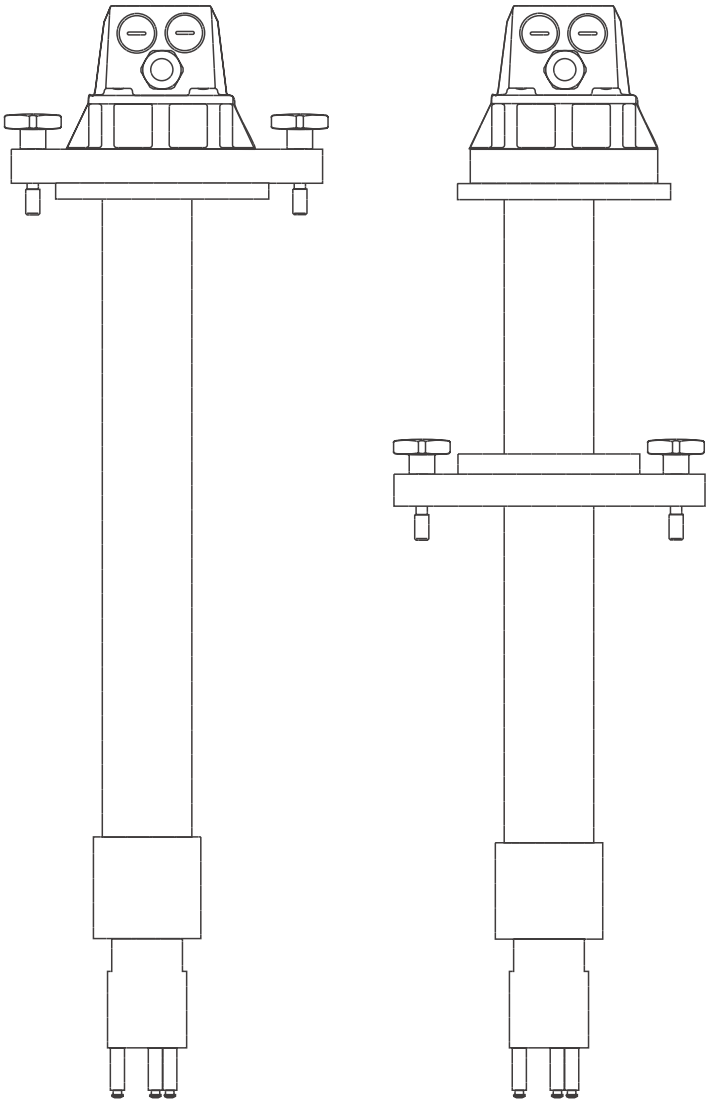
BA 112e00/03.00
No. 51502180

OPA 111
Immersion Assembly for pH/Redox Measurement

Operating Instructions



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1 Safety

1.1 Safety symbols

Warning!
This symbol alerts to hazards. Disregard may cause serious injuries to persons or damage to equipment.

Caution!
This symbol alerts to possible malfunction due to operator error. Disregard may cause damage to equipment.

Note!
This symbol indicates important items of information.

1.2 Intended application

The immersion and process assembly OPA 111 is suitable for universal use in waste water / water treatment as well as process applications. It can be used in pressures of up to 4 bar.
The bayonet mounting technique of the electrode holder permits the electrodes to be removed and installed quickly and conveniently.
A chemical electrode cleaning system can be integrated without modifying the assembly.

All required accessories are available:
- Wet bucket
- KCl reservoir
- Calibration cap
- Mounting frame
- Pendulum frame
- Adapter for adjustable flange
- Spray cleaning.

1.3 Installation, start-up, maintenance

Warning!
- The assembly may only be installed, commissioned and serviced by properly trained personnel authorised by the system operator.
- The personnel must be familiar with these operating instructions and must adhere to the instructions contained therein.
- Damaged assemblies that may be dangerous must not be operated and should be clearly identified as being defective.
- Any troubleshooting of the assembly and complete measuring system is to be performed exclusively by authorised, trained personnel.
- If faults cannot be remedied, the assembly must be removed from service and secured to prevent accidental start-up.
- Maintenance work not described in these operating instructions may only be performed at the manufacturer's works.

1.4 Operational security

The assembly has been designed for safe operation according to the state-of-the-art in engineering and according to current regulations and European standards (see “Technical data”). It has left the manufacturer’s works in perfect condition.
However, if used improperly or for purposes other than the intended purpose, it may be dangerous, e.g. due to incorrect installation or incorrect operating conditions.

Warning!
- Operation in any way other than as described in these instructions may compromise the safety and function of the measuring system and is therefore impermissible.
- The notes and warnings in these operating instructions must be strictly adhered to.

Notes for installation in pressurized systems

Warning!
- The maximum operating pressure of the assembly must not be exceeded.
- The system must be depressurized before installation or removal of the assembly.
- Couplings and lines must be checked for leakage and damage at regular intervals.

1.5 Sending back

In case of repair, please send the **cleaned** assembly back to your supplier. Use the original packaging material if possible.
If you send back assemblies from toxic or strongly aggressive processes, please fill in and enclose a “Safety regulation form for repairs” (see last page but one of these operating instructions).

2 Identification

2.1 Product designation

2.1.1 Nameplate

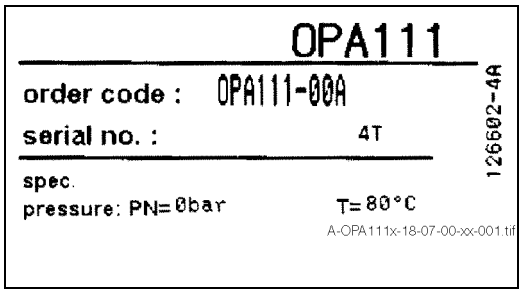


Fig. 2.1: Nameplate of OPA 111-00A

2.1.2 Product structure

	Length of the assembly			
	0	1000 mm		
	1	2000 mm		
	2	500 … 3000 mm (A, C, F only)		
		Material		
		0	Assembly of PP, sealing of EPDM	
			Process connection / material	
			A	Flange DN 100 of PP-GF 20, unpressurized
			B	Adapter for adjustable flange DN 100 of PP-GF 20, variable adjustment of immersion depth
			C	Pressurized flange DN 100, max. 4 bar
			D	Suspension bracket of SS 316Ti (1000 mm only)
			F	For pendulum frame mounting
OPA 111-				complete order code

2.2 Scope of supply

Caution!
- Verify that the packaging is undamaged! Inform the post office or freight carrier of any damage. Keep the original packaging material until the matter has been settled.
- Verify that the contents are undamaged! Inform the post office or freight carrier of any damage and consult your supplier. Keep damaged merchandise until the matter has been settled.
- Check that the delivery is complete and agrees with the shipping documents and your order (refer to nameplate for type and version).

The delivery includes:
- Assembly OPA 111
- Operating instructions BA 112e00.

If you have any questions, consult your supplier.

3 Installation

3.1 Measuring system

A complete measuring system comprises
- the assembly OPA 111
- a pH and/or redox electrode with a length of 120 mm
- a pH/redox measuring transmitter, e.g. OPM 223
- a measuring cable, e.g. OPK 1, OPK 7 or OPK 9

and optionally
- a temperature sensor Pt 100
- a junction box
- an extension cable.

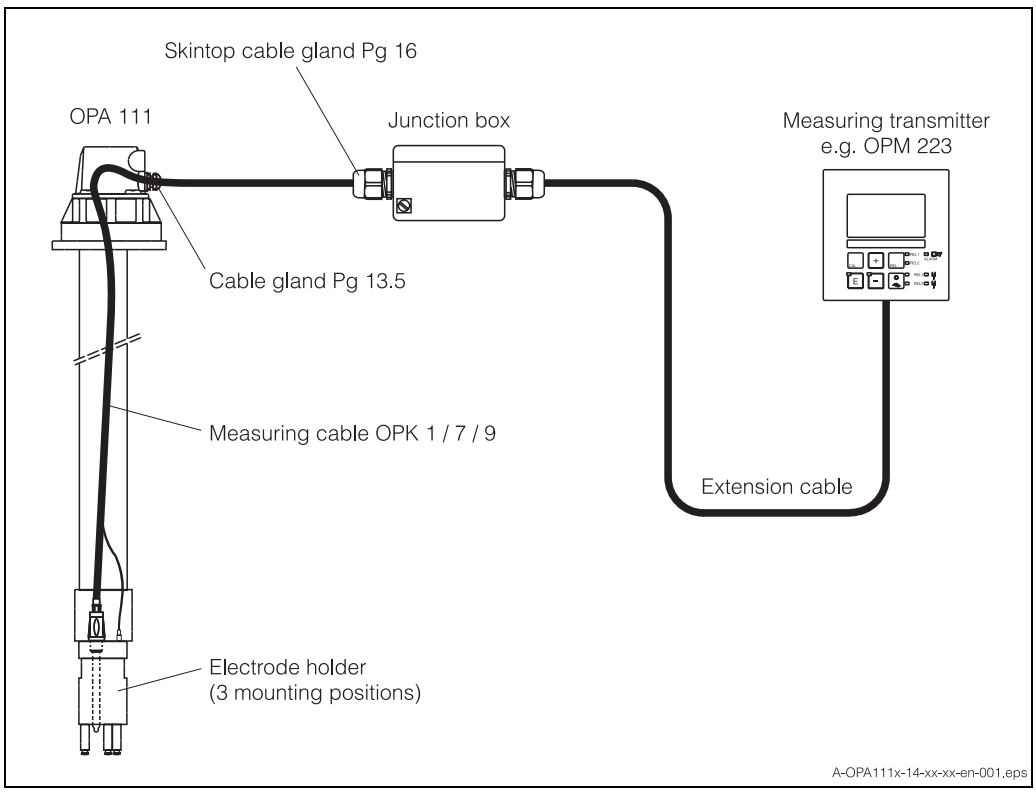


Fig. 3.1: Example of a complete measuring system with OPA 111

3.2 Dimensions

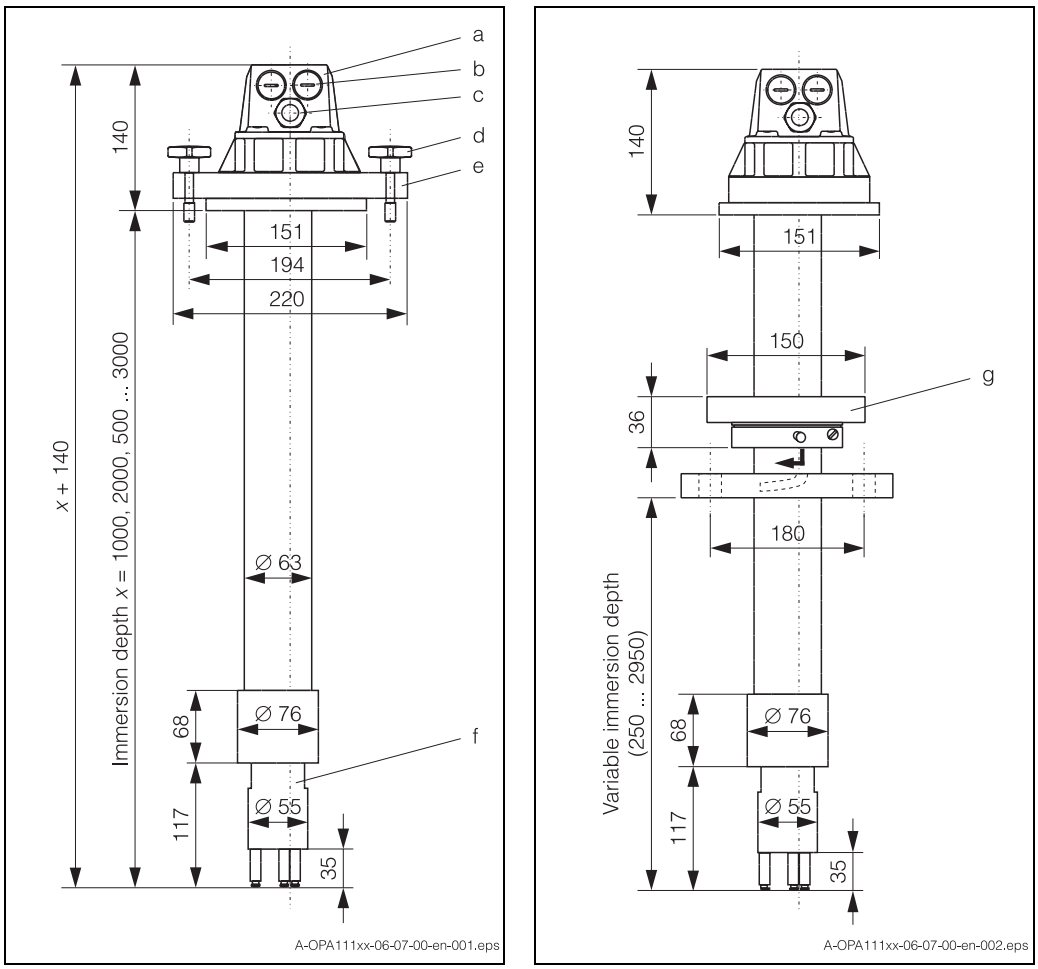


Fig. 3.2: Dimensions of OPA 111-A/C (left), OPA 111-B (right)
a Assembly head
b Dummy plug Pg 16
c Cable gland Pg 13.5
d Star handle screws
e Flange DN 100
f Electrode holder
g Adjustable flange

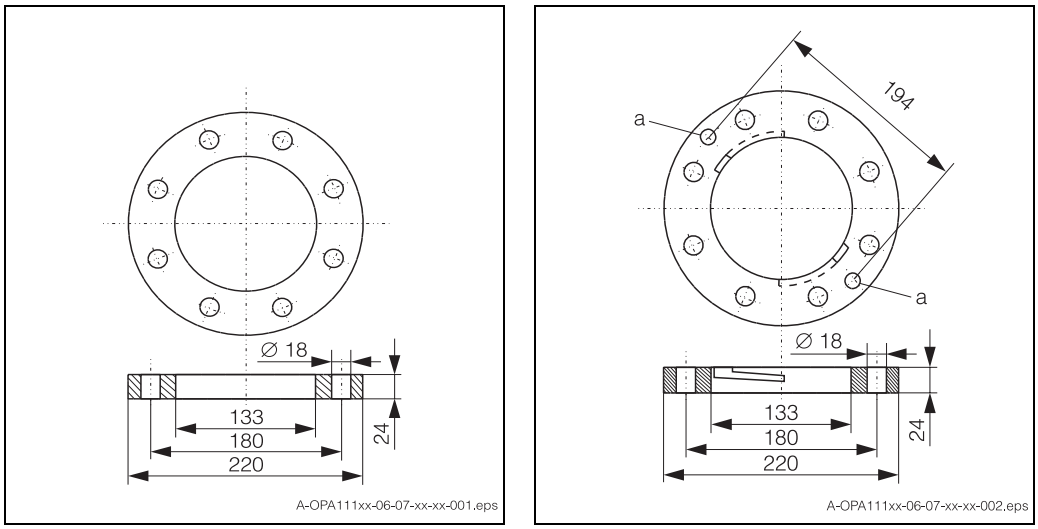


Fig. 3.3: Pressurized flange DN 100 for OPA 111-C, max. 4 bar (left), flange DN 100 for OPA 111-A/B (right)
a Through holes for captive star handle screws

3.3 Overview of mounting parts

3.3.1 Versions with flange DN 100

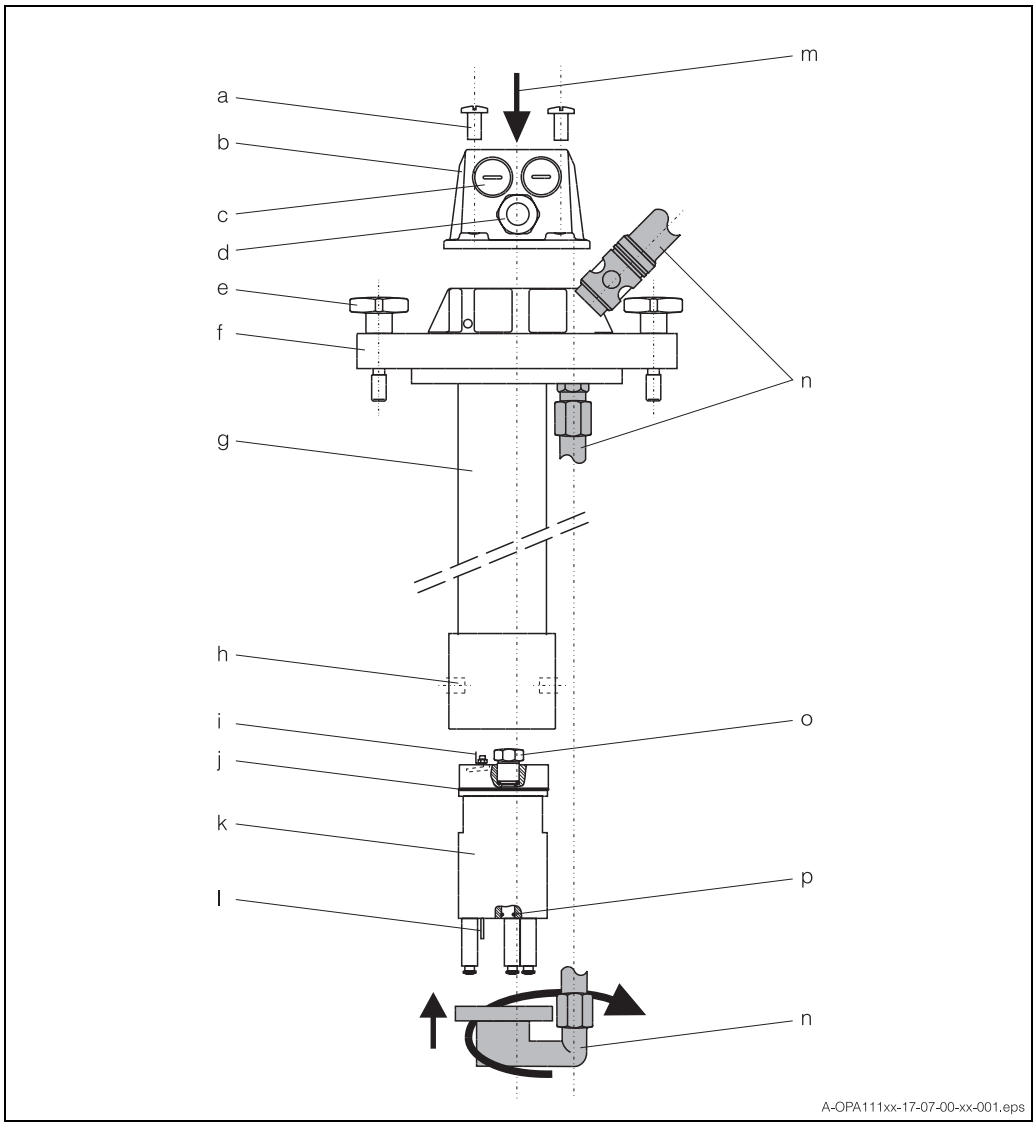


Fig. 3.4: Overview of OPA 111-A/C

a Recessed head screws (4 pieces)
b Assembly head
c Dummy plug Pg 16
d Cable gland Pg 13.5
e Star handle screws (not for pressurized version)
f Flange DN 100; version A: standard; version C: pressurized flange
g Assembly pipe
h Bore hole for wet bucket
i AMP plug for PM connection
j O-ring
k Electrode holder (3 mounting positions)
l PM (potential matching pin); material: SS 316Ti
m Punch hole for electrolyte reservoir OPY 7
n Option: accessory spray cleaning head
o Dummy plug
p O-ring for electrode installation

3.3.2 Version with adjustable flange DN 100

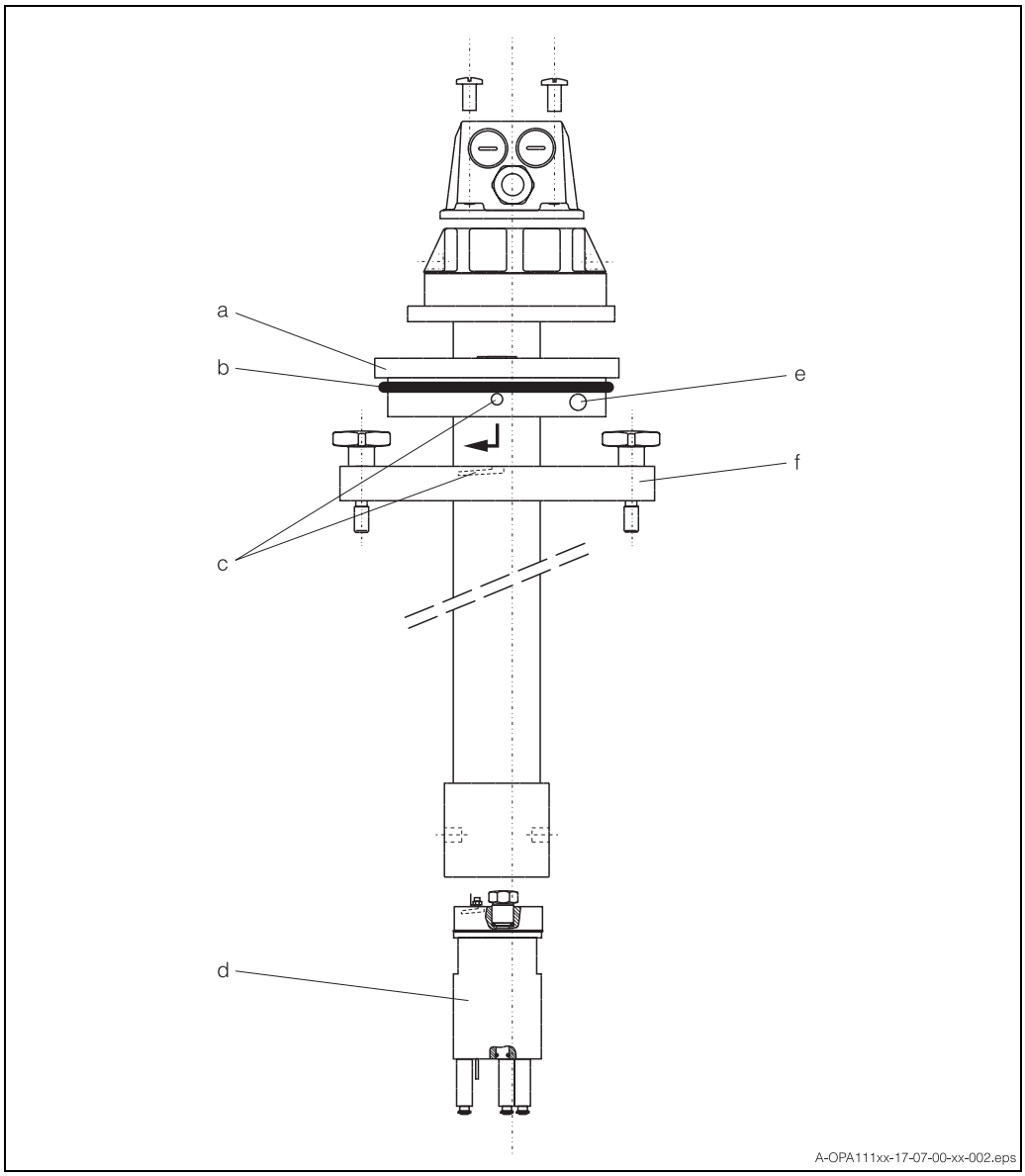


Fig. 3.5: Overview of OPA 111-B
a Adapter for adjustable flange (2 half-shells)
b O-ring for tolerance compensation
c Bayonet lock
d Electrode holder (3 mounting positions)
e Straining screws (2 pieces) for adjustable flange
f Flange DN 100

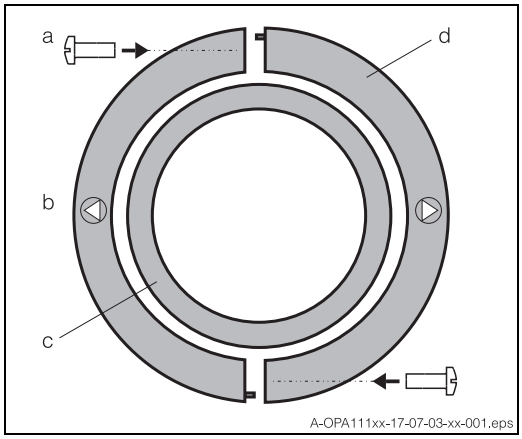


Fig. 3.6: Adapter for adjustable flange
a Recessed head screws
b Marker "final position"
c Assembly pipe
d Half-shells

Mounting

1. Attach flange DN 100 to mounting frame.
2. Put half-shells (d) of adapter on desired position of pipe.
3. Insert recessed head screws (a) in provided impressions and screw both parts together.
4. Put O-ring in O-ring groove.
5. Insert assembly in installed flange DN 100 flange.
6. Screw assembly at assembly head clockwise until marker "final position" (b).

Removal

1. Leave installed flange DN 100 flange on mounting frame.
2. Screw out assembly at assembly head counterclockwise and take out of the medium.

3.3.3 Version with suspension bracket

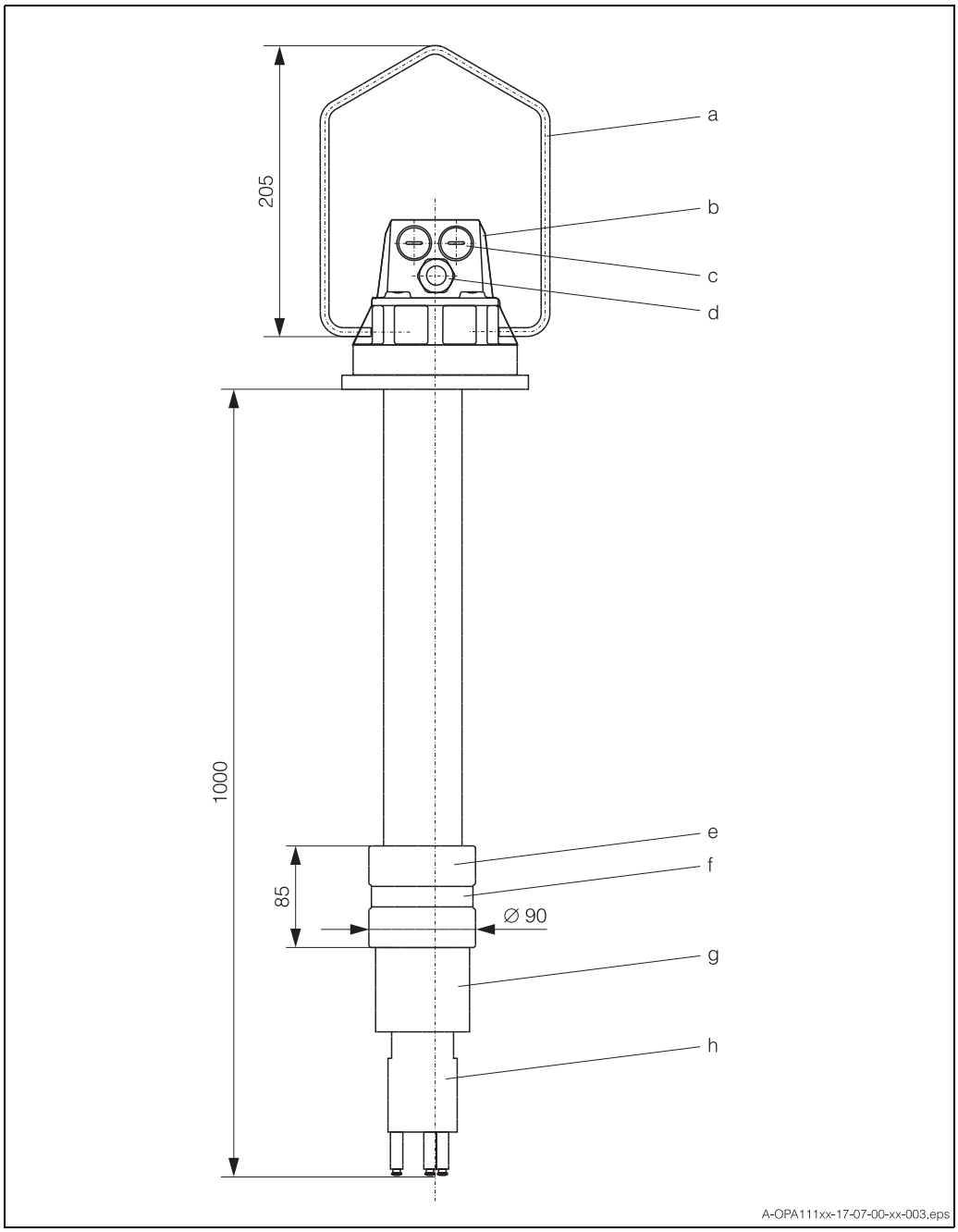


Fig. 3.7: Overview of OPA 111-D
- *a Suspension bracket; material: SS 316Ti*
- *b Assembly head*
- *c Dummy plug Pg 16*
- *d Cable gland Pg 13.5*
- *e Weight (half-shells)*
- *f Cable clamp for fixing of the half-shells*
- *g Sleeve*
- *h Electrode holder (3 mounting positions)*

Mounting

The suspended version of OPA 111 can be mounted at the basin using an assembly holder. A mounting chain allows a flexible immersion depth.

Note!
Weight (e) is required to stabilize the assembly. Push it all the way down to sleeve (g) before you finally fix the cable clamp (f).

3.3.4 Version for pendulum frame mounting

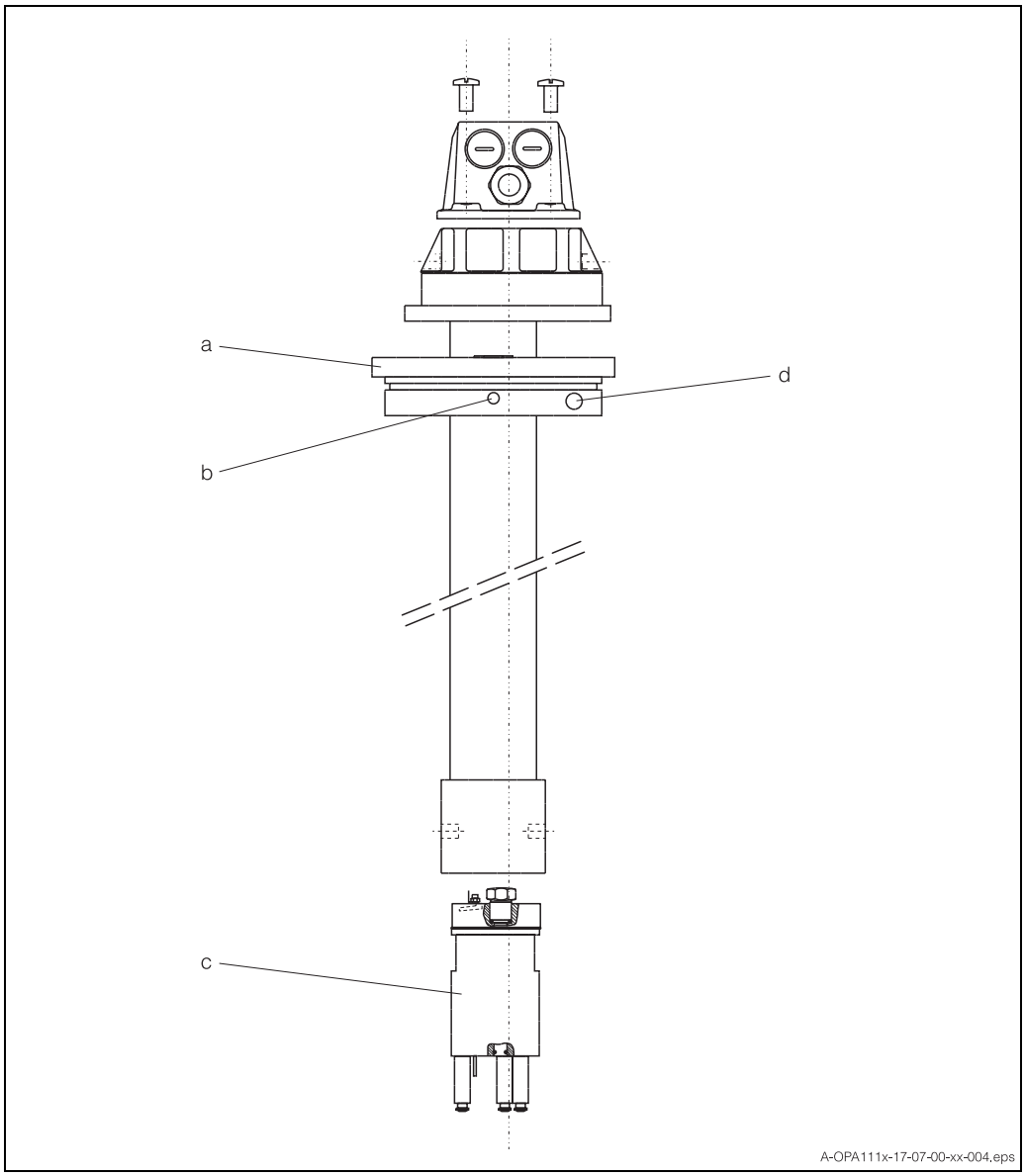


Fig. 3.8: Overview of OPA 111-F
a Retaining ring (half-shells)
b Bore hole M8 for knurled banjo bolts
c Electrode holder (3 mounting positions)
d Straining screws (2 pieces) for fixing of the half-shells

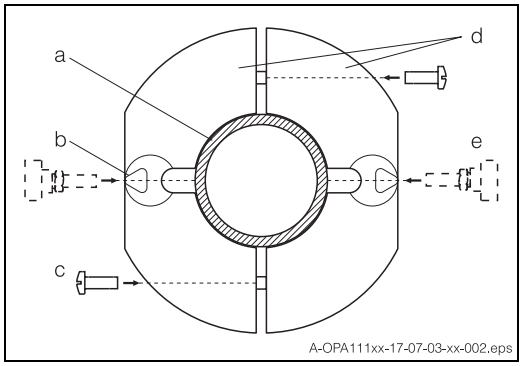


Fig. 3.9: Retaining ring
a Assembly pipe
b Marker "final position"
c Recessed head screws
d Half-shells
e Knurled banjo bolts

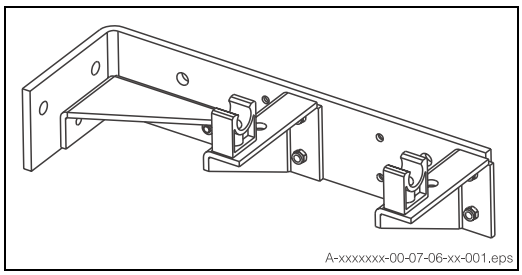


Fig. 3.10: Pendulum frame

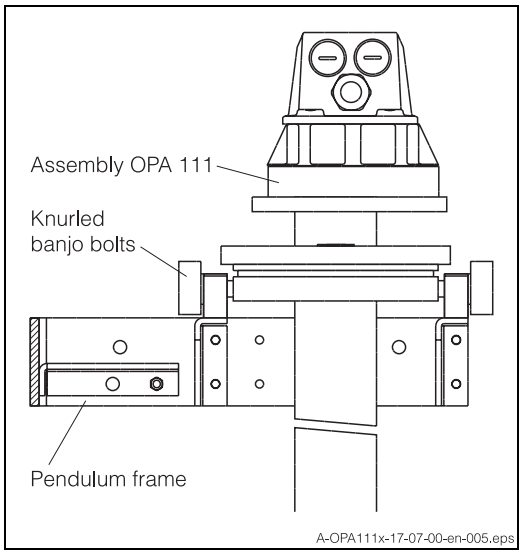


Fig. 3.11: OPA 111 mounted with pendulum frame

Mounting (see Fig. 3.9 to 3.11)
The OPA 111-F is designed for pendulous suspension from the pendulum frame (order no. 50080196) by the retaining ring.

1. Put half-shells (d) of adapter on desired position of assembly pipe
2. Insert recessed head screws (c) in provided impressions and screw both parts together
3. Screw stop nuts on the two knurled banjo bolts (e) (both included in delivery of pendulum frame)
4. Screw knurled banjo bolts (e) into the bore holes M8 of the retaining ring and fix them by the stop nuts
5. Hang assembly into the pillow blocks of the pendulum frame.

3.4 Mounting

3.4.1 Mounting of electrodes

The assembly can be fitted with electrodes with a threaded Pg 13.5 plug-in head, a shaft length of 120 mm and a shaft diameter of 12 mm.

Caution!
- Before mounting the pH electrode make sure that the electrode shaft is fitted with an O-ring and clamping ring and that the protection cap is removed.
- Make the electrodes slidable before mounting. Wetting with water is sufficient.

Removal of the electrode holder
Disengage the bayonet lock (a) by turning the electrode holder (b).

Mounting of the electrode(s)
1. Unscrew upper dummy plug (d).
2. Remove lower dummy plug (e).
3. Screw in electrode (c).

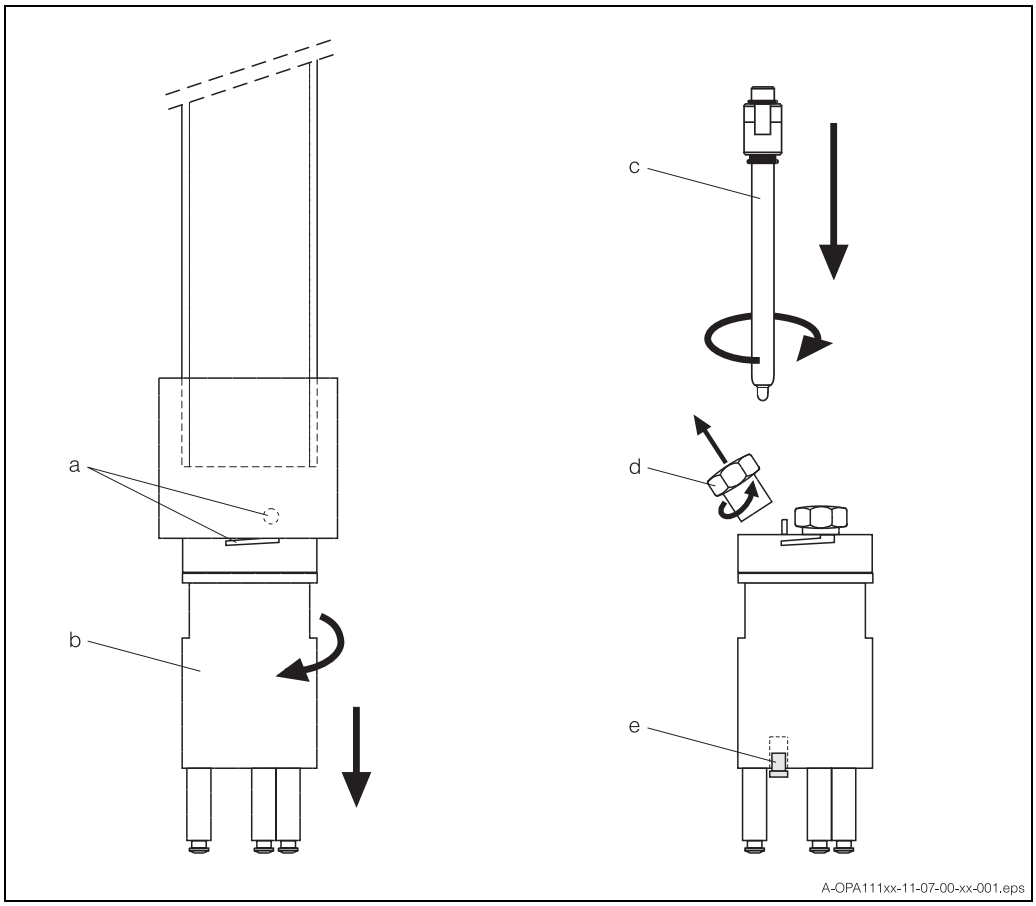


Fig. 3.12: Removal of the electrode holder (left), mounting of the pH/redox electrode (right)
a Bayonet lock
b Electrode holder
c pH/redox electrode
d Dummy plug
e Dummy plug

3.4.2 Mounting of measuring cable

1. Unscrew cover (a) from assembly head (b).
2. Push the terminated end of the measuring cable through the assembly pipe.
3. Screw the electrode connector of measuring cable (c) onto electrode (d).
4. Plug the potential matching connector (e) into the AMP connector.
5. Close the bayonet lock by turning electrode holder (g).
6. Push the non-terminated end of the measuring cable through the cable gland Pg 13.5 (f); be sure to have an extra measuring cable length of approx. 10 cm!
7. Screw cover (a) onto assembly head (b).
8. Tighten the Pg cable gland (f).

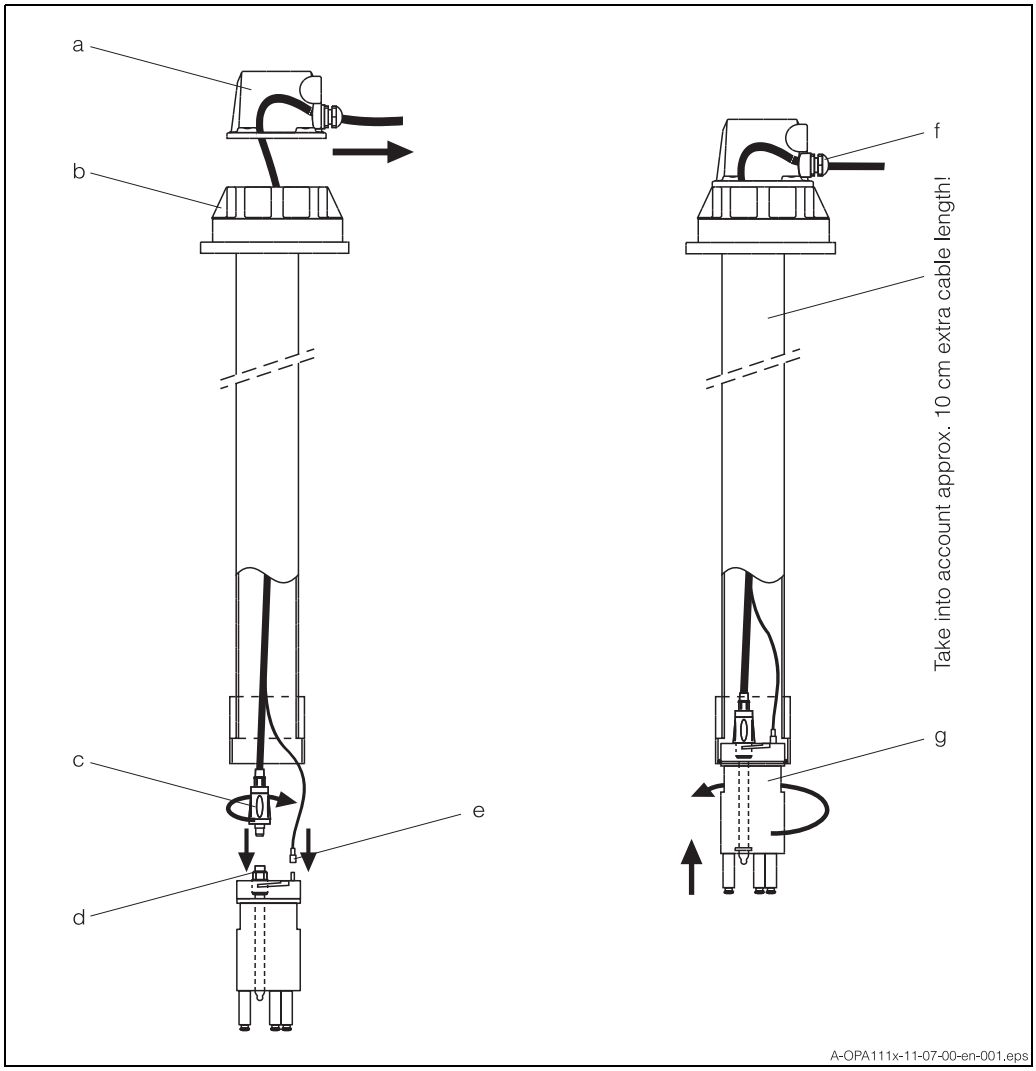


Fig. 3.13: Mounting of the measuring cable
a Cover
b Assembly head
c Cable connector plug
d Electrode
e PM connector plug
f Cable gland Pg 13.5
g Electrode holder

4 Maintenance

4.1 Cleaning of electrodes

Soiling of the electrode may impair measurement up to malfunction:
- Coatings on the pH-sensitive part of the glass electrode cause poor response time and low sensitivity.
- Soiling or blocking of the diaphragm causes poor response and unstable measurement.

Therefore all parts in contact with the medium must be cleaned at regular intervals. The frequency and intensity of cleaning depend on the medium to be measured.

Caution!
- Do not use abrasive cleaning agents. These may cause irreparable damage to the glass membrane of the electrode.
- After cleaning, the complete system must be thoroughly rinsed with water (tap water, no distilled or deionised water). Cleaning agent residue not removed may impair measurement.
- After each cleaning, the measuring system should be checked and recalibrated if required.

Cleaning
The procedure depends on the degree of soiling.
- Remove light soiling and coatings by rinsing with a suitable cleaning agent.
- To remove adherent dirt, use a soft brush and suitable cleaning agent.

A cleaning of the electrodes in an installed condition may be carried out by a spray cleaning head.

Selection of cleaning agents
The selection of cleaning agents depends on the type of soiling. The types of soiling most frequently encountered and the corresponding cleaning agents are listed in the following table.

Soiling, coating	Cleaning agent
Grease and oil	(Alkaline) agents containing surfactants or water-soluble organic solvents (e.g. alcohol)
Limestone deposits, metal hydroxide coatings, heavy biological coatings	Hydrochloric acid (3%)
Sulphide deposits	Mixture of hydrochloric acid (3%) and thiourea (commercial)
Protein coatings	Mixture of hydrochloric acid (0.1-molar) and pepsin (commercial)
Fibres, suspended substances	Pressure water, containing wetting agents if required
Light biological coatings	Pressure water

Note!
Redox electrodes may only be cleaned mechanically. Chemical cleaning forces a potential to the electrode. This potential takes several hours to decay and causes a measured error.

4.2 Maintenance work

All in all, the OPA 111 is a very low-maintenance assembly. Safe operation, however, requires the following maintenance work:
- Replace damaged assembly parts.
- Keep O-rings and sealing surfaces clear of dirt.
- Replace damaged O-rings.
- Grease dry O-rings.
- Remove adherent coatings from time to time.

5 Accessories

❑ pH electrodes:
– OPS 11
– OPS 21
– OPS 31
– OPS 41

❑ Redox electrode:
– OPS 12

Fig. 5.1: Pressure electrolyte reservoir OPY 7 for wall mounting, OPA 111 with spray cleaning head, wet bucket (from left to right)

❑ Electrolyte reservoir OPY 7
It is used to supply unpressurized or pressurized electrodes filled with liquid electrolyte. The delivery includes:
– Distance pipe
– Gland Pg 9 with connection hose
– Pressure hose and hose couplings with check valve (version for pressurized applications)
– Wall mounting support (optional)
see operating instructions order no. 51502346

❑ Spray cleaning head
Spray cleaning system for hydromechanical-chemical cleaning of the electrodes.

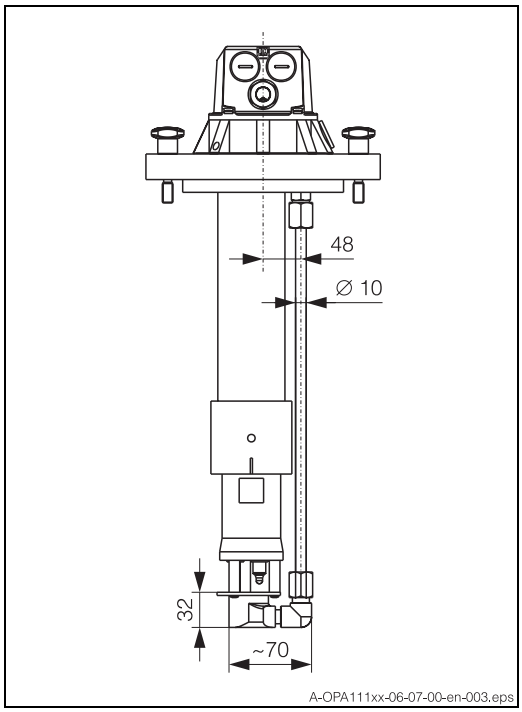


Fig. 5.2: Dimensions of OPA 111 with spray cleaning head

❑ Wet bucket for OPA 111
Can be used in open containers, tanks or channels to prevent drying out of electrodes at too low water level.
Material: PP
Order no. 50066569

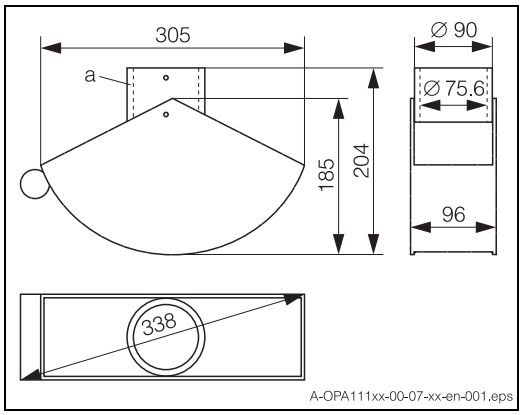


Fig. 5.3: Dimensions of wet bucket
a Distance pipe

❑ Calibration cap for OPA 111. Designed for calibration of pH/redox electrodes. An advantage is the short-time mounting possibility at the distance bolts of the electrode holder.
Material: PP
Order no. 50066570

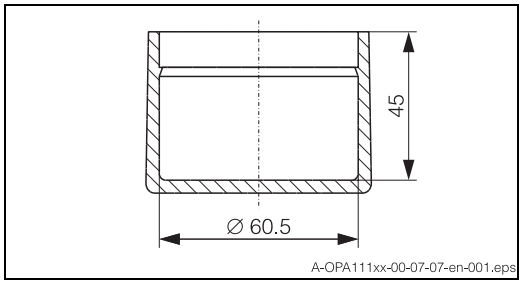


Fig. 5.4: Dimensions of calibration cap; max. filling volume 70 ml

❑ Mounting frame for OPA 111
Material: SS 304
Order no. 50066561

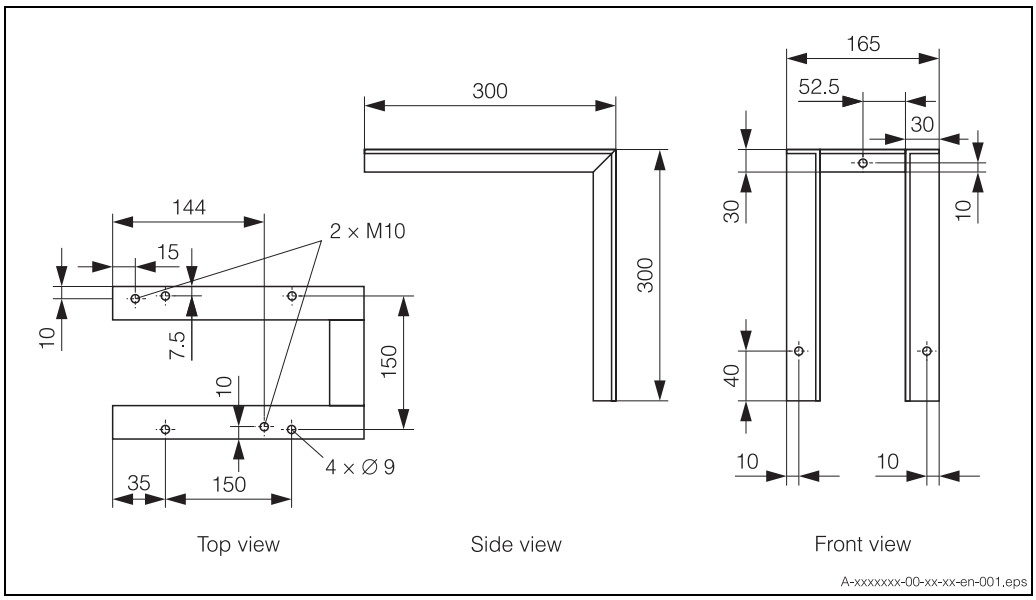


Fig. 5.5: Dimensions of mounting frame

❑ Pendulum frame for pendulous suspension of OPA 111, OPA 510, OLA 111 and CYA 611
Order no. 50080196

❑ Retrofit kit for mounting of OPA 111 on pendulum frame
Order no. 50087873

❑ Adapter for adjustable flange DN 100 for OPA 111 to adjust immersion depth
Order no. 50070514
see chapter 3.3.2

❑ Flange DN 100 unpressurized, suitable to adapter for adjustable flange
Order no. 50066632

❑ O-ring set for OPA 111
Material: EPDM
Order no. 50091993

6 Technical data

Mounting	
Version A	flange DN 100, with additional captive star handle screws
Version B	adjustable flange DN 100
Version C	pressurized flange DN 100
Version D	suspension bracket; material: SS 316Ti
Version F	for pendulum frame mounting
Materials in contact with medium	
Electrode holder	PP-GF 20
Immersion pipe	PP
Potential matching pin	SS 316Ti
O-ring	EPDM
additionally for versions D, F:	
Half-shells	grey cast iron, coated with PVC
Cable clamp	SS 316, plastic-coated
Operating pressure and temperature	
Versions A, B, D, F	unpressurized, 80 °C
Version C	4 bar at 20 °C, unpressurized at 80 °C
Measures and weight	
Cable glands	1 × Pg 13.5, 2 × Pg 16
Number of electrodes	max. 3
Electrode length	120 mm
Immersion depth	standard: 1000 mm, 2000 mm special length: 500 … 3000 mm
Required cross section	DN 100
Weight	approx. 4 kg

Subject to modifications.

Caution!
The operating limits of the system are determined by the operating limits of the individual components used (assembly, sensors, cable, accessories, etc.).

Index

Gefahrgutblatt für Reparaturen
Safety regulation form for repairs
Bulletin de marchandises dangereuses pour réparations

Lieber Kunde, bitte helfen Sie uns mit Ihren Informationen, damit wir Ihre Reparatur schnell, exakt und risikofrei durchführen können.
Dear customer, please help us with your information to handle your repair fast, exact and free of any risks for the technicians.
Cher client, aidez-nous avec vos informations, afin que nous puissions exécuter vos réparations rapidement, exactement et sans risques.

Firma / company / entreprise: _____

Abt. / dept. / service: _____

Anschrift / adress / adresse: _____

Name / name / nom: _____

Tel. / phone: _____

Fax: _____

Sensortyp / type of sensor / modèle de détecteur: _____

Auswertegerät / type of instrument / type d´appareil: _____

Seriennummer / serial no. / numéro de série: _____

Seriennummer / serial no. / numéro de série: _____

Prozessdaten / process data / données des opérations

Medium: _____

Chemische Formel:
Chemical formula:
Formule chimique: _____

Gereinigt mit / cleaned with / nettoyé avec

Medium: _____

_____

SAFE

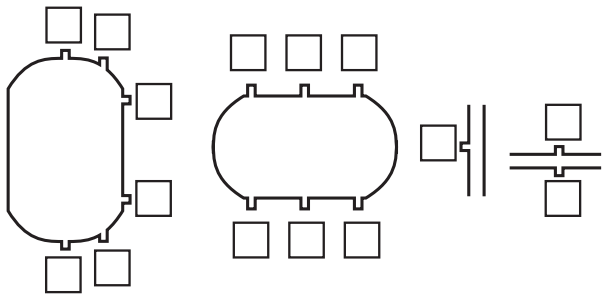
Ungefährlich
Safe to handle
Sans danger

Aggregatzustand / state of aggregation / état d´agrégation

flüssig/liquid liquide ☐ fest/solid solide ☐

gasförmig/gazeous gazéiforme ☐ pulverig/powdery poudreux ☐

Einbauort / mounting place / lieu de montage



Ex-Anlage / Ex-Zone / Ex-plan

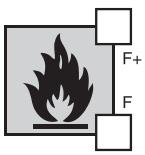
Ja Yes Oui ☐ Nein No Non ☐ Zone Class _____

Sicherheitshinweise / safety regulations / normes de sécurité

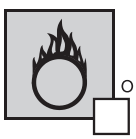
Umweltgefährlich
Dangerous for the envir.
Dangereux pour l'envir.

Radioaktiv
Radioactive
Radioactif

Giftig
Toxic
Toxique

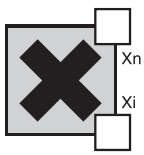


Entzündlich
Flammable
Inflammable

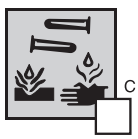


Brandfördernd
Oxidizing
Comburant

Expl.gefährlich
Explosive
Explosif



Schädlich / Reizend
Harmful / Irritant
Nocif / Irritant



Ätzend
Corrosive
Corrosif

Ungefährlich
Safe to handle
Sans danger

➤ Hiermit bestätigen wir, dass die zurückgeschickten Geräte frei sind von jeglichen Gefahr- oder Giftstoffen (Säuren, Laugen, Lösungsmitteln, usw.). Radioaktiv kontaminierte Geräte müssen vor Einsendung entsprechend den Strahlenschutzvorschriften dekontaminiert werden. Falls spezielle Handhabungsvorschriften nötig sind, legen Sie diese bitte bei.
➤ We herewith confirm that the returned instruments are free of any dangerous or toxic materials (acids, caustics, solvents, etc.). Radioactive contaminated instruments must be decontaminated according to nuclear safety regulations prior to shipment. If special handling regulations are required, please attach.
➤ Par la présente, nous certifions que les instruments en retour sont exempts de tous risques de contamination ou de matières toxiques. Avant expédition les instruments contaminés par de la radio-activité doivent être décontaminés en référence aux prescriptions des règles de securité en vigueur contre les radiations nucléaires. Au cas où des règles de manipulations spécifiques sont nécessaires, veuillez les joindre s. v. p.

Datum / date: _____ Unterschrift: _____
Firmenstempel / stamp / cachet: _____ Signature: _____

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