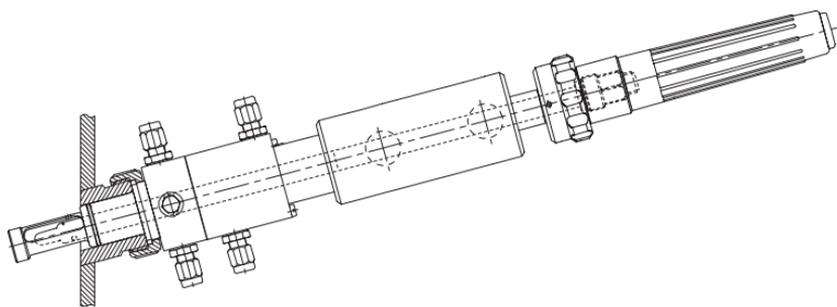


**InTrac® 797-M**

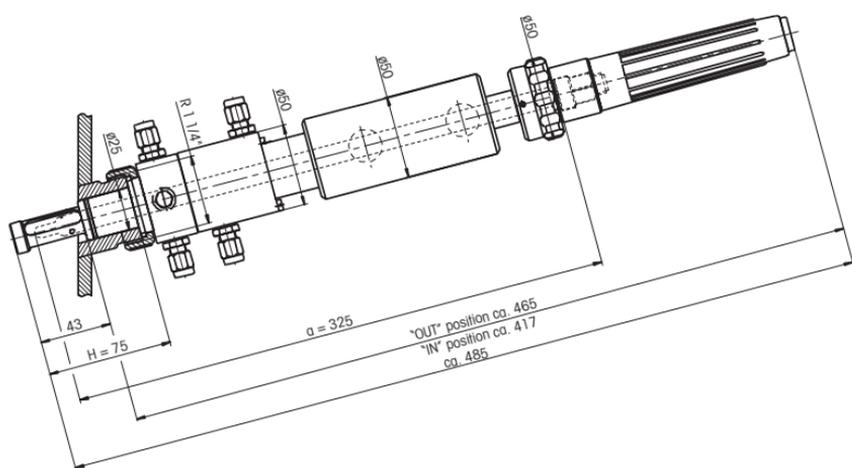
**InTrac® 797-P**

**Instruction manual**



# InTrac® 797-M InTrac® 797-P

## Instruction manual



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## 1. Introduction



- When used correctly the InTrac® 797 retractable housing is safe to operate and does not present any danger.
- **Before starting to use the housing carefully read this Instruction Manual, and observe the safety precautions and warnings contained in it.**
- The housing has been tested by us and dispatched ready for installation.
- The retractable housing is delivered without fittings for connecting steam lines. Sets of steam-line fittings in various types are obtainable as accessories (see 7.2) and can easily be attached to the housing (the illustrations in this manual show the InTrac® 797 housing fitted with Serto unions).

## 2. General remarks

### 2.1 Please note

- On receipt immediately check that the housing is undamaged and the accessories are complete.
- For further information, to order spare parts or for repairs, please contact your supplier.

### 2.2 Safety precautions



1. Do not attempt any work on the head part of the housing or the fitted electrode when the housing is installed and in the inserted position, i.e. in the process medium. Such operation should only be carried out when the retractable member is in the retracted position, i.e. the electrode tip must be in the lower rinsing chamber (see Fig. 1.2).
2. The retractable member must **always** be in one of two **defined positions**:
  - **"IN"** : measuring or operating or inserted position
  - **"OUT"**: maintenance or retracted or withdrawn position

If the member stops between the defined positions "IN" and "OUT", the process medium can escape through the lower rinsing chamber and rinsing lines (see section 3.2 "Safety precautions").
3. The retractable member must not be inserted without the electrode in place (see Fig. 1.1).
4. **Warning!** When the electrode retracts, small amounts of process medium cling to the electrode and find their way into the housing.  
If the substances are toxic, environmentally harmful or pathogenic, they must be properly disposed of.

### 3. Description

#### 3.1 Uses and features

InTrac® 797 is a sterilizable, retractable housing designed to contain pH, redox electrodes, or 12 mm O<sub>2</sub> sensors for use in bioreactors. It can also contain FSC 402 turbidity sensors.

It enables the electrode to be withdrawn for maintenance purposes under sterile conditions while the process is running. After servicing, the electrode can be sterilized in the twin-chamber lock and inserted again without impairing the reactor's sterile contents.

Combination pH and redox electrodes are filled with a gelled reference electrolyte which needs no topping-up and requires no pressurization.

InTrac 797 is mounted on the side of the bioreactor with the aid of a weld-in socket (25 mm dia.).

#### 3.2 Function of twin-chamber lock

In the twin-chamber lock (see Fig. 1.2), the measuring tip of the withdrawn electrode can be cleaned, serviced if necessary and then sterilized with steam. In contrast to single-chamber designs, the twin-chamber arrangement ensures that after sterilization the lower rinsing chamber adjacent to the process medium remains sterile when the electrode is inserted. This is because the portion of the retractable member arriving in the lower rinsing chamber as the electrode is being inserted, has first been sterilized in the upper rinsing chamber.

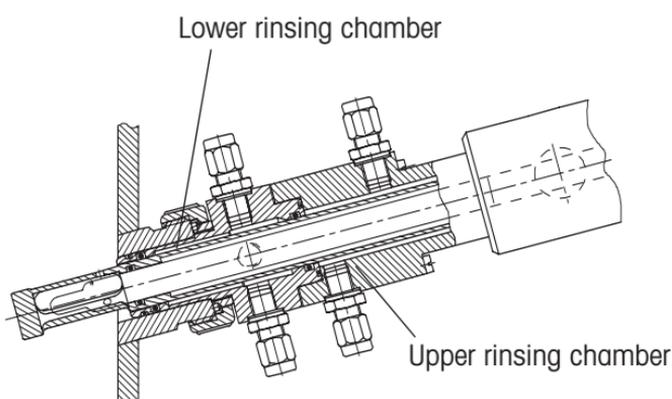


Figure 1.1 "IN" Position

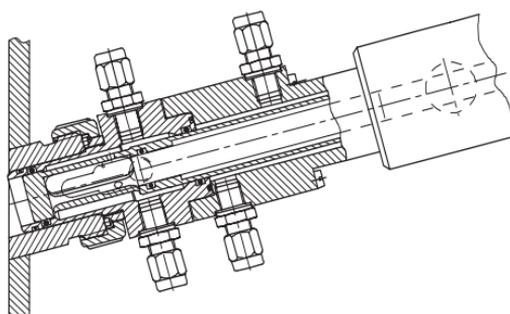


Figure 1.2 "OUT" Position

### Safety precautions



All valves (see Fig. 2) must be closed while the moving part of the housing is travelling forwards or backwards, otherwise the reactor contents can escape through the lower rinsing chamber.

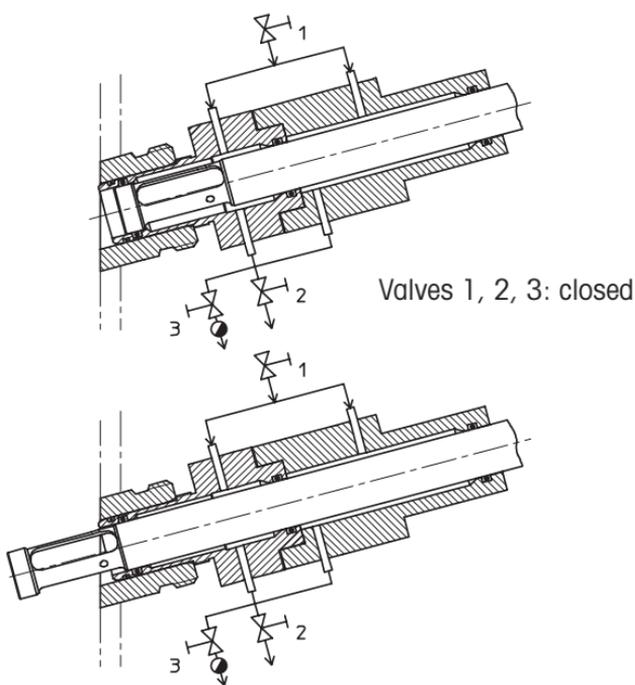


Figure 2 "Installation of valves"

### 3.3 Operation of manual retractable housing (InTrac® 797-M)

With manual operation, the retractable member is brought to the required position by actuating the locking pin and moving it by hand.

Only when the locking pin has latched in place is the member in one of the two defined positions:

- "IN": measuring or operating or inserted position
- "OUT": maintenance or retracted or withdrawn position

### Safety precautions



If the retractable member is left between the defined positions "IN" and "OUT", the process medium can escape through the lower rinsing chamber and rinsing lines (see section 3.2 "Safety precautions").

### To withdraw the retractable member

Pull out lower locking pin (1) and withdraw the moving part by hand until pin (1) latches in place. Turning the retractable member slightly clockwise will release any ring seals that may have become stuck.

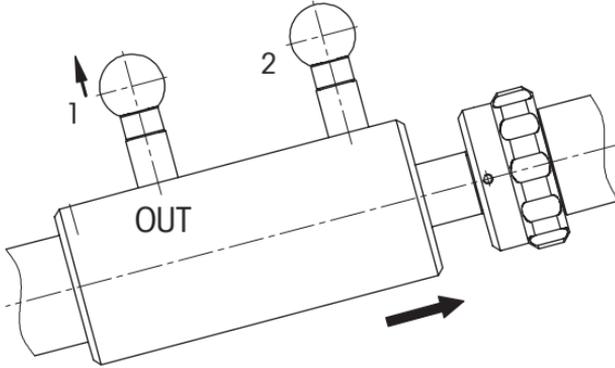


Figure 3 "Retractable member I"

### To insert the retractable member

Pull out the upper locking pin (2) and insert the retractable member by hand until pin (2) latches in place. Turning the retractable member slightly clockwise will release any ring seals that may have become stuck.

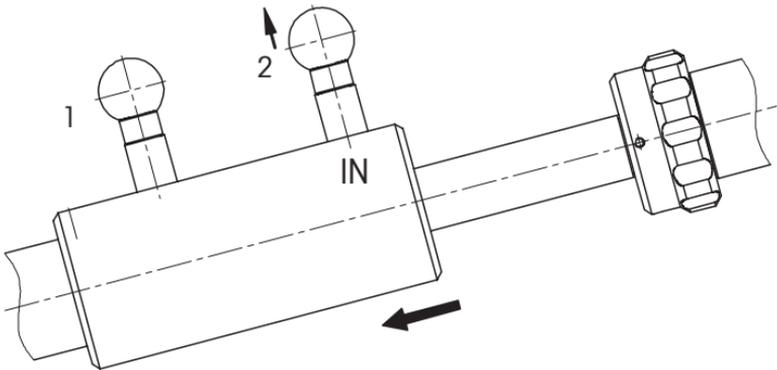


Figure 4 "Retractable member II"

The force required to insert and withdraw the retractable member increases with the pressure in the reactor. We recommend a practicable limit of 4 bar vessel pressure for manual operation. Above this pressure, use pneumatic operation.

### 3.4 Operation of pneumatic retractable housing (InTrac® 797-P)

The InTrac® 797-P housing is delivered without compressed air connections. These are part of the pneumatic Festo set, which is obtainable as an accessory (see 7.2).

When operated pneumatically, the retractable member is moved to the required position by means of compressed air at 3-8 bar. Movement is controlled by a 5/2-way valve with toggle switch, and two one-way restrictor valves. The desired position ("IN" or "OUT") is determined by the setting of the 5/2-way valve.

Air connections (for 6/4 mm plastic tube)

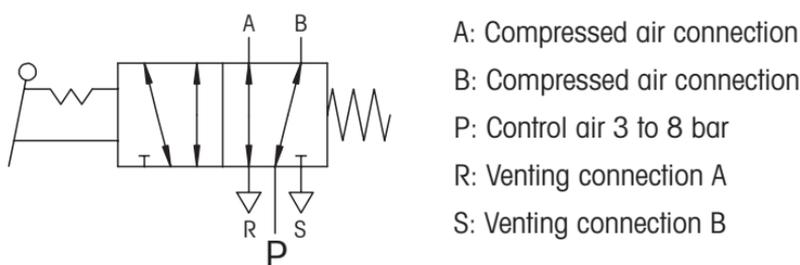


Figure 5 "Compressed air connections"

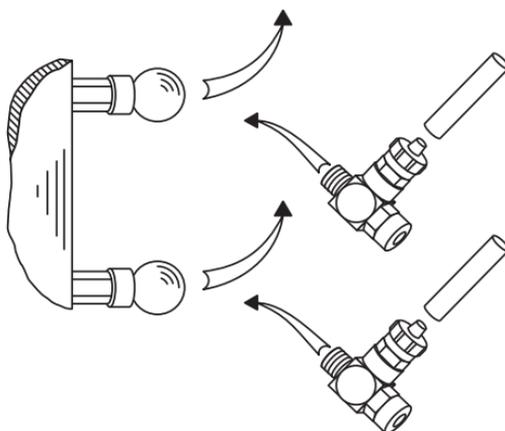


Figure 6 "Conversion of manual to pneumatic version"

#### Safety precautions



- If the control air loses pressure or is contaminated with dust, the retractable member might jam at some position between "IN" and "OUT". If this happens, the process medium can escape through the rinsing chamber and flushing lines (see also 3.2).
- The retractable member must never be inserted without the electrode in place.
- Consideration should be given to the installation of an alarm to signal drop in, or loss of, air pressure. A suitable, check-valve protected, pneumatic reservoir may also be considered. These items are not of our supply.

## 4. Setup

### 4.1 Mounting the retractable housing

The housing is mounted on the side of the bioreactor using a weld-in socket (25 mm dia. 40 mm long) inclined at 15°. If a new socket has to be welded on, make sure the angle is 15°. After careful welding, the bore must be reamed out to 25 mm H7 (Consult "Instructions for weld-in sockets ES-O2-CH").

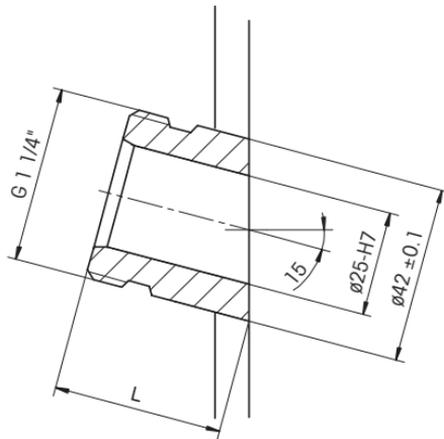


Figure 7 "Weld-in socket"

### 4.2 Calibrating the sensor or pH electrode

See instructions for electrode, sensor and transmitter.

### 4.3 Inserting the electrode in the housing

1. Move the retractable member to the "OUT" position.
2. Unscrew protective sleeve (A) from adapter (B) (see Fig. 8).
3. First place the white slip-ring (002011055) on the electrode, then the O-ring (203021000).
4. Push the electrode or sensor fully into the housing, and screw in fingertight only.
5. Pass the plug of the electrode cable through the protective sleeve (A), and screw to the receptacle of the electrode (see Fig. 8).
6. Screw the protective sleeve (A) fingertight to adapter (B).
7. Draw cable grommet (C) over cable and press it into protective sleeve (A).

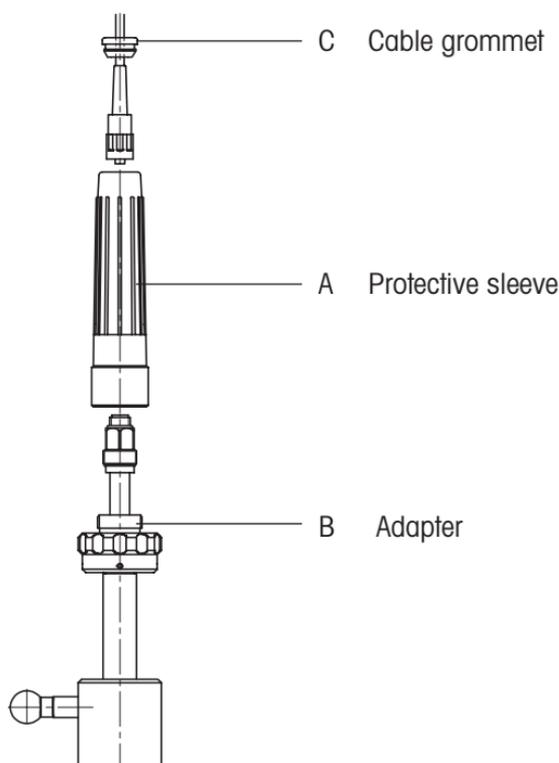


Figure 8 "Inserting the electrode"

#### 4.4 Removing the electrode from the housing

1. Move the retractable member to the "OUT" position.
2. Detach cable grommet (C) from protective sleeve (A) (see Fig. 8).
3. Unscrew protective sleeve (A) from adapter (B).
4. Unplug electrode cable from electrode.
5. Unscrew the electrode using the hexagon head and withdraw the electrode from the housing in a straight line.

##### Safety precautions



Never remove the electrode while at the "IN" (measuring) position, otherwise the reactor's contents will run out through the housing.

## 4.5 Inserting the retractable housing

1. Insert the housing, containing the calibrated sensor or pH electrode, into the welded socket, and tighten the cap nut on the welded socket by hand. Do not over-tighten or use tools, hand tight is sufficient.
2. Connect steam lines to fittings (see section 4.7).

### Safety precautions



- The retractable member of the electrode assembly must never be inserted without the electrode in place.
- Initially the retractable member must be in the "OUT" position.

## 4.6 Removing the retractable housing

### Safety precautions



Before attempting to remove the housing ensure the vessel (or pipe-line) is empty and clean if necessary.

1. Close all valves.
2. Move the retractable member to the "OUT" position.
3. Flush the twin-chamber lock with steam or condensate for a few seconds. Valve settings as in Table 1-C.
4. Remove cable grommet (C) from protective sleeve (A) (see Fig. 8).
5. Unscrew protective sleeve (A) from adapter (B).
6. Disconnect electrode cable from electrode.
7. Carefully disconnect steam lines from the fittings.
8. Undo cap nut from the welded socket and withdraw housing complete with electrode out of the welded socket.

## 4.7 Connecting the sterilizing and flushing lines (see Fig. 2)

The housing is supplied with blind plugs in the ports of the rinsing chambers.

**Important:** It is essential that the two closely adjacent fittings point vertically downwards (see Fig. 1.1/1.2). Do not mount horizontally.

### Safety precautions



- Stainless steel tube of 6/4 mm (OD/ID) is recommended for the supply and drain lines. Long runs of these are not recommended. Steam should be brought as close as possible in wider bore tubing and then reduced to 6 mm size.
- Steam lines should be lagged to protect operatives, and to prevent undue heat loss.
- It is also desirable to arrange for a supply of sterile air to the rinsing chamber (see 5.1.1, 5.1.4 and Fig. 10).
- If calibrating the O<sub>2</sub> sensor in the rinsing chamber, it is mandatory to connect a supply of sterile air (see 5.1.4 and Fig. 10).

## 4.8 Connecting the air supply for actuating the pneumatic housing InTrac® 797-P

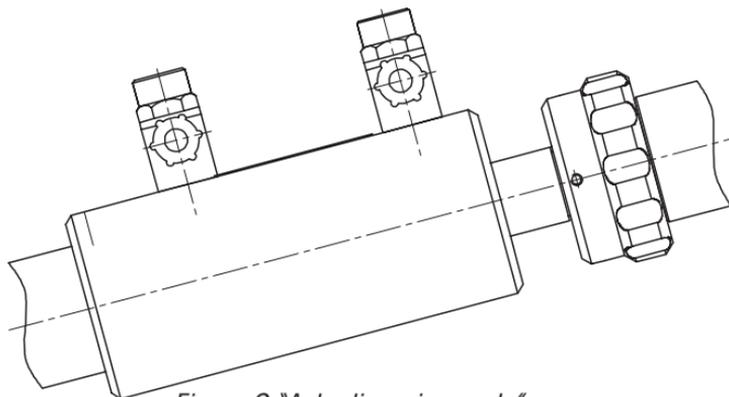


Figure 9 "Actuating air supply"

The pneumatically operated housing requires an oil- and dust-free, non-condensing air supply. The pressure must be in the range of 3 - 8 bar, and at least 1 bar more than the vessel pressure (not neglecting the hydrostatic head). The compressed air fittings shown in Fig. 9 are from the pneumatic Festo set, obtainable as an accessory (see 7.2).

## 4.9 Temperature sensor

A sensor for monitoring the sterilization temperature can be fitted after removing the 1/8" screw plug on the twin-chamber lock. A suitable temperature sensor type Pt100-764/5m is included in our list of optional accessories (see section 7.2).

## 5. Operation

### 5.1 Sterilizing the electrode

#### 5.1.1 General

The electrode or sensor can be sterilized either when inserted into the reactor (see 5.1.2) or gently under controlled conditions in the twin-chamber lock (see 5.1.3). When sterilizing is done in the inserted position, the twin-chamber lock must be sterilized as well to ensure maximum sterility.

We recommend using a sterilization procedure that exposes the electrode to as little temperature shock as possible. Inserting the steam-heated electrode into the cold reactor contents, for example, puts a severe thermal stress on the glass electrode. The following chapters 5.1.2 and 5.1.3 describe the sterilization of the electrode or sensor using a minimum amount of piping and valving. We advise fitting the steam line with a sterilizable air filter through which air can be fed to the twin-chamber lock as it cools down from the sterilizing temperature. For applications in media with solids loading, we also recommend the installation of a flushing water line for rinsing the lower rinsing chamber. An example of such a sophisticated installation is given in chapter 5.1.4.

**Important:** When employing a 12 mm O<sub>2</sub> sensor and calibrating it in the rinsing chamber, it is mandatory to connect a supply of sterile air (see 5.1.4 and Fig. 10).

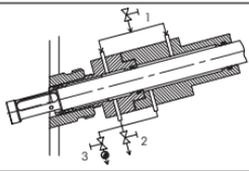
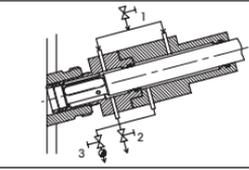
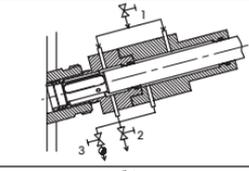
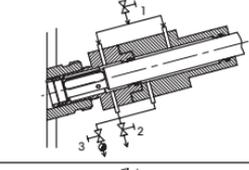
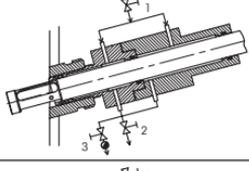
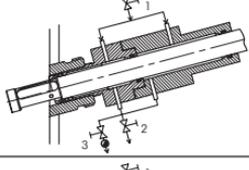
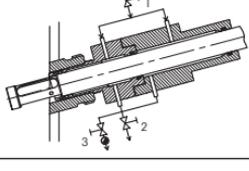
#### 5.1.2 Sterilizing the electrode in the reactor

1. Insert the electrode as in section 4.3.
2. Insert the housing as in section 4.5.
3. Insert the retractable member. Valve settings as in Table 1/F.
4. Sterilize the electrode in the reactor. Valve settings as in Table 1/A.
5. As soon as the reactor reaches the sterilizing temperature the twin-chamber lock must also be sterilized.  
Purge with steam until the rinsing chambers are hot (valve settings as in Table 1/G), then establish valve settings as in Table 1/E to sterilize (recommended sterilizing conditions: 20 minutes at 121 °C).  
This procedure ensures the condensate trap is not overloaded.
6. Close all valves (valve settings as in Table 1/F).

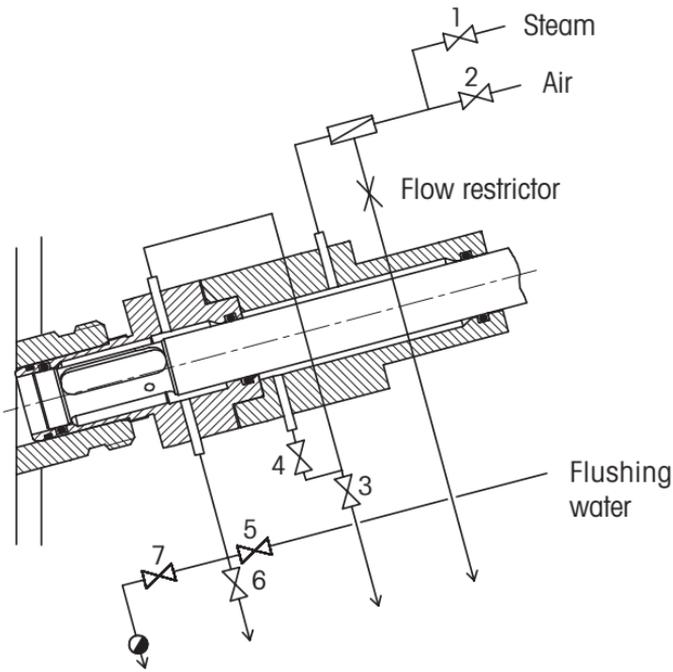
### 5.1.3 Sterilizing the electrode in the twin-chamber lock

1. Insert the electrode as in section 4.3.
2. Insert the housing as in section 4.5.
3. Sterilize the electrode in the twin-chamber lock.  
Purge with steam until the twin-chamber lock is hot (valve settings as in Table 1/C), then establish valve settings as in Table 1/D to sterilize (recommended sterilizing conditions: 20 minutes at 121 °C).  
This procedure ensures the condensate trap is not overloaded.
4. Set valves as in Table 1/B and vent chambers through sterile air filter if possible (see 5.1.1).
5. Insert sensor into sterilized reactor. Valve settings as in Table 1/F.

**Table 1:** Typical operating situations for InTrac® 797 electrode housing

|   | <b>Situation</b>                                | <b>1 Steam inlet</b> | <b>2 Flushing water outlet</b> | <b>3 Condensate drain</b> | <b>Position of electrode in InTrac® 797 housing</b>                                 |
|---|---|----------------------|--------------------------------|---------------------------|---|
| A | Sterilizing in reactor                          | CLOSED               | CLOSED                         | CLOSED                    |   |
| B | Electrode retracting                            | CLOSED               | CLOSED                         | CLOSED                    |  |
| C | Rinsing twin-chamber lock with condensate/steam | OPEN                 | OPEN                           | CLOSED                    |  |
| D | Sterilizing the twin-chamber lock               | OPEN                 | CLOSED                         | OPEN                      |  |
| E | Sterilizing the electrode                       | OPEN                 | CLOSED                         | OPEN                      |  |
| F | Electrode extending                             | CLOSED               | CLOSED                         | CLOSED                    |  |
| G | Rinsing twin-chamber lock with condensate/steam | OPEN                 | OPEN                           | CLOSED                    |  |

### 5.1.4 Piping and valving for demanding applications



Figur 10 "Connections for flushing water and air"

The recommended steam pressure is 2.2 bar. Valves 3, 5 and 6 have to be mounted as close as possible to the T-connectors to ensure good heat transfer up to the valves. The flow restrictor (diameter 0.5 mm) on the condensate side of the filter is a simple means to save an extra steam trap or a bleed valve. The flushing water enters the lower rinsing chamber through the bottom to remove the air readily. The upper rinsing chamber does not require rinsing because it remains clean under all operating conditions. We recommend to use a 0.2  $\mu\text{m}$  pore size filter with a flow capacity of 100  $\text{m}^3/\text{h}$  such as Emflon 2 from Pall corporation (type: MCY4463V002PVH4).

#### 1. Sterilization:

First, valves 2, 3, 5 and 7 are closed, valves 1, 4 and 6 are opened to purge with steam until the twin-chamber lock is hot. Valve 6 is then closed and valve 7 opened for sterilization.

#### 2. Airing:

After sterilization, valves 1 and 7 are closed and valve 2 is opened to let air enter the system during cool down from sterilization temperature.

#### 3. Rinsing:

To rinse the lower rinsing chamber, valves 1, 2, 4, 6 and 7 are closed and valves 3 and 5 are opened. Rinsing water can be removed from the chamber by either purging with steam as described under section 1 above or by blowing out with air while valves 2, 4 and 6 are open and valves 1, 3, 5 and 7 are closed.

## 5.2 Removing the electrode without stopping process

1. Close all valves.
2. Withdraw the retractable member.
3. Flush twin-chamber lock with condensate/steam for a few seconds (valve settings as in Table 1/C) or rinse thoroughly with water (see Fig. 10).
4. Remove cable grommet (C) from protective sleeve (see Fig. 8).
5. Unscrew protective sleeve (A) from adapter (B).
6. Disconnect electrode cable from electrode.
7. Turning the hexagon head, draw the electrode in a straight line out of the housing.

The sensor or electrode may now be serviced (e.g. calibrated, see section 4.2).

## 5.3 Inserting the electrode without stopping process

1. Unscrew protective sleeve (A) from adapter (B) (see Fig. 8).
2. First place the white slipping (002011055) on the electrode, then the O-ring (203021000).
3. Push the electrode fully into the housing and screw in fingertight.
4. Pass the plug of the electrode cable through the protective sleeve (A), and screw to the receptacle of the electrode (see Fig. 8).
5. Screw the protective sleeve (A) fingertight to adapter (B).
6. Draw cable grommet (C) over the cable and press it into protective sleeve (A).
7. Sterilize the sensor according to section 5.1.3.

## 6. Maintenance

### 6.1 Calibration intervals for pH electrodes

The frequency of calibration depends upon the required accuracy and the nature of the process. We advise frequent calibration to start with. If the zero point and slope do not vary significantly, then the time between calibrations can be extended.

### 6.2 Cleaning the electrode

Each time the electrode is retracted into the maintenance position, it should be flushed with steam condensate for a few seconds (valve settings as in Table 1/C) or thoroughly rinsed with water (see Fig. 10).



**Warning!** When the electrode retracts, small amounts of process medium cling to the electrode and so find their way into the housing. If the substances are toxic, environmentally harmful or pathogenic, they must be properly disposed of.

The sensor/electrode may be further cleaned by any of the standard procedures to be found in the instruction bulletin for the product.

### 6.3 Storing the electrode

For pH electrodes, the tip should be kept either in the watering cap filled with reference electrolyte or, if the electrode is mounted in the housing, in the water-filled rinsing chamber.

The O<sub>2</sub> sensor should be stored with O<sub>2</sub> electrolyte in its membrane body.

**Important:** Store cleaned electrodes in a clean place.

### 6.4 Replacing the O-rings

The time between O-ring changes depends on how often the retractable member is inserted and withdrawn, and also upon the compatibility of the Viton material of the O-rings with the process medium.

For details of the O-rings, see section 7.2 "Service kit" and Fig. 11 "Exploded drawing".

## 7. Specifications

### 7.1 Technical data

|   | <b>InTrac® 797-M</b>  | <b>InTrac® 797-P</b>                          |
|---|---|---|
| Mode of operation   | manual  | pneumatic                                     |
| Control air   |   | 3 to 8 bar, oil- and dustfree, non-condensing |
| Pressure in reactor   | depending on sensor specification, but not more than 6 bar  |   |
| Temperature ranges:<br>– Retractable member<br>– Headpart   | 0 to 130 °C, steam sterilizable<br>0 to 80 °C   |   |
| Weld-in socket  | D= 25 mm, L= 40 mm, 15° chamfer   |   |
| Insertion length  | H= 75 mm  |   |
| Materials:<br>– Parts in contact with medium<br>– Headpart<br>– Seals in contact with medium<br>– Other seals | stainless steel DIN 1.4435<br><br>POM (polyoxymethylene) and PP (polypropylene)<br><br>Viton<br><br>Nitrile, Buna |   |
| Flushing connections  | d= 6 mm / 4mm   |   |
| Weight  | 2 kg  |   |

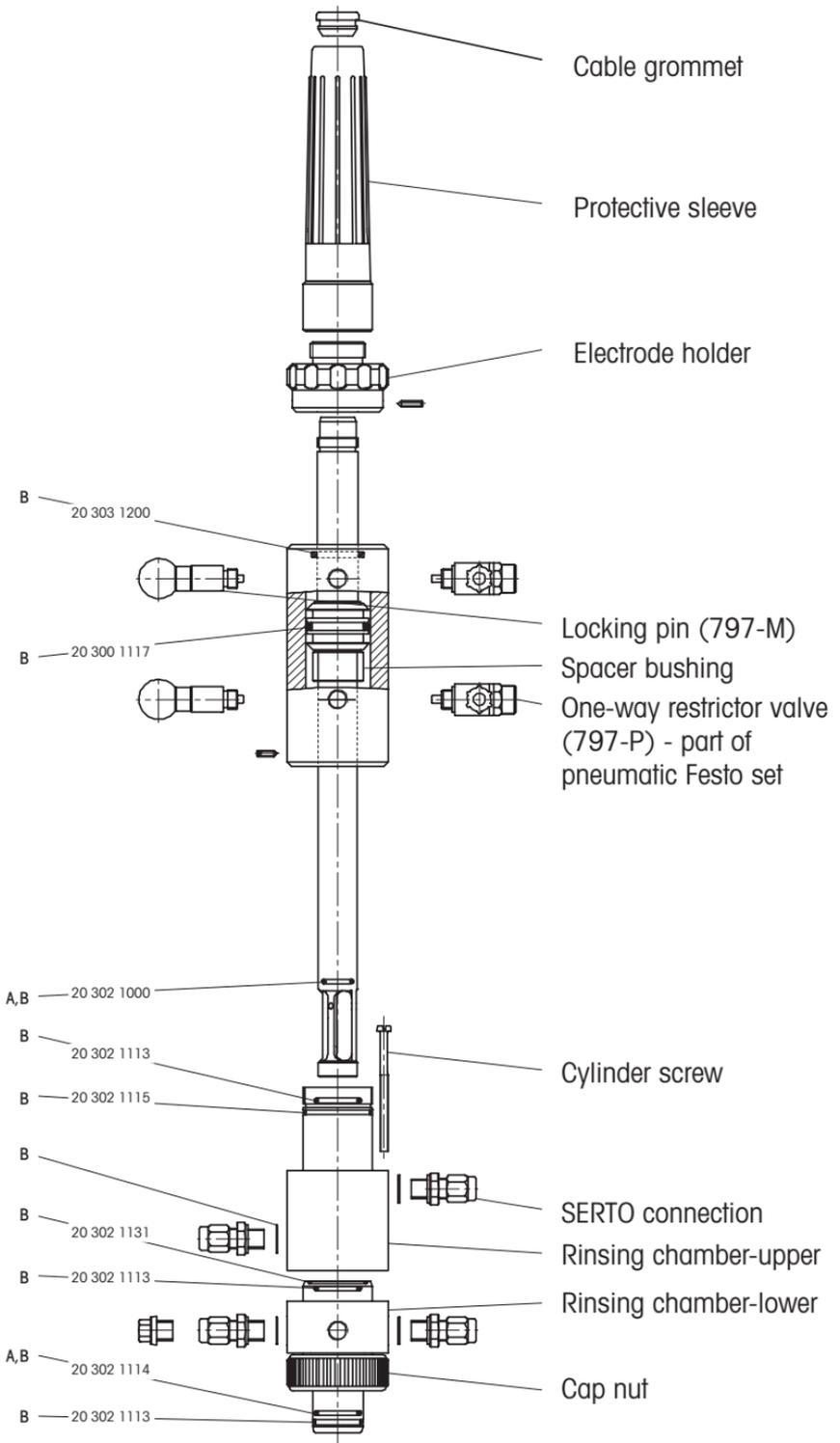
### 7.2 Ordering information

#### Standard scope of delivery

| <b>Description</b>  | <b>Order no.</b> |
|---|------------------|
| <b>InTrac® 797-M / 75 manual</b> , with:<br>– Protective sleeve     | 007973007        |
| <b>In Trac® 797-P / 75 pneumatic</b> , with:<br>– Protective sleeve | 007973009        |
| <b>In Trac® 797-M / 75 FSC</b> , for turbidity measurements         | 007973012        |

### Spare parts and accessories

| Description   | Order no. |
|---|-----------|
| Service kit small ("A" in exploded drawing):<br>1 pc. O-ring 21.95 x 1.78 Viton<br>2 pcs. O-ring 10.50 x 2.70 Viton R9  | 007972003 |
| Service kit complete ("B" in exploded drawing):<br>5 pcs. Gasket 10/14/0.8<br>1 pc. Quad ring 20.22 x 3.53 Buna<br>1 pc. O-ring 25.00 x 4.00 Nitril<br>1 pc. O-ring 31.47 x 1.78 Viton<br>1 pc. O-ring 21.95 x 1.78 Viton<br>1 pc. O-ring 18.72 x 2.62 Viton<br>1 pc. O-ring 25.12 x 1.78 Viton<br>1 pc. O-ring 10.50 x 2.70 R9 Viton | 007972002 |
| Weld-in socket, straight, L= 40 mm, steel DIN 1.4435  | 007641017 |
| Weld-in socket, angl. 15°, L= 40 mm, steel DIN 1.4435   | 007641014 |
| Pressure connection set   | 201022000 |
| Protective sleeve, cable grommet 5 mm   | 007642163 |
| Protective sleeve   | 007642148 |
| Cable grommet 5 mm  | 007641236 |
| Electrode holder  | 007771004 |
| Locking pin, complete   | 007772000 |
| One-way restrictor valve GRL 1/8"   | 201021049 |
| Serto connection, steel 18/8  | 201021007 |
| O-ring 25.00 x 4.00 nitrile   | 203001117 |
| O-ring 10.50 x 2.70 Viton R9  | 203021000 |
| O-ring 18.72 x 2.62 Viton   | 203021113 |
| O-ring 21.95 x 1.78 Viton   | 203021114 |
| O-ring 31.47 x 1.78 Viton   | 203021115 |
| Quad ring 20.22 x 3.53 Buna   | 203031200 |
| Fitting Set for InTrac® 796/InTrac® 797 Serto   | 007972006 |
| Fitting Set for InTrac® 796/InTrac® 797 Swagelok  | 007972007 |
| Fitting Set for InTrac® 796/InTrac® 797 Gyrolok   | 007972008 |
| Pneumatic operation set Festo   | 007772004 |
| Gasket  | 203051004 |



Figur 11 "Exploded drawing"



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