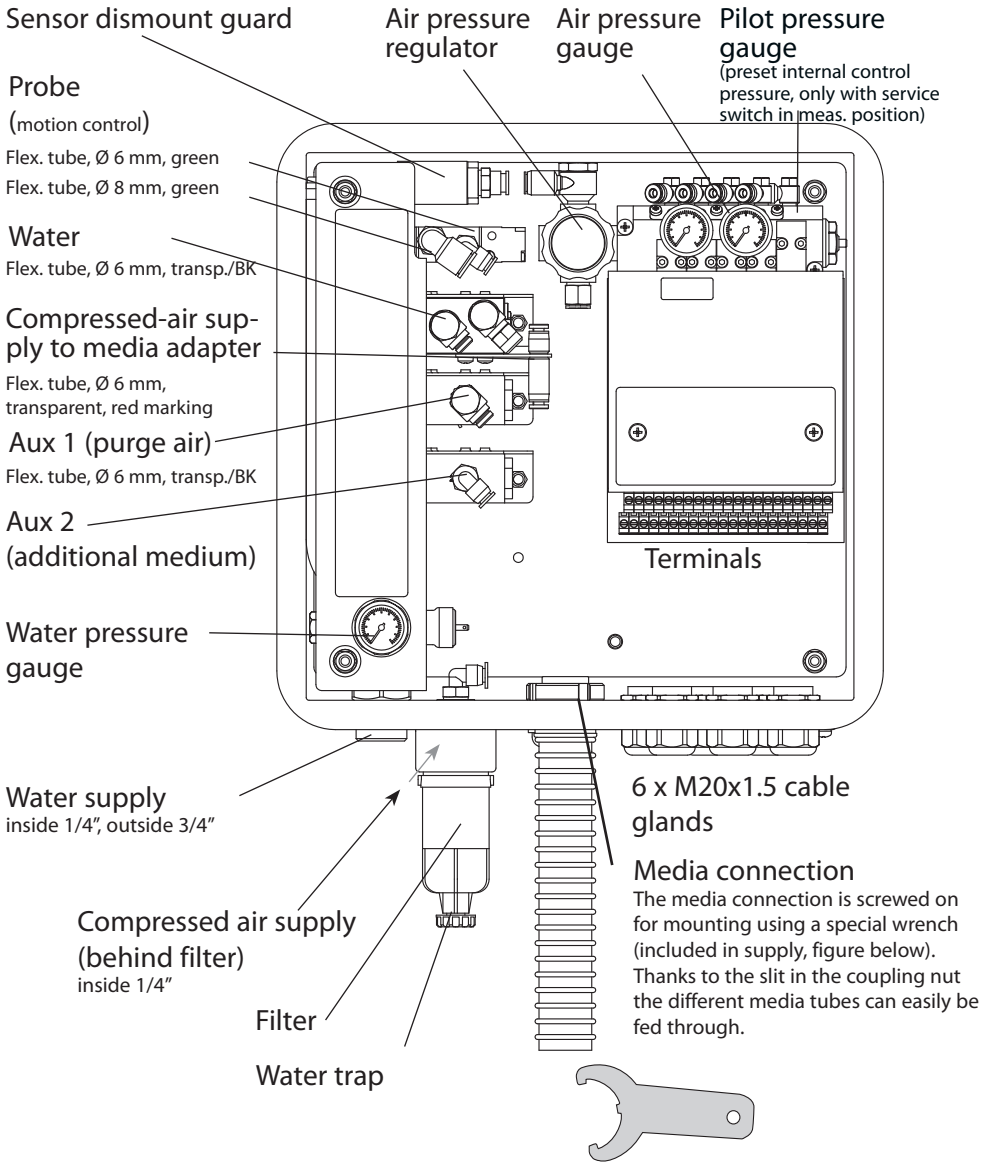


Fig.: Arrangement of the functional elements in the Unical 9000(X)

Media Supply: 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 Protos 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.

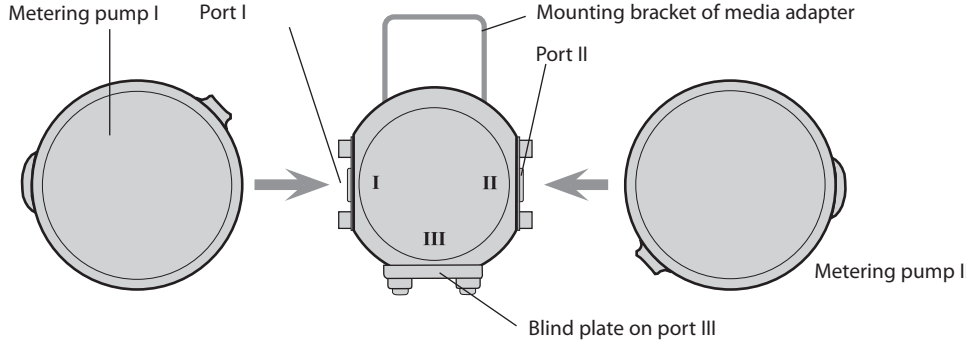


Fig.: Top view of media adapter. Metering pumps are simply plugged on and fixed with two captive screws.

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 Unical 9000(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.

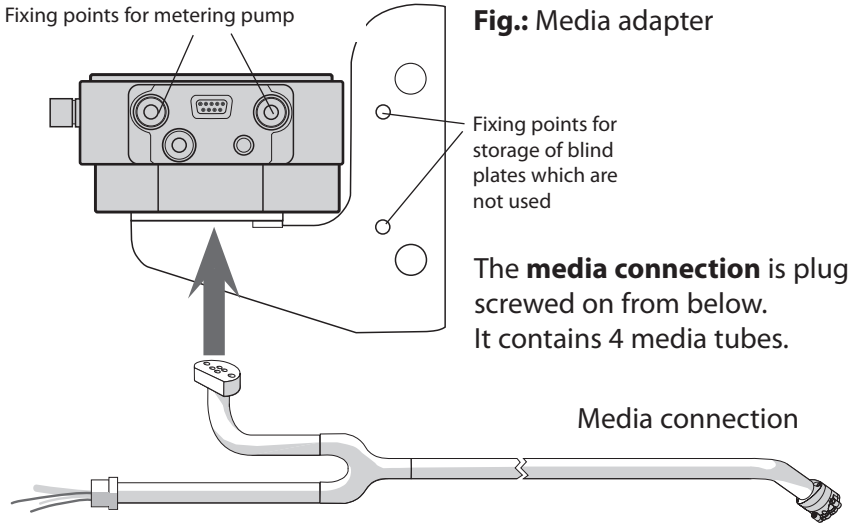
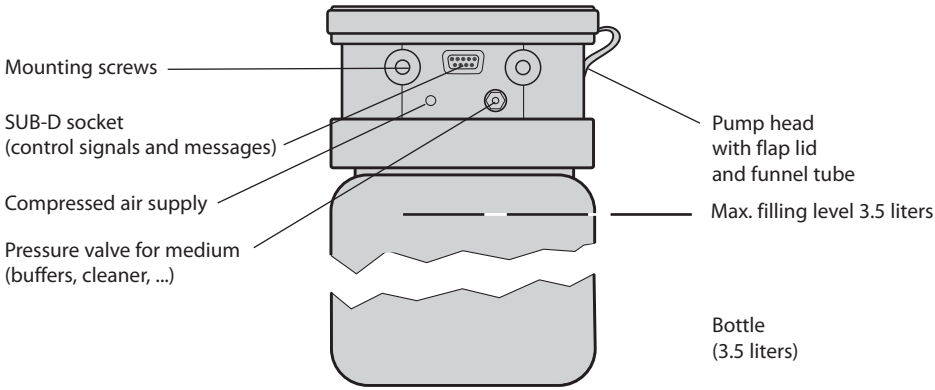


Fig.: Media adapter

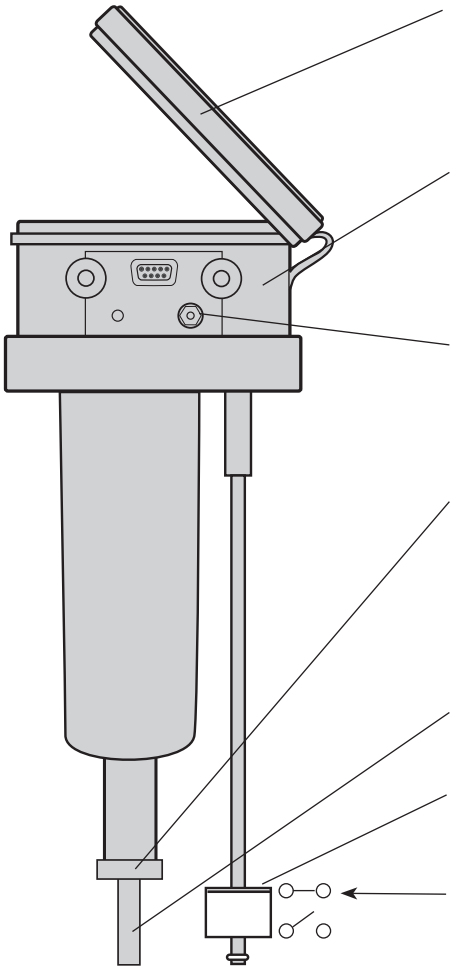
Metering Pump: Plug-in Connection for Media and Control Signals



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:



Lid
After opening the flap lid, the funnel tube can be accessed.

Pump head
The bottle is simply screwed off the pump head which remains connected to the media adapter.

Pressure valve
The complete valve can be removed using a wrench (8 mm).

Suction valve
Ball, spring, and O-ring are located behind a hexagon head screw (17 mm).
(Be careful when disassembling!)

Suction nozzle

Level monitoring
Remove O-ring for cleaning.
Float can be pulled off.
Caution:
Observe the mark on the float! Top:

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 (FKM gasket supplied with FKM pump)
Housing	PP-H
Gasket for media connection	FKM / EPDM *

Bill of Material for Metering Pump

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

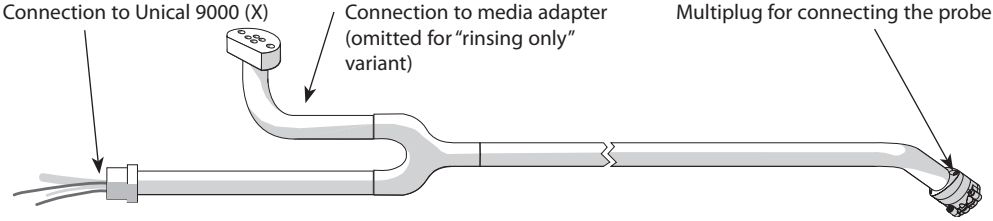
* Depending on model version:
Model ... /1: FKM
Model ... /2: EPDM

Media Connection

Variants, Assembly

The media connection is available in 5, 10, 15, or 17 mm length.
It consists of a Ø 30 mm corrugated hose with a metal coil.
2 variants are available:
• for rinse function only (without branch outlet to media adapter)
• for calibration and cleaning function with branch outlet to media adapter

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 Unical 9000 (X)
The corrugated hose is screwed to the joining piece of the Unical 9000(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 26 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 Sensor Lock-Gate
The multiplug is plugged on the Ceramat WA 150 and screwed tight.
In doing so, you must bend the media connection and fix it to the support provided to avoid that it impedes the rotation of the Ceramat WA 150 (see Pg 30).
The multiplug includes media tubing (5x, all with check valves), limit position control, and compressed air supply.

Bill of Material for Media Connection, Calibration and Rinse Function

(gray: omitted for media connection with "rinse function")

Media connection	Tubings	Outer Ø	Material	Color
Probe compressed-air	2	6, 8	PA	Green
Rinse water, Purge air (with rinse function)	2	6	PA	Black
Rinse water, Purge air (with calibration function)	2	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

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

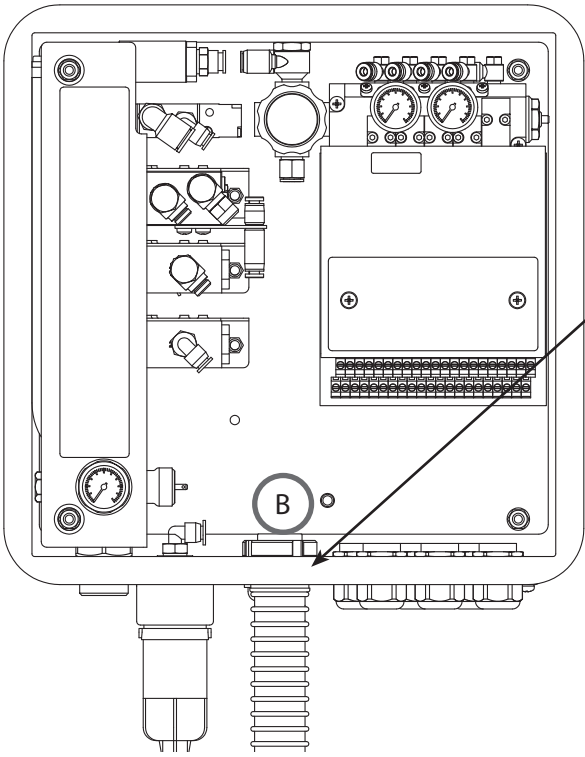
Check valve of multiplug		Material
Ball	5 (with rinse function: 2)	Glass
Spring	5 (with rinse function: 2)	Hastelloy (2.4610)
Gaskets		FKM / EPDM *

* Depending on variant:
Model ... /1: FKM
Model ... /2: EPDM

Attaching the Media Connection

Attaching the Media Connection to the Unical 9000(X)

Loosen the slotted nut (A). Insert this end of the hose into the Unical 9000(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.

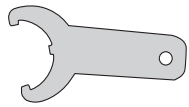


Fig.: Unical 9000(X) without cover

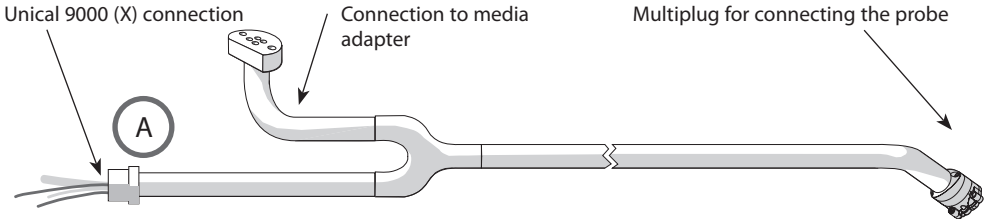


Fig.: Media connection

Pneumatic Couplings on the Unical 9000(X)

Connecting the Tubes of the Media Connection to the Unical 9000(X)
The tubes of the media connection can now be connected to the Unical 9000(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.

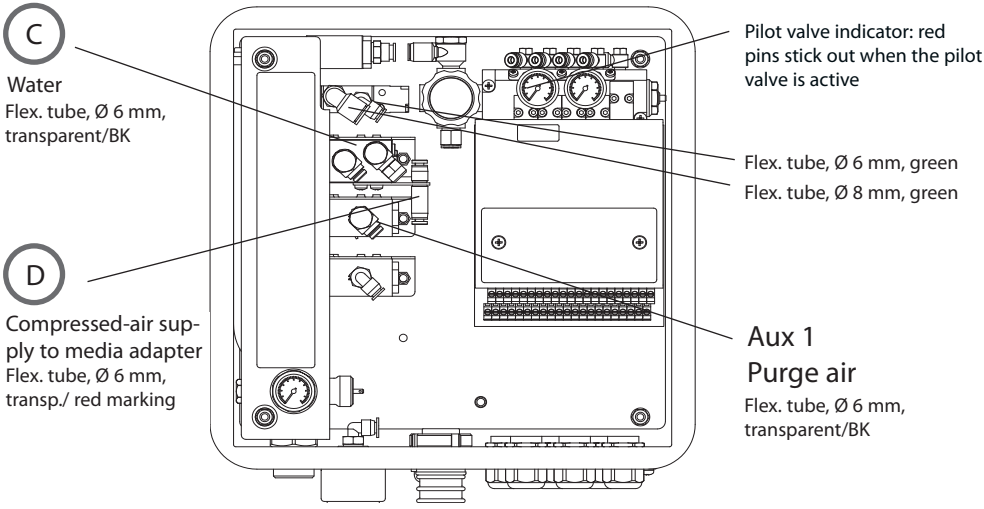
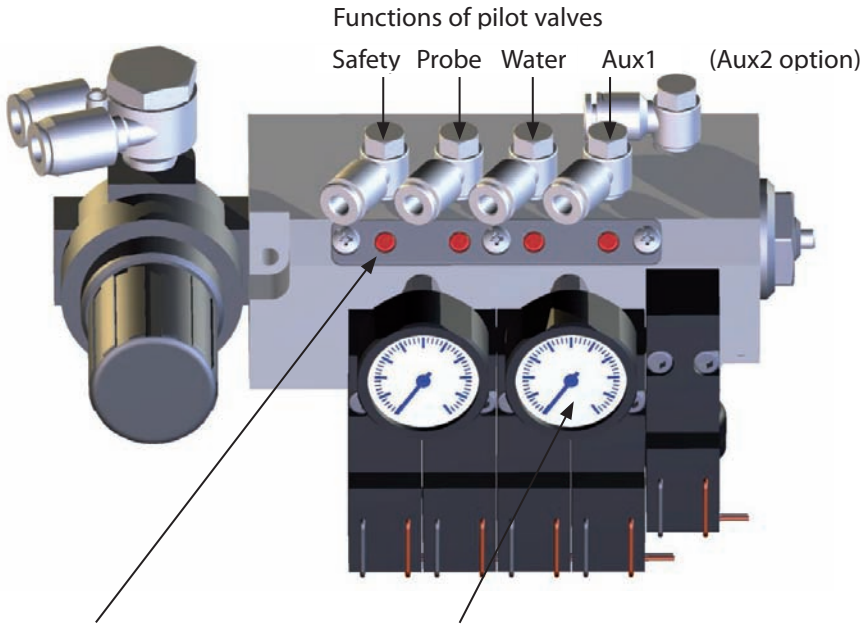


Fig.: Unical 9000 (X)

Valve Block



The red pins stick out of the valve block when the pilot valve is active.

When the safety valve is active, the right pressure gauge indicates the pilot pressure.
(The safety valve is controlled by the service switch.)

Attaching the Media Connection to Ceramat WA 150(X) - Example

Attaching the Media Connection to the Ceramat WA 150(X)

1.Push the multiplug onto the Ceramat and screw it tight (A).
2.Bend the corrugated hose (shown in gray in the figure below) by 180° and fix the hose fastener to the Ceramat (B).
3.Connect the outlet tubing. Screw coupling nut on (C).

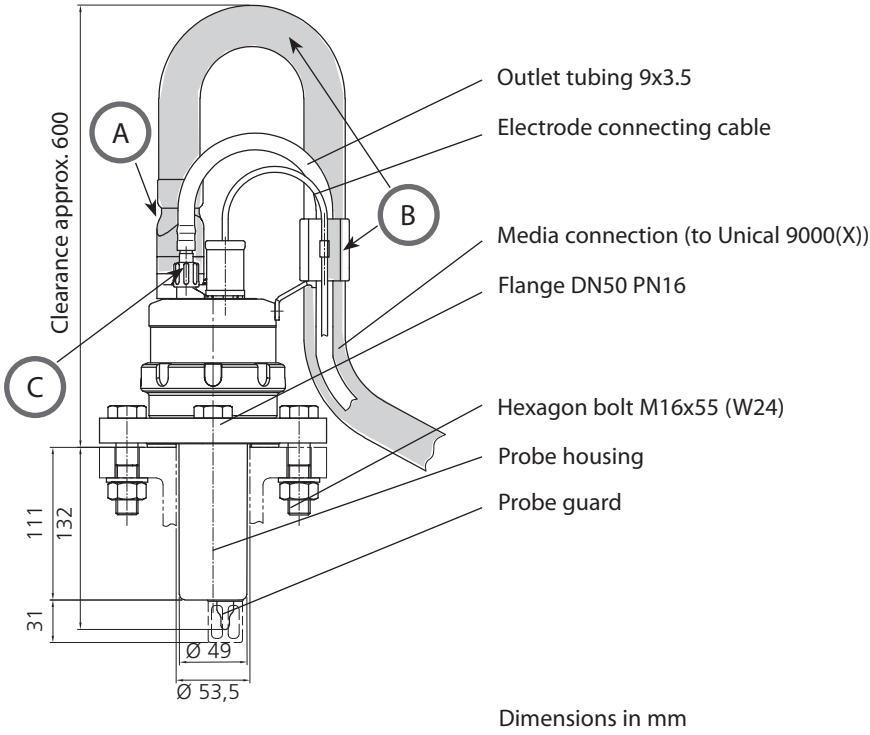
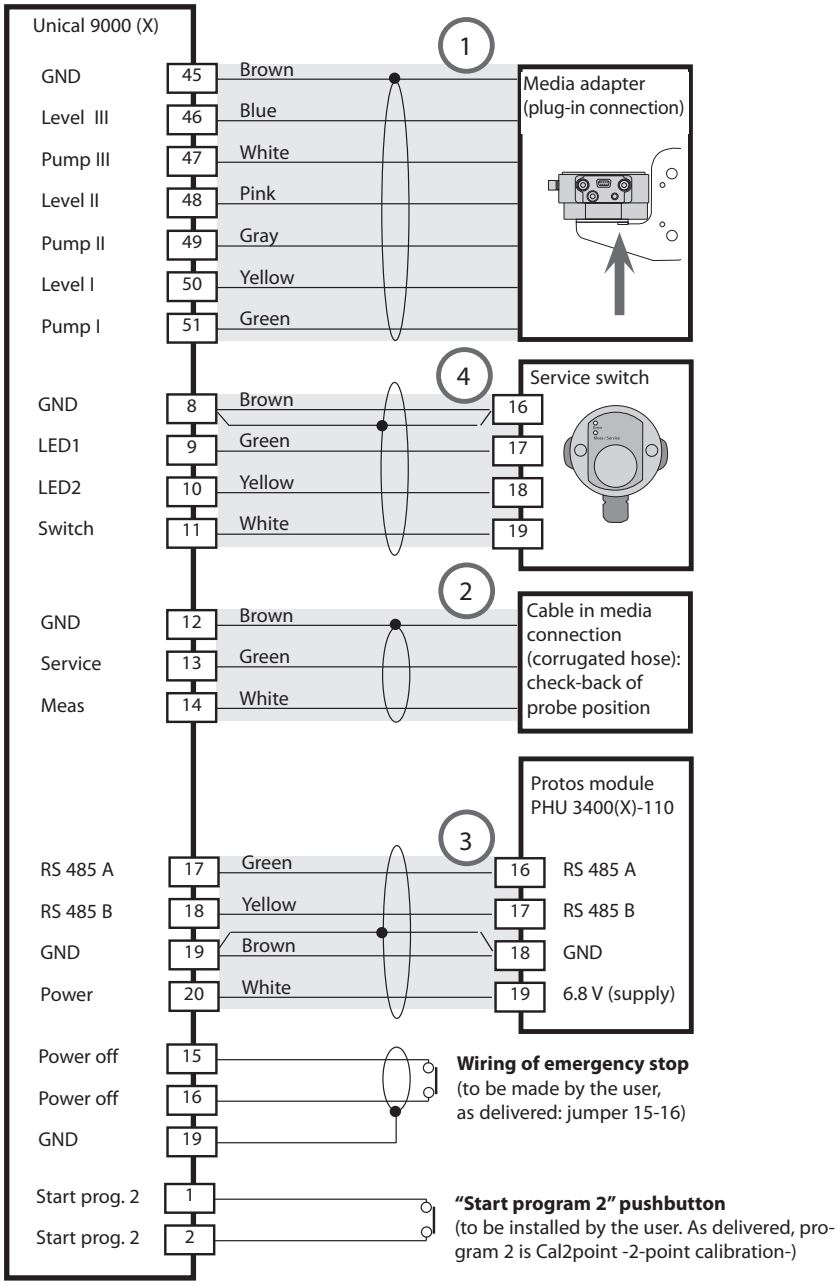


Fig.: Installation dimensions of Ceramat WA150(X), with DN50 PN16 flange

Electrical Installation



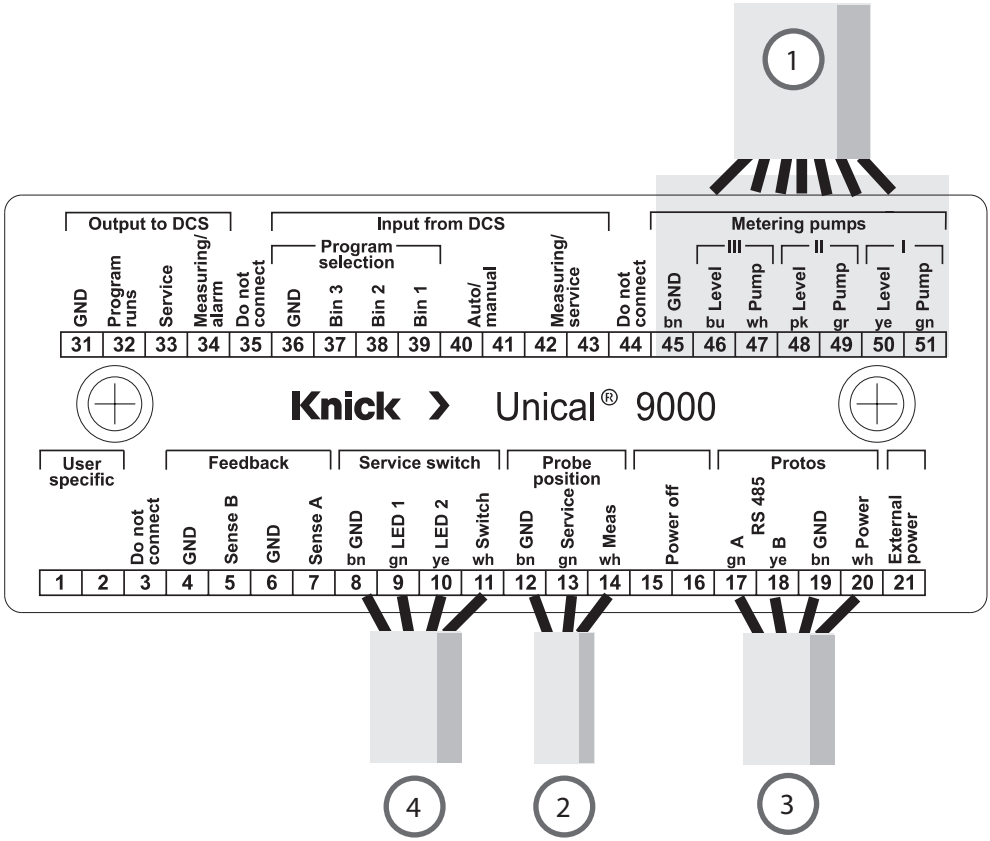
Cable Connection

Electrical Connections to Unical 9000(X)

Connect preassembled cables:

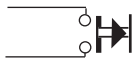
- Cable no. 1: Unical 9000 – Media adapter
- Cable no. 2: Unical 9000 – Ceramat (probe) (in media connection)
- Cable no. 3: Unical 9000 – Protos PHU 3400(X)-110 module
- Cable no. 4: Unical 9000 – Service switch

(Cables no. 3 and no. 4 are identical.)



Electrical Connection

Terminal Assignments of Unical 9000(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 Protos
21		Ext. power	External power supply

* Sense signal under development

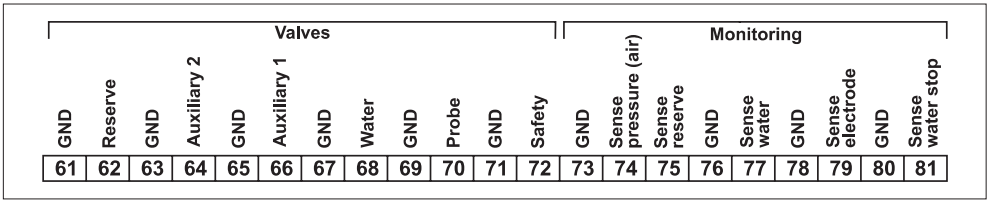
Electrical Connection

Terminal Assignments of Unical 9000(X)

No.	Wire color	Terminal	Function
31		GND	DCS message GND
32		Program runs (DCS out)	Unical 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 Unical 9000(X) - Beneath Terminal Cover -
These contacts are factory prewired.



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

Control via Process Control System (DCS)

Inputs/Outputs of Unical 9000(X)

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

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

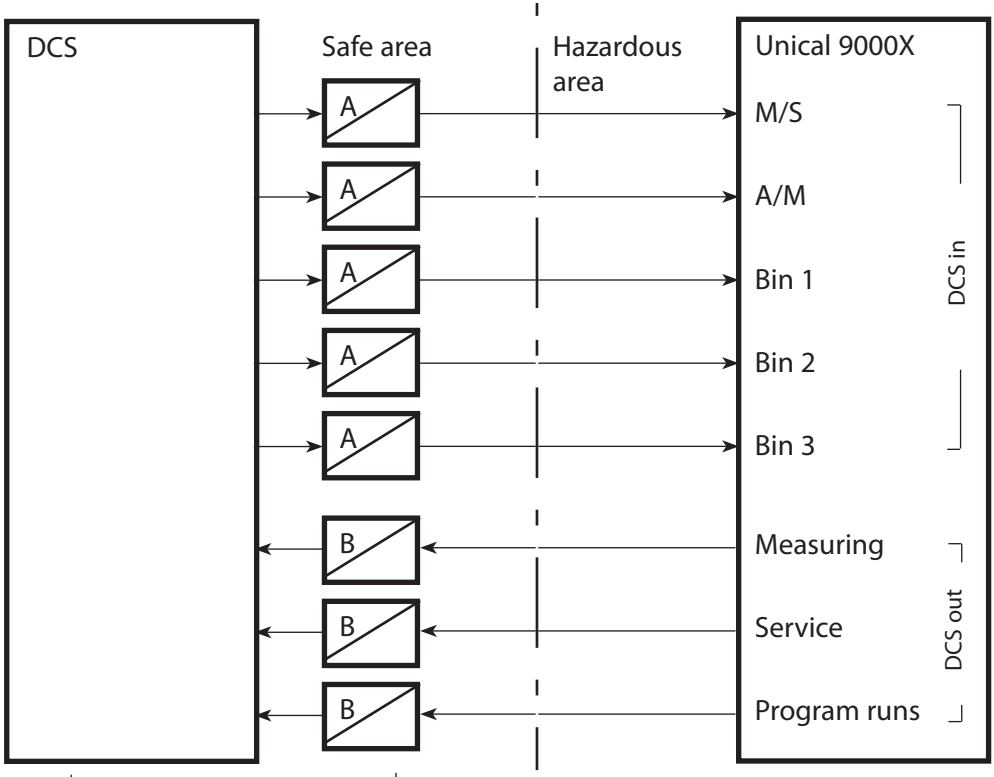
** Signal duration at least 2 sec (passing contacts)

Ex 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 Unical 9000X 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 of Unical 9000(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 via
- Protos 3400(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	Park position (user-programmable)	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 Unical via Protos 3400(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 / Unical 9000 / 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 Switch

Service Switch and SERVICE Position
Be sure to actuate the service switch before starting maintenance work on the Unical 9000(X), the sensor lock-gate, or the electrode. The service switch moves the sensor lock-gate into SERVICE position and actuates an additional safety valve. The sensor lock-gate is safely in SERVICE position when the yellow LED is permanently lit. Now, you can start your maintenance work. You can remove the electrode from the sensor lock-gate for replacement or regeneration. The Unical probe controller contains a dismount guard which prevents probe movement when the sensor has been removed. After maintenance work has been completed, actuate the service switch to end service mode. The sensor lock-gate moves into its original position (before activation of service mode).

LEDs at Service Switch
When the service switch is actuated, the yellow LED blinks faster and faster until it lights permanently to indicate that the probe is in SERVICE position and the safety valve has interrupted the control air.

When the probe is in measurement position, the yellow LED flashes.

If the safe SERVICE position is not reached, the red LED is lit.

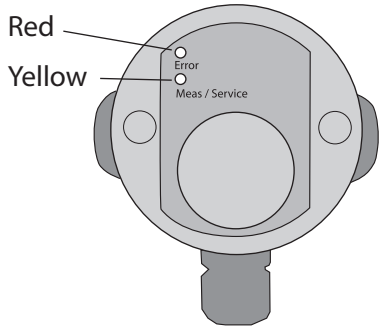


Fig.: Service switch

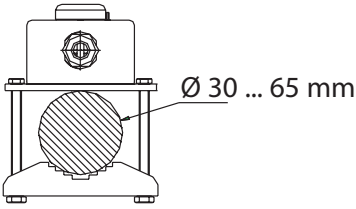
Red	Yellow	Status	Remark
-	flashes	Probe in measurement position (PROCESS)	
-	blinks	SERVICE switch actuated	
-	on	SERVICE mode active	
on	-	SERVICE position is not reached	Probe defective

SERVICE Position, Service Program

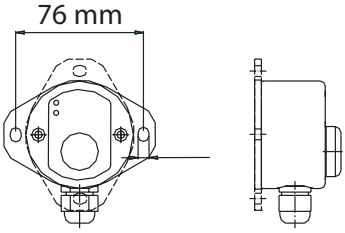
Service Program: Request and End
After a service request the sensor lock-gate executes the service program steps. The sensor lock-gate moves into SERVICE position. A currently running program (e.g. calibration) is immediately stopped. All other accesses are blocked. The service program defines steps for moving the sensor lock-gate as well as rinsing and cleaning procedures (see user manual of Protos PHU 3400(X)-110 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.

Mounting Dimensions of Service Switch



Vertical or horizontal
pipe mounting



Vertical or horizontal
wall mounting

Unical 9000(X) Specifications

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* ... 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
Media adapter	Three ports for metering pump
• Port I and II:	Calibration buffer
• Port III:	Cleaning agent

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

Unical 9000(X) Specifications

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	Unical network diagram as well as NAMUR messages: Maintenance request and failure	
Material	See bill of material	
Ingress protection	IP 65	
Dimensions	See dimension drawing	
SERVICE switch	Safety switch for service work on Unical or probe, in two variants: stainless steel and plastic	
Signaling	Yellow LED "flashes": Yellow LED on: Red LED on:	Probe in PROCESS SERVICE position reached SERVICE position not reached
Material	Stainless steel A4, polished or POM	
Ingress protection	IP 65	
Assembly	Wall or pipe mounting	
Dimensions	90 mm x 65 mm x 43 mm	

Unical 9000(X) Specifications

Power (EEx ia IIC)	Supplied via Protos module or external power supply source 15 ... 30 V / 20 mA (see EC-Type-Examination Certificate for hazardous-area application!)
	PHU 3400(X)-110 6.8 V (± 10 %) / 15 mA
Connection	Terminals, conductor cross-section max. 2.5 mm^2 (preassembled connecting cable to Protos, length 10 m)
RS 485 (EEx ia)	Communication with Protos PHU 3400(X)-110 module or 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
Protocol	HART Rev. 5
Connection	Terminals, conductor cross-section max. 2.5 mm^2 (preassembled connecting cable to Protos, length 10 m)
DCS input (passive)	
Measuring /Service	Measuring / Service
(EEx ia IIC)	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	Automatic blocked
(EEx ia IIC)	Vi = 30 V, floating, galvanic isolation up to 60 V

Unical 9000(X) Specifications

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 Ii = 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	II 2(1) GD EEx ia IIC T4 T 70°C
EMC	EN 61326
Lightning protection	EN 61000-4-5, Installation Class 2
Protection against electric shock	according to EN 61010

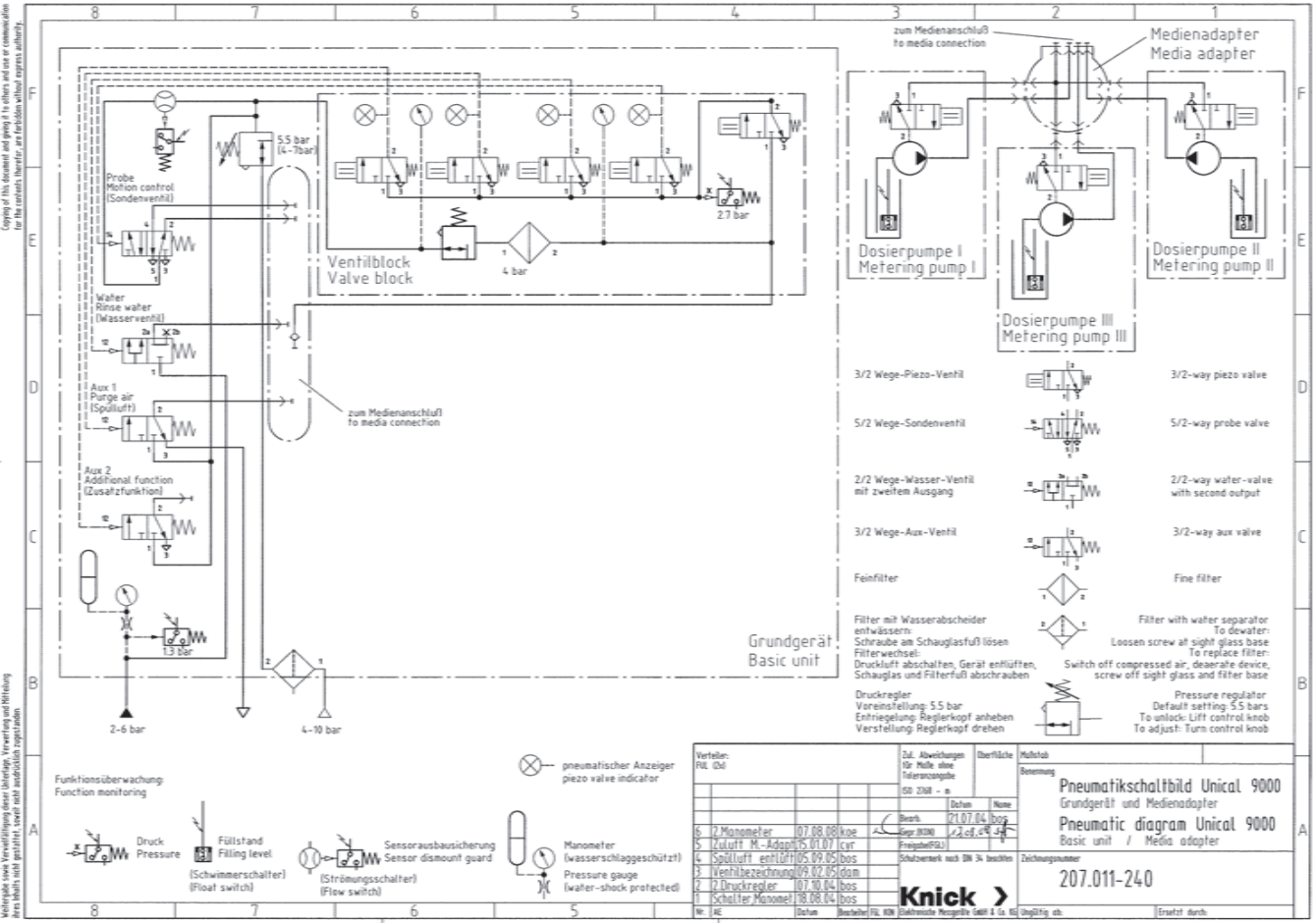
Unical 9000(X) Specifications

Ambient conditions	
Ambient temperature	+5 ... +55 °C (Ex: +5 ... +50 °C) (different temperature range on request)
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	• 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:
- Unical 9000(X) pneumatic diagram
- Media connection
- Connection of standard probes using standard probe adapter (ZU 0576)
- Table for selecting a cleaning agent

For enlarged printouts of the drawings, this manual can be downloaded from: www.knick.de.

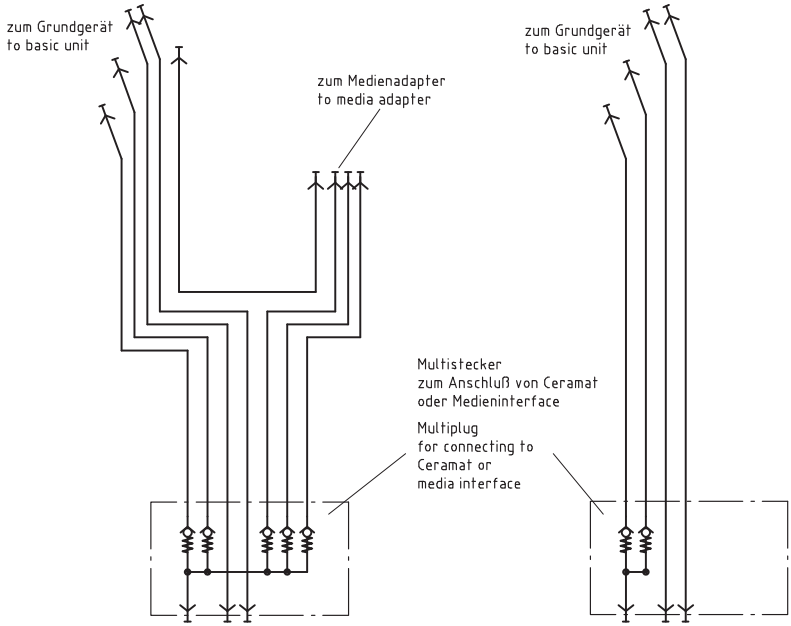


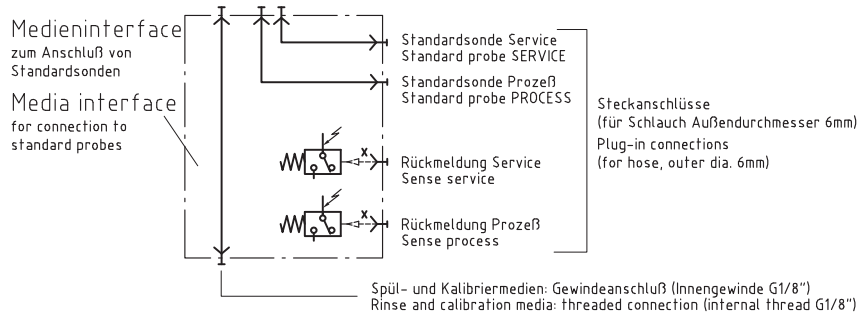
4 | 3 | 2 | 1

D C B A

Medienanschluß für Kalibrier- und Spülfunktion
Media connection for calibration and rinse function

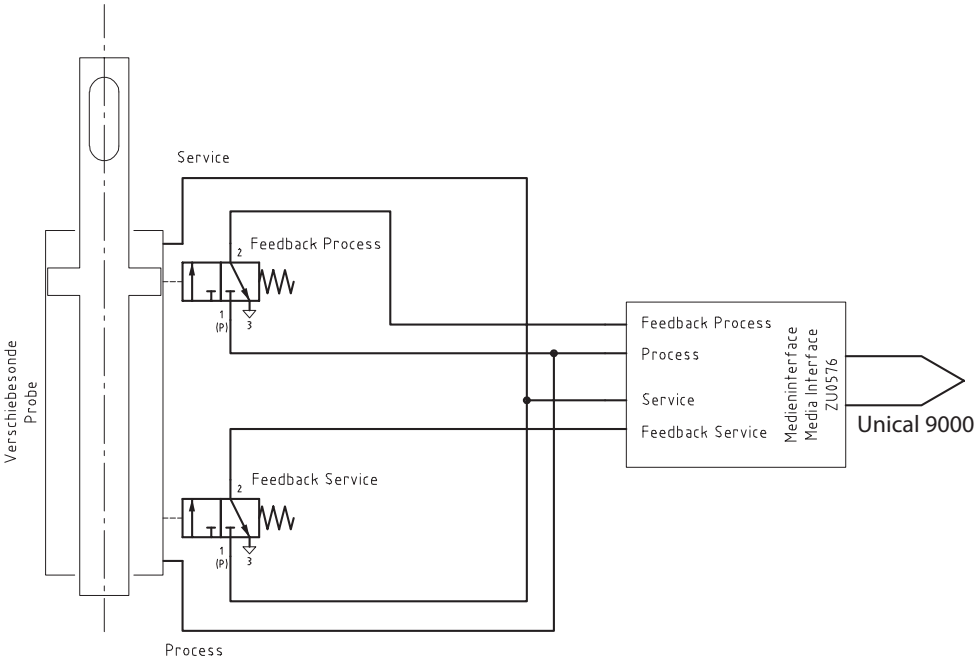
Medienanschluß für Spülfunktion
Media connection for rinse function





Verteiler: FUL (2x)					Zul. Abweichungen für Maße ohne Toleranzangabe ISO 2768 - m	Oberfläche	Maßstab
							Benennung: Pneumatikschaltbild Unical 9000 / Medienanschluß und Medieninterface / Pneumatic diagram Unical 9000 / Media connection / Media interface
						Datum / Name	
					Bearb.	17.08.04 bos	
					Gepr.(KON)		
					Freigabe(FGL)		
					Schutzvermerk nach DIN 34 beachten		Zeichnungsnummer: 207.011-250
Nr.	AE	Datum	Bearbeiter	FGL KON	Knick Elektronische Messgeräte GmbH & Co. KG		Ungültig ab: / Ersetzt durch:

Recommended Connection of Standard Retractable Housings, e.g. InTrac 7xx (Mettler-Toledo)



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 (e.g. Feedback Process) to generate the feedback signal for the Unical 9000(X).

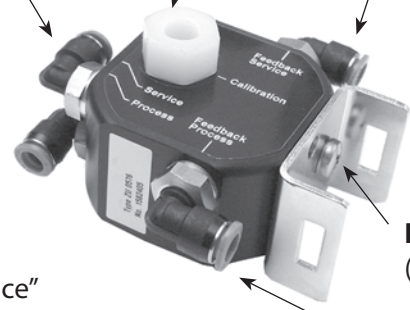
Standard Media Interface (ZU 0576)
Connecting an InTrac 7xx Retractable Housing

The retractable housings of the InTrac 7xx series provide pneumatic limit switches. The media interface shown here converts these pneumatic check-back signals into electric signals for the Unical 9000(X) 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



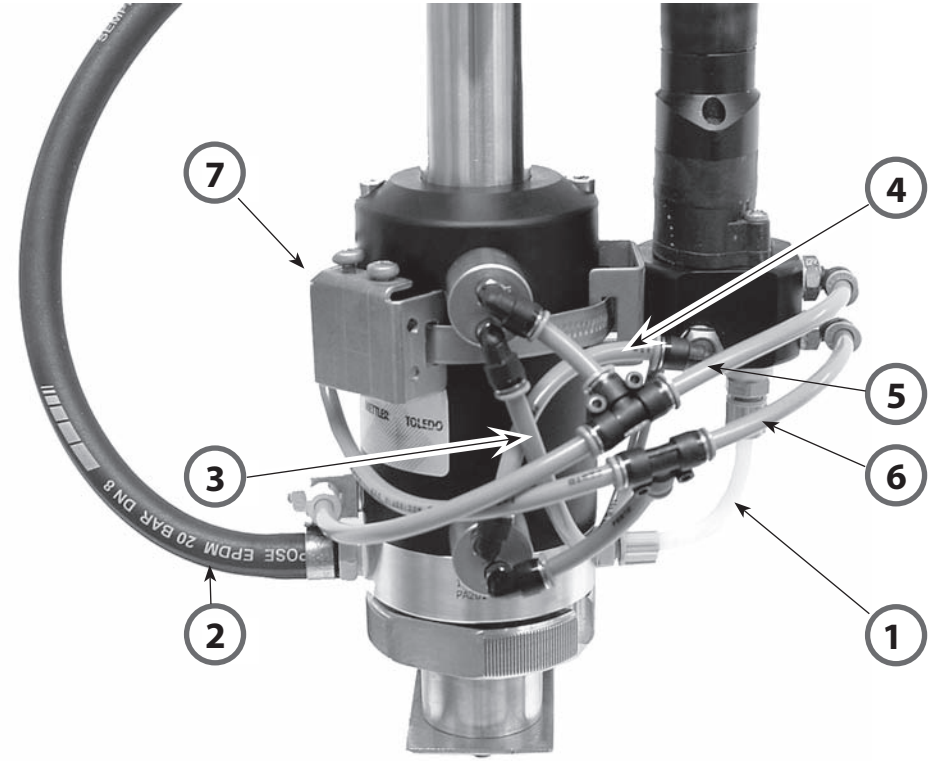
Service:
Control air for "Service" position and supply for "Service" position feedback unit

Fixing screw
(PZ-2)

Feedback Process:
Sense "MEASURE" position

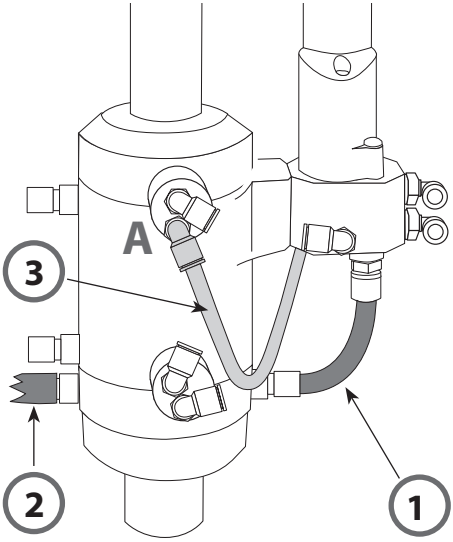
The interface is mounted to the retractable housing using the included hose clamp. To turn the interface into the required position, you can loosen the fixing screws. The holding bracket providing strain relief for the media connection can be fastend with the same or a separate hose clamp – as required. Use the included connection kit for connecting the Intrac 7xx retractable housing. All connections to the Unical 9000 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 InTrac 7xx Retractable Housing



1 Media connection to rinsing chamber
2 Rinsing chamber outlet
3 Feedback of "SERVICE" position
4 Feedback of "MEASURE" position
5 Control air for "SERVICE" position and supply for "SERVICE" position feedback unit
6 Control air for "MEASURE" position and supply for "MEASURE" position feedback unit
7 Holding bracket for strain relief of media connection

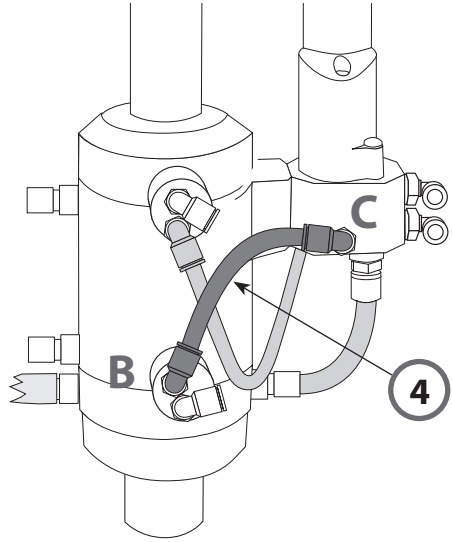
Connecting an InTrac 7xx Retractable Housing



1 Media connection to rinsing chamber

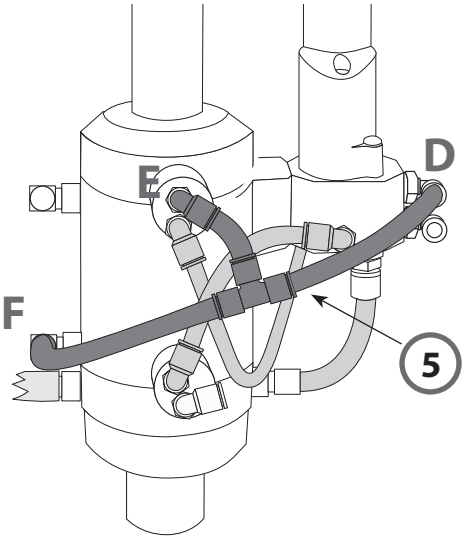
2 Rinsing chamber outlet
Connect outlet here.

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).

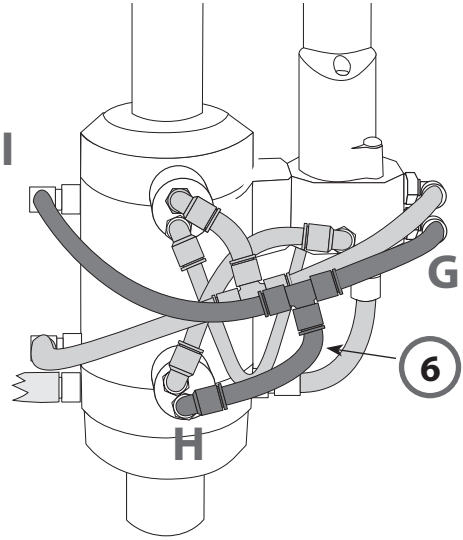


4 Feedback "MEASURE" position
Connect the "MEASURE" feedback unit of the probe (B) – unlabeled connecting port – with the "Feedback Process" port on the adapter (C) by a flexible tube.

Connecting an InTrac 7xx 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.

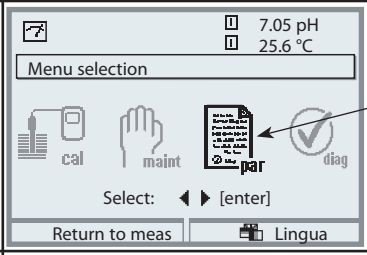
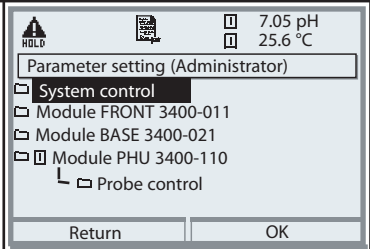
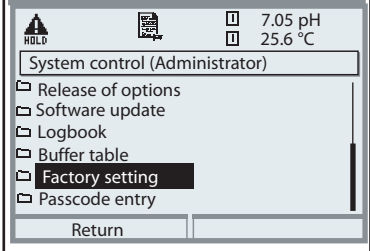
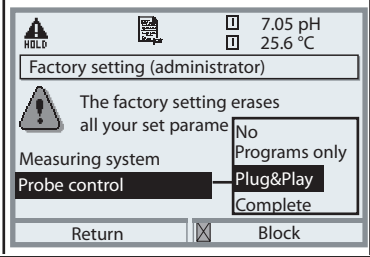


6 Control air for "MEASURE" position and supply for "MEASURE" position feedback unit
Place flexible tube between "Process" port at adapter (G) (control air), "MEASURE" position feedback supply (H)
– connecting port labeled "p / 1" – and "MEASURE" port (I) at probe.

Start-up: “Plug and Play”

Automatic hardware recognition
(Parameter setting/System control/Factory setting/Probe control ...)

First select “Plug and Play” in the Parameter Setting menu:
The Unical 9000(X) probe controller automatically recognizes the hardware installed and sets the corresponding installation parameters.

Menu	Display	Plug and Play
		**Open parameter setting** From the measuring mode: Press **menu** key to select menu. Select parameter setting using arrow keys, confirm with **enter**.
par		Parameter setting: Select “System control”.
		Select “Factory setting”.
		First select “Probe control”, then select “Plug & Play”. The hardware installed is automatically recognized.

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.

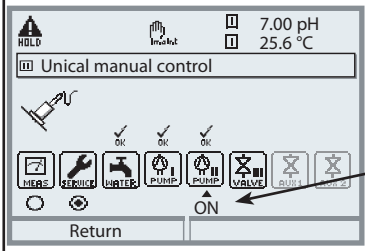
The buffer pumps require approx. 1 stroke to fill the pump and approx. 9 strokes to fill the tubing.

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

Electrode Dismount Guard
To check the electrode dismount guard (only in conjunction with Ceramat), loosen the electrode (hissing sound at the electrode). The dismount guard has a response time of approx. 2 sec until an error message is released.

Manual Control via Protos 3400(X)

"Maintenance / Unical 9000" Menu

Menu	Display	Maintenance
		**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.)

Warning for Use of Manual Control!

When the electrode has been removed, it must always be replaced by a dummy! During manual control the dismount guard does not prevent insertion into the process!

Manual control via Protos 3400(X) allows actuating the Unical 9000 probe controller for servicing.
Rinsing water, media supply, and valve functions can be tested individually.

Selected Cleaning Agents for Unical 9000 and their Applications

The sealing material of the accessories is identified by a suffix to the order number.
Suffix / 1 stands for FKM, suffix / 2 for EPDM.
Example:
Metering pump, sealing material FKM: Order number ZU 0580 / 1
Metering pump, sealing material EPDM: Order number ZU 0580 / 2

Cleaning agent	**Chemical formula**	**Concen-tration**	**Application**	**Possible accessories** (sealing material) Suffix /1 **FKM**	Suffix /2 **EPDM**
Diluted acids:			e.g. against limy deposits		
Hydrochloric acid	HCl	Max. 5 %		+	+
Sulfamic acid	H_3NO_3S		Food industry	+	+
Acetic acid	CH_3COOH				+
Nitric acid	HNO_3	Max. 5 %		+	+

Cleaning agent	Chemical formula	Concen-tration	Application	Possible accessories (sealing material) Suffix /1 FKM	Suffix /2 EPDM
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 and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **KEMA 04ATEX1036** Issue Number: **2**

(4) Equipment: **Retractable Probe Control Unit Type Unical 9000-X... and Type Uniclean 900-X...**

(5) Manufacturer: **Knick Elektronische Messgeräte GmbH & Co. KG**

(6) Address: **Beuckestrasse 22, D-14163 Berlin, Germany**

(7) This equipment 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 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 test report number 2107128.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014 : 1997 + A1, A2 **EN 50020 : 2002**
EN 50281-1-1 : 1998 + A1 **EN 50284 : 1999**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment 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 according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex **II 2(1) GD EEx ia IIC T4 T 70 °C**

This certificate is issued on 22 June 2007 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

T. Pijpker
Certification Manager

Page 1/3

PRODUCTS RvA C 001

KEMA Quality B.V. Utrechtseweg 310, 6812 AR Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 26 3 56 20 00 F +31 26 3 52 58 00 customer@kema.com www.kema.com Registered Arnhem 09085396

KEMA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 04ATEX1036** Issue No. **2**

(15) **Description**

The Retractable Probe Control Unit Type Unical 9000-X... and Type Uniclean 900-X... is mainly intended for control of Retractable Probe Type Ceramat WA 1**-X... and is controlled by the Modular Analyzing System Protos Type 3400 X */*** or similar measuring system or by a DCS. The Retractable Probe Control Unit Type Uniclean 900-X... is identical to Type Unical 9000-X... but with simplified software and pneumatics, without the Service switch circuit, without valve and with only one position for the Media adapter. The Retractable Probe Control Unit 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 protection intrinsic safety EEx ia IIC, only for connection to intrinsically safe circuits, with the following maximum values:
U_i = 30 V; P_i = 1 W; C_i = 0 µF; L_i = 0 mH
or
Auxiliary power supply (KL19, KL20):
in type of protection intrinsic safety EEx ia IIC, only for connection to the certified Protos Module Type PHU 3400 X - 11* or Type FIU 3400 X - 14*

Emergency Shutdown circuit (KL15, KL16):
in type of protection intrinsic safety EEx ia IIC, with the following maximum values:
U_o = 30 V; I_o = 146 mA; P_o = 1 W; C_o = 66 nF; L_o = 1 mH

Interface RS485 (KL17, KL18, KL19):
in type of protection intrinsic safety EEx ia IIC, with the following maximum values:
U_i/U_o = 5 V; I_i/I_o = 257 mA; R_i = 19,5 Ω; C_i = 0 µF; L_i = 0 mH; C_o = 3,5 µF; L_o = 1,2 mH
or
in type of protection intrinsic safety EEx ia IIC, only for connection to the certified Protos Module Type PHU 3400 X - 11* or Type FIU 3400 X - 14*

DCS Outputs ML1, ML2, ML3 (KL31, KL32, KL33, KL34):
in type of protection intrinsic safety EEx ia IIC, only for connection to intrinsically safe circuits, with the following maximum values per circuit:
U_i = 30 V; I_i = 100 mA; P_i = 800 mW; C_i = 12 nF; L_i = 0 mH

DCS Inputs PRG1, PRG2, PRG3 (KL36...KL39) A/M (KL40, KL41) M/S (KL42, KL43):
in type of protection intrinsic safety EEx ia IIC, only for connection to intrinsically safe circuits, with the following maximum values per circuit:
U_i = 30 V; C_i = 0 µF; L_i = 0 mH

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

KEMA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 04ATEX1036** Issue No. **2**

Leakage circuit (KL1, KL2):
in type of protection intrinsic safety EEx ia IIC, with the following maximum values:
U_o = 5 V; I_o = 8 mA; P_o = 10 mW; C_o = 5 µF; L_o = 2 mH; Linear characteristic

Service Switch circuit (KL8, KL9, KL10, KL11):
in type of protection intrinsic safety EEx ia IIC, only for connection to the Service Switch, which is part of the Retractable Probe Control Unit Cable length < 100 m.

Pump circuits (KL45, KL46, KL47, KL48 KL49, KL50, KL51):
in type of protection intrinsic safety EEx ia IIC, only for connection to the media adapter / dosing pumps, which are part of the Retractable Probe Control Unit Cable length < 100 m.

Probe circuits (KL12, KL13, KL14):
in type of protection intrinsic safety EEx ia IIC, only for connection to process connections which are part of the Retractable Probe Control Unit 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.

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) **Test Report**

KEMA No. 2107128.

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

None.

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

Assured by compliance with the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 2107128.

FM Certificate of Compliance

FM Approvals
Member of the FM Global Group

FM Approvals
1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781 762 9375 www.fmglobal.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

Unical-9000 - XSabcdefgh 000 000 Control System

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 2°C to 50°C - 207.011-260 Entity; Type 4X/IP65
I / 0 / AEx ia IIC / T4 Ta = 2°C to 50°C - 207.011-260 Entity; Type 4X/IP65
NI / I / 2 / ABCD; S / II, III / 2 / EFG /T4 Ta = 2°C to 50°C; Type 4X/IP65
I / 2 / IIC / T4 Ta = 2°C to 50°C; Type 4X/IP65

Where

a = Media connection: 1, 2, 3, 4
b = Media Interface: 0, 1
c = Media Adapter: 0, 1, 2
d = Equipment for Port I: 0, 2
e = Equipment for Port II: 0, 2
f = Equipment for Port III: 0, 2, 3
g = Supplementary air purging kit: C, N
h = Supplementary ext. valve control kit: E, N

Equipment Ratings:

Intrinsically Safe for Class I, II, and III, Division 1, Groups A-G; intrinsically safe for Class I, Zone 0, Group IIC; suitable for Class I, II, and III, Division 2, Groups A-G; suitable for Class I, Zone 2, Group IIC.

FM Approved for:

Knick Elektronische Meßgeräte GmbH & Co. KG
Berlin, Germany

FM Certificate of Compliance

FM Approvals™
Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following FM Approval Standards and other documents:

Class 3600	1998
Class 3610	1999
Class 3611	2004
Class 3819	1995
ANSI/NEMA 250	1991

Original Project ID: 3024483 Approval Granted: June 23, 2006

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date

FM Approvals LLC

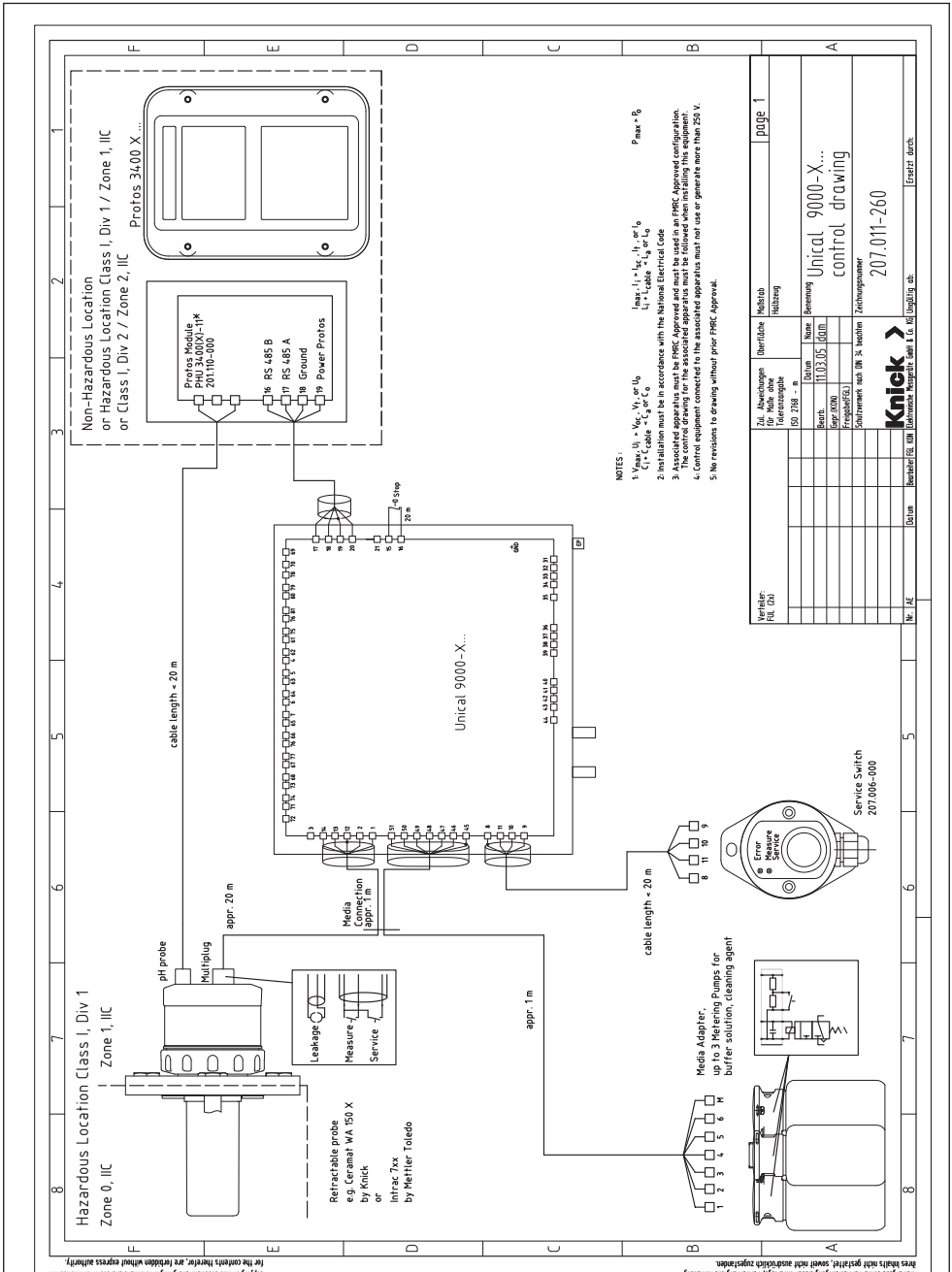
Robert L. Martell, Jr.
Assistant Vice President

June 23, 2006
Date

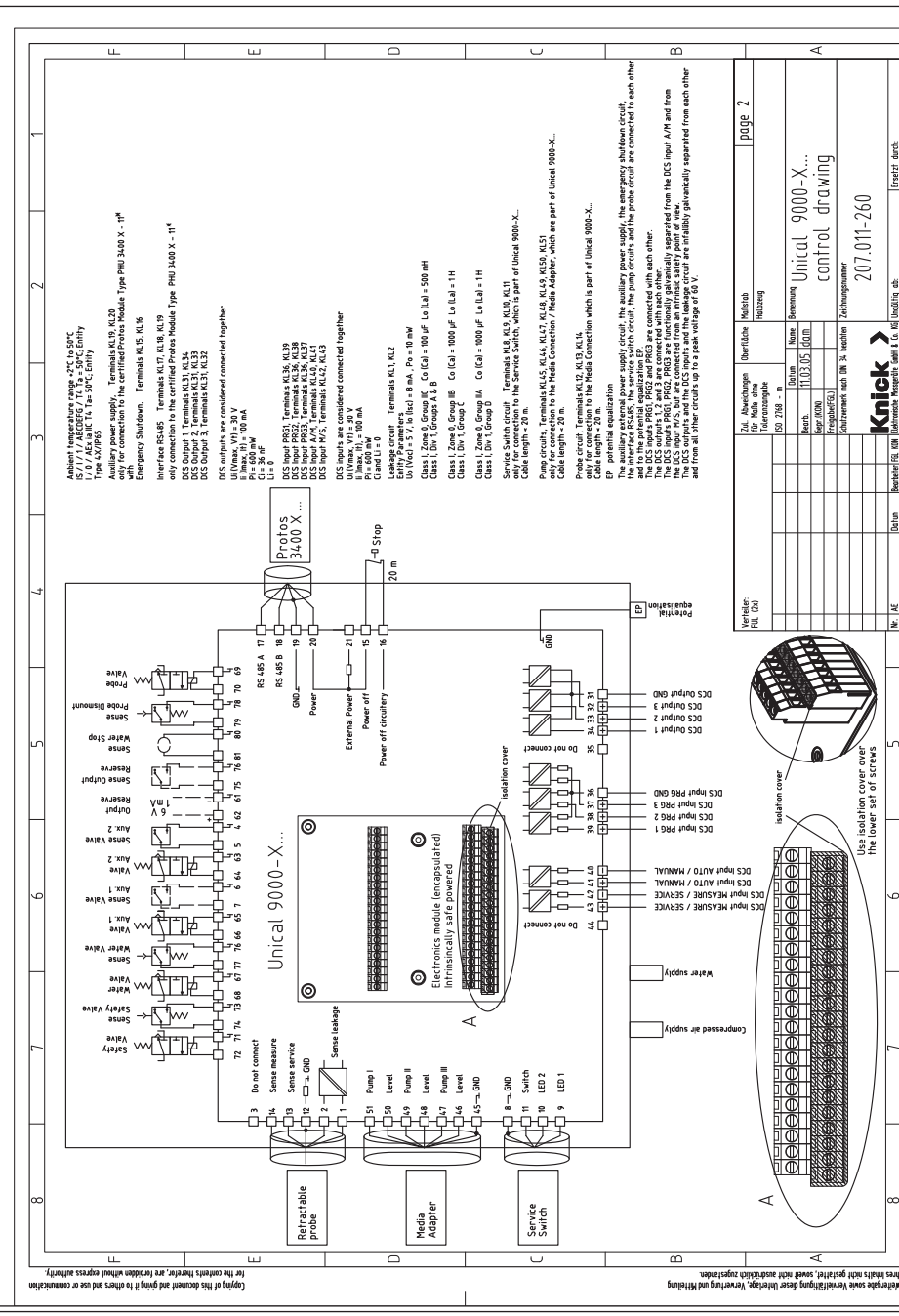
FM Approvals HLC 1/06

3024483
Page 2 of 2

FM Control Drawing



FM Control Drawing



Index

Index

Index

Knick
Elektronische Messgeräte GmbH & Co. KG
P.O. Box 37 04 15
D-14134 Berlin
Tel: +49 (0)30 - 801 91 - 0
Fax: +49 (0)30 - 801 91 - 200
Internet: http://www.knick.de
knick@knick.de

TA-207.000-KNE09 20100901 Software version 4.x