

General Specifications

Model FD20
Immersion Fittings for pH/ORP (Redox)
measuring loops

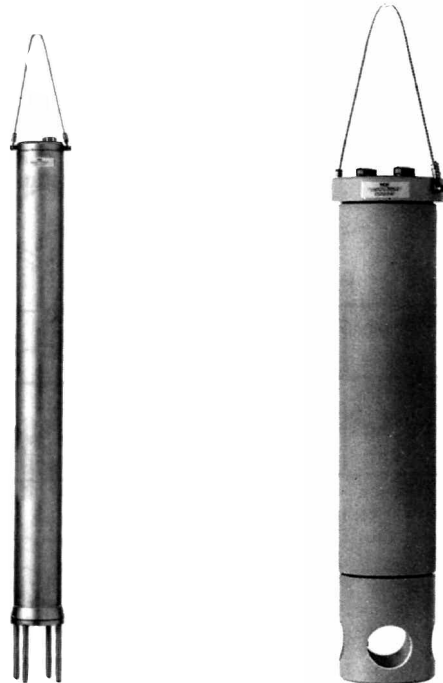
pH/ORP

For liquid analysis, the sensors are usually mounted in either a flow or an immersion fitting. Therefore Yokogawa has invested considerable design and development time in producing a full range of fittings with particular emphasis on designs that reduce installation and maintenance time and consequently save operation costs.

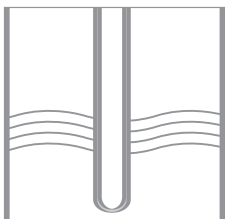
A high degree of standardisation makes it possible to mount electrodes with DIN dimensions direct in a fitting. For most other types a mounting kit (accessory) is available. A wide choice of construction materials gives the user the optimal solution for any process considering chemical resistance, pressure and temperature specifications. The immersion fittings are designed for either pH or ORP (Redox) measurements in tanks, open vessels and drains. They have a "hoisting cable" for easy maintenance. The program includes fittings for mounting of 1 electrode, 3 electrodes, 4 electrodes or alternatively 3 electrodes and a cleaning system. As standard, the immersion length can be between 0.5 and 2 m. A flange for fixing in tanks, etc. is available on request.

Features

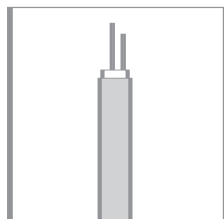
- Designed for either pH or ORP measurements in tanks open vessels and drains.
- "Hoisting cable" for easy maintenance.
- Pre-selected immersion length.
- Wide choice of construction materials.
- Flange mounting.
- High degree of standardisation reduces spare holding requirements.
- Liquid earth pin for stable measurements.
- Chemical or brush cleaning systems as an option.



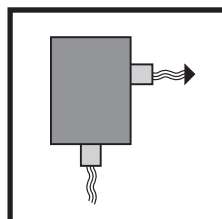
System Configuration



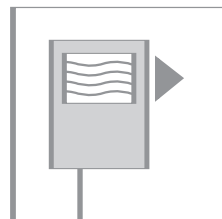
Sensors



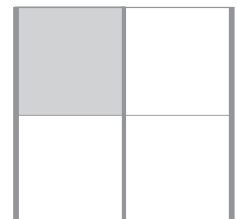
Cables



Fittings



Transmitters



Accessories

General Specifications

Materials

- Wetted parts
 - A. Body (refer to model code): Polypropylene (PP)
Stainless steel AISI 316 (SS)
Polyvinylchloride (PVC)
Polyvinylidene fluoride (PVDF)
 - B. "O" rings : Silicone rubber
 - C. Liquid earth sensor : Titanium (PP and PVDF design)
Stainless steel AISI 316 (SS design)
- Electrode mounting sets : Ryton R 4
- "Hoisting eye" : Stainless steel cable (twisted)

Weight* : See tabel 1

Table 1

| Material | PVC | PP | SS | PVDF |
|----------------|--------|--------|--------|--------|
| Fitting | | | | |
| 1-hole fitting | 0.4 kg | | | |
| 3-hole fitting | | 2 kg | 5.3 kg | 2.5 kg |
| 4-hole fitting | | 4.5 kg | 5.4 kg | 5.5 kg |

* The accessories are not included.
The noted weights are at an immersion length of 1 m.

Mounting : by means of the "hoisting eye" or flange mounting

Functional Specifications

Temperature

- min. : -10°C
- max. : depending on material and application (see figure 1)

Immersion length (in dm) : between 0.5 and 2.0 m

Pressure : see figure 1

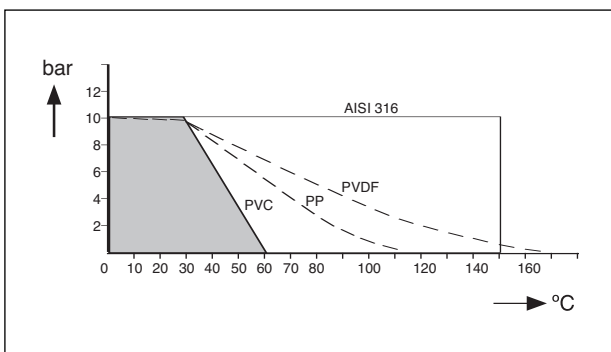
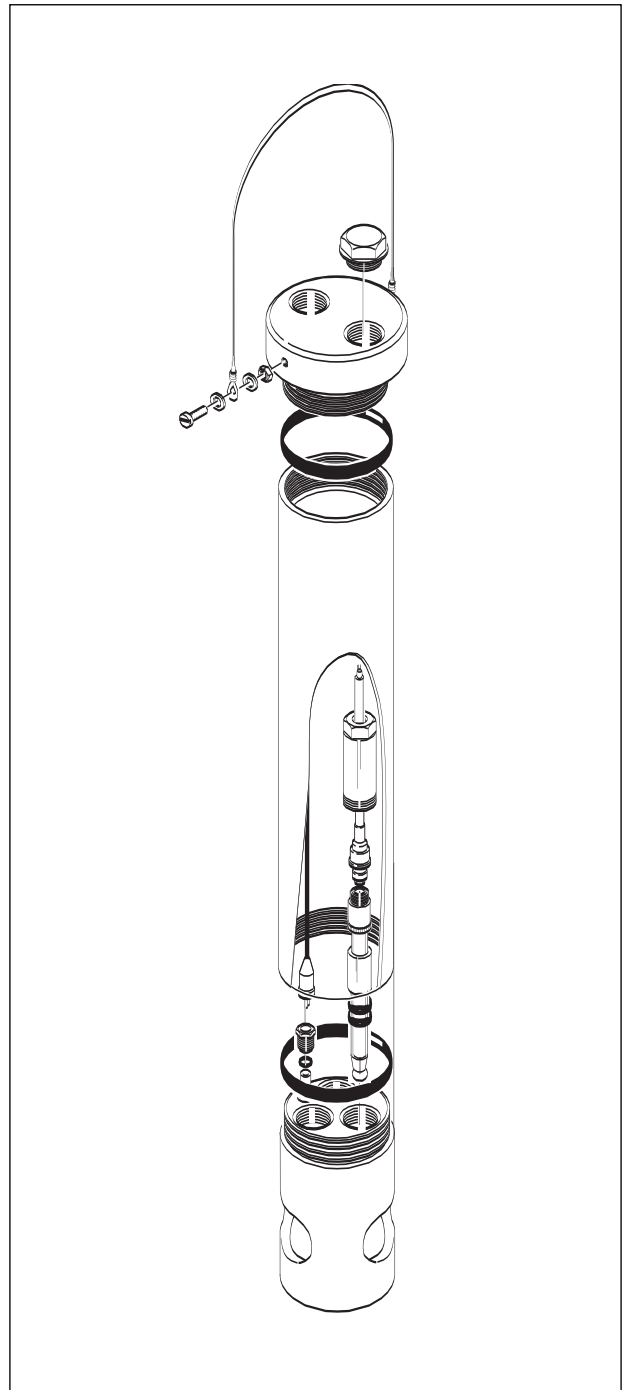


Fig. 1. Pressure/temperature class



FD20-P37-10-NF*A

Model and Suffix codes

| Model | Suffix Code | Option Code | Description |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FD20F37 FD20F47 FD20P37 FD20P47 FD20S37 FD20S47 FD20V18 ¹ | | | Immersion fitting, PVDF, 3 electrode mounting holes Immersion fitting, PVDF, 4 electrode mounting holes Immersion fitting, PP, 3 electrode mounting holes Immersion fitting, PP, 4 electrode mounting holes Immersion fitting, SS, 3 electrode mounting holes Immersion fitting, SS, 4 electrode mounting holes Immersion fitting, PVC, 1 electrode mounting hole |
| Immersion length ² | -NN | | Between 5 and 20 (in dm) example 06=0.6 mtr. |
| Flange ³ (Working pressure not more than 3 bar) | -NF -F1 -F2 -F3 -F4 -F5 -F6 -F7 -S1 -S2 -S3 -S4 -S7 | | No flange Flange DN32 for 1 hole fitting Flange DN80 for 3 hole fitting PP Flange DN80 for 3 hole fitting PVDF Flange DN80 for 3 hole fitting SS Flange DN125 for 4 hole fitting PP Flange DN125 for 4 hole fitting PVDF Flange DN100 for 4 hole fitting SS Flange ANSI 1 1/4" 150Lbs for 1 hole fitting PVC Flange ANSI 3" 150Lbs for 3 hole fitting PP Flange ANSI 3" 150Lbs for 3 hole fitting PVDF Flange ANSI 4" 150Lbs for 3 hole fitting SS Flange ANSI 4" 150Lbs for 4 hole fitting SS |
| | | *A | Style A |
| Options | | | |
| Cleaning system | | /HCN2 /HCN3 /HCN4 | FD20- .27 FD20- .37 FD20- .47 |
| Protectionhose installation kit | | /PH5 /PH10 | For 5.5 m cable For 10 m cable |
| Mounting kit | | /R /B | For mounting (top) refillable electrodes with along glass shaft For mounting Bellomatic reference and combined electrodes |
| KCL reservoir ⁴ | | /K | Electrolyte tubing is included (2.5 m) (only in combination with /R) |
| Salt bridge | | /S | For liquid which cannot stand contamination with KCL |
| Certificate | | /M | 3.1 according EN 10024 for wetted metal parts |

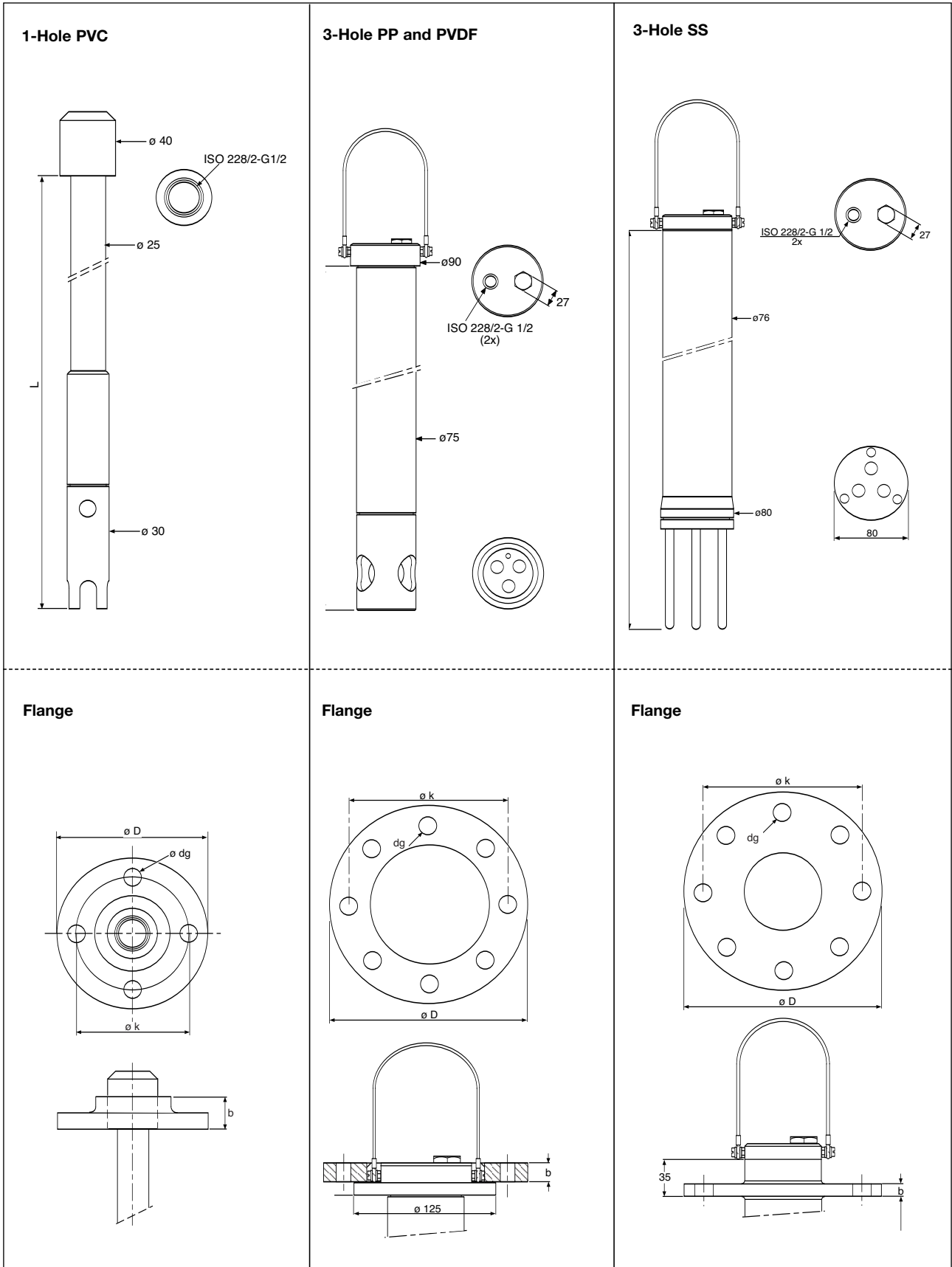
- PVC is available in a 1-hole design only.
- The immersion length of stainless steel fittings with a flange will be shortened by 35 mm (refer to dimensional drawings).
- Configuration of hole (see dimensional drawings).
Working pressure not more than 3 bar.
For higher pressure ratings please contact your local Sales Department of Yokogawa.
- In combination with /R option only.

Notes:

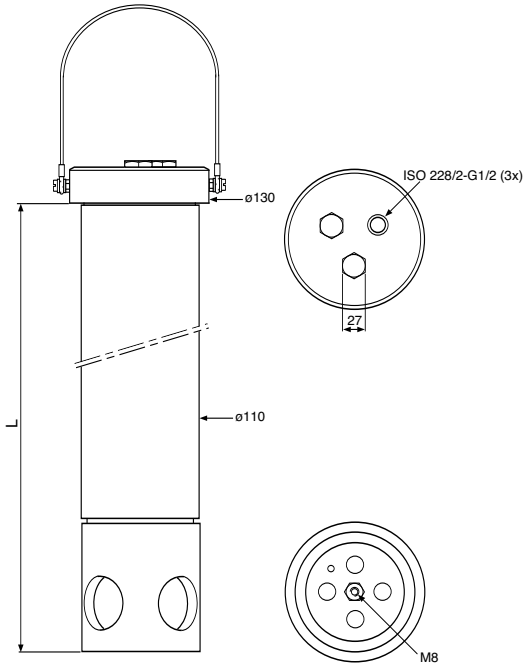
- Options are supplied with the fitting.
- The available length of the electrode cables between fitting and converter or connection box is cable length minus immersion length (L).
- It is possible to order the fittings assembled (complete with cables, cleaning system, options, etc.). Please contact your local Yokogawa sales organisation for more information.

Dimensions

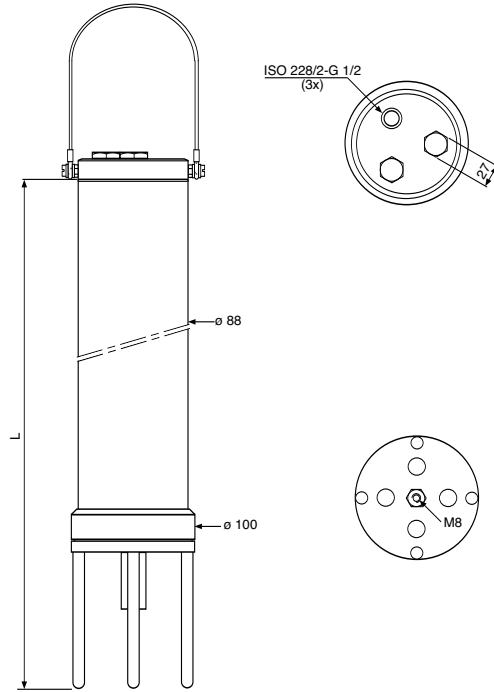
Unit: mm



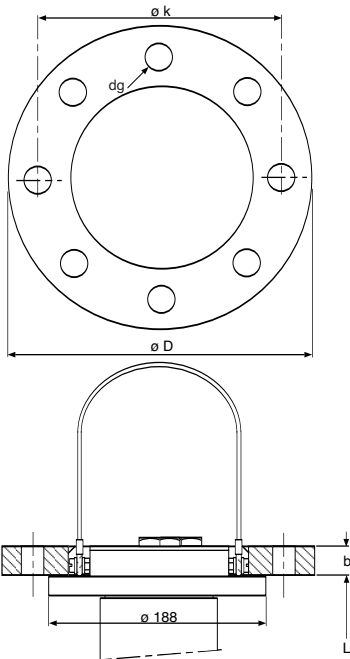
4-Hole PP and PVDF



4-Hole SS



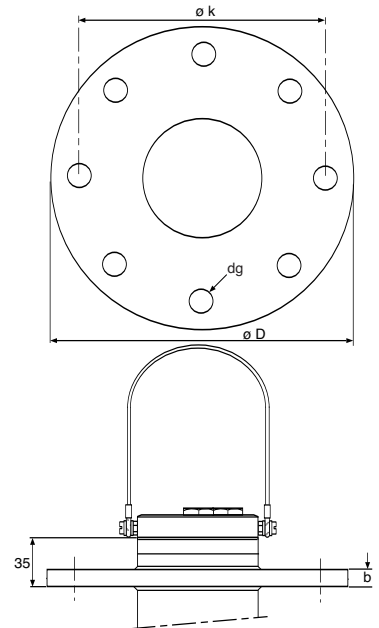
Flange



unit in mm

| | L | D | k | dg | b |
|----------------|--------|-------|-------|----|------|
| FD20-V18...-FN | 5-20dm | | | | |
| FD20-V18...-F1 | 5-20dm | 120 | 90 | 14 | 26 |
| FD20-V18...-S1 | 5-20dm | 120 | 90 | 16 | 26 |
| FD20-P37...-FN | 5-20dm | | | | |
| FD20-F37...-FN | 5-20dm | | | | |
| FD20-P37...-F2 | 5-20dm | 200 | 160 | 18 | 20 |
| FD20-F37...-F3 | 5-20dm | 200 | 160 | 18 | 20 |
| FD20-P37...-S2 | 5-20dm | 190 | 152.4 | 20 | 18 |
| FD20-F37...-S3 | 5-20dm | 190 | 152.4 | 20 | 18 |
| FD20-S37...-FN | 5-20dm | | | | |
| FD20-S37...-F4 | 5-20dm | 200 | 160 | 18 | 10 |
| FD20-S37...-S4 | 5-20dm | 228.6 | 190.5 | 19 | 23.8 |
| FD20-P47...-FN | 5-20dm | | | | |
| FD20-F47...-FN | 5-20dm | | | | |
| FD20-P47...-F5 | 5-20dm | 250 | 210 | 18 | 25 |
| FD20-F47...-F6 | 5-20dm | 250 | 210 | 18 | 25 |
| FD20-P47...-S5 | 5-20dm | 285 | 241 | 22 | 30 |
| FD20-F47...-S6 | 5-20dm | 285 | 241 | 22 | 30 |
| FD20-S47...-FN | 5-20dm | | | | |
| FD20-S47...-F7 | 5-20dm | 220 | 180 | 18 | 10 |
| FD20-S47...-S7 | 5-20dm | 228.6 | 190.5 | 19 | |

Flange



Accessories

| Type no. | Description |
|-----------|------------------------------------------------------------------------------------------------|
| K1500FU | KCl-reservoir + tubing (2.5 mtr) (option /K) |
| K1500GA | Electrolyte tubing (5 mtr) for connection between KCl-reservoir and electrode |
| SB20-VC | Salt bridge (option /S) |
| FC20-VE* | Brush cleaning system (electric driven) |
| BC10* | Supply unit (220 V/24 V) for motor-drive of electric driven brush cleaning |
| FC20-VP* | Brush cleaning system (pneumatic driven) |
| BA10 | Connection box (between electrodes and transmitter) |
| WF10 | Connection cable (per mtr) between connection box and transmitter input |
| K1500BX | Grommet for watertight cable input in PG 16 gland (3 electrodes cables and liquid earth cable) |
| K1500BY | Mounting kit for (top) refillable electrodes (option /R) |
| FP20-S13 | Mounting kit for BELLOMATIC reference electrode and combined electrodes (option /B) |
| WU20-PC01 | COAX-cable (1 mtr) for single electrode |
| WU20-PC02 | COAX-cable (2 mtr) for single electrode |
| WU20-PC05 | COAX-cable (5.5 mtr) for single electrode |
| WU20-PC10 | COAX-cable (10 mtr) for single electrode |
| WU20-PC15 | COAX-cable (15 mtr) for single electrode |
| WU20-PC20 | COAX-cable (20 mtr) for single electrode |
| WU20-PC25 | COAX-cable (25 mtr) for single electrode |
| WU20-LT01 | TRIAX-cable (1 mtr) for combined electrode |
| WU20-LT02 | TRIAX-cable (2 mtr) for combined electrode |
| WU20-LT05 | TRIAX-cable (5.5 mtr) for combined electrode |
| WU20-LT10 | TRIAX-cable (10 mtr) for combined electrode |
| WU20-LT15 | TRIAX-cable (15 mtr) for combined electrode |
| WU20-LT20 | TRIAX-cable (20 mtr) for combined electrode |
| WU20-LT25 | TRIAX-cable (25 mtr) for combined electrode |
| K1500FV | Liquid earth cable (10 mtr) |
| K1500DU | Liquid earth cable (25 mtr) |

* For details see GS 12B6V1-E-E

Service Parts

| Type no. | Description |
|----------|-----------------------------------------------------------------------------|
| K1500BW | Diaphragm tube for SB20-VC |
| K1500EE | Diaphragm tube for SB20-VP |
| K1500EF | Diaphragm tube for SB20-VS |
| K1500DX | Nylon tubing for salt bridge |
| K1520NA | Tubing (ø 4x6) for brush cleaning (pneumatic driven) |
| K1520FJ | Tubing (ø 1/4") for chemical cleaning (5 m) |
| K1520FK | Tubing (ø 1/4") for chemical cleaning (10 m) |
| K1500GR | O-ring (11x3) for electrode mounting (8 pieces) |
| K1500GH | Set O-rings for 1-hole fitting (PVC) |
| K1500GU | Set O-rings for 3-hole fitting (PP and PVDF) |
| K1500GV | Set O-rings for 4-hole fitting (PP and PVDF) |
| K1500GW | Set O-rings for 3-hole fitting (SS) |
| K1500GX | Set O-rings for 4-hole fitting (SS) |
| FP20-R12 | Electrode mounting set (Ryton R4) |
| FP20-S12 | Electrode mounting set (SS) |
| K1500HC | Sealing rings for BELLOMATIC electrode holder (10 pieces) |
| K1500GE | 5 Sets O-rings for BELLOMATIC electrode |
| K1500FZ | O-ring for mounting the (top) refillable electrodes with a long glass shaft |
| K1520NB | Brush for mechanical cleaning |
| K1500DQ | /PH3 protection hose (3 m) |
| K1500DN | /PH3 protection hose (10 m) |
| K1500DR | /PH15 protection hose (15 m) |
| K1500DS | /PH20 protection hose (20 m) |
| K1500DM | /PH25 protection hose (25 m) |

GS 12B6K2-01E-E

Consumable Parts

| Type no. | Description |
|----------|-----------------------------------------|
| 6C231 | Buffer powder pH 1.68 (at 25°C) |
| 6C232 | Buffer powder pH 4.01 (at 25°C) |
| 6C237 | Buffer powder pH 6.87 (at 25°C) |
| 6C236 | Buffer powder pH 9.18 (at 25°C) |
| K1500GF | 250 ml. KCl-solution (1 M) |
| K1500GG | 250 ml. KCl-solution (1 M), thickened |
| K1520VA | 250 ml. KCl-solution (3.3 M) |
| K1520VN | 250 ml. KCl-solution (3.3 M), thickened |

Spare Parts FD20F47

| Part no. | Description |
|----------|----------------------------|
| K1500FE | O-ring set EPDM FD20P&F47 |
| K1500FF | O-ring set Viton FD20P&F47 |
| K1500GV | O-ring set FD20P&F47 |

Spare Parts FD20S37

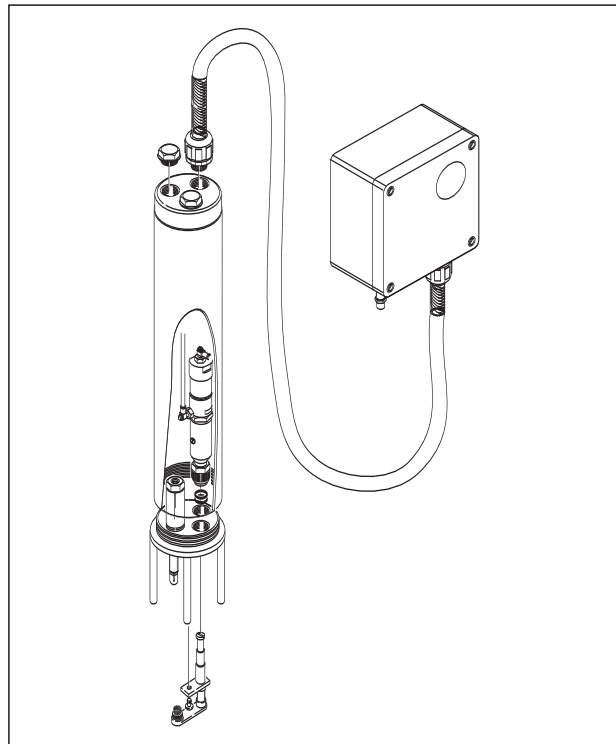
| Part no. | Description |
|----------|-------------------------------|
| K1500AN | Hauling parts kit for FD20-SS |
| K1500FC | O-ring set EPDM FD20-S37 |
| K1500FD | O-ring set Viton FD20-S37 |
| K1500GW | O-ring set FD20S37 |

Spare Parts FD20S47

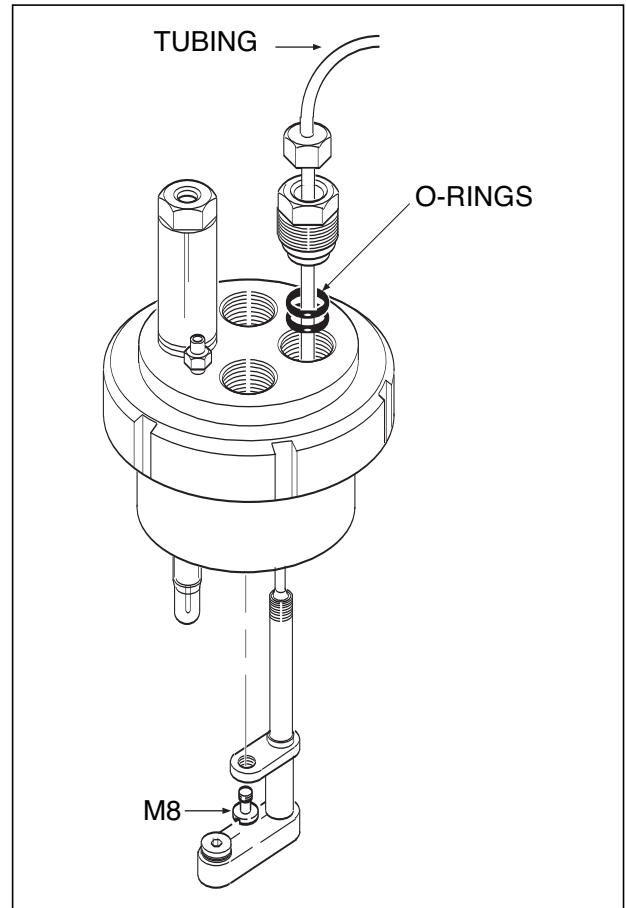
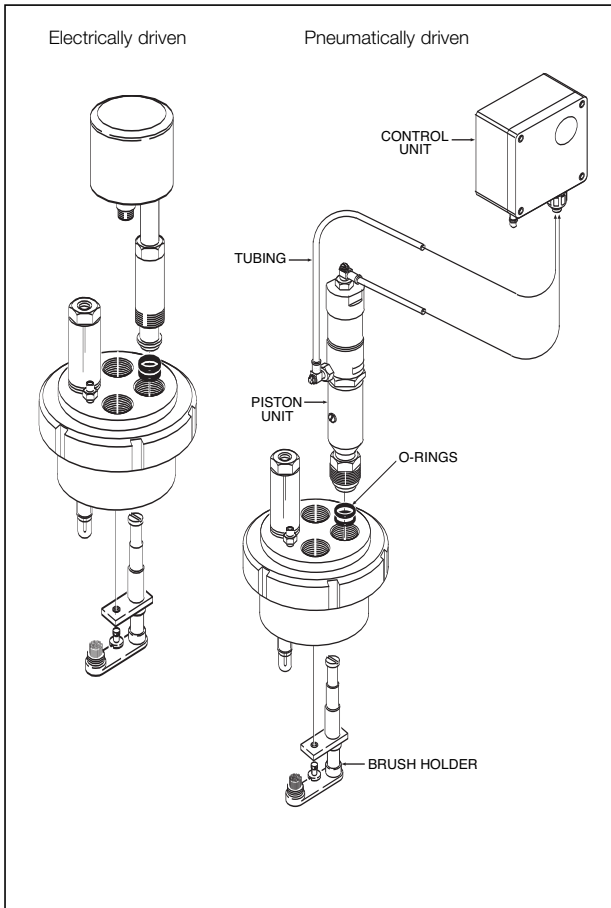
| Part no. | Description |
|----------|------------------------------|
| K1500FG | O-ring set EPDM FD20-S47 |
| K1500FH | O-ring set Viton FD20-S47 |
| K1500GT | O-ring set silicon. FF20-.4. |
| K1500GX | O-ring set FD20S47 |

Spare Parts FD20V18

| Part no. | Description |
|----------|----------------------------|
| K1500GH | O-ring set 1-hole imm. PVC |



FD20-S47-10-NF*A with FC20-VP fitted



Ordering Instructions

When ordering, specify model and codes, item name and part numbers.

Items to be specified:

- | | |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Immersion fitting | : FD20-V18, FD20-P37, FD20-P47, FD20-S37, FD20-S47, FD20-F37 or FD20-F47 |
| 2. Suffix codes, if relevant | : |
| 3. Electrode cables | : WU20-PC01, WU20-LT01 WU20-PC02, WU20-LT02 WU20-PC05, WU20-LT05 WU20-PC10, WU20-LT10 WU20-PC15, WU20-LT15 WU20-PC20, WU20-LT20 WU20-PC25, WU20-LT25 |
| 4. Liquid earth cable | : K1500FV (10 m) |
| 5. Connecting box/extension cable (up to 30 mtr. cable length) | : BA10/WF10 |
| 6. Cleaning system | : FC20-VP, FC20-VE, HCN2/3, HCN4 or HCNF |
| 7. Consumable parts | : Part name and part number (quantity) |
| 8. Service parts | : Part name and part number (quantity) |

Selection Criteria

| Chemical | | Concentration and pH | | Material | | | |
|-----------------|--------------------------------------------|----------------------|-----------|----------|------|----|--------|
| | | W/V (%) | pH (25°C) | PVC | PVDF | PP | SS 316 |
| Inorganic acid | Sulfuric acid | 0.5 | 1.0 | ○ | ○ | ○ | X |
| | | 0.05 | 2.0 | ○ | ○ | ○ | X |
| | Hydrochloric acid | 0.4 | 1.0 | ○ | ○ | ○ | X |
| | | 0.04 | 2.0 | ○ | ○ | ○ | X |
| | Nitric acid | 0.6 | 1.0 | ○ | ○ | ○ | ○ |
| | | 0.06 | 2.0 | ○ | ○ | ○ | ○ |
| | Phosphoric acid | 1.0 | 1.5 | ○ | ○ | ○ | ○ |
| | Boric acid | 0.6 | 5.0 | * | ○ | ○ | * |
| | Carbonic acid | 0.6 | 3.6 | ○ | ○ | ○ | * |
| Chromic acid | 1.2 | 0.8 | ○ | ○ | ○ | ○ | |
| Sulfurous acid | 0.8 | 1.4 | ○ | ○ | ○ | * | |
| Organic acid | Acetic acid | 0.6 | 2.8 | * | ○ | ○ | * |
| | Formic acid | 0.5 | 2.3 | * | ○ | ○ | ○ |
| | Oxalic acid | 0.9 | 1.0 | * | ○ | * | * |
| | Lactic acid | 0.9 | 2.4 | * | X | ○ | ○ |
| | Phenol acid | 0.9 | 5.4 | * | ○ | * | ○ |
| | Monochloroacetic acid | 0.9 | 1.8 | X | ○ | ○ | ○ |
| | | | | | | | |
| Alkali | Calcium hydroxide | 0.2 | 12.4 | ○ | ○ | ○ | ○ |
| | Potassium hydroxide | 0.5 | 12.7 | ○ | ○ | ○ | * |
| | Sodium hydroxide | 0.4 | 12.9 | ○ | ○ | ○ | ○ |
| | Ammonium hydroxide | 0.5 | 10.4 | ○ | ○ | ○ | ○ |
| Acid salt | Ammonium chloride | 5 | | ○ | ○ | ○ | X |
| | Aluminous water | 5 | | ○ | ○ | ○ | * |
| | Zinc chloride | 5 | | ○ | ○ | ○ | X |
| | Iron (III) chloride | 5 | | ○ | ○ | ○ | X |
| | Iron (III) nitrate | 5 | 1.3 | ○ | ○ | ○ | ○ |
| Basic salt | Sodium sulfite | 5 | | ○ | ○ | ○ | * |
| | Sodium carbonate | 5 | 11.8 | ○ | ○ | ○ | ○ |
| | Sodium phosphate | 5 | | ○ | ○ | ○ | * |
| Neutral salt | Potassium chloride | 5 | | ○ | ○ | ○ | X |
| | Sodium sulfate | 5 | | ○ | ○ | ○ | * |
| | Calcium chloride | 5 | | ○ | ○ | ○ | X |
| | Sodium nitrate | 5 | 8.2 | ○ | ○ | ○ | * |
| | Aluminium chloride | 5 | | ○ | ○ | ○ | X |
| Oxidizing agent | Hydrogen peroxide | 1 | | ○ | ○ | ○ | * |
| | Sodium hypochlorite solution | 1 | 12.5 | ○ | ○ | * | X |
| | Chlorinated lime | 1 | | * | ○ | ○ | * |
| | Potassium dichromate | 5 | 4.5 | ○ | ○ | ○ | * |
| Organic solvent | Alcohol | 10 | | ○ | ○ | ○ | ○ |
| | Organic solvent or oil (excluding alcohol) | | | * | ○ | * | ○ |
| | Chlorinated solvent | | | X | ○ | X | * |

○ = can be used
 * = shortens useful life
 X = cannot be used

Note:

- pH in table was calculated with dissociated constant (related to measurement)
- When any of the two conditions listed below are applicable, please consult our sales department.
 - Strong, oxidizing solutions such as aqua regia, chromic acid, hypochloric acid, perchloric acid, etc.
 - The organic solvent is contained in the order of a few percent.

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