



FILTER SYSTEMS

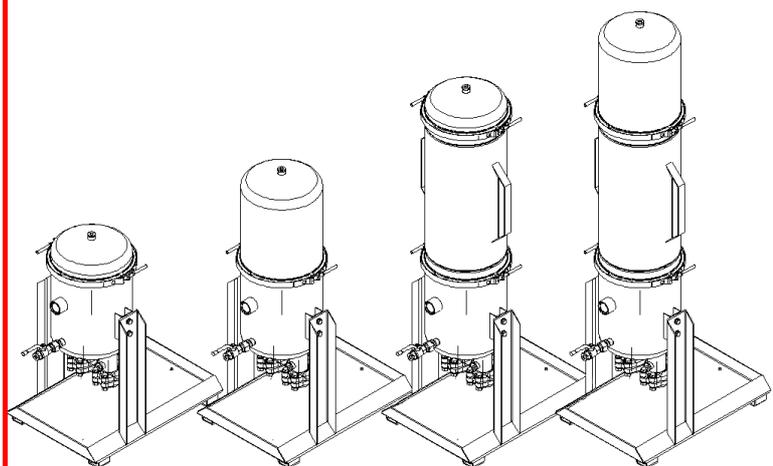
MRF 3

MultiRheo Filter

Operating and Maintenance Instructions

English (translation of original instructions)

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Imprint

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Preface

For you, as the owner of a product manufactured by us, we have produced this manual, comprising the most important instructions for its **operation** and **maintenance**.

It is intended to help you become acquainted with the ins and outs of the product and use it properly.

You should keep it in the vicinity of the product so it is always at your fingertips.

Sometimes the information contained in this documentation cannot always keep up with changes made to the product as we attach considerable importance to keeping our products cutting-edge. Consequently, there might be deviations in technical details, figures and dimensions.

If you discover errors while reading the documentation or have suggestions or other useful information, please don't hesitate to contact us:

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The editor would welcome your involvement.

Our motto: "Putting experience into practice"

Customer Service

If you have any questions, suggestions, or encounter any problems of a technical nature, please don't hesitate to contact us. When contacting us, please always include the model/type designation and article no. of the product:

Fax.: ++49 (0) 6897 / 509 - 846

E-Mail: filtersystems@hydac.com

Modifications to the Product

We would like to point out that changes to the product (e.g. purchasing options, etc.) may result in the information in the operating instructions no longer being completely accurate or sufficient.

When making modifications or performing repair work to components affecting the safety of the product, the product may not be put back into operation until it has been examined and released by a HYDAC representative.

Please notify us immediately of any modifications made to the product whether by you or a third party.

Warranty

For the warranty provided by us, please refer to the General Terms of Sale and Delivery of HYDAC FILTER SYSTEMS GmbH.

You will find these under www.hydac.com -> General terms and conditions.

Using the documentation



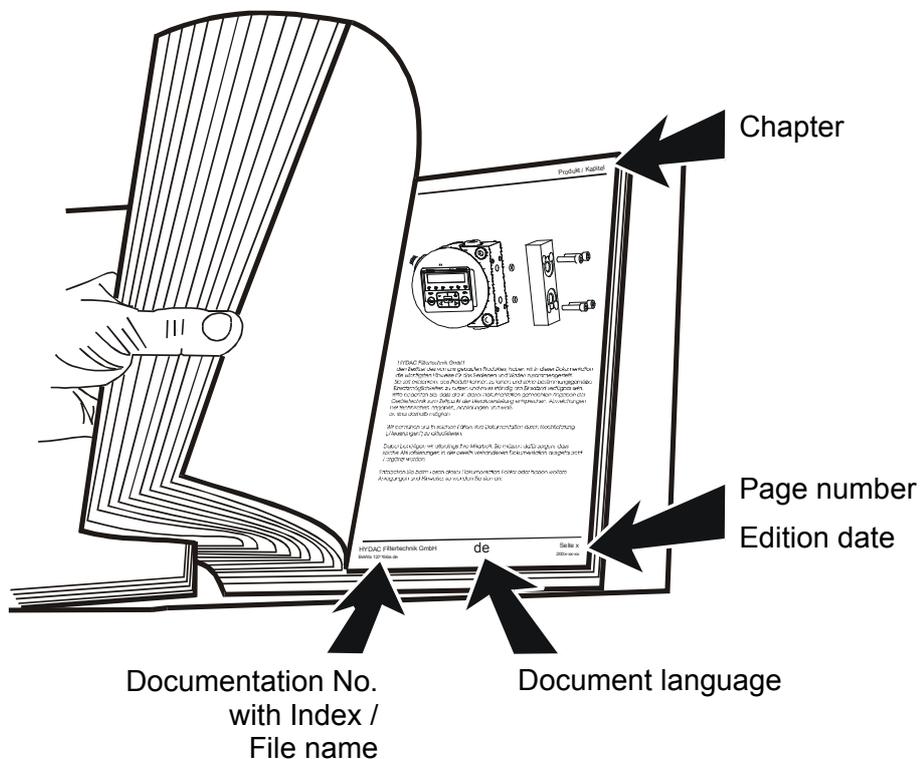
Please note that the method described above of locating specific information does not release you from your responsibility for carefully reading the entire manual prior to starting the unit up for the first time and carefully rereading the manual at regular intervals later on.

WHAT do you want to know?

I determine which topic I am looking for.

WHERE can I find the information I'm looking for?

The document has a table of contents at the beginning. I select the chapter I'm looking for and the corresponding page number.



The documentation number with its index enables you to order another copy of the operating and maintenance instructions. The index is incremented by one number every time the manual is revised or changed.

Safety information and instructions

These operating instructions contain the key instructions for properly and safely operating the MRF.

Obligations and Liability

The basic prerequisite for the safe and proper handling and operation of the MRF is knowledge of the safety instructions and warnings.

These operating instructions in general, and the safety precautions in particular, are to be adhered to by all those who work with the MRF.

Adherence is to be maintained to pertinent accident prevention regulations applicable at the site where the product is used.

The safety precautions listed herein are limited solely to using the MRF.

The MRF has been designed and constructed in accordance with the current state of the art and recognized safety regulations. Nevertheless, hazards may be posed to the life and limb of the individual using the product or to third parties. Risk of damage may be posed to the product or other equipment and property.

The MRF is only to be used as follows:

- solely for its designated use
- only when in a safe, perfect condition

Immediately remedy any malfunctions that might impair safety.

Our General Terms and Conditions apply. They are made available to the owner upon concluding purchase of the unit at the latest. Any and all warranty and liability claims for personal injuries and damage to property shall be excluded in the event they are attributable to one or more of the following causes:

- improper use of the MRF or use deviating from its designated use
- improper assembly, installation, commissioning, operation and maintenance of the MRF
- operating the MRF when the system equipment or systems are defective
- modifications to the MRF made by the user or purchaser
- improper monitoring of product components subject to wear and tear
- improperly performed repair work

Explanation of Symbols and Warnings

The following designations and symbols are used in this manual to designate hazards, etc.:

 DANGER	DANGER denotes situations which can lead to death if safety precautions are not observed.
 WARNING	WARNING denotes situations which can lead to death if safety precautions are not observed.
 CAUTION	CAUTION denotes situations which can lead to severe injuries if safety precautions are not observed.
NOTICE	NOTICE denotes situations which can lead to property damage if safety precautions are not observed.

Proper/Designated Use

The MultiRheoFilter (MRF) is a stationary filtration unit used for the full-flow and bypass filtration of low-viscosity fluids.

Any other uses shall be deemed to be improper and not in keeping with the product's designated use.

The manufacturer will not assume any liability for any damage resulting from such use.

Proper or designated use of the product extends to the following:

- Maintaining adherence to all the instructions contained herein.
- Performing requisite inspection and maintenance work.

Improper Use

Any use deviating from the proper/designated use described above is prohibited.

Improper use may result in hazard to life and limb.

Safety Devices

Prior to starting up the product each time, make sure that all the safety devices are properly fitted to the hydraulic system in which the product is to be used and are in proper working order.

Informal Safety Precautions

Make sure to always keep the operating instructions in the vicinity of the product.

In addition to the manual, the general and local regulations concerning accident prevention and protection of the environment should be available and observed.

Make sure to keep the safety and hazard symbols and warnings on the product in a legible condition.

Check the unit daily for leaking (perform a visual check). Any loose connections are to be replaced immediately.

Training and Instruction of Personnel

The MRF may only be operated by properly trained and instructed personnel.

The areas of responsibility of your staff must be established in a clear-cut manner.

Trainees may only work with the MRF when supervised by an experienced individual.

Activity	Individuals	Individuals undergoing training	Individuals with technical training	Electrician	Supervisor with the appropriate authority
Packing Transportation		X	X		X
Commissioning			X	X	X
Operation		X	X	X	X
Troubleshooting / locating the source of malfunction			X	X	X
Remedying faults Mechanical			X		X
Troubleshooting, electrical problem				X	X
Maintenance		X	X	X	X
Repair work					X
Decommissioning/storage		X	X	X	X

Safety Measures to Be Followed during Normal Operation

The product is to be checked at least once a day for external damage and the proper functioning of the safety devices.

Hazards Posed by Stored Residual Energy

	 WARNING
	<p>Hydraulic systems are under pressure</p> <p>Bodily injury leading to death</p> <ul style="list-style-type: none">▶ The hydraulic system must be depressurized before performing any work on the hydraulic system

Note that the unit may pose a hazard as the result of residual stored mechanical and electrical energy. Take the proper precautions when instructing personnel on the use of the unit. Detailed information is provided in the respective sections of this manual.

Modifications to the MRF

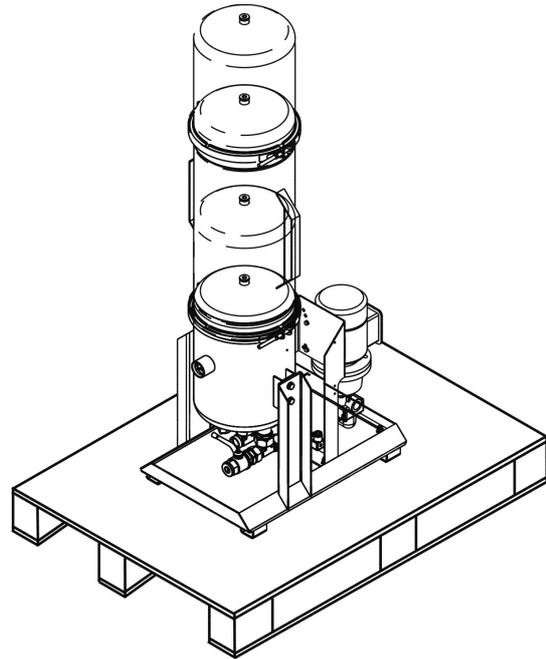
Do not make any modifications (design modifications, extensions) to the MRF without the prior consent of the manufacturer.

Immediately replace any unit components which are not in perfect condition.

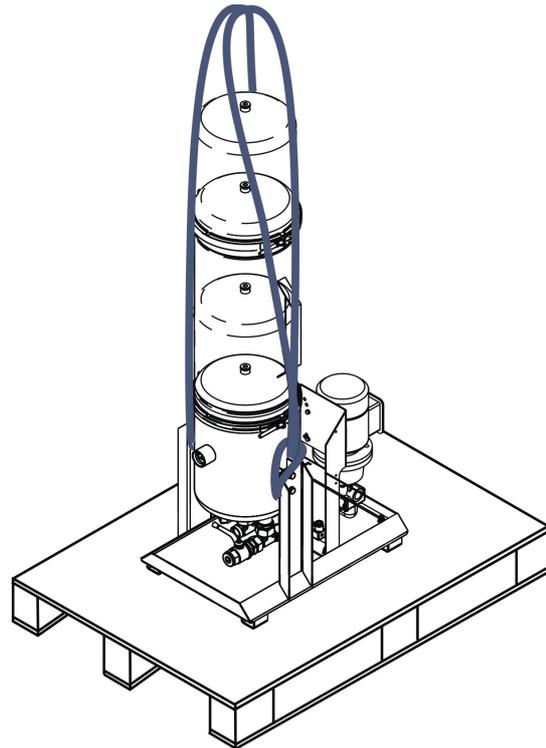
Only use original (OEM) spare parts and consumables. When using non-OEM components it cannot be ensured that they have been designed and manufactured so as to comply with loading and safety requirements.

Transporting the MRF

Transport the AMRF in an upright position only.



For transportation using a crane or forklift, use two slings on the specified anchor points between the filter housing and the base.



Storing the MRF

Remove all filter elements and completely drain the filter housing. Clean and flush the filter housing

Storage temperature: 5 ... 30°C / 41 ... 86°F

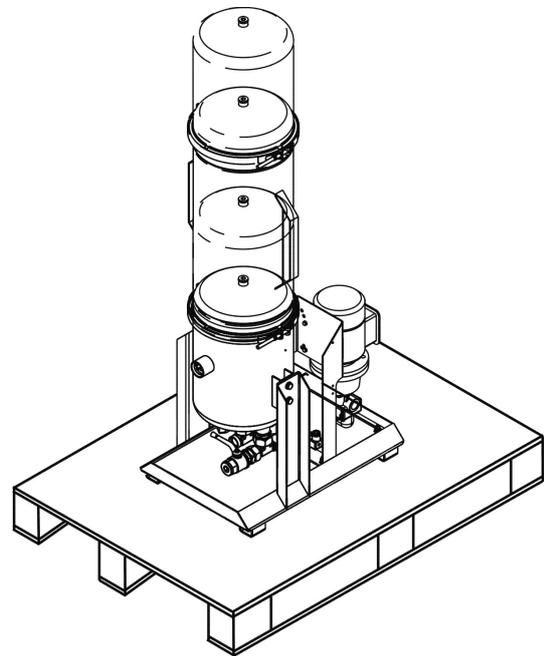
Humidity: Up to 80% relative humidity, non-condensing

Air Clean, salt-free air, not near oxidizing substances (rust film).

Storage duration Indefinite.

Before the unit is started up again after being stored for more than two years, all seals must be replaced.

Store the MRF in an upright position only.

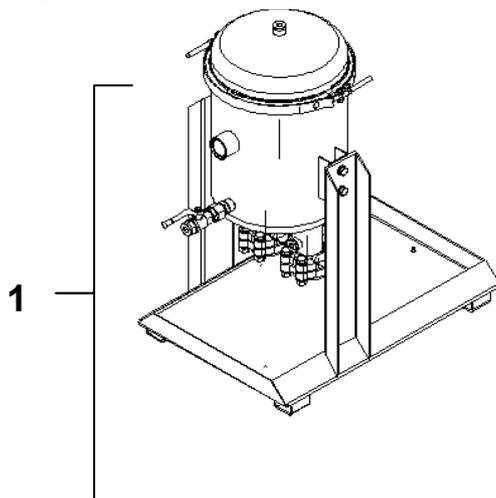


Checking the scope of delivery

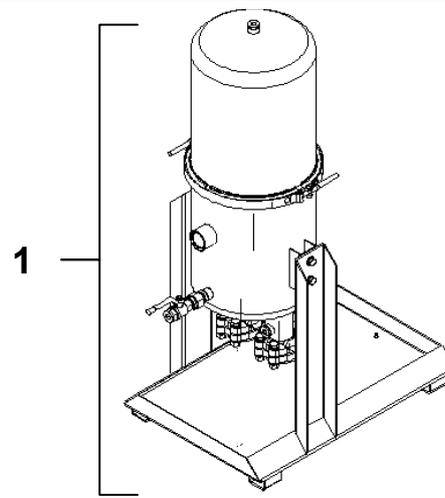
Upon receiving the MRF check it for any damage in transit. Do not put the MRF into operation unless it is in perfect condition. Any damage in transit is to be reported to the forwarding agent or the department in charge immediately; the unit may not be commissioned until this damage is properly remedied.

The following items are supplied:

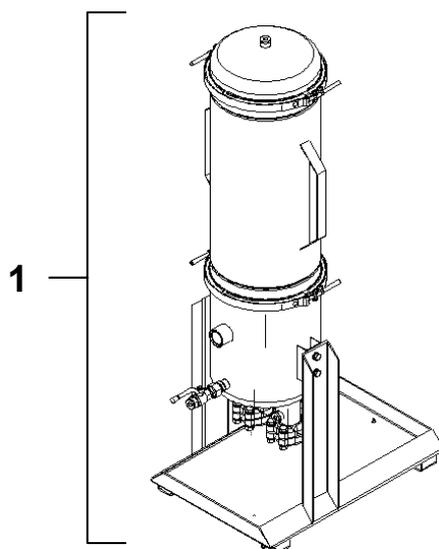
Item	Qty	Description
1	1	MultiRheo Filter 3, filter size and version of ports in accordance with order, (excluding filter elements)
-	1	Operating and Maintenance Instructions



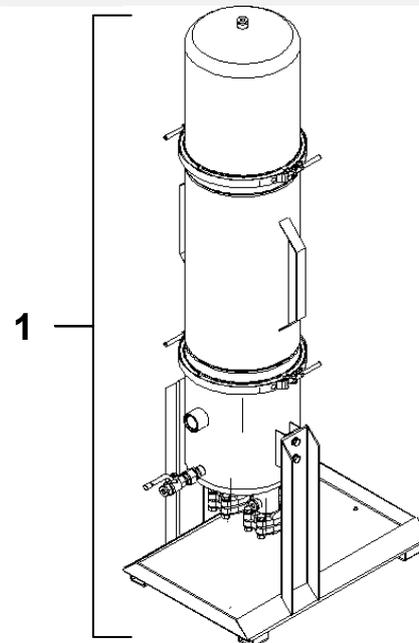
MRF 3 E/xx x 1010



MRF 3 E/xx x 2010



MRF 3 E/xx x 3010



MRF 3 E/xx x 4010

Technical Description

The MultiRheo Filter (MRF) is a stationary filtration unit used for the full-flow and bypass filtration of low-viscosity fluids for the separation of particles of 100 µm to 1 µm (absolute).

The MultiRheo Filter is a filter series for the use of Flexmicron filter elements.

Suitable Fluids

NOTICE

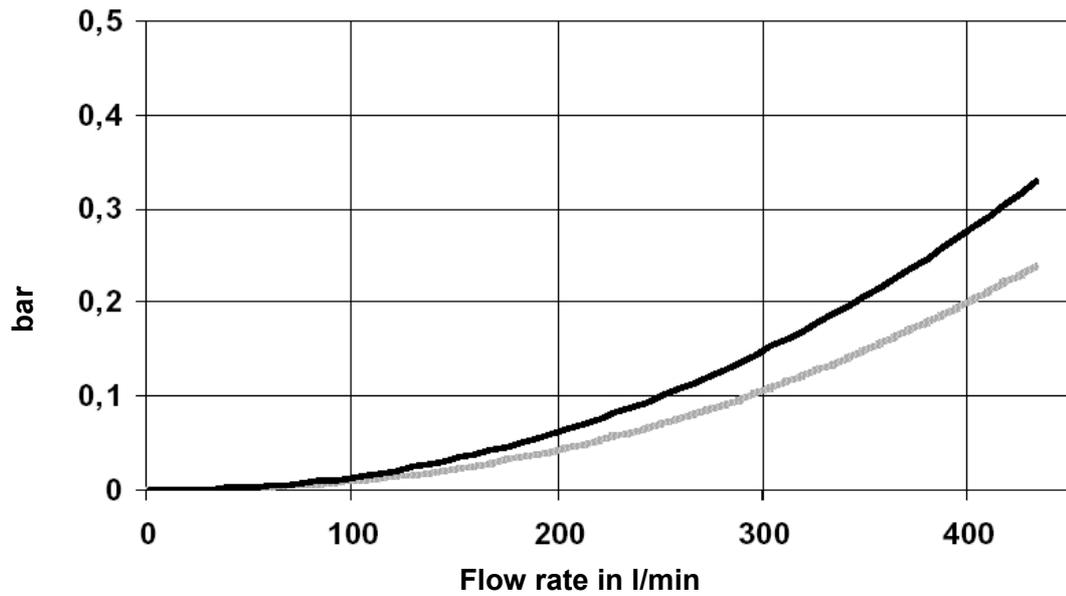
Impermissible operating media

The MRF will be destroyed

- ▶ Only use the MRF in connection with:
 - lubrication and mineral oils or media based on mineral oil
 - cooling lubricants

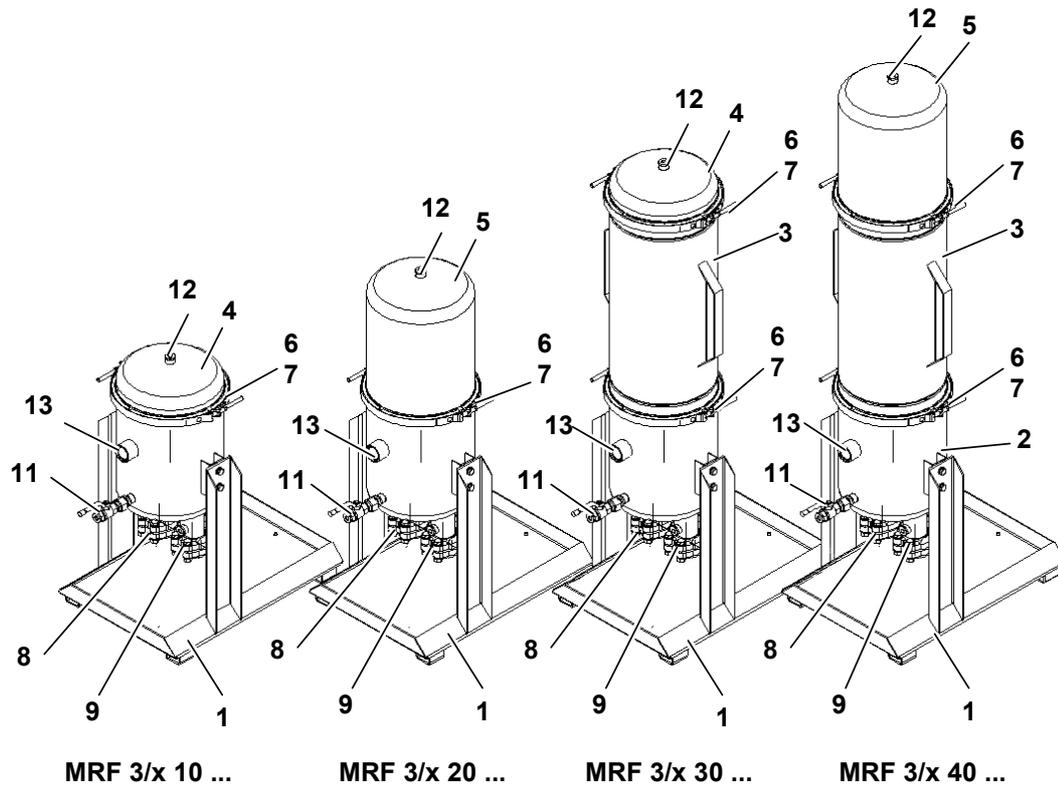
Filter Design

The total pressure of the filters at a specific flow rate is comprised of the housing Δp and the element Δp . The pressure loss of the housing can be determined using the following pressure loss curve.

Pressure loss curve, housing

The upper housing curve holds for mineral oil with a density of 0.86 kg/dm^3 and a kinematics viscosity of $30 \text{ mm}^2/\text{s}$. The lower housing curve holds for water at 20°C . For turbulent flow, the differential pressure will change proportionally to the density; for laminar flow, it will change proportionally to the density and viscosity. The flow velocity should not exceed 3 m/s at the filter inlet for oil and 4 m/s for water.

Design of the MultiRheoFilter (MRF)

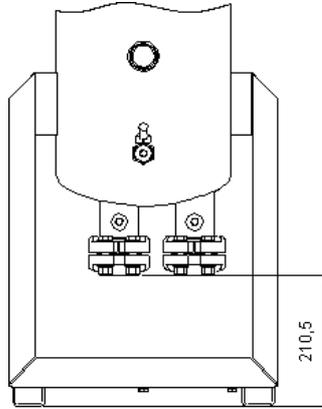


Item	Description
1	Foot
2	Lower section
3	Extension piece
4	Flat cover
5	Tall cover
6	O-ring
7	Housing clamp
8	Inlet
9	Outlet
10	Drain valve, clean side
11	Drain valve, dirt side
12	Air-vent plug
13	Back-pressure indicator

Port Versions — Inlet/Outlet

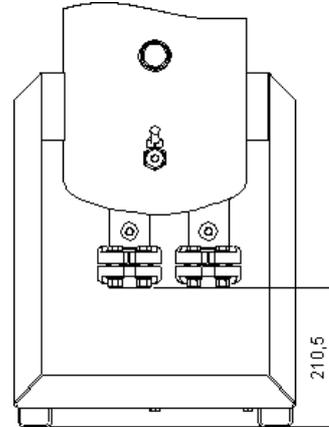
MRF3 E /x D

G 1"



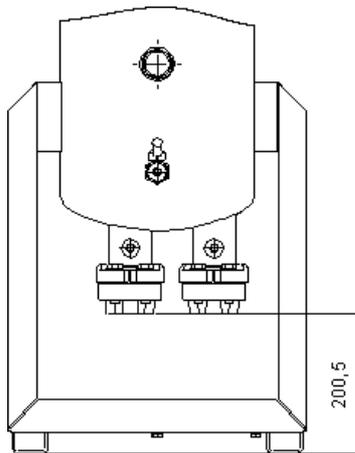
MRF3 E /x F

G 1 1/2"



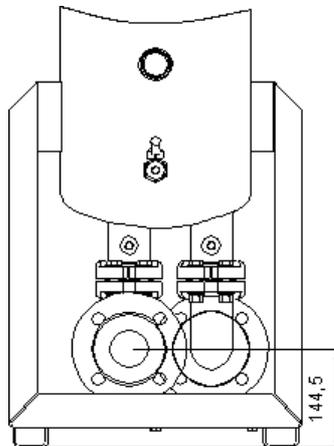
MRF3 E /x G

G 2"



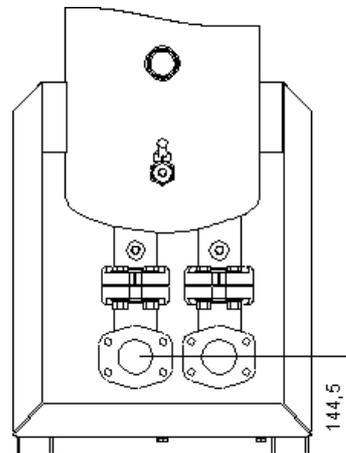
MRF3 E /x J

DIN DN 50

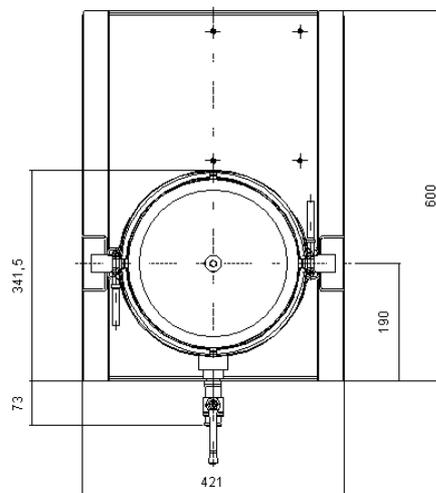
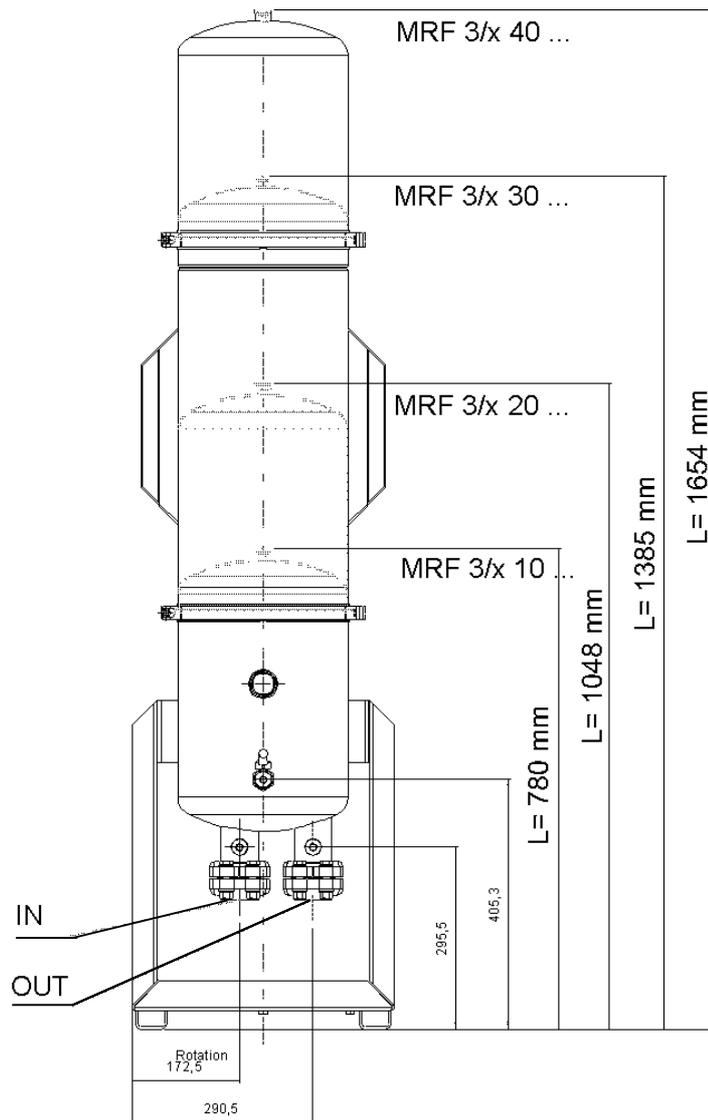


MRF3 E /x L

SAE DN 50



Dimensions



Commissioning

The MRF is supplied ex works without any filter elements. Prior to commissioning, insert the filter elements into the filter housing, as described on page 22.

Set up

Set up the unit horizontally on a level surface.

Make sure that there is sufficient space above the filter housing to remove the filter elements.

Notes on Piping / Hosing

Make sure that no vibrations or stress/loading from other machinery and equipment are carried over to the filter housing. If necessary, use expansion joints.

The pressure differential in a hydraulic line depends upon:

- flow rate
- kinematic viscosity
- pipe dimensions
- density of fluid

The pressure loss can be estimated for hydraulic oils as follows:

$$\Delta p \sim 6.8 * L / d^4 * Q * V * D$$

Δp = Pressure differential in [bar]

L = Line length [m]

d = Internal line diameter [mm]

Q = Flow rate [l/min]

V = Kinematic viscosity [mm²/s]

D = Density [kg/dm³] Mineral oil based hydraulic fluid has a density of ~ 0.9 kg/dm³.

This applies to straight pipelines and hydraulic oils. Additional threaded connections and pipe bends increase the pressure differential.

Keep the height difference between the pump and the oil level in the tank as low as possible.

Hoses must be suitable for suction pressures of at least -0.5 bar.

Constrictions in the connections and lines should be avoided. This could compromise suction output and cause cavitation .

Take note that the nominal size of the connected hoses/piping must be at least as large as the inlet port sizes.

Make sure that no vibrations or stress/loading from other machinery and equipment are carried over to the filter unit. Use hoses or expansion joints if necessary.

Connecting the IN suction port connection

Connect the suction-side connection via a negative pressure-resistant hose or through a pipeline. Make sure that no vibrations or stress/loading from other machinery and equipment are carried over to filter housing. Use hoses or expansion joints if necessary.

Performing maintenance

	 WARNING
	<p>Hydraulic systems are under pressure</p> <p>Bodily injury</p> <p>► The hydraulic system must be depressurized before performing any work on the hydraulic system.</p>

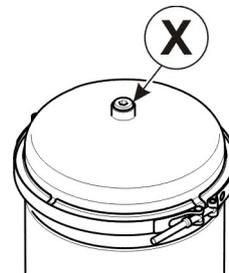
The MRF is standardly equipped with an electric differential pressure gauge (red/green) which shows when an element needs to be replaced.

The MRF can be optionally equipped with an electric back-pressure indicator or differential pressure gauge.

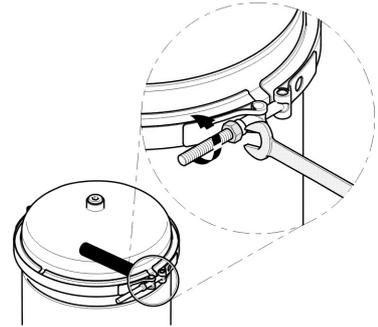
Replacing the filter elements

To change the filter elements, proceed as follows:

1. Switch the pump off and close the shut-off valves at the inlet and outlet.
2. Depressurize the filter housing.
Carefully unscrew the air bleed screw in the cover counterclockwise using a 10 mm Allen wrench.
The air bleed screw has ventilation slots.
3. Open the drain valve on the dirt side and collect the escaping fluid with a suitable container.
Once no more fluid escapes, close the drain valve.

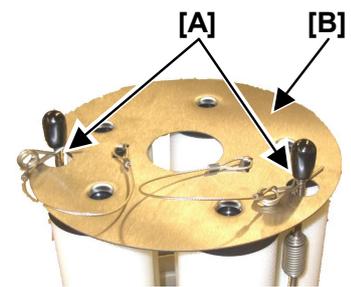


4. Undo the tensioning clamps between the cover and the topmost intermediate piece with the aid of a SW 13 mm open-end wrench.

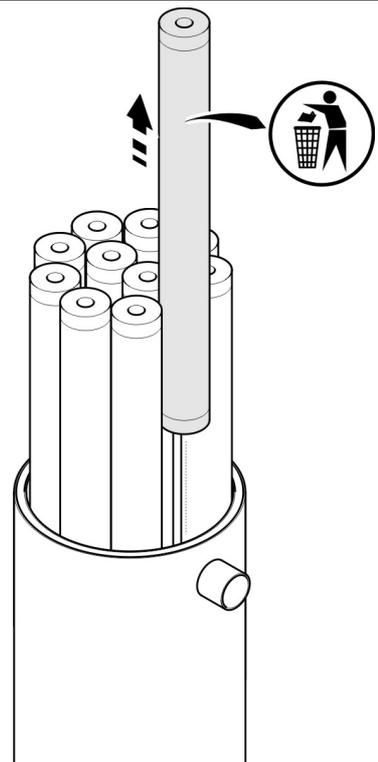


5. Remove the cover and place it on a clean surface.

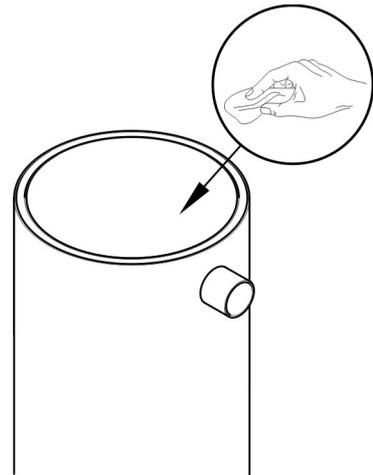
6. Pull off both cotter pins **[A]** and remove the element holding plate **[B]**.



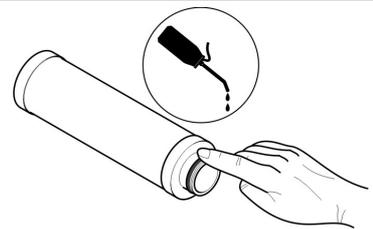
7. Remove all filter elements and dispose of them in an environmentally friendly way.



8. Clean the inside of the filter housing.



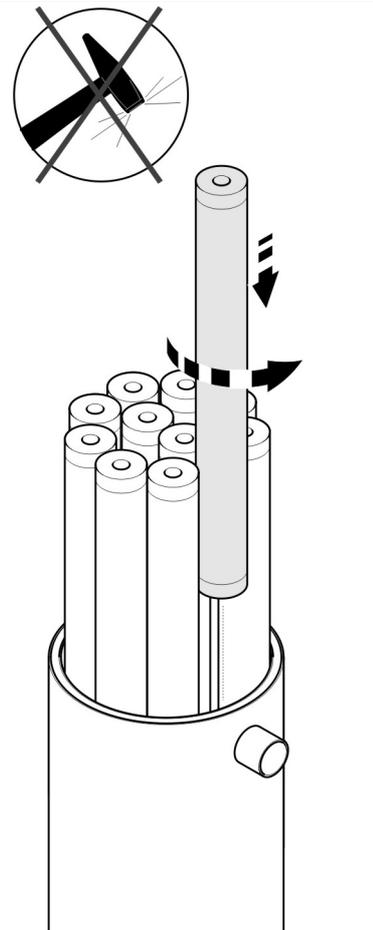
9. Wet the O-ring on each filter element with fluid.



10. Insert the new filter elements into the element mount by rotating them slightly while applying pressure to the element



Do not use excessive force or a hammer, etc.

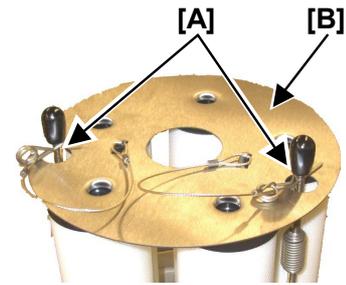


11. Place the element retaining plate **[B]** back in place making sure it is pointed in the right direction so that it secures all the filter elements in place.

Insert both of the cotter pins **[A]** in the designated holes.



The cotter pins can be more easily inserted if you lift up the knob **[C]**.



12. Clean the sealing surface on the housing. Check the O-ring for damage. Replace it if necessary.

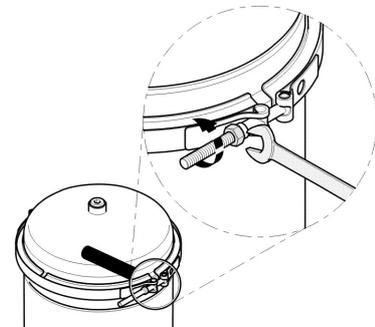
Wet the O-ring with fluid and insert it.

13. Clean the sealing surface on the cover.

Put the cover on.

14. Use an SW 13 open-jaw wrench to tighten the tensioning clamp evenly to 20 Nm.

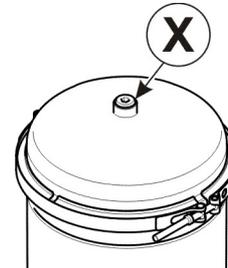
Screw on the lock nut and tighten it.



15. Undo the air bleed screw (X).

Fill the filter housing.

If fluid escapes, screw in the air bleed screw and tighten it.



16. The MRF is ready for operation.

Disposal of MRF

Remove all filter elements and completely drain the filter housing. Clean and flush the filter housing

Observe the conditions required for storage on page 13.

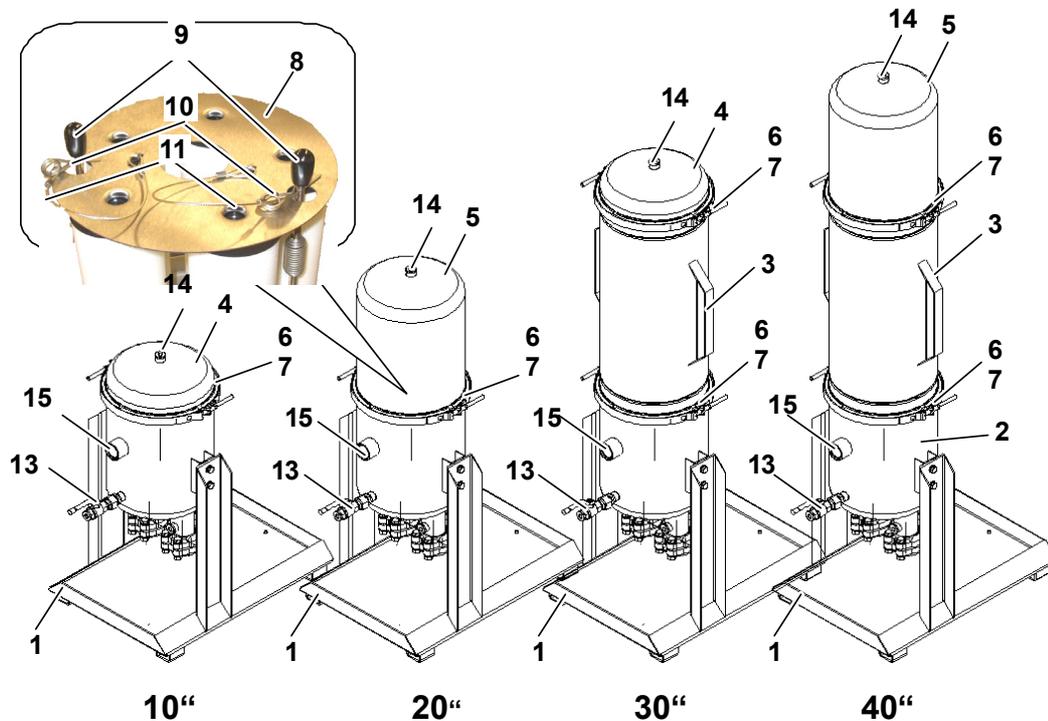
Disposing of the MRF

Please dispose of the packaging material in an environmentally friendly manner.

After dismantling the unit and separating the various materials, dispose of the unit in an environmentally friendly manner.

Spare parts

To ensure safe and reliable operation of the unit, use only original spare parts and accessories. Make sure to always indicate the unit designation (see type label) and the serial number when ordering spare parts.



Item	Description	Part no.	Quantity				
			10"	20"	30"	40"	
1	Foot	*	1	1	1	1	
2	Lower section	*	1	1	1	1	
3	Extension piece	3030463	-	-	1	1	
4	Cover, flat	3030462	1	-	1	-	
5	Cover, tall	3030461	-	1	-	1	
6	Housing clamp	6028356	1	1	2	2	
7	O-ring	NBR	6005449	1	1	2	2
7	O-ring	FKM	6012630	1	1	2	2
8	Element retaining plate	7 elements	3410034	1	1	1	1
8	Element retaining plate	11 elements	3203923	1	1	1	1
9	Knob	6043751	2	2	2	2	
10	Wire cable	6043864	2	2	2	2	
11	Cotter pin	6043775	2	2	2	2	

12	Filter element	1 µm	*	X	X	X	X
12	Filter element	3 µm	*	X	X	X	X
12	Filter element	5 µm	*	X	X	X	X
12	Filter element	10 µm	*	X	X	X	X
12	Filter element	20 µm	*	X	X	X	X
12	Filter element	30 µm	*	X	X	X	X
13	Ball valve	Dirt side	*	1	1	1	1
14	Air-vent plug		0403302	1	1	1	1
15	Manometer		0036198	1	1	1	1

*) Available on request, x) 3/7 or 3/11, depending on version

Technical data

Technical data	MRF3/xx 10"	MRF3/xx 20"	MRF3/xx 30"	MRF3/xx 40"
Size in " [inches]	10"	20"	30"	40"
Number of filter elements	7 / 11	7 / 11	7 / 11	7 / 11
Permissible Δp on the element	See element data sheet			
Filter housing material	1.4301			
Filter housing content	21 l	40 l	60 l	78 l
Operating pressure, maximum	10 bar			
Sealing material (depending on order)	NBR / FKM / EPDM			
Filter housing empty weight	74 kg	79 kg	89 kg	94 kg
Hydraulic fluid temperature	-10 ... 90 °C			
Ambient temperature	10 ... 40 °C			

Model Code

MRF 3 E / 5 G 30 10 N E 0

Filter type

MRF = MultiRheo Filter

Filter Size

3 = Housing diameter ~ 274 mm

Housing material

E = Stainless steel

N = Carbon steel, stainless steel,
aluminum

Number of elements

7 = 7 elements

11 = 11 elements

Connection type

D = G 1"

F = G 1 1/2"

G = G 2"

J = DIN DN 50

L = SAE DN 50

Element construction length

10 = 10"

20 = 20"

30 = 30"

40 = 40"

Pressure stage

10 = 10 bar

Sealing material

F = FKM (FPM / Viton®)

N = NBR

E = EPDM

Clogging indicator

C12= PVD 2 C.0

D13= VM 2 D.0 /-110

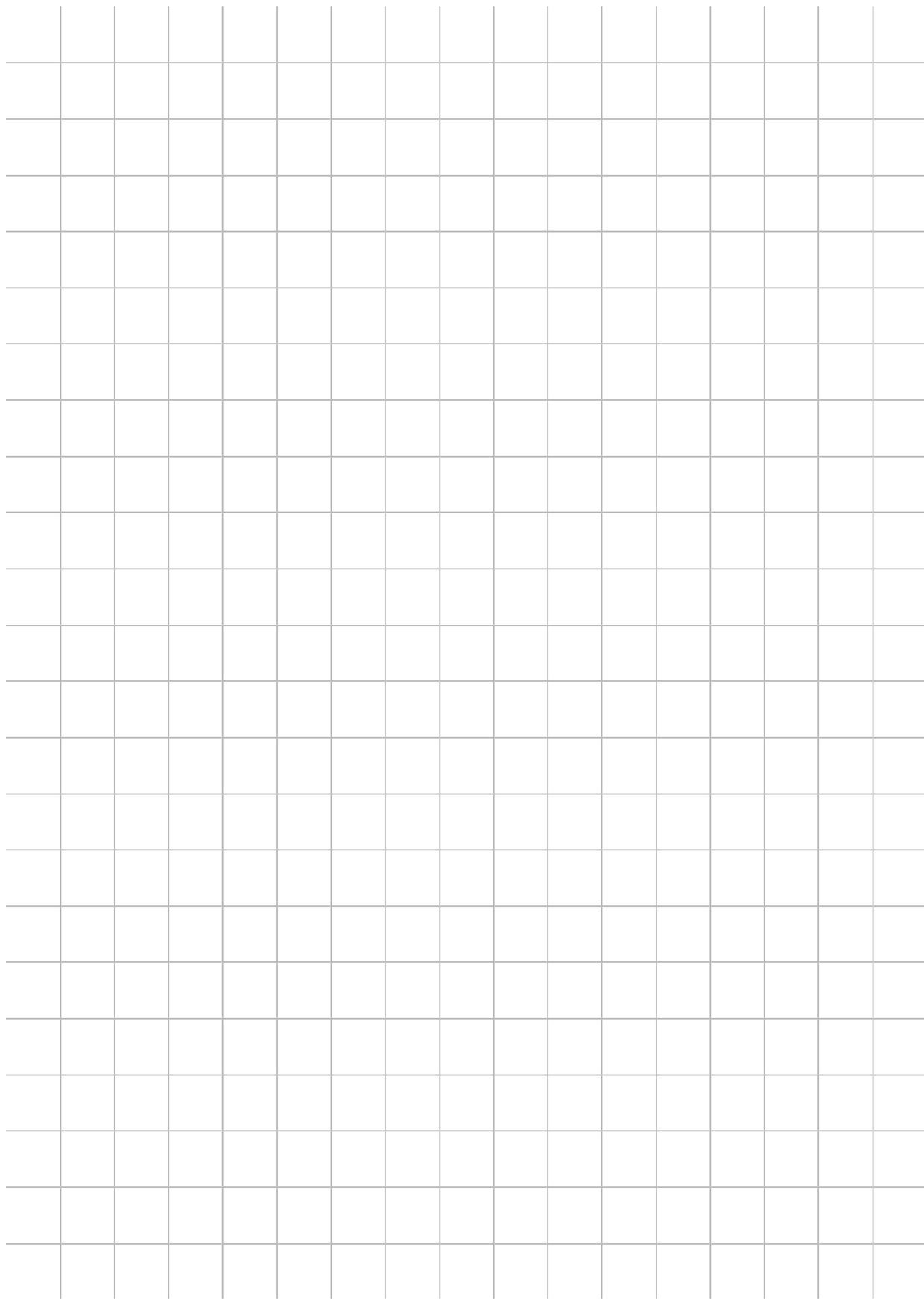
D17= PVD 2 D.0 /-L220

D18= PVD 2 D.0 /-L24

D32= PVL 2 GW/.0/-V-113

D33= PVL 2 GW/.0/-V-111-6

Modification ID





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