

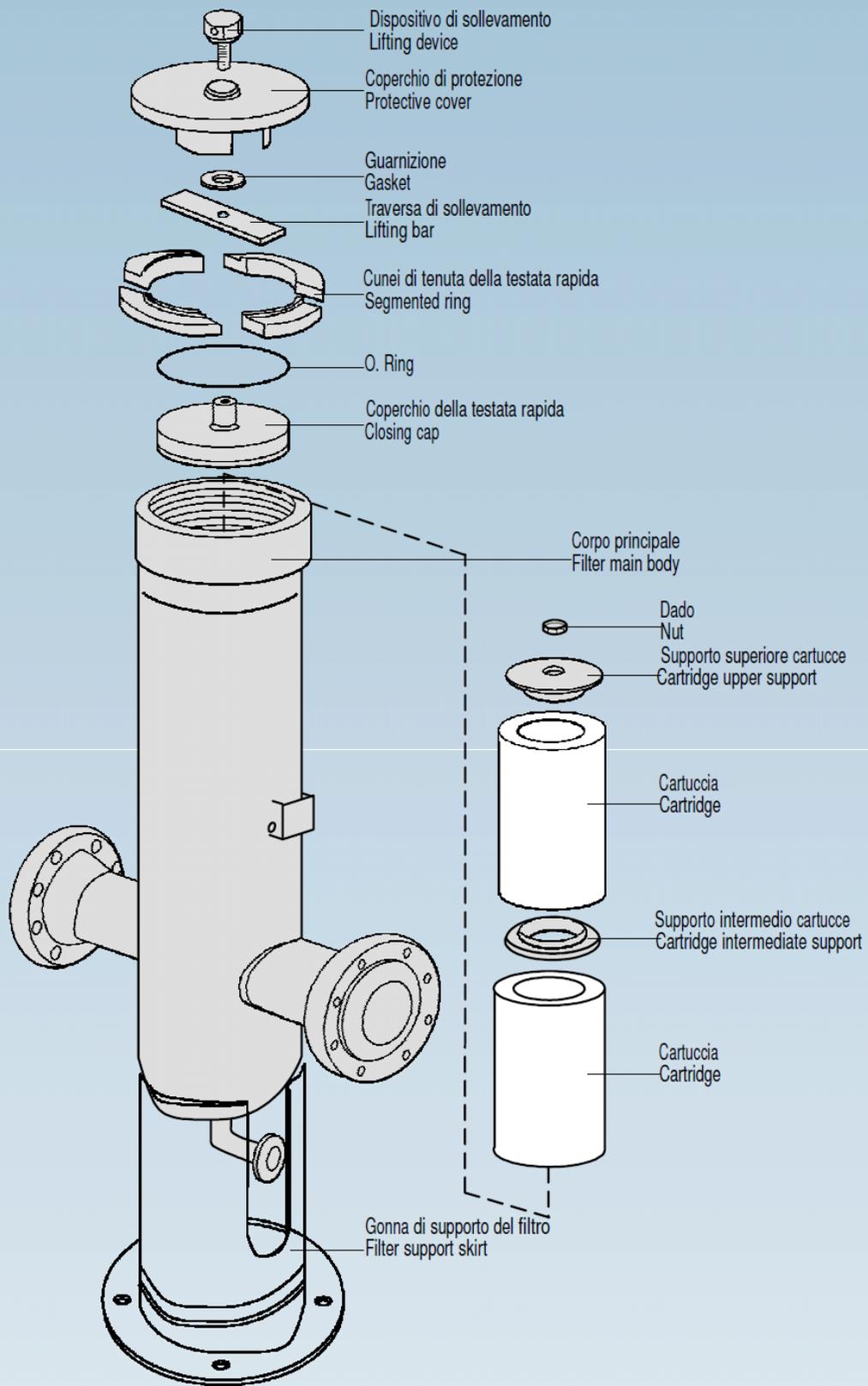
CARTRIDGE FILTERS



TECHNICAL MANUAL MT 080

Installation, commissioning and maintenance instructions

08/02 Edition



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1.0 INTRODUCTION

The purpose of this manual is to provide essential information for the installation, commissioning and maintenance of cartridge filters model HF...

It is also considered appropriate to provide a brief illustration herein of the main features of the filters and their accessories.

1.1 MAIN FEATURES

HF filters... are dry filters to be used with natural gas, manufactured gas, air, propane and other non-aggressive gases.

The main features are:

- Collection capacitance: higher than 12% of the total capacitance with purge.
- Possibility of construction with quick closing.
- Cartridges made with pressed felt with reinforced mesh. Filtering degree of 3.5 or 50 micron.

1.2 OPERATION (FIG. 1)

The gas reaches the filter body through the inlet where it slows down causing the first separation of large particles, including liquids.

The collected impurities accumulate at the bottom of the recipient from where they are drained periodically.

The gas then passes through the filtering elements, consisting of one or more cartridges, penetrating them from the outside towards the inside and depositing fine solid particles on them.

The clean gas then continues towards the outlet.

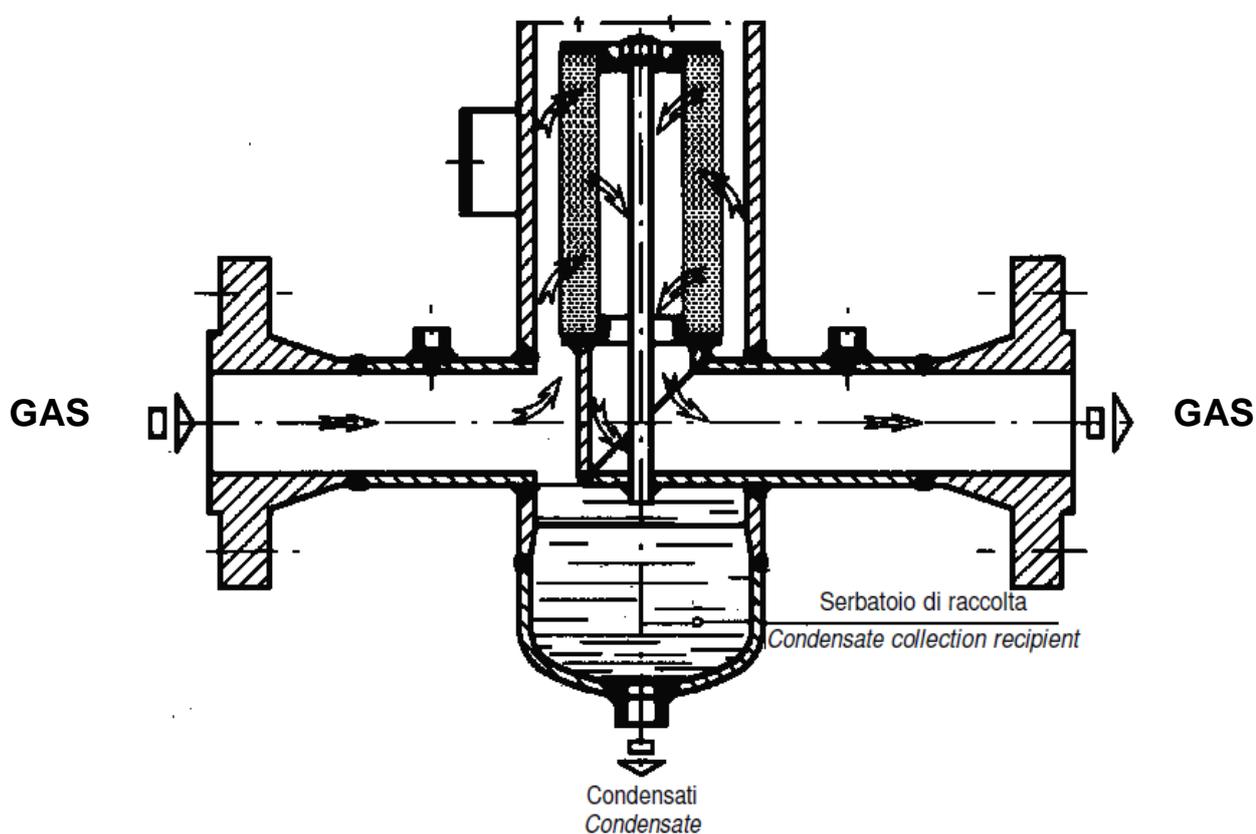


Fig. 1

1.3 CLOSING OF HEAD WITH FLANGE (FIG. 2)

This consists of a blind bolted coupling flange on the recipient containing the filtering element.

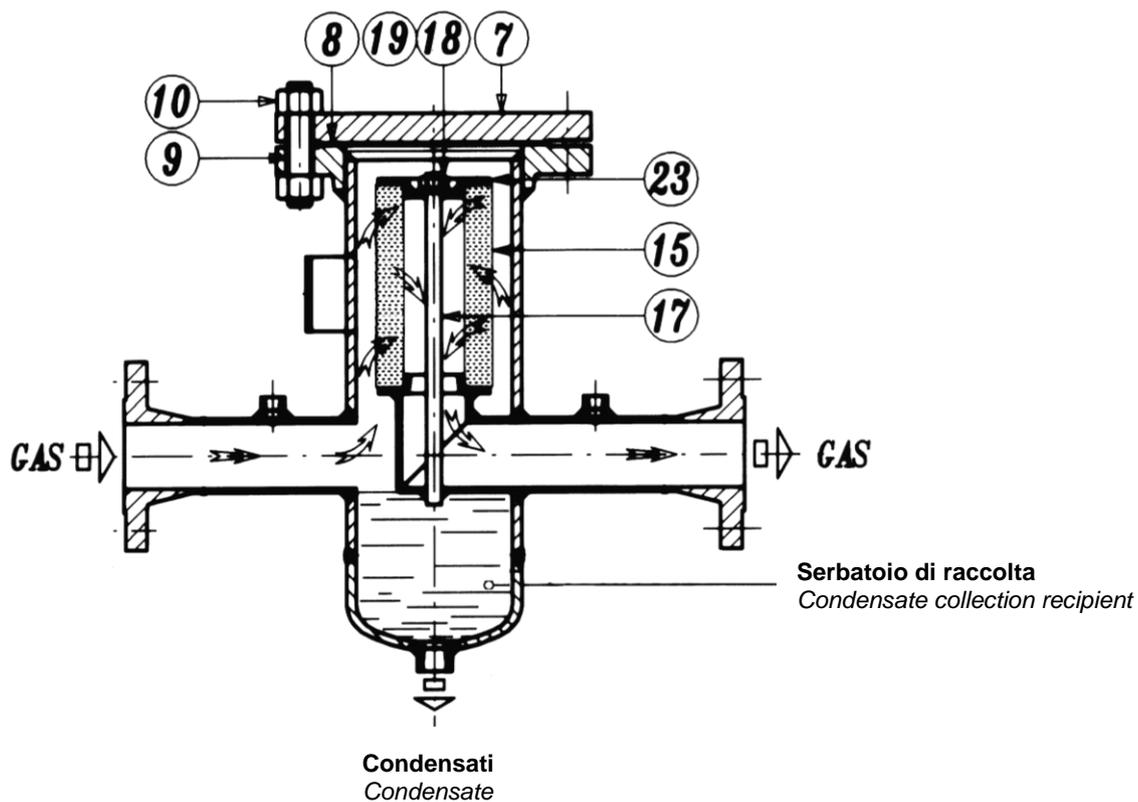


Fig. 2

(for the meaning of the positions see chapter 5)

1.4 CLOSING OF QUICK HEAD (FIG. 3)

The filters are provided with quick closing heads, especially if large and for high pressure, to facilitate maintenance of the cartridges.

TRC X HFA/1 – 10 – 1.5 – 15 – 2 – 20 – 25

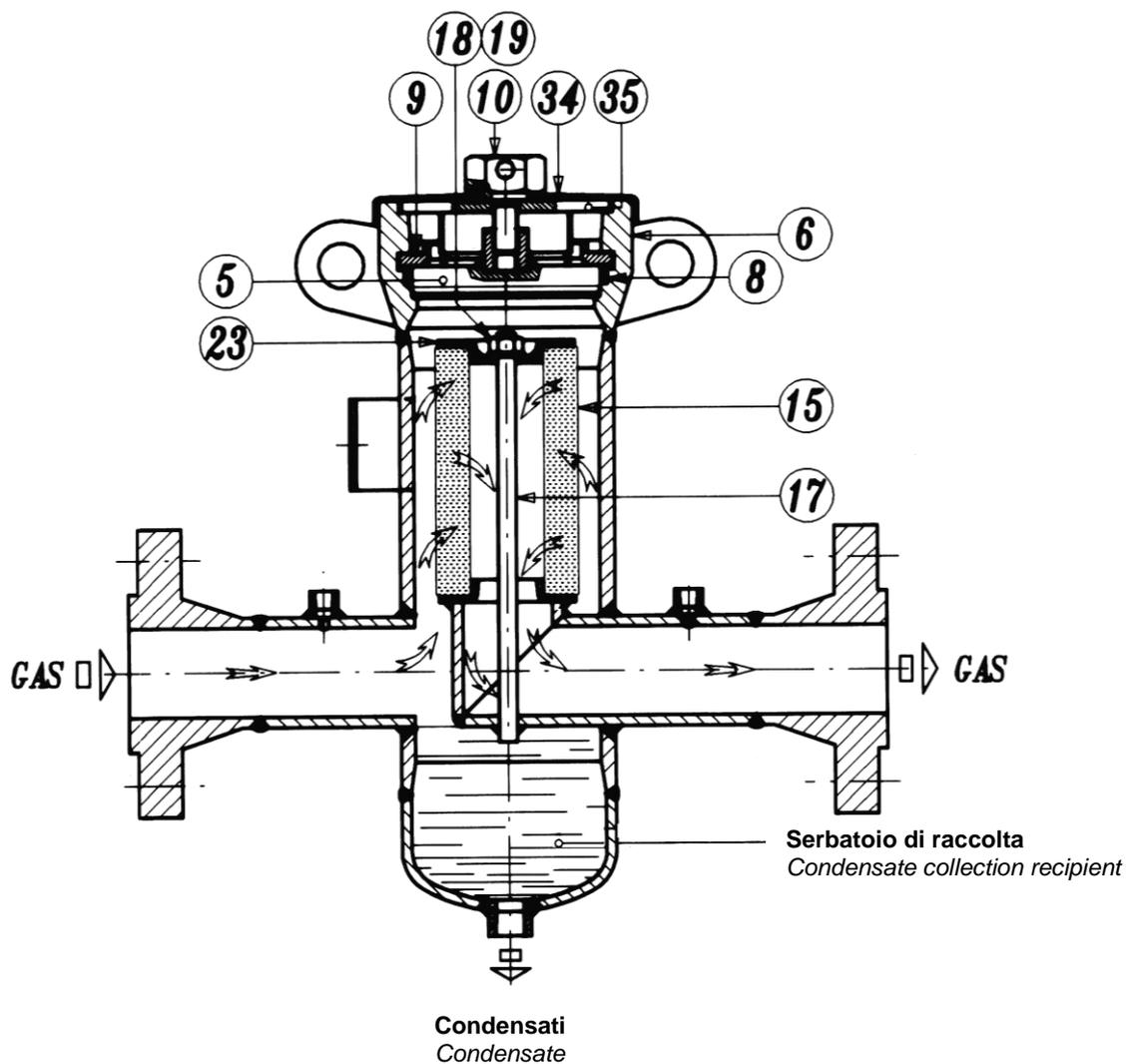


Fig. 3

(for the meaning of the positions see chapter 5)

TRC X HFA/30 – 40 – 50 – 60

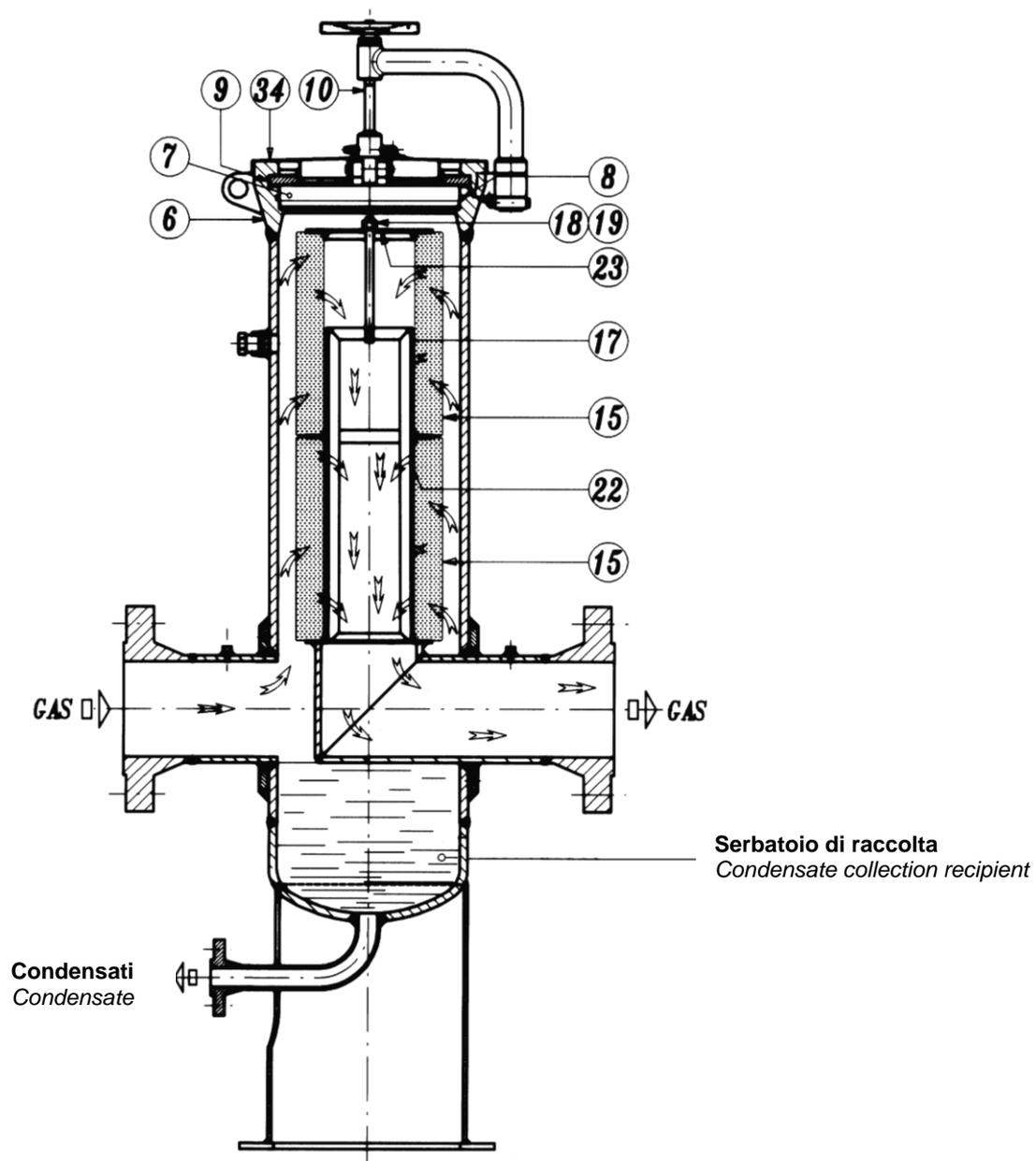


Fig. 3/b

(for the meaning of the positions see chapter 5)

2.0 ACCESSORIES

The filter is normally designed for the installation of the accessories listed in the following paragraphs (not included in the supply unless expressly requested).

The choice of these accessories must be made taking into account the use conditions of the filter that they will be associated with.

It is recommended to install

- the purge valve, in order to depressurise the filter before any maintenance intervention and to evacuate any impurities collected in the filter itself;
- the clogging indicator, in order to verify the degree of cartridge clogging and thus to proceed with its replacement.

Other accessories can be applied depending on the conditions of use and on the installation specifications (see chapter 3.3).

2.1 CLOGGING INDICATOR

The clogging indicator is a tool designed to detect pressure drops. In particular it can be used to detect the degree of clogging of the cartridge filters inserted in the natural gas reduction and measuring plants.

It is recommended to couple this tool to the filter by means of a manifold with 3 built-in valves, allowing to:

- connect the indicator to the two environments where it is necessary to detect the differential pressure avoiding the bypass between the environments;
- shut off connections to the two pressurised environments when performing maintenance or replacing the tool (without needing to depressurise the filter);
- bypass the two pressurised environments to verify homing of the tool.

2.2 PURGE VALVE

This valve is applied at the bottom of the filter.

It has the purpose of draining any liquid and solid impurities from the filter built up in the collection part of the recipient and to depressurise the filter before inspections and maintenance.

2.3 PRESSURE INDICATOR

The filter is designed for installation of a pressure indicator which signals the presence of pressure in the filter.

It is recommended to install this instrument, if not already applied, on the system in the immediate vicinity of the filter (installation on pipe branch connected to the filter without interposing main process valve).

It is also recommended to couple this instrument to the filter by means of a valve to shut off the connection to the pressurised environment when performing maintenance or replacing the tool (without needing to depressurise the filter).

3.0 INSTALLATION

3.1 GENERAL WARNINGS

Before installation, commissioning or maintenance of the filter, operators must:

- take note of the safety regulations applicable to the installation that they are working on;
- obtain the necessary permits to operate when required;
- acquire the necessary personal protective equipment (helmet, goggles, etc.);
- ensure that the area that they are operating in is equipped with the required collective protections and the necessary safety information.

The equipment and its components must be handled after ensuring that the lifting means are adequate for the loads being lifted (lifting capacity and function). The equipment must be handled using the lifting points provided on the equipment itself.

The use of motorised means is reserved for the persons in charge.

If the installation of the equipment or its accessories requires the application of compression fittings, these must be installed following the instructions of the manufacturer of the fittings themselves. The choice of fittings must be compatible with the use specified for the equipment and with the specifications of the system, when applicable.

Commissioning must be carried out by properly trained personnel.

During the commissioning operations, personnel who are not strictly necessary must be kept at a distance and the forbidden area must be suitably marked (signs, barriers, etc.).

3.2 GENERAL REQUIREMENTS

Before installing the filter, you must ensure that:

- the filter can be inserted in the space provided and is sufficiently accessible for subsequent maintenance operations;
- the piping upstream and downstream is at the same level as the inlets and outlets and capable of bearing the weight of the filter, when not equipped with its own support;
- the inlet/outlet flanges of the pipe are parallel to that of the filter;
- the inlet/outlet flanges of the filter are clean and the filter was not damaged during transport;
- the upstream piping has been cleaned in order to expel residual impurities such as welding slag, sand, paint residues, water, etc.

The filter must be installed on the line, directing the arrow on the plating in the direction of the gas flow.

If there is no arrow, the inlet has direct access to the filter body (also see figure 1).

The filter is only sized to bear its own weight. Therefore the user must build the plant so as not to overload the inlet and outlet connections of the filter with further loads.

The connections to the input and output pipes are done using standard flanges whose sizes and types are indicated on the rating plate (see chapter 3.4); the choice of connecting screws and seals must be made by the installer considering this information and the conditions of use at the installation site.

3.3 SPECIAL REQUIREMENTS

Installation of the filter must comply with the regulations (laws or standards) in force in the place of installation.

In particular, systems for natural gas must possess features in accordance with the legal requirements or regulations in force at the installation site or at least in accordance with EN 12186 or EN 12279 (please note that installation in compliance with these regulations minimizes the risk of fire hazard).

Unless agreed otherwise in the order, the filter is without pressure limiting devices, therefore, it must be installed making sure that the inlet pressure never exceeds the maximum permissible pressure value (PS). Peaks with a value of $1.1 \times PS$ are only allowed for short periods of time. The user must make sure that the pressure in the pipe which carries the fluid to the filter never exceeds the PS value (or value $1.1 \times PS$ for short periods of time) or that the pressure reduction system installed upstream of the filter ensures a maximum incidental pressure MIP no higher than the PS.

To avoid erosion, the fluid speed at the inlet must be limited to 30 m/sec; the speed at the outlet may be higher (up to 40 m/sec).

The speed value must be calculated in the maximum intended flow rate and minimum operating pressure conditions.

Any accessories such as clogging indicators, pressure gauges, pressure relief valves, purge valves, must be connected at the points indicated on the filter by means of specific identification plates.

These devices are not an integral part of the supply, unless expressly requested in the order, and must therefore be chosen by the user depending on the actual use and installation conditions of the filter. In particular, the choice of pressure relief valves must be made considering the actual maximum operating pressure conditions required for the filter.

3.4 CONDITIONS OF USE

It is recommended to check, before commissioning, that the conditions of use comply with the features of the device.

These specifications are provided on the rating plates which are applied to each device (figure 4 and figure 4 bis).

In particular, it draws attention to the following features:

- Maximum allowable pressure PS.
- Design temperature (the minimum and maximum values are shown).
- The class of the input and output connections.

Furthermore you must take into account that:

the device can be used for service on non-corrosive gaseous fluids, therefore (unless agreed otherwise in the order) no corrosion margin was considered in the design stage;

operation with cyclical load variations was not foreseen and therefore fatigue phenomena were not considered.

certain stresses from traffic or earthquakes were not considered. Therefore, the user must take appropriate precautions to reduce the effects of these events when they are expected.

| | | | | | | |
|---|----------------------|----------------------------|---|---|-------------------------------------|--|
|  | | Pietro Fiorentini | | ARCUGNANO (ITALY) | | |
| FILTRO TIPO FILTER TYPE | <input type="text"/> | N. FABBR. SERIAL N° | <input type="text"/> | ANNO YEAR | <input type="text"/> | |
| PORTATA NOMINALE NOMINAL FLOW | Nm ³ /h | | <input type="text"/> | | | |
| DNe / DNu | <input type="text"/> | ANSI/PN | <input type="text"/> | ITEM | <input type="text"/> | |
| GRUPPO FLUIDO FLUID GROUP | <input type="text"/> | |  | CAPACITA' CAPACITY | litri/litres <input type="text"/> | |
| PRESSIONE PROGETTO DESIGN PRESSURE | PS | <input type="text"/> | | CAP. SERBATOIO RACCOLTA RESERVOIR CAPACITY | litri/litres <input type="text"/> | |
| TEMPERATURA PROGETTO DESIGN TEMPERATURE | TS | <input type="text"/> | | EFFICIENZA FILTRANTE FILTERING EFFICIENCY | μ <input type="text"/> | |
| PROVA IDRAULICA HYDROSTATIC TEST | PT | <input type="text"/> | | SUPERFICIE FILTRANTE FILTERING SURFACE | m ² <input type="text"/> | |
| | | DATA COLLAUDO TEST DATE | | <input type="text"/> | | |
| | | | | | | |

Fig. 4

| | | | | | | | |
|---|----------------------|------------------------------|----------------------|--|-------------------------------------|--|----------------------|
|  | | Pietro Fiorentini | | ARCUGNANO-VI ITALY | |  | |
| FILTRO TIPO FILTER TYPE | <input type="text"/> | GRUPPO FLUIDO FLUID GROUP | <input type="text"/> | DATA COLL. TEST DATE | <input type="text"/> | ANNO YEAR | <input type="text"/> |
| DNe / DNu | <input type="text"/> | ANSI/PN | <input type="text"/> | N. FABBR. SERIAL N° | <input type="text"/> | | |
| PRESSIONE PROGETTO/DESIGN PRESSURE | PS | <input type="text"/> | | CAPACITA'/CAPACITY | litri/litres <input type="text"/> | | |
| TEMPERATURA PROGETTO/DESIGN TEMPERATURE | TS | <input type="text"/> | | CAPACITA' FILTRANTE/FILTERING CAPACITY | μ <input type="text"/> | | |
| PROVA IDRAULICA/HYDROSTATIC TEST | PT | <input type="text"/> | | SUPERFICIE FILTRANTE/FILTERING SURFACE | m ² <input type="text"/> | | |

Fig. 4 bis

Note: the two plates are alternative and are applied depending on the filter model

4.0 COMMISSIONING

4.1 PRESSURISATION

After installation, make sure that the purge valve is closed.

Slowly pressurize the system equipment by means of the upstream process valve or other systems provided for this purpose on the plant.

4.2 SEALING CHECK

The air leak test should be carried out as prescribed in the installation site.

The outer seal is guaranteed when sprinkling the pressure element with a foaming agent and no bubbles form.

5.0 MAINTENANCE

5.1 GENERAL

Before performing any intervention, you must make sure that the filter has been shut off upstream and downstream and pressure discharged from the duct sections between the shut-off valves.

Maintenance interventions are closely related to the quality of the transported gas (impurities, humidity, gasoline, ...).

Preventive maintenance is therefore always recommended, the frequency of which, if not established by regulations, depends on:

- the quality of the transported gas;
- the state of cleanliness and preservation of the piping downstream of the filter: in general, for example, after the first start-up of the plants, they require more frequent maintenance due to the precarious state of cleanliness inside the piping.

Before beginning disassembly of the equipment, make sure to:

- have a set of recommended spare parts. The spares must be original Pietro Fiorentini Spa parts.

N.B. The use of non-original spare parts relieves the manufacturer of any liability.

- Have a series of spanners as referred to in table 1.

5.2 REPLACEMENT OF FILTERING CARTRIDGE/S

5.2.1 FILTERS WITH FLANGED HEAD

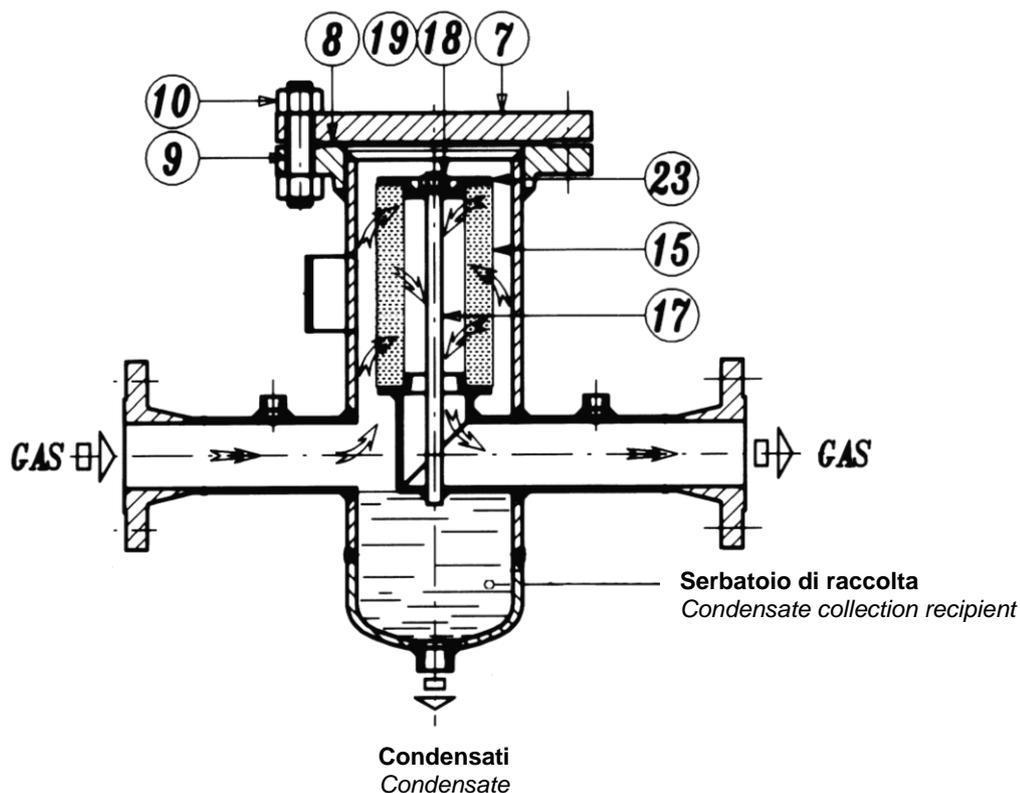


Fig. 5

- Loosen the bolts pos. 10 and remove them.
- Remove the blind flange pos. 7
- Loosen and remove the fixing nut pos. 18 of the upper support pos. 23 of the filtering cartridge and remove it.
- Remove the filtering cartridge/s pos. 15 and replace it/them.
- Refit the new filtering cartridge/s taking care to apply some grease on the felt support surfaces.
- Refit the upper support pos. 23 and tighten the fixing nut pos. 18. Final clamping must be carried out with a spanner in order to compress the support felts.
- Replace the sealing gasket pos. 8.
- Refit the closing flange pos. 7 and tighten the bolts pos. 10

5.2.2 FILTERS WITH QUICK CLOSING HEAD

Without lifting arm (fig. 6)

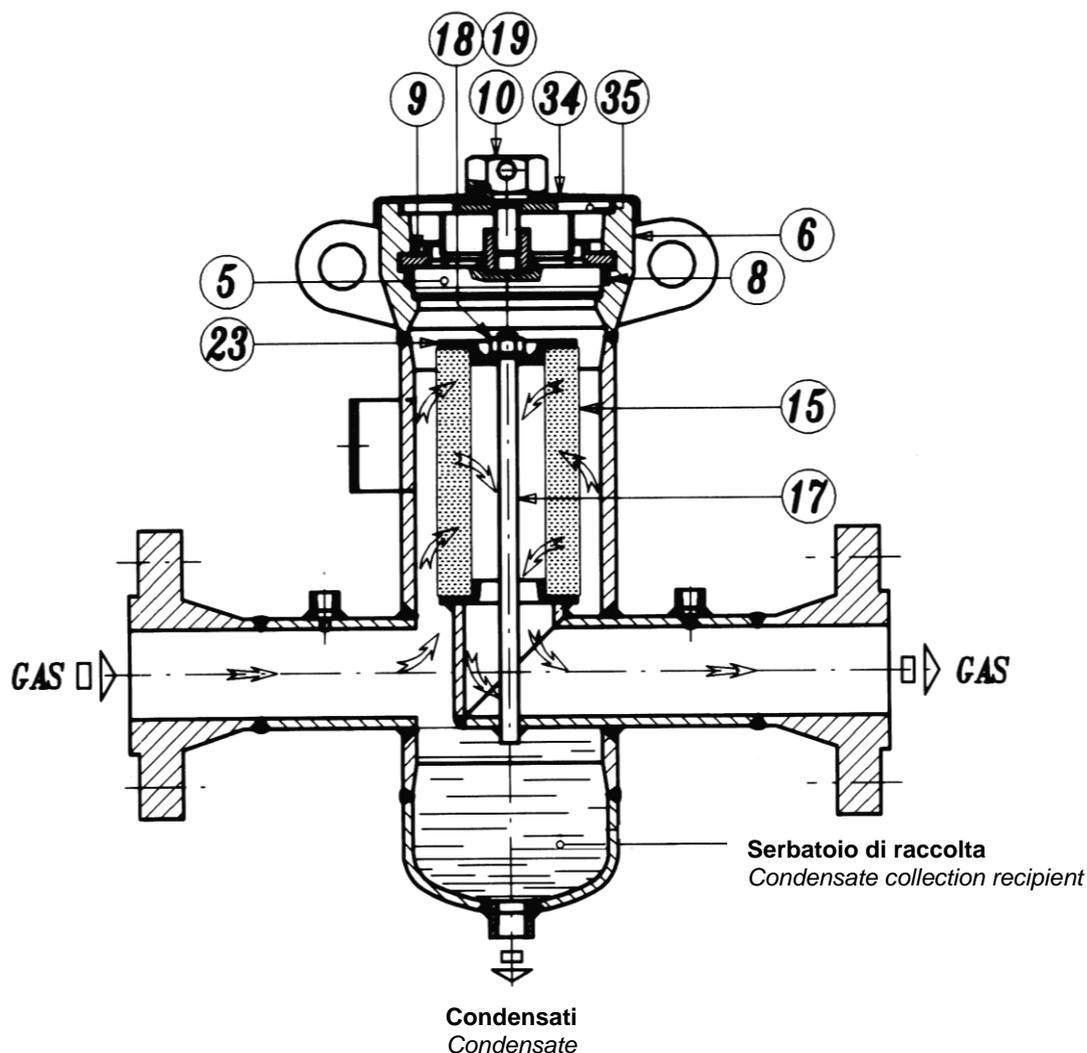


Fig. 6

Opening of the head

- Unscrew the lifting device pos. 10.
- Remove the protective cover pos. 34 .
- Remove the segmented ring pos. 9.
- Screw the lifting device back on pos. 10 on the closing cover pos. 5 and tighten it. The presence of the segment pos. 35 facilitates releasing the closing cover from the body pos. 6.
- Remove the closing cover pos. 5 days.

Replacement of filtering cartridge/s

- Loosen and remove the fixing nut pos. 18 of the upper support pos. 23 of the filtering cartridge/s and remove it.
- Remove the filtering cartridge/s pos. 15 and replace it/them.
- Refit the new filtering cartridge/s taking care to apply some grease on the felt support surfaces.
- Refit the upper support pos. 23 and tighten the fixing nut pos. 18. Final clamping must be carried out with a spanner in order to compress the support felts.

Closing the head

During assembly operations, it is of the utmost importance to pay attention to the side surface of the closing cover and of the seat of the o-ring to make sure they are clean. There must be no trace of dust, rust etc. in the seat.

The sealing parts, side surface of the closing cover and the o-ring, must be carefully lubricated.

The closing cover must be introduced horizontally into the body until it touches it.

- Unscrew the lifting device pos. 10.
- Insert the segmented ring pos. 9 (first the two large segments and then the smaller ones).

The segments must be inserted completely into the specific seat made in the body.

- Fit the protective cover pos. 34.
- Screw the lifting device pos. 10 to secure the protective cover.

5.2.3 FILTERS WITH QUICK CLOSING HEAD

With lifting arm (fig. 7)

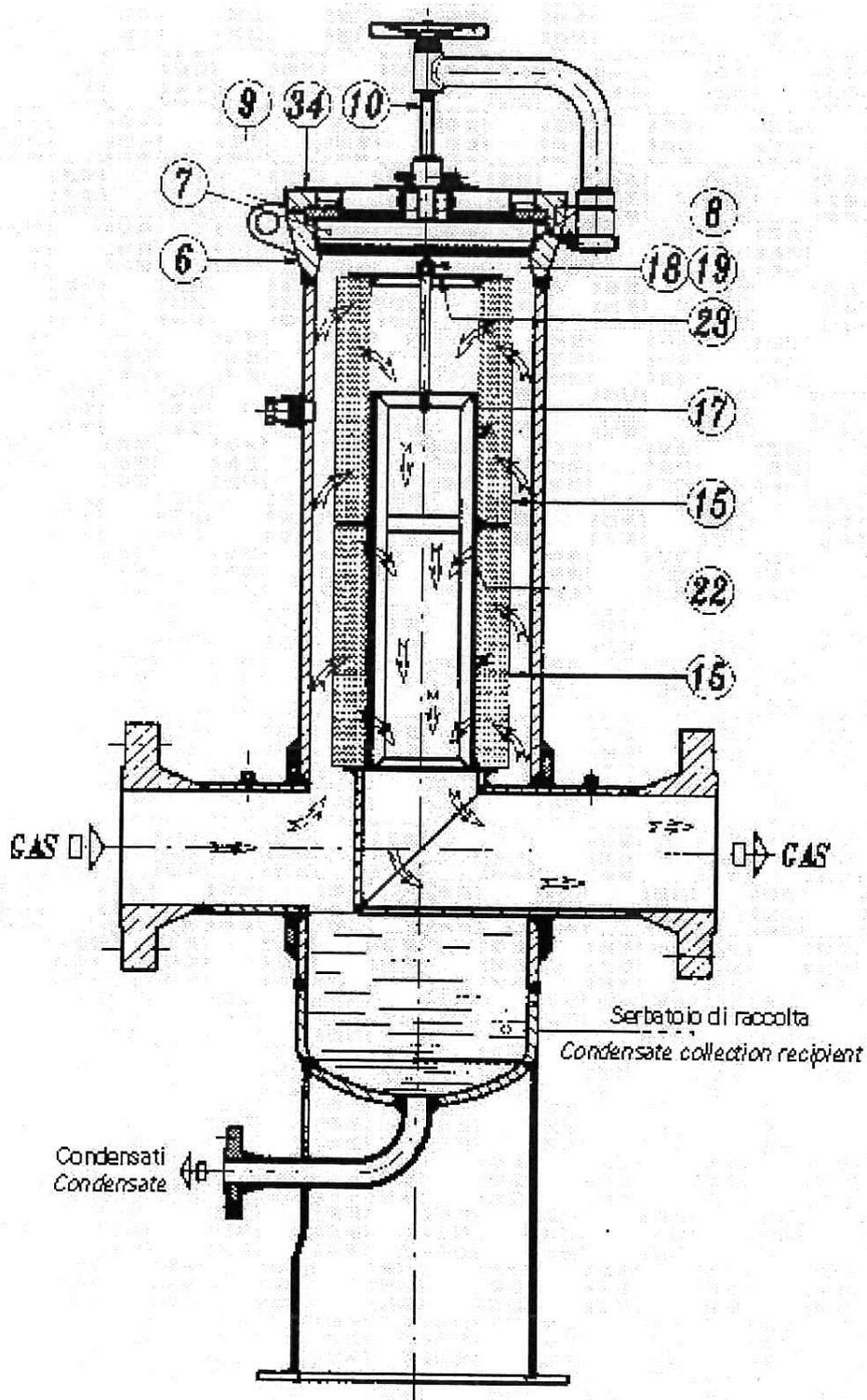


Fig. 7

Opening of the head

- Disconnect the lifting device pos. 10.
- Rotate the lifting arm to make the head accessible.
- Remove the protective cover pos. 34.
- Remove the segmented ring pos. 9.
- Position and connect the lifting device pos. 10 on the closing cover pos. 5.
- Turn the handwheel of the lifting device clockwise to lift the closing cover pos. 5 until it is extracted completely.
- Rotate the lifting arm with the closing cover pos. 5 to make the inside of the filter accessible.

Replacement of filtering cartridge/s

- Loosen and remove the fixing nut pos. 18 of the upper support pos. 23 of the filtering cartridge/s and remove it.
- Remove the filtering cartridge/s pos. 15 and replace it/them.
- Refit the new filtering cartridge/s taking care to apply some grease on the felt support surfaces.
- Refit the upper support pos. 23 and tighten the fixing nut pos. 18. Final clamping must be carried out with a spanner in order to compress the support felts.

Closing the head

During assembly operations, it is of the utmost importance to pay attention to the side surface of the closing cover and of the seat of the o-ring to make sure they are clean. There must be no trace of dust, rust etc. in the seat.

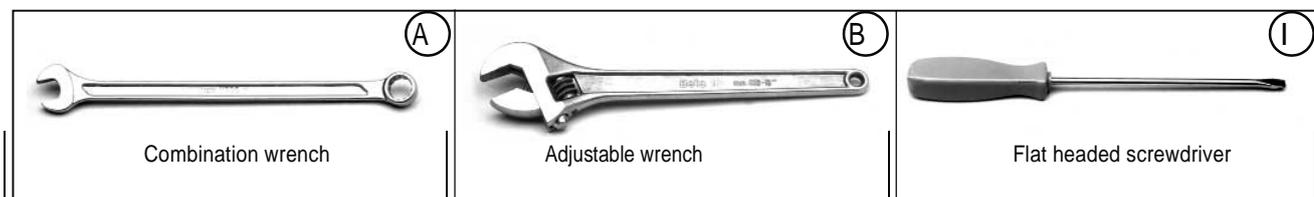
The sealing parts, side surface of the closing cover and the o-ring, must be carefully lubricated.

The closing cover must be introduced horizontally into the body until it touches it.

- Rotate the lifting arm to align the cover pos. 5 with the body of the head pos. 6.
- Turn the handwheel of the lifting device anticlockwise pos. 10 and lower the cover pos. 5 to its position.
- Disconnect the lifting device pos. 10 from the cover.
- Insert the segmented ring pos. 9 (first the two large segments and then the smaller ones).

The segments must be inserted completely into the specific seat made in the body.

- Fit the protective cover pos. 34.
- Connect the lifting device pos. 10 to secure the protective cover.

Tab. 1 SPANNERS FOR SERVICING FILTERS
1


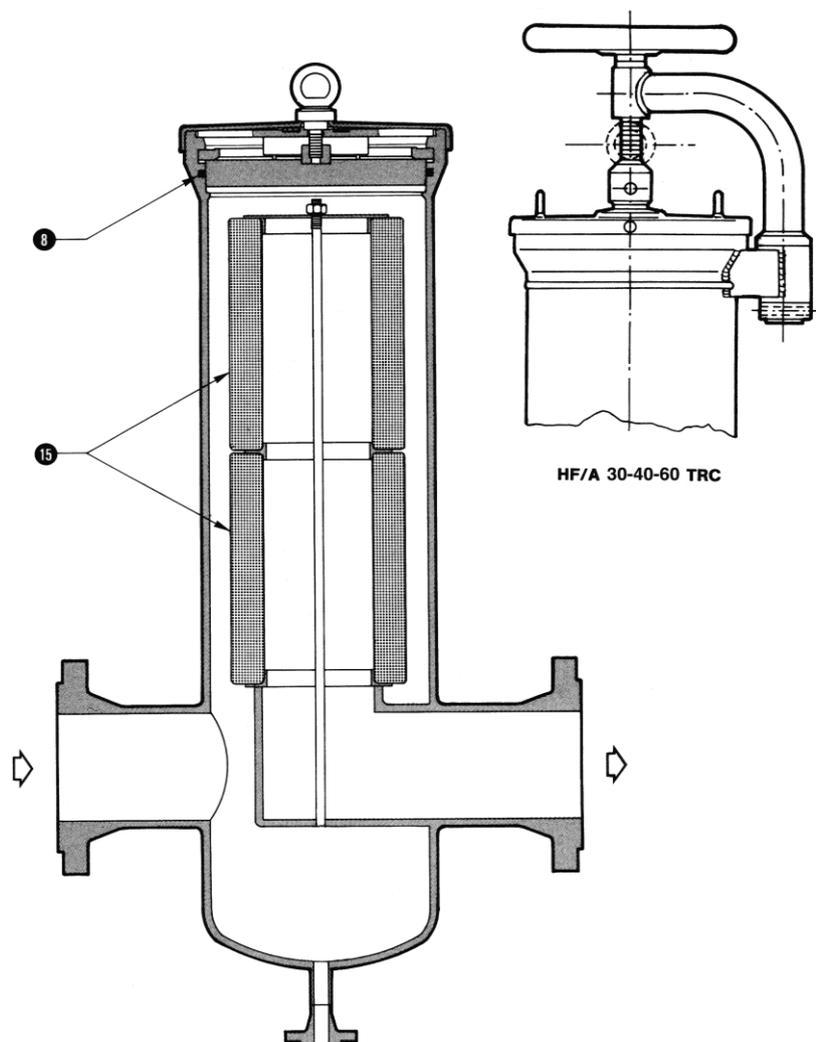
| FRA | Tipo/Type | FR 1 | FA 1.5 | FA 2 |
|------------|-----------|----------|--------|------|
| | A | 17 | 17 | 17 |
| | B | 300 | | |
| | I | 65 x 100 | | |

| HF/... | Tipo/Type | HF 0.5 | HF 1 | HF 1.5 | HF 2 | HF 2.5 | HF 3 | HF 4 | HF 5 | HF 6 | |
|---------------|-----------|----------|---------|---------|---------|--------|---------|---------|---------|---------|--|
| | A | 19 - 24 | 19 - 24 | 19 - 24 | 19 - 24 | 24 | 30 - 24 | 30 - 24 | 30 - 24 | 30 - 24 | |
| | B | 300 | | | | | | | | | |
| | I | 65 x 100 | | | | | | | | | |

| HF/...TRC | Tipo/Type | HF 1 | HF1.5 | HF 2 | HF 10 | HF 15 | HF 20 | HF 25 | HF 30 | HF 40 | HF 50 | HF 60 |
|------------------|-----------|----------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| | A | 19 | 19 | 19 | 19 | 19 | 19 | 24 | 24 | 24 | 24 | 30 |
| | B | 300 | | | | | | | | | | |
| | I | 65 x 100 | | | | | | | | | | |

6.0 LIST OF RECOMMENDED SPARE PARTS

HF/A-... TRC FILTERS

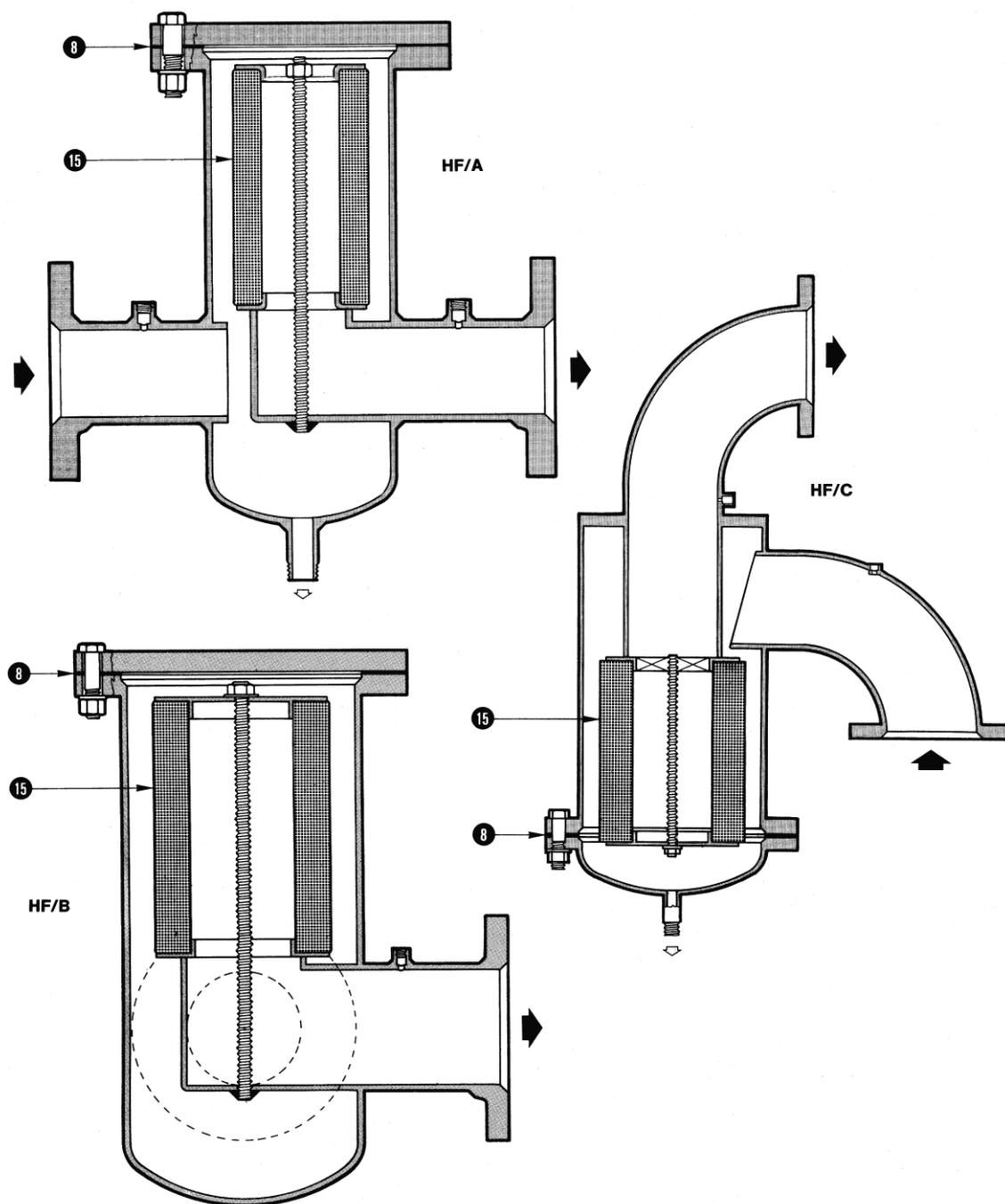


HF/A 1-1,5-2-10-16-20-26 TRC

N. PEZZI/No. OF PIECES

| POS. | DESCRIZIONE/DESCRIPTION | DN | |
|------|--|----------------------|----------------|
| | | HF/A 1 - 1,5 - 2 TRC | HF/A 10÷60 TRC |
| 8 | Anello di tenuta O. ring <i>Sealing O-ring</i> | 1 | 1 |
| 15 | Cartuccia filtrante <i>Filtering cartridges</i> | 1 | 2 |

Abitualmente forniamo il kit completo.
Usually we supply full kit.



| POS. | DESCRIZIONE/DESCRIPTION | N. PEZZI/ No. OF PIECES |
|------|--|----------------------------|
| 8 | Guarnizione Gasket | 1 |
| 15 | Cartuccia filtrante Filtering cartridge | 1 |

Abitualmente forniamo il kit completo.
Usually we supply full kit.

WHEN ORDERING SPARE PARTS SPECIFY

- **Type** of filter
- **Serial number**
- **Year of manufacture**
- **Type of fluid** used
- **Part number** (position)
- **Amount** required

Address:

Pietro Fiorentini Spa Via Enrico Fermi, 8/10 36047 Arcugnano (VI)

Tel. 0444/96851; Fax 0444/960468