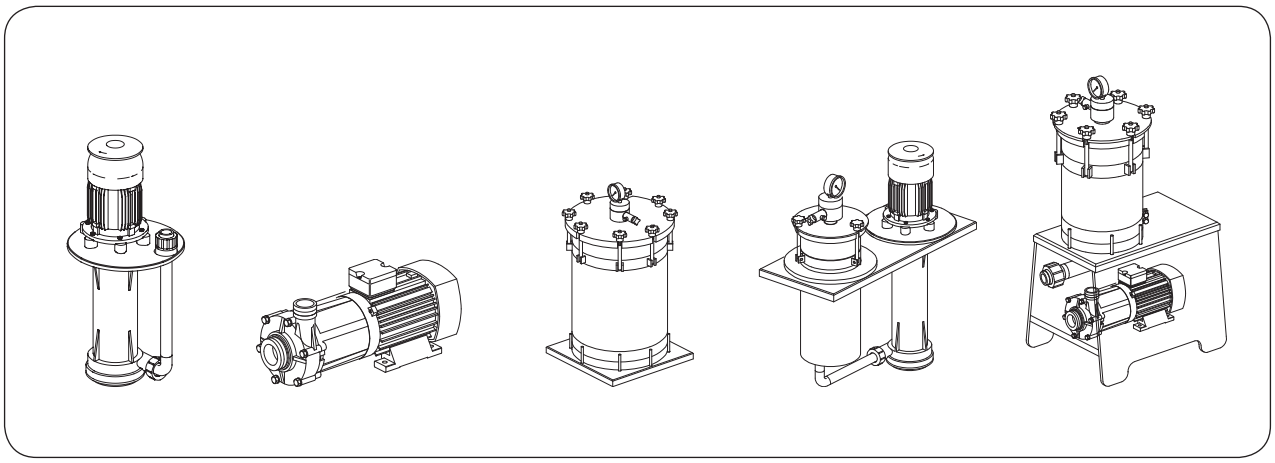
Instruction manual for Hendor pumps & filters



1. Introduction

Thank you for choosing a Hendor product. Before starting to use this product Hendor strongly recommends to read this owner's manual thoroughly and to follow instructions as closely as possible. In this way your product will function properly for years to come. This owner's manual contains all obligatory safety precautions. The manual should be put at disposal of the end-user of this product and should be present at site in order to allow operator and maintenance crew to use it.

2. Safety precautions

The presented symbols are safety alert symbols. Be alert to potential personal injury in case symbols on the product or in this manual are shown.

DANGER

This label warns for risk of electrical shock when failing to observe.

WARNING

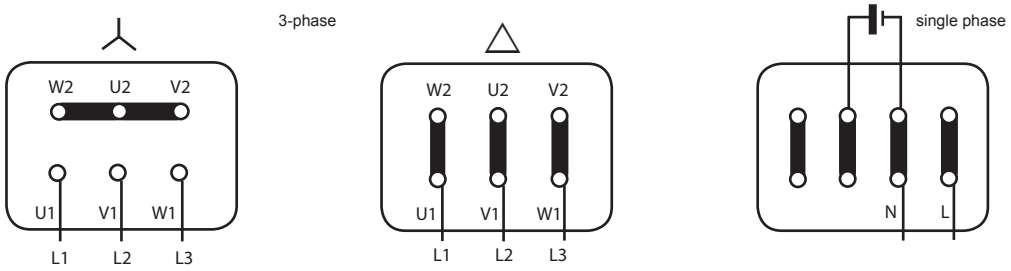
This label warns about hazards that can cause personal injury, death or major property damage if ignored.
Keep in mind that the product can contain chemical liquids.

Carefully read and follow all safety instructions in the manual and on the pump.
Keep safety labels in good condition. Replace missing or damaged safety labels.

2.1 Installation

Pumps and filters should be connected in the prescribed way.

The user always has to consider personal safety and health for himself as well as his direct vicinity.



2.2 Electrical

1. Only qualified electricians are allowed to connect pumps according to local regulations of the power supplier.
2. Grounding of the motor should be applied first; failure to ground can cause severe or fatal shock. Do not ground to gas supply lines.
3. Before connecting the motor check corresponding voltage of motor and power supply. Incorrect connection can cause fire or serious damage to the motor and voids warranty. See wiring diagram.
4. Avoid unexpected or accidental starting of the motor by disconnecting and locking out power supply.
5. In case of repair and maintenance disconnect and lock out power supply.
6. Do not point a jet of water at the motor to avoid personal injury (risk of electrical shock).
7. Check wiring dimensions according to the power of the motor.
8. Check fuses on the power supply connection.
9. Thermal overload switch should be used on the connection to the pump. The current overload is adjusted to the value of the motor name plate including +10%.
10. Do avoid damage to the cord line by not hoisting the pump by the cord line and be sure the cord line is not jammed; avoid sharp edges.
11. General rule for Hendor pump shaft rotation: Always run clockwise (CW), looking at cooling fan side. Direction of rotation is also indicated on the motor by arrow.

2.3 Checking direction of rotation

Vertical pumps: Always check direction of rotation ***outside*** the liquid.
Horizontal pumps: Always check the direction of rotation ***flooded*** with liquid.
Briefly switching on the power will show direction of rotation, looking at cooling fan side. Ignoring these recommendations will damage the pump severely.

2.4 Plumbing

1. Connections to the pump and filter should be provided with reliable, persistent materials.
2. Where hoses are used, take care of correct hose clamps.
3. Use the right O-rings for connections.
4. Pipes and hoses should be internally cleared of any obstructions.
5. Check tightness of connections before starting up.
6. Thermoplastic components will not tolerate any plumbing stress.
7. Plumbing should be properly aligned and supported to prevent distortion and damage of parts.
8. Leave enough space for easy access and/or maintenance.
9. Keep position of pump away from any heaters or heater coils.
10. Pumps and filters should be mounted on a sturdy base.

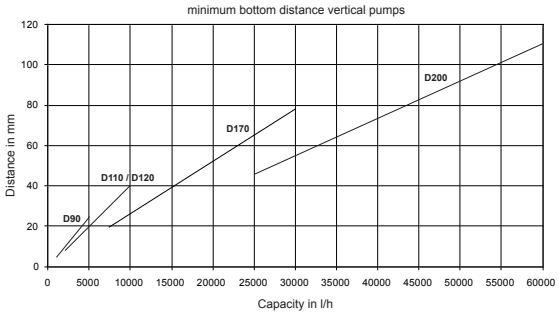
3. Receipt

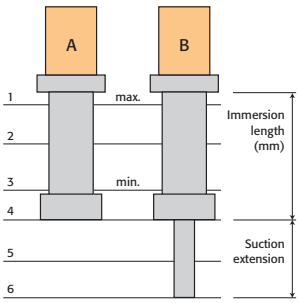
At receipt of the product the identity of the product (by checking name plate data), the completeness of delivery as well as absence of visible damage should be ascertained. The end-user or his representative must ascertain the match of material specification and specific liquid used. Any problems arising from these checks should be made in writing and preferably signed by the forwarding agent as evidence.

4.1 Vertical pumps

4.1.1 Installation

Take notice of enough bottom clearance at the suction side of vertical pumps.
See recommendations for bottom clearance.
Hendor vertical pumps are designed for in-tank installation.
Out-of-tank models are optional and require special installation instructions.





1 maximum liquid level
2 normal working level
3 minimal starting level
4 pump A stops pumping
5 pump B will continue to work
(provided it is not switched off intermittently)
6 pump B stops pumping

4.1.2 Operation and maintenance

These type of pumps are capable of running dry. At start up the pump should be **checked for direction of rotation outside** the liquid.
Contaminated strainers if mounted can reduce performance and should be cleaned regularly.

Regular pump inspection

During operation all pumps should be checked regularly. Check flow, pressure, manometer indication, pipe work, hoses, hose clamps and absorbed power by monitoring amperage of the motor. Pumps should be fitted with thermal overload switch. Check pumps for any unusual noise or vibration (this may indicate the moment of maintenance).

Maintenance precautions

To avoid dangerous or fatal electric shock hazard and to avoid injury from starting the motor unexpectedly, disconnect and lock out power supply to the motor. Always use genuine parts to assure good performance. When taking pump apart check for sequence of disassembly and reassembly. After having completed maintenance or repair, follow safety and installation instructions.

4.1.3 Dismantling and reassembly

For efficient maintenance of Hendor vertical pumps, **some special tools** are available (see page 4).

General precautions prior to dismantling

- always disconnect electric cables.
- disconnect discharge pipe.
- watch remaining liquid in pump housing.
- do work on a clean bench.

When ordering Hendor parts always quote **pump type** and **serial number**.

Dismantling

- remove drip cover (if applicable).
- remove fan cover.
- remove cooling fan by applying two screwdrivers.
- remove sealing ring and locking ring.
- turn pump upside down.
- remove volute cover (by turning clockwise).
- secure shaft end against rotation and loosen impeller (turning anti-clockwise) by using impeller key.

Series D90

- take off wiring casing of motor by removing 3 bolts; mind not to damage stator wiring!
- unscrew 4 screws that are accessible for removing pump house
- take off pump house
- loosen shaft protection pipe (turning anti-clockwise)

Other series

- remove bolts/nuts that connect motor to pump housing.
- take off pump housing completely.
- loosen impeller-shaft protection pipe (if applicable).

Electric Motor

All motors are fitted with standard ball bearings.

- by removing rear-end and front-end cover, bearings are accessible.
- rear bearing can be taken off by standard puller.
- front bearing is only accessible after taking out spring ring and removing front shield.
  front bearing of vertical pump motors can only be taken off by applying special Hendor bearing puller.

Replacing worn or damaged parts

Dismounting and refitting should be carried out very carefully.

Assembling motor is done in reverse order

Ensure free rotation and check end play of the shaft of vertical pumps at 0,03 mm maximum.

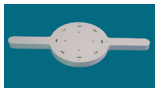
Assembly

- refit all parts in reverse order.
- prior to mounting volute cover measure distance between top of impeller and bottom of volute cover; this dimension should be in range of 1-2 mm.

Prior to operation of the pump check direction of rotation as indicated by arrow on the motor.
Motor shaft rotation is clockwise, viewed from top of the motor. Testing the rotation of the shaft has to be done outside the liquid; running the pump backwards may loosen the impeller and damage the pump.

Special tools

Grip



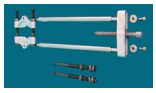
Impeller key

Radius key

Pen key

Wrench

Bearing puller



Toolbit

	For disassembly of	Use	Pump type	Article number
1	Suction extension pipe (if applicable)	Wrench	All types	9999-000-000-037
2	Strainer (if applicable)			
	Flat strainer	Grip	D17*	9011-000-001-499
	High strainer	Radius key	All types	9062-600-999-002
3	Pump house cover	Grip	D9*/D110/D12*	9011-000-001-551
		Grip	D17*	9011-000-001-499
		Pen key	D2**	9063-623-100-250
4	Impellor	Grip	D9*/D110/D12*	9011-000-001-551
		Grip	D17*	9011-000-001-499
		and Impellor key		9011-891-001-080
		Pen key	D2*	9063-623-100-250
		and Impellor key		9011-891-001-080
5	Motor	Toolbit M4	0,12 - 0,18 - 0,25 kW	9999-000-000-020
		Toolbit M5	0,37 .. 2,2 kW	9999-000-000-021
		Toolbit M6	3 .. 9 kW	9999-000-000-047
6	Motor bearings	Complete bearing puller set	All types	9999-000-000-031
		Bearing puller	D9* only	9999-000-000-023
		Bearing puller	D110 only	9999-000-000-024
		Bearing puller	D12*/D170/D2* only	9999-000-000-025

	PU Paint	0.25L tin (Hendor brown)	All motors	9999-000-000-041

4.2 Horizontal Pumps

4.2.1 Installation

Horizontal magnetic drive & seal pumps are very sensitive to suction conditions. Many pump problems are caused by poor suction conditions. The bigger the pump and the higher the temperature, the more important the general hydraulic guidelines should be applied. Always try to respect the basic rules for liquid velocity v (m/s).
We recommend for Suction side v = 1 - 2 m/s; Discharge side v = 1,5 - 3 m/s

Flow	Inner pipe diameter (mm)								
l/h	15	20	25	32	40	50	65	80	100
	Velocity (m/s) at given flow (l/h)								
1000	1,57	0,88	0,57						
2000	3,15	1,77	1,13	0,69					
4000	6,29	3,54	2,26	1,38	0,88				
6000		5,31	3,4	2,07	1,33				
8000			4,53	2,76	1,77	1,13			
10000			5,66	3,46	2,21	1,42	0,84		
15000				5,18	3,32	2,12	1,26	0,83	
20000				6,91	4,42	2,83	1,68	1,11	
30000				10,4	6,63	4,25	2,51	1,66	1,1
40000					8,85	5,66	3,35	2,21	1,4

Golden rules for proper pipe work

1. Keep suction pipe work as short as possible.
2. Increase pipe size on suction side by at least one pipe diameter for longer suction pipe and/or higher temperature.
3. Use eccentric adaptors at varying diameters to prevent air pockets.
4. Avoid elbows, bends and fittings at suction side. When unavoidable keep fittings at a distance of 10 times pipe diameter away from pump inlet.
5. Pipe work should slope up towards pump to prevent air pockets.
6. Pipe work should be completely leak free.
7. Support pipe work near to pump to prevent stress on plumbing.
8. Allow sufficient liquid level to prevent air intake on suction side.
9. Use generously oversized strainer in case of foreign particles.
10. Use siphon breaker when priming over top of tank.
11. Never throttle pump on suction side.
12. In case of doubt consult Hendor for proper sizing and NPSH calculation.

4.2.2 Operation and maintenance

Magnetic drive pumps. How it works?
Driver (motor) and impeller (driven) are physically separated by a shell.
Pump part (wet end) is completely sealed.
Power transmission is established by magnetic force between motor shaft and impeller.
Bearings are lubricated and cooled by liquid itself.

Mechanical seal pumps. How it works?
Impeller is directly attached to the motor shaft by shaft coupling.
Mechanical seal on pump shaft prevents liquid from coming out.
Mechanical seal is lubricated and cooled by liquid itself.

These type of pumps are not self priming and not designed to run dry. Optional priming chambers and dry run protection devices are available.

Initial start-up

1. Check for direction of rotation before start-up by shortly switching on/off.

Priming instructions at **flooded suction**:

2. Open all valves on suction and discharge side.
3. At start up the pump always should be flooded with liquid to prevent any damage on bearings.
4. These type of pumps are not self priming. Therefore liquid level in the bath should be ample above entrance level of the pump.
5. Start the pump when no air remains in the pump.
6. When pumping liquid with higher density than water, start up with almost closed discharge valve to reduce power consumption.

Priming instructions at **non flooded suction**:

2. Ensure entrance of suction pipe is in liquid.
3. Slowly fill pump casing and suction pipe. Use discharge connection to fill.
4. Check if pump is free of air.
5. Close discharge valve and start the pump.
6. Wait until pump is building up pressure, and slowly open discharge valve.

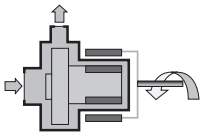
Restart after power failure: Check if the pump is able to prime again. Suction pipe and pump housing should be filled.

4.2.3 Dismantling and reassembly

4.2.3.1 Magnetic drive pumps

General precautions prior to dismantling

- always drain liquid from pump.
- disconnect all necessary electric cables or use switch on pump.
- disconnect suction and discharge piping (watch spilling liquid).
- do work on a clean bench.



When ordering Hendor parts always quote Pump Type and Serial Number.

Dismantling

- remove bolts from pump casing.
- take out impeller and impeller shell; mind strong magnetic force.

Replacing worn or damaged wet end parts

Series M10..M15

- rear static bearing is easy to replace.
- take ceramic shaft out of casing and replace it.
- rotating bushing is molded into impeller; replacing only possible by exchanging complete impeller.

Series MX60..MX120 and M110..M400

- static bearings cannot be replaced (heat shrinked); when damaged replace complete part.
- rotating bearings are mounted by thread; front right-handed thread ; rear left-handed thread.

General description of dismounting a drive magnet

- loosen hex. screws through hole in bracket.
- by means of a lever drive magnet down the shaft; mind strong magnetic force.
- check for remaining metal particles on the magnet and remove them.

General description of mounting a drive magnet

- slightly grease shaft of motor.
- replace drive magnet on shaft by hand watching position of key.
- ensure that drive magnet goes up to shaft end (when using a hammer, be sure motor bearings are not damaged).
- secure hex. screws.

Assembly

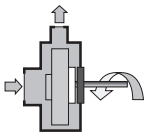
- mount impeller shell.
- put impeller into shell; mind strong magnetic force.
- place O-ring and put pump casing into place.
- mount bolts and tighten them crosswise.

After assembly always check for free rotation by hand. Verify direction of rotation indicated by arrow on pump/motor prior to regular operation.

4.2.3.2 Mechanical seal pumps S55 .. S300-PP

General precautions prior to dismantling

- always drain liquid from pump.
- disconnect electric cables or use switch on pump.
- disconnect suction and discharge piping.
- do work on a clean bench.



When ordering Hendor parts always quote **pump type** and **serial number**.

Dismantling

- remove bolts from pump casing.
- take off SS plate and pump casing.
- turn safety guard so that hex. screw on coupling is accessible.
- loosen front screw in coupling (pump side).
- take out impeller together with rotating parts of mechanical seal.

Replacing worn or damaged parts

- rear static seal ring is easy to replace; mind position of seal ring according to locking pin; always renew O-rings after removing parts.
- take off rotating part; mind position of coil and hook; at replacing seal ring do position O-ring, coil and hook.

- put back cover including static seal ring in place against steel bracket; mind upright position of supply channel for seal.
- place flat rubber gasket in position.
- put a spacer (thickness 2 mm) between back cover and steel bracket (adjusting pre-load on seal).
- put impeller back into position; mind correct position of all rotating parts.
- push impeller firmly as far as possible; hold that position and secure front hex. screw in coupling.
- remove spacer from back cover.
- put pump casing and SS plate back into place.
- mount bolts and tighten them gradually.
- turn safety guard so that holes are pointing downwards (drain in case of leakage).

Check for free rotation by turning cooling fan by hand.
Prior to operation of the pump check direction of rotation as indicated by arrow on the motor.
Testing the rotation has to be done flooded with liquid.

4.3 Filter chambers

4.3.1 Installation

Following rules should be respected when installing *filter chambers*:
Bottom of filter chamber (by preference) is placed at the same height as bath level; this will ensure an easy medium change and prevents unwanted emptying of tank.

1. Maximum pressure should not exceed indication on dial of manometer.
2. Maximum allowable pressure at temperature range is indicated on top of filter chamber.
3. Adjust diameter of in- and outlet of the filter to required capacity of the system.
4. Return pipe from filter chamber should be placed as far as possible from pump inlet in order to promote good bath movement.
5. Filter chamber 362 has a tiltable lid. Position of lid can be changed by positioning top ring (304).

4.3.2 Operation and Maintenance

Maximum pressure in filter chamber
The maximum pressure in Hendor filter chamber should not exceed the engraved value on top of the cover plate.

Pressure gauge
A pressure gauge is fitted on most Hendor filter chambers. An anti-freeze filled chamber above a membrane separates the pressure gauge from the process liquid. During normal operation the filter chamber regularly should be inspected for flow (dial indication on gauge).

If pressure on manometer is less than usual, the chamber below the manometer should be refilled.
Topping up manometer liquid:
After removing gauge (328) and air release screw, top up casing (327) with anti-freeze.
When assembling gauge (mind O-ring 335) liquid must show up.
Put back air release screw into casing and tighten it.
If liquid does not show up repeat procedure here above. If still no liquid shows up the membrane should be replaced.
Remove gauge (328), unscrew 4 screws, take off the lid (327), replace membrane (326), refit 4 screws lightly, holding down the membrane with unsharp object through lid, tighten 4 screws and repeat above mentioned procedure.
If pressure on the dial of the gauge is not coming back to zero, when the pump is switched off, there may exist a difference of pressure between inside gauge and open air. To correct dial indication cut off the top of the rubber cap on top of the gauge.

4.3.3 Dismantling and reassembly

Replacement of filter elements

Depending on the type of filter, the filter element(s) should be exchanged reaching a maximum pressure difference of 1-2,5 bar.

Sequence of operation

- switch off pump (ensure pump cannot be started unexpectedly).
- close all main taps.
- open drain valve.
- open air release tap to empty filter chamber.
- loosen all star buttons.
- remove or tilt the lid of the filter chamber; sometimes the gasket sticks to the chamber and extra lifting effort is required to remove the lid.

  Hendor filter chambers are equipped with cartridges, discs or bags.
  After removing the contaminated filter medium it should be disposed off according to environmental guidelines.
  Properly install the new filter medium to prevent by-pass of unfiltrated liquid.

Closing sequence

- check sealing rubber of chamber on distortion.
- close lid
- turn two fixed star button 4 times clockwise.
- tighten remaining star buttons firmly crosswise.
- close drain valve, open main taps and start-up the pump.
- check unit for any leakage.
- after bleeding the unit, close air release tap.

5. Trouble shooting

Pump problem	Possible reason - horizontal pump	Possible reason - vertical pump
No liquid flow	2-3-4-5-6-7-8-12-15-22-24-31	4-5-7-8-12-15-17-22-24-28-31
Insufficient liquid flow	1-3-6-8-10-11-13-14-15-16-18-19-20-25-28-29	8-10-13-14-15-16-18-19-20-25-28-29-30
Insufficient pressure	8-10-13-14-15-16-18-20-25-29-30	10-13-14-16-18-30-25-29-30
Rising liquid temperature	8-15-19-25	8-15-18-19
Noisy pump or excessive vibration	1-3-6-13-14-15-20-21-22-23-28-34	9-13-14-15-16-17-21-22-23-32
Motor is overheating	13-15-16-20-21-22-23-24-25-27-28-29-30	15-16-21-22-23-24-25-27
Motor overload activated	20-25-26-28-29-30	22-25-26-29-30
Cracking/deformation	9-34-49	9-34-49
Corrosion	27-50	27-50

Filter problem	Possible reason
No or insufficient liquid flow	8-19-28-38-39-41-42-48
Leakage	39-40-49
Pressure gauge reading not correct	35-36-37-38
High dial indication on pressure gauge	8-42-48
Bad filtering result	33-42-43-45-47
Foam formation in the bath	11-31-46

System / Pipework

1 Suction pipe too long or diameter too small
2 Air pocket in suction pipe
3 Leak in suction pipe
4 Suction pipe or strainer blocked
5 Suction height too high
6 Air supply close to suction inlet
7 Foot valve or suction pipe insufficiently submerged
8 Valve in pipework (partly) closed
9 Discharge pipe under tension
10 Leak in discharge pipe
11 Return pipe not submerged (air intake)
12 Liquid level in tank too low

Pump

13 Impeller damaged or worn out by abrasives
14 Impeller out of balance
15 Impeller / volute blocked by foreign matter
16 Wrong impeller choice (50 or 60 Hz)
17 Volute not immerged sufficiently in the liquid
18 Wrong choice of pump size
19 Pump is running at very low flow

Motor

20 Wrong direction of rotation
21 Cooling fan blocked or loose
22 Motor bearings jammed or worn out
23 Motor bearings incorrectly installed
24 Motor down on a phase
25 Incorrect voltage
26 Thermal overload setting incorrect
27 Insufficient cleaning

Liquid

28 Liquid has crystallised
29 Specific gravity of liquid too high
30 Viscosity of liquid too high
31 Air / gas in liquid
32 Abrasive particles in liquid
33 Colloïdal liquid
34 Liquid temperature too high

Filter

35 Not enough anti-freeze in chamber below pressure gauge
36 Membrane in chamber below pressure gauge deformed/damaged
37 Pressure gauge defect
38 Filter chamber insufficiently bled
39 Filter chamber not closed properly
40 Filter chamber gasket damaged of deformed
41 Filter element incorrectly installed
42 Filter system element saturated
43 Bypass of unfiltrated liquid
44 Filter medium is too coarse
45 Filter material damaged or torn
46 Unwashed cartridges used (residues of wetting agents)
47 Wrong choice of filter medium
48 Wrong choice of micron rating

Material / Environment

49 Wrong choice of pump / o-ring material
50 Aggressive environment

6. EC-Declaration of conformity

Manufacturer: Hendor Pompen BV
Address: P.O. box 9
5530 AA Bladel
The Netherlands

Herewith we declare, that the product:

Pump

- is in conformity with the provisions of the Machinery Directive, as amended, and with national implementing legislation (Directive 98/37/EC, annex II sub A)
- is in conformity with the provisions of the following other EC directives: Low voltage directive (Directive 73/23/EC)

Filter

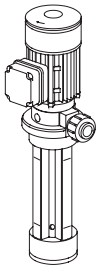
- is in conformity with the provisions of the Pressure Equipment Directive PED97/23/EC

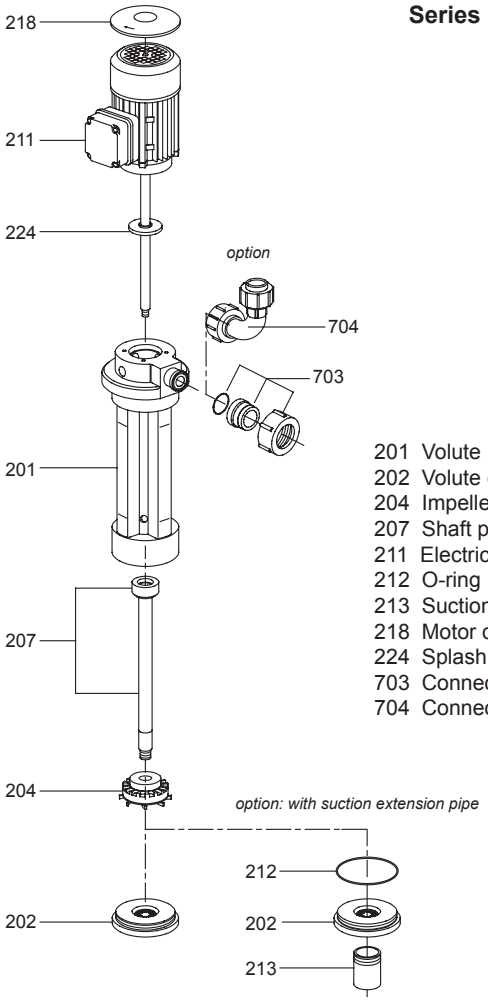
Confirmed at Bladel

Signature

Technical Director H.F.G. Bohncke

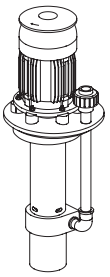
Series D90 - PP/PVDF

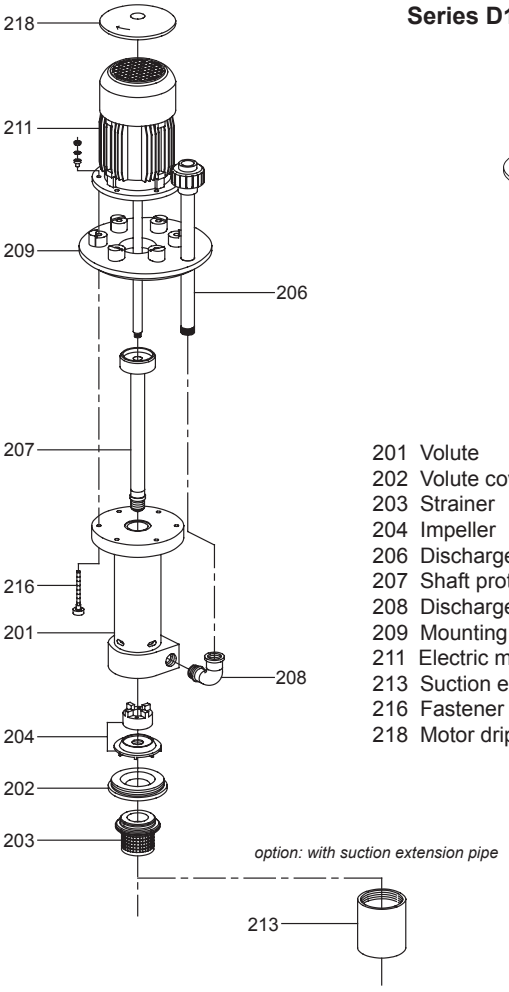




201 Volute
202 Volute cover
204 Impeller
207 Shaft protection pipe
211 Electric motor
212 O-ring
213 Suction extension pipe
218 Motor drip cover
224 Splash guard
703 Connection
704 Connection

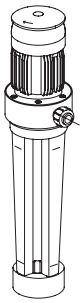
Series D110 - PP

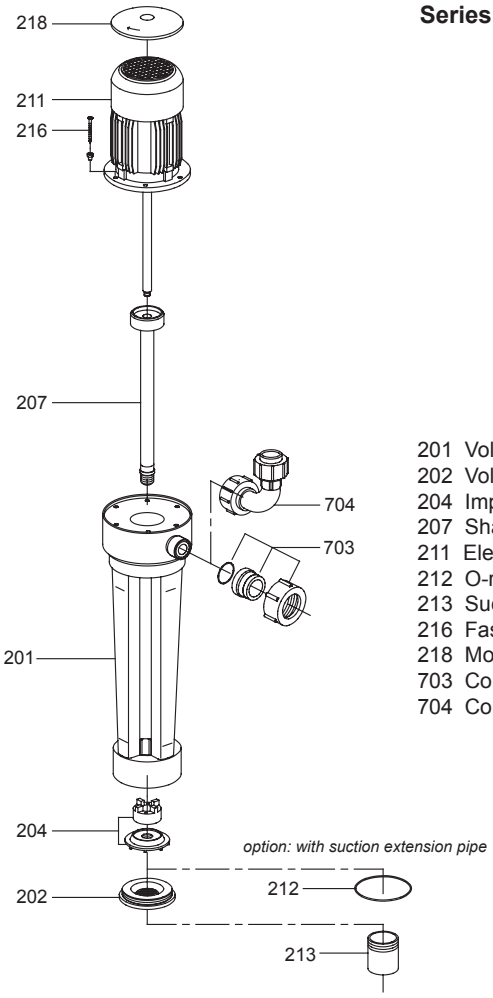




201 Volute
202 Volute cover
203 Strainer
204 Impeller
206 Discharge pipe
207 Shaft protection pipe
208 Discharge elbow
209 Mounting plate
211 Electric motor
213 Suction extension pipe
216 Fastener kit
218 Motor drip cover

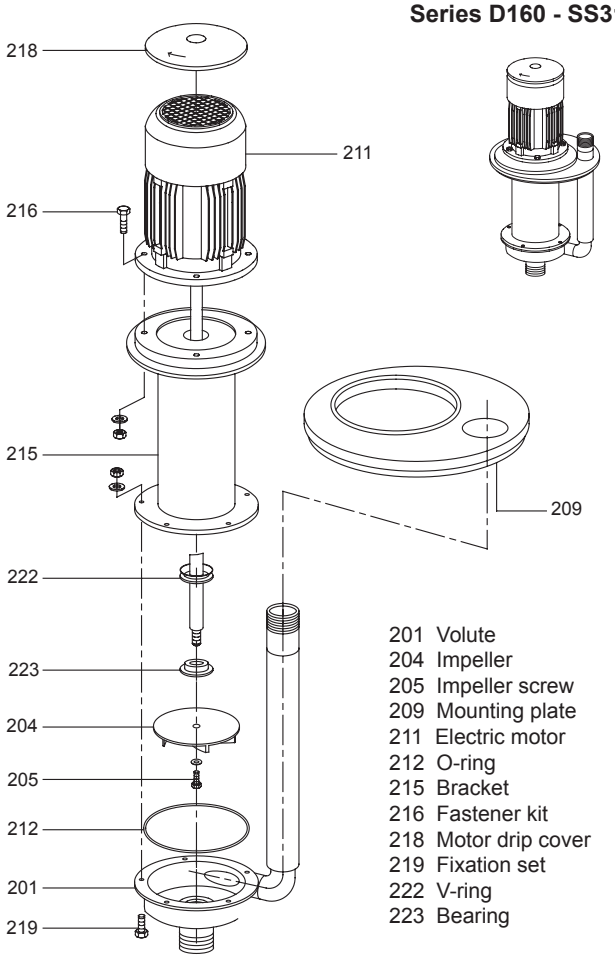
Series D120 - PP/PVDF





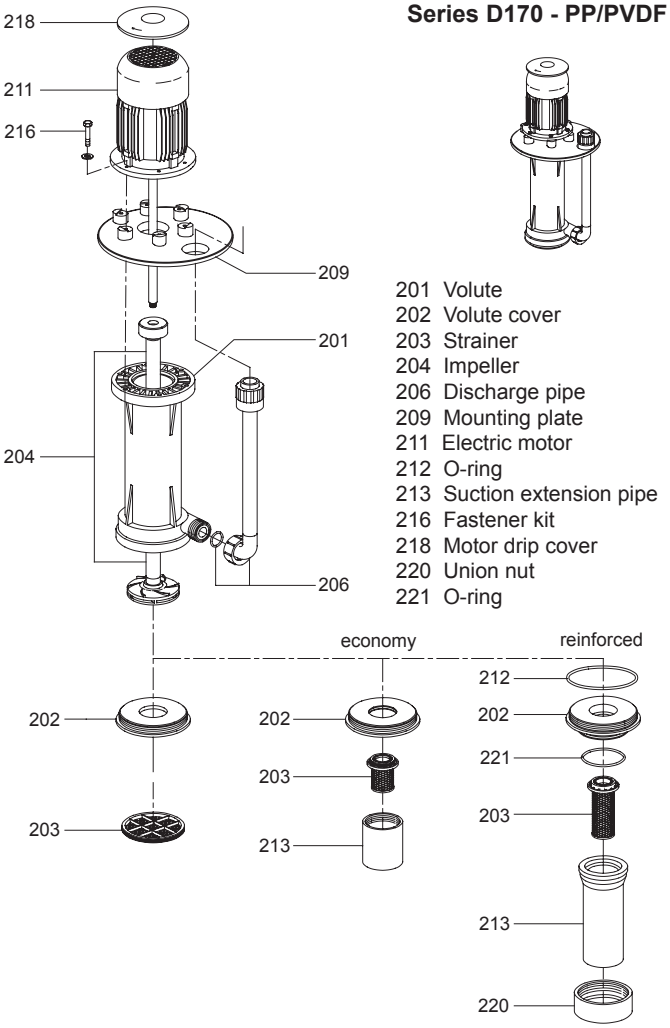
201 Volute
202 Volute cover
204 Impeller
207 Shaft protection pipe
211 Electric motor
212 O-ring
213 Suction extension pipe
216 Fastener kit
218 Motor drip cover
703 Connection
704 Connection

Series D160 - SS316



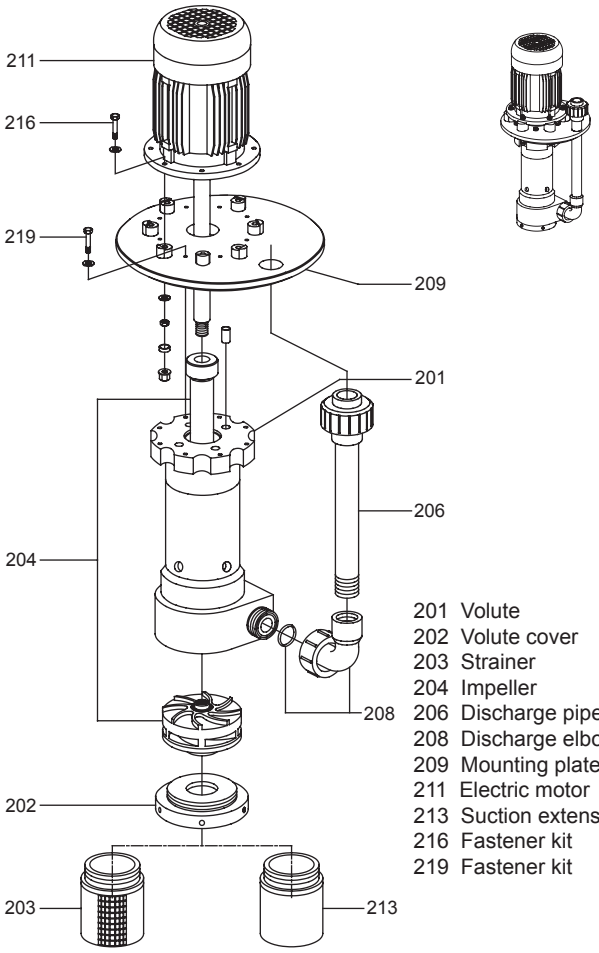
201 Volute
204 Impeller
205 Impeller screw
209 Mounting plate
211 Electric motor
212 O-ring
215 Bracket
216 Fastener kit
218 Motor drip cover
219 Fixation set
222 V-ring
223 Bearing

Series D170 - PP/PVDF



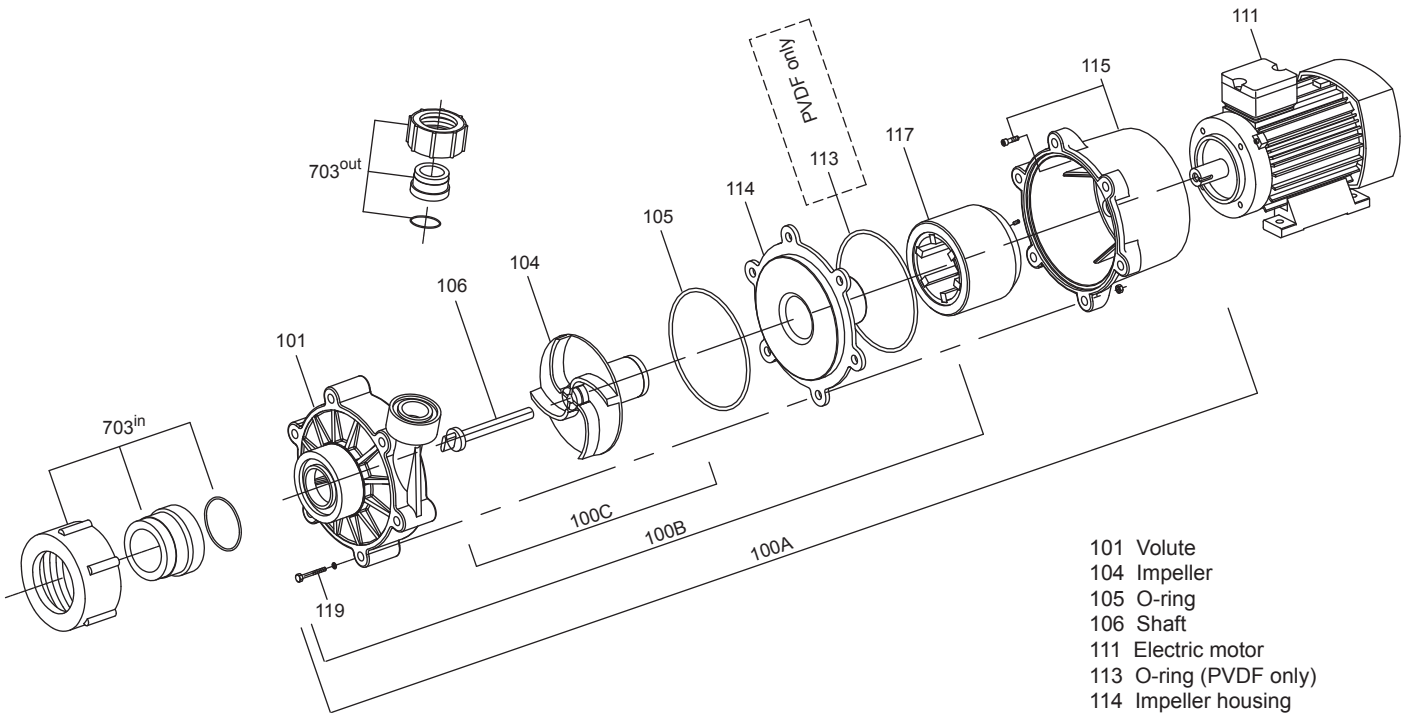
201 Volute
202 Volute cover
203 Strainer
204 Impeller
206 Discharge pipe
209 Mounting plate
211 Electric motor
212 O-ring
213 Suction extension pipe
216 Fastener kit
218 Motor drip cover
220 Union nut
221 O-ring

Series D200 - PP



201 Volute
202 Volute cover
203 Strainer
204 Impeller
206 Discharge pipe
208 Discharge elbow
209 Mounting plate
211 Electric motor
213 Suction extension pipe
216 Fastener kit
219 Fastener kit

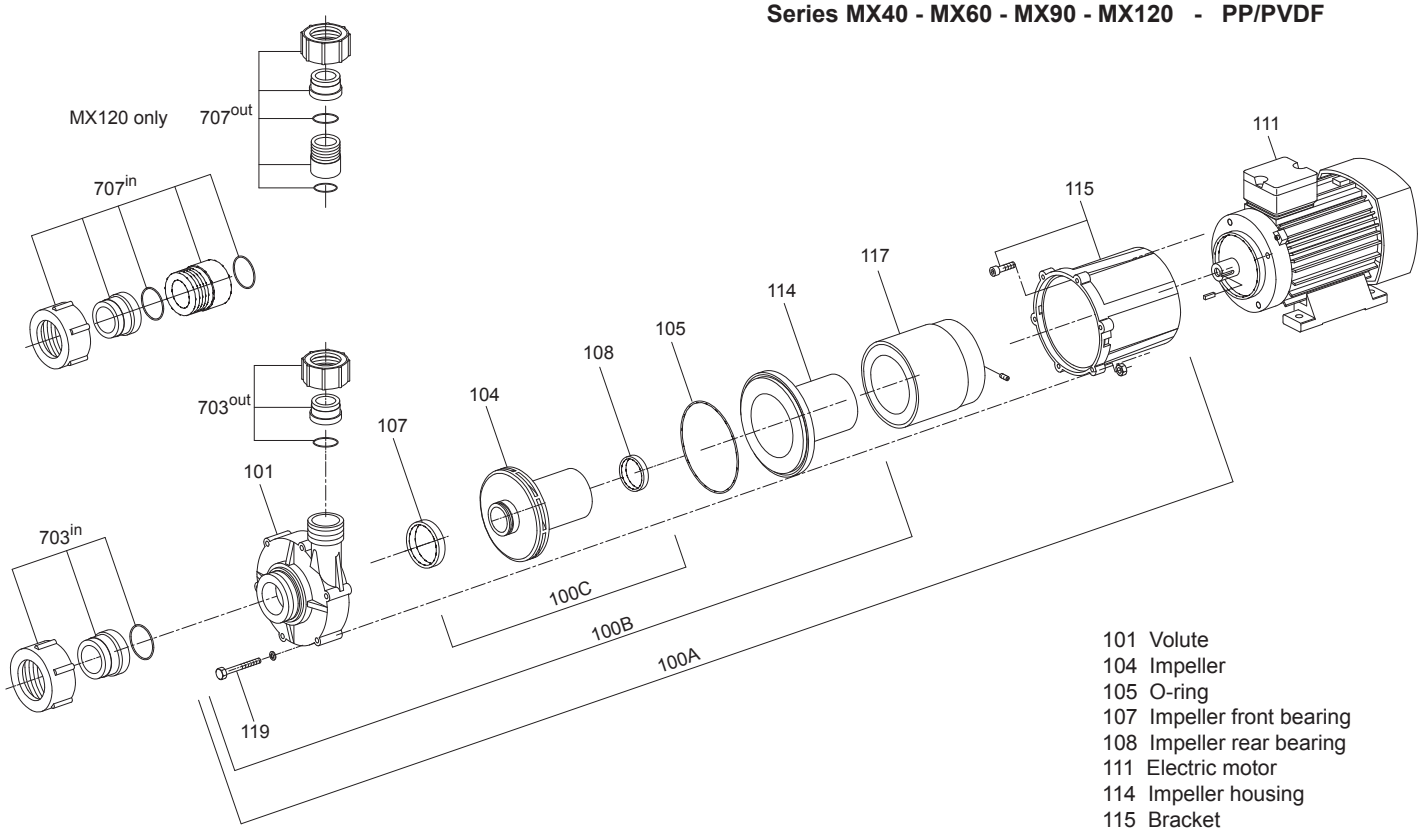
Series M10 - M11 - M15 - PP/PVDF



100A Pump without motor
100B Wet end
100C Impeller complete

101 Volute
104 Impeller
105 O-ring
106 Shaft
111 Electric motor
113 O-ring (PVDF only)
114 Impeller housing
115 Bracket
117 Drive magnet
119 Fastener kit
175 O-ring kit (all O-rings)
703 Connection

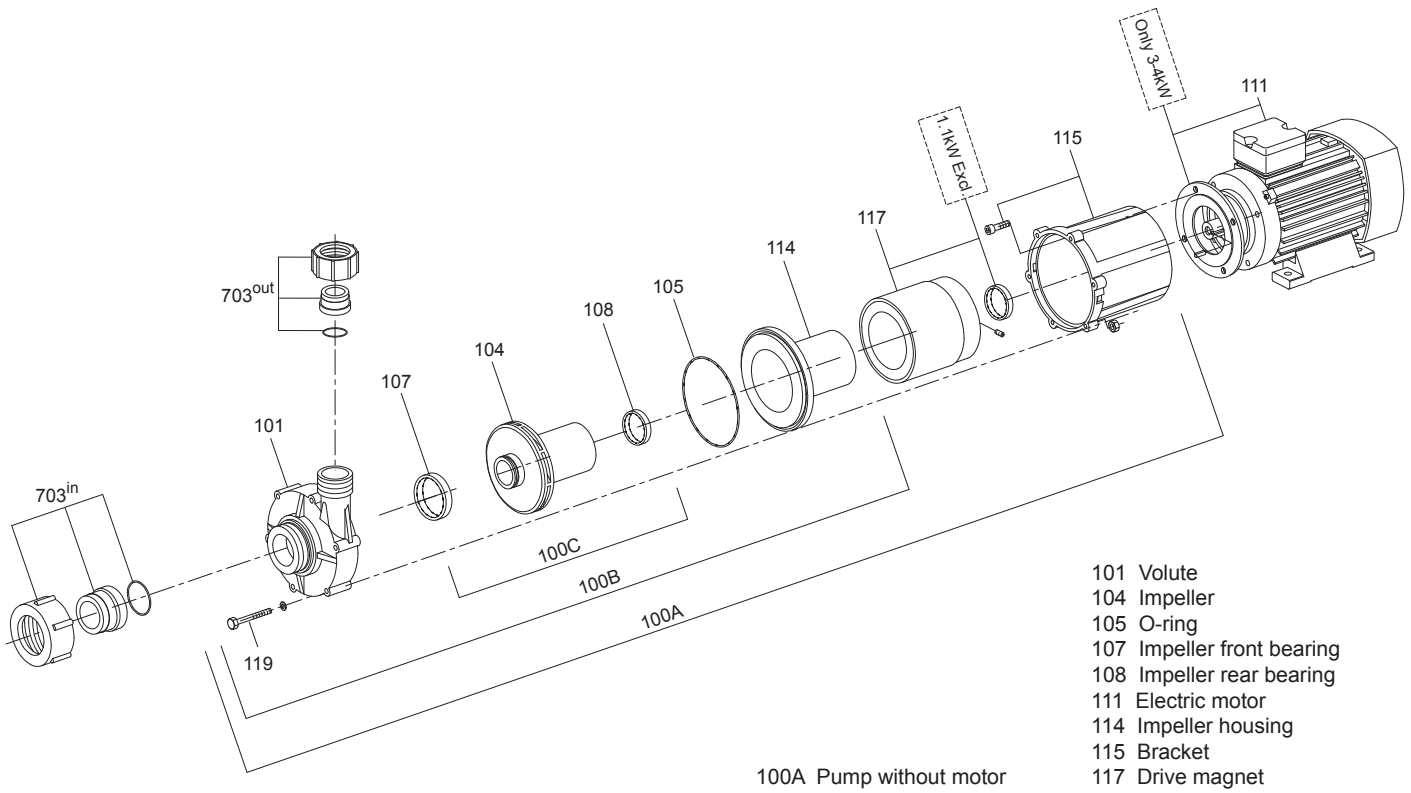
Series MX40 - MX60 - MX90 - MX120 - PP/PVDF



100A Pump without motor
100B Wet end
100C Impeller complete

101 Volute
104 Impeller
105 O-ring
107 Impeller front bearing
108 Impeller rear bearing
111 Electric motor
114 Impeller housing
115 Bracket
117 Drive magnet
119 Fastener kit
175 O-ring kit (all O-rings)
703 Connection
707 Connection (MX120)

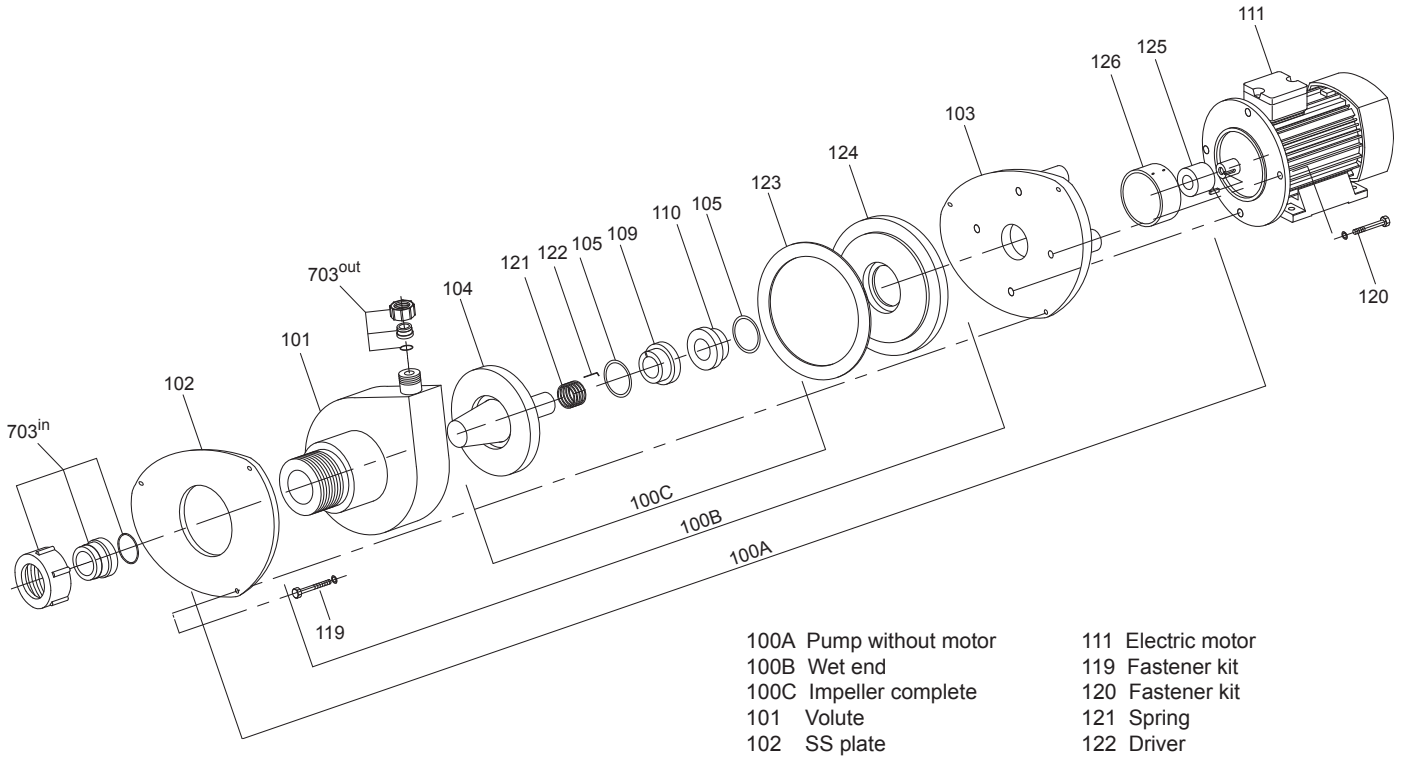
Series M110 - M150 - M220 - M300 - M400 - PP/PVDF



100A Pump without motor
100B Wet end
100C Impeller complete

101 Volute
104 Impeller
105 O-ring
107 Impeller front bearing
108 Impeller rear bearing
111 Electric motor
114 Impeller housing
115 Bracket
117 Drive magnet
119 Fastener kit
175 O-ring kit (all O-rings)
703 Connection

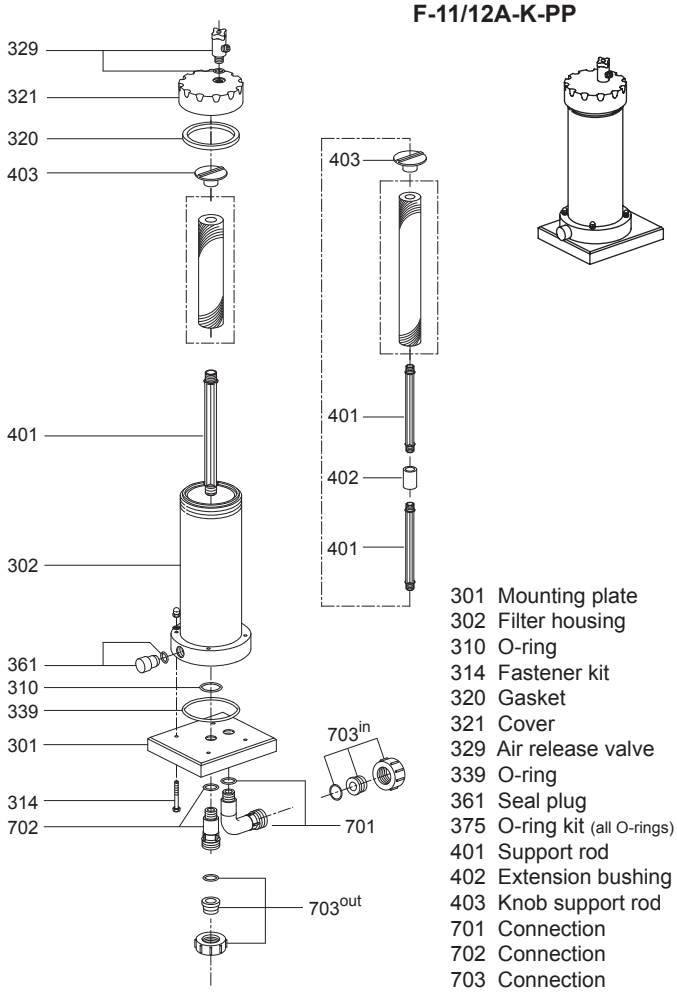
Series S55 - S75 - S110 - S150 - S220 - S300 - PP



100A Pump without motor
100B Wet end
100C Impeller complete
101 Volute
102 SS plate
103 Bracket
104 Impeller
105 O-ring
109 Rotary seat
110 Stationary seat

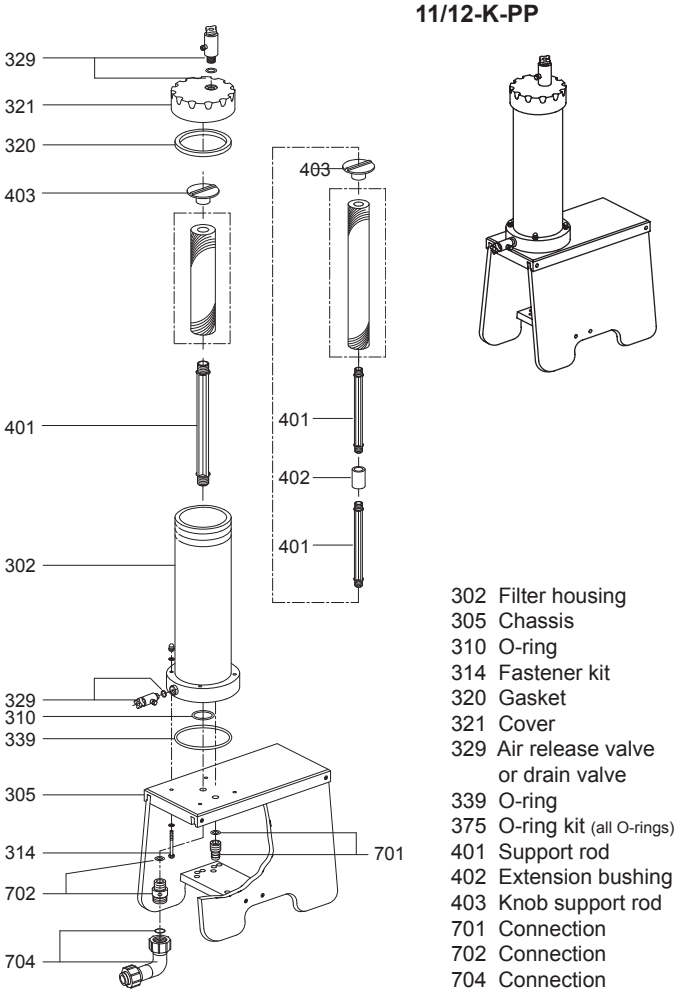
111 Electric motor
119 Fastener kit
120 Fastener kit
121 Spring
122 Driver
123 Gasket
124 Volute cover
125 Shaft coupling
126 Safety guard
175 O-ring kit (all O-rings)
703 Connection

F-11/12A-K-PP



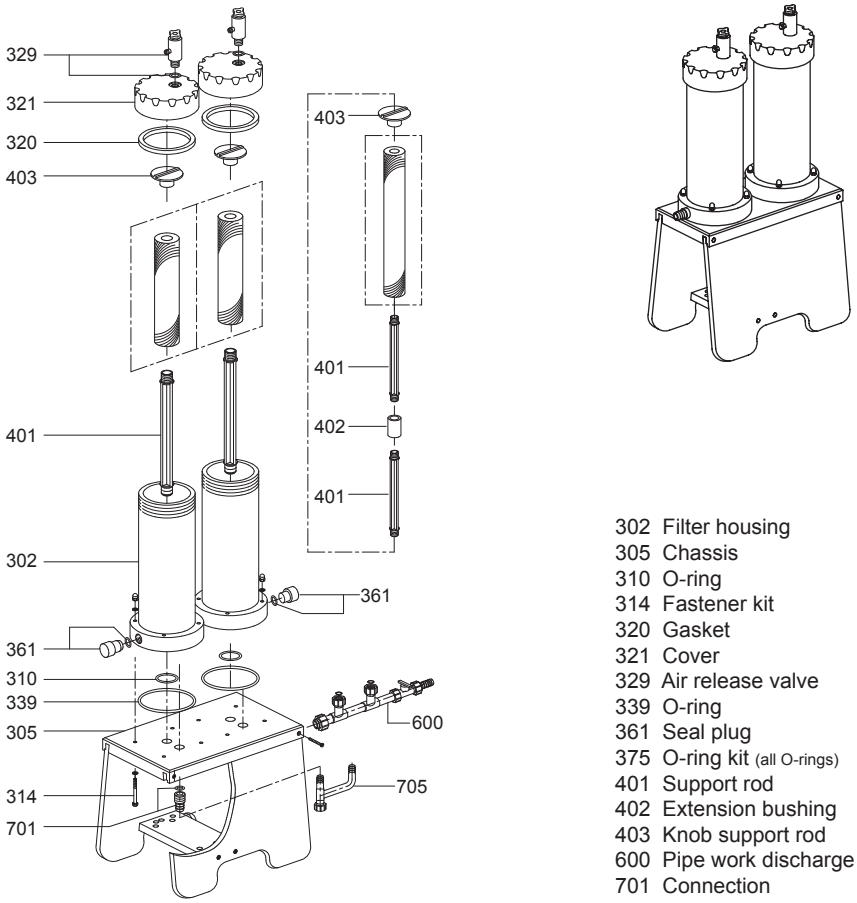
301 Mounting plate
302 Filter housing
310 O-ring
314 Fastener kit
320 Gasket
321 Cover
329 Air release valve
339 O-ring
361 Seal plug
375 O-ring kit (all O-rings)
401 Support rod
402 Extension bushing
403 Knob support rod
701 Connection
702 Connection
703 Connection

11/12-K-PP



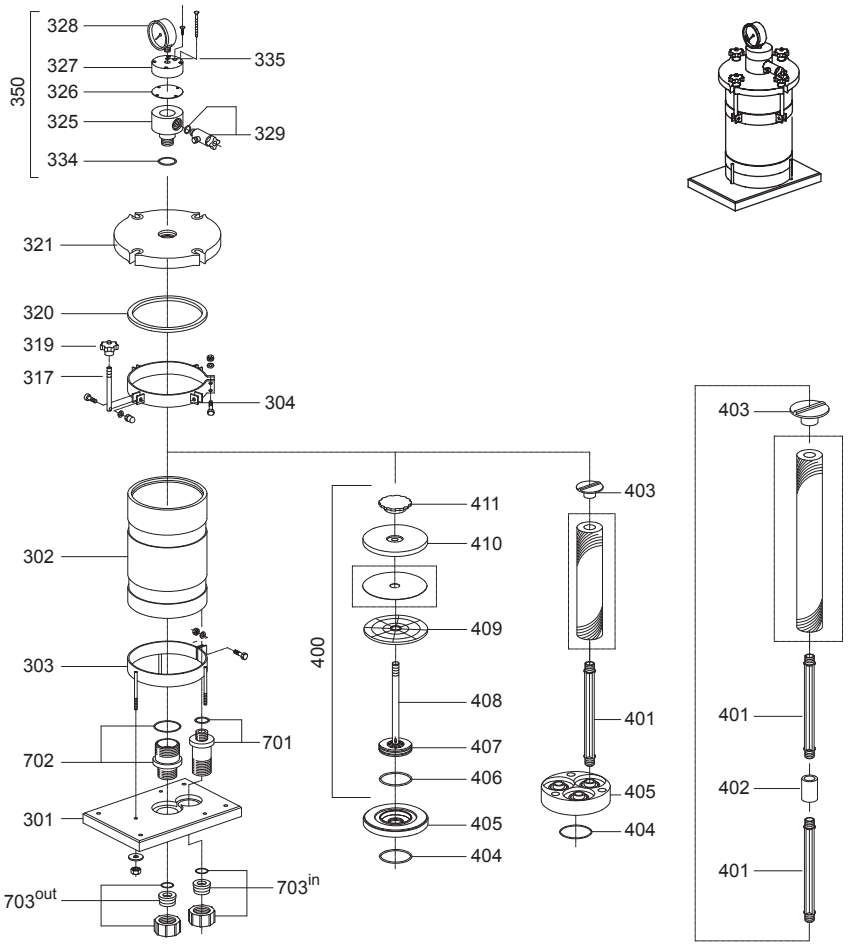
302 Filter housing
305 Chassis
310 O-ring
314 Fastener kit
320 Gasket
321 Cover
329 Air release valve or drain valve
339 O-ring
375 O-ring kit (all O-rings)
401 Support rod
402 Extension bushing
403 Knob support rod
701 Connection
702 Connection
704 Connection

21/22-K-PP



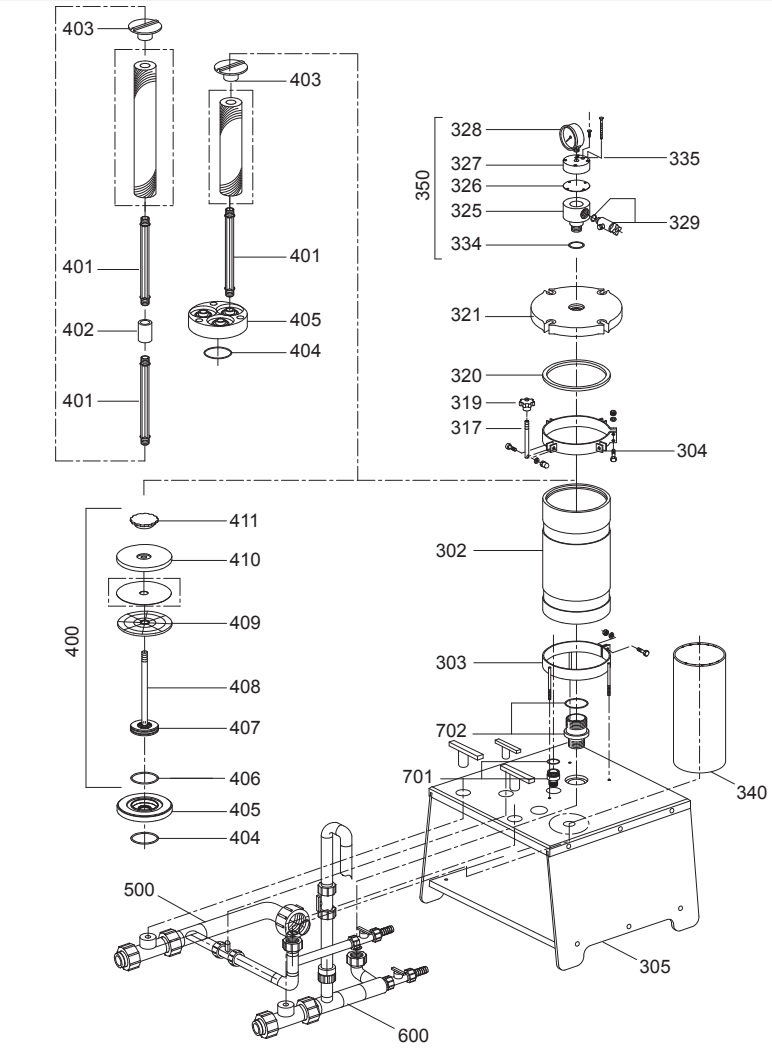
302 Filter housing
305 Chassis
310 O-ring
314 Fastener kit
320 Gasket
321 Cover
329 Air release valve
339 O-ring
361 Seal plug
375 O-ring kit (all O-rings)
401 Support rod
402 Extension bushing
403 Knob support rod
600 Pipe work discharge
701 Connection
705 Pipe work

F-31/32A-K/P-PP



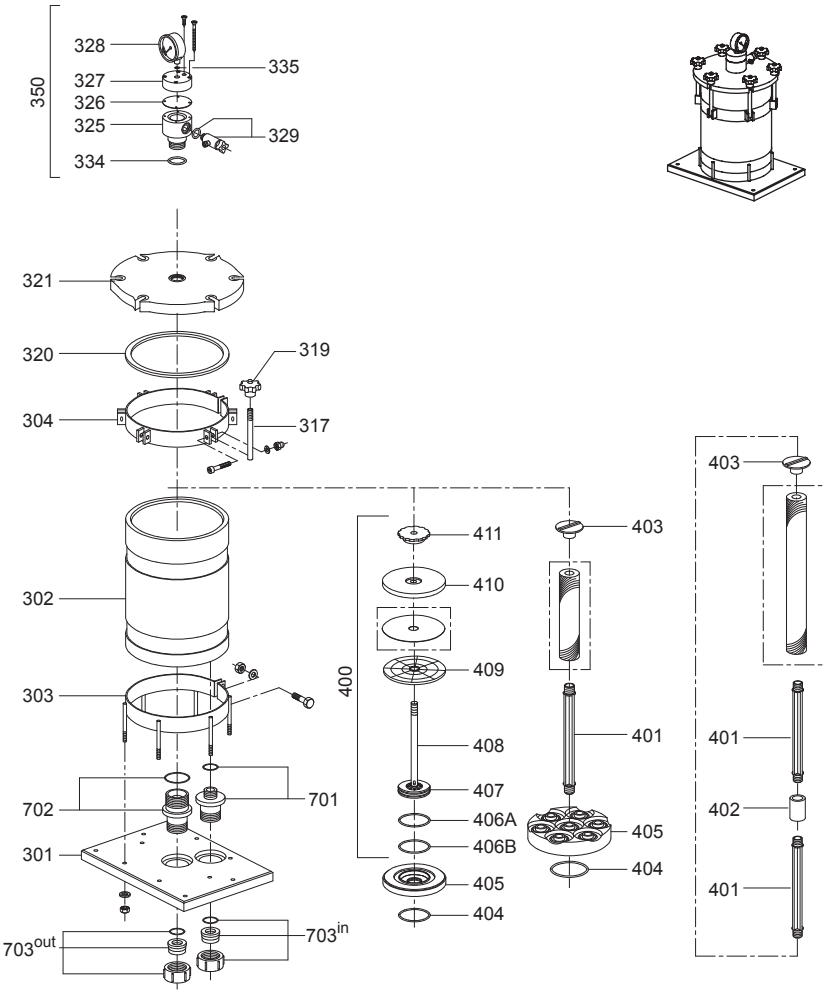
301 Mounting plate
302 Filter housing
303 Bottom ring
304 Top ring
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
406 O-ring
407 Base disc holder
408 Rod disc holder
409 Disc
410 Top disc holder
411 Nut disc holder
701 Connection
702 Connection
703 Connection

31/32A-K/P-S-PP



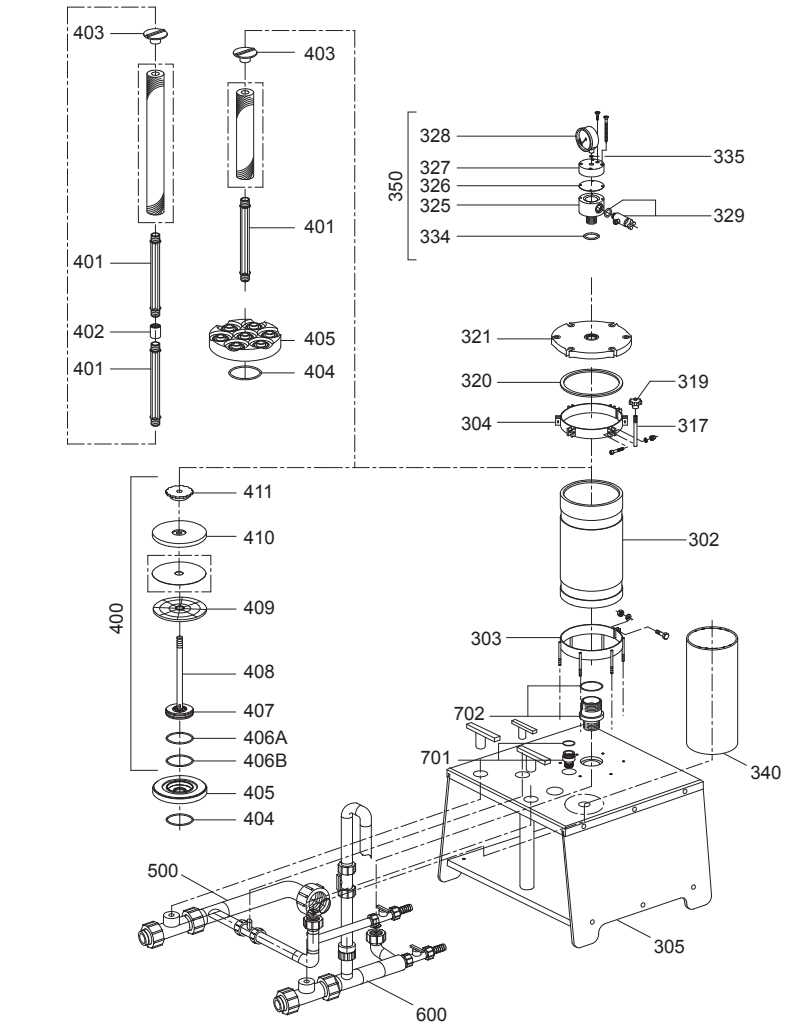
302 Filter housing
303 Bottom ring
304 Top ring
305 Chassis
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
340 Slurry tank
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
406 O-ring
407 Base disc holder
408 Rod disc holder
409 Disc
410 Top disc holder
411 Nut disc holder
500 Pipe work suction
600 Pipe work discharge
701 Connection
702 Connection

F-71/72A-K/P-PP

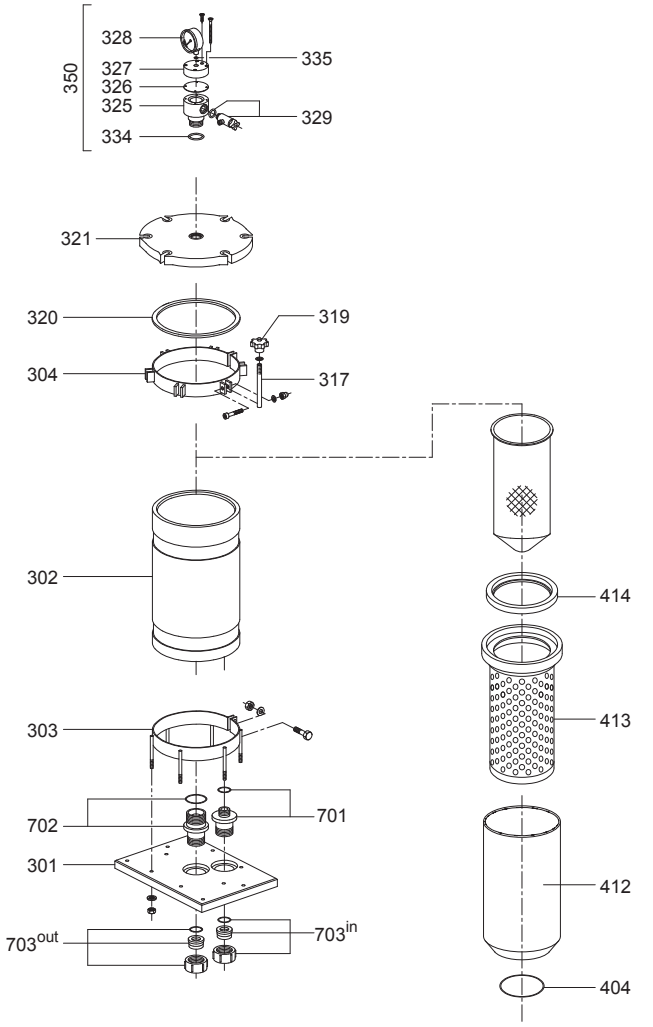


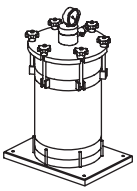
301 Mounting plate
302 Filter housing
303 Bottom ring
304 Top ring
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
406A O-ring
406B O-ring
407 Base disc holder
408 Rod disc holder
409 Disc
410 Top disc holder
411 Nut disc holder
701 Connection
702 Connection
703 Connection

71/72A-K/P-S-PP



302 Filter housing
303 Bottom ring
304 Top ring
305 Chassis
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
340 Slurry tank
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
406A O-ring
406B O-ring
407 Base disc holder
408 Rod disc holder
409 Disc
410 Top disc holder
411 Nut disc holder
500 Pipe work suction
600 Pipe work discharge
701 Connection
702 Connection

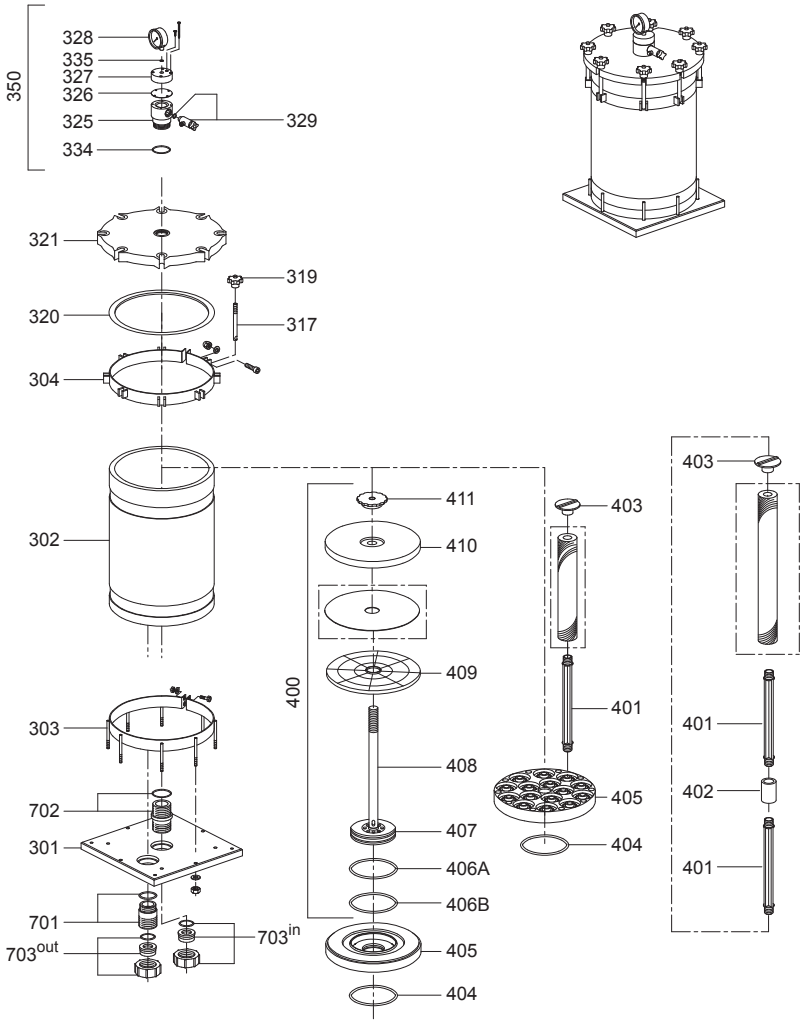




F-71/72A-B-PP

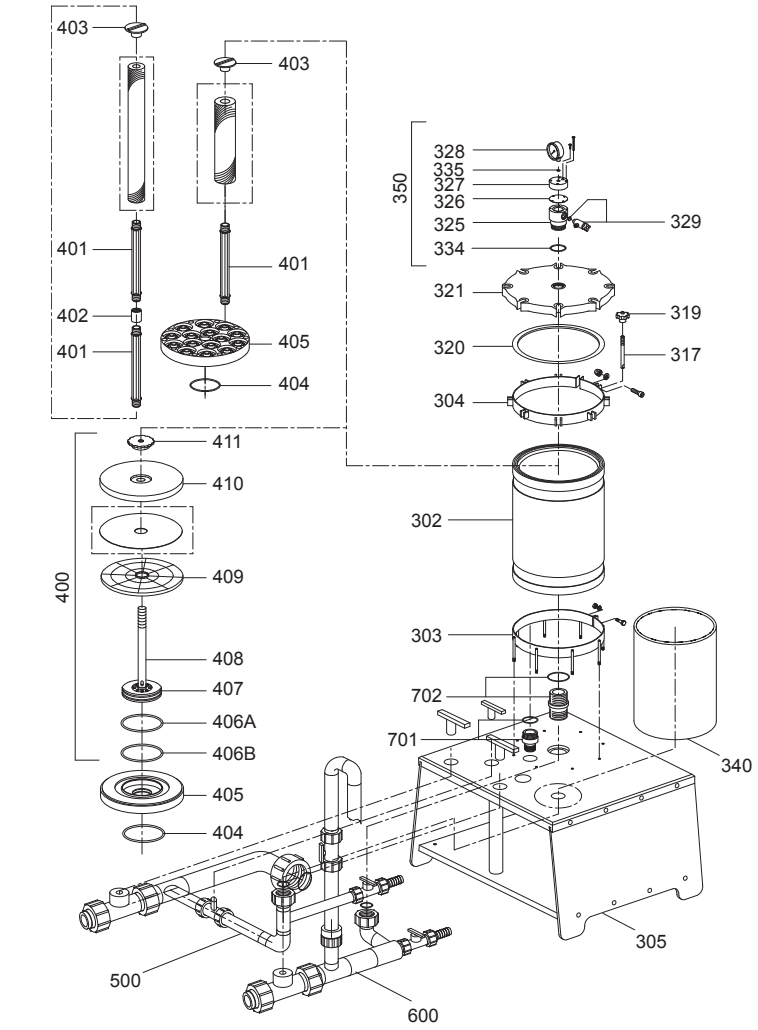
301 Mounting plate
302 Filter housing
303 Bottom ring
304 Top ring
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
404 O-ring
412 Inner cylinder
413 Basket
414 Sealing
701 Connection
702 Connection
703 Connection

F-151/152A-K/P-PP

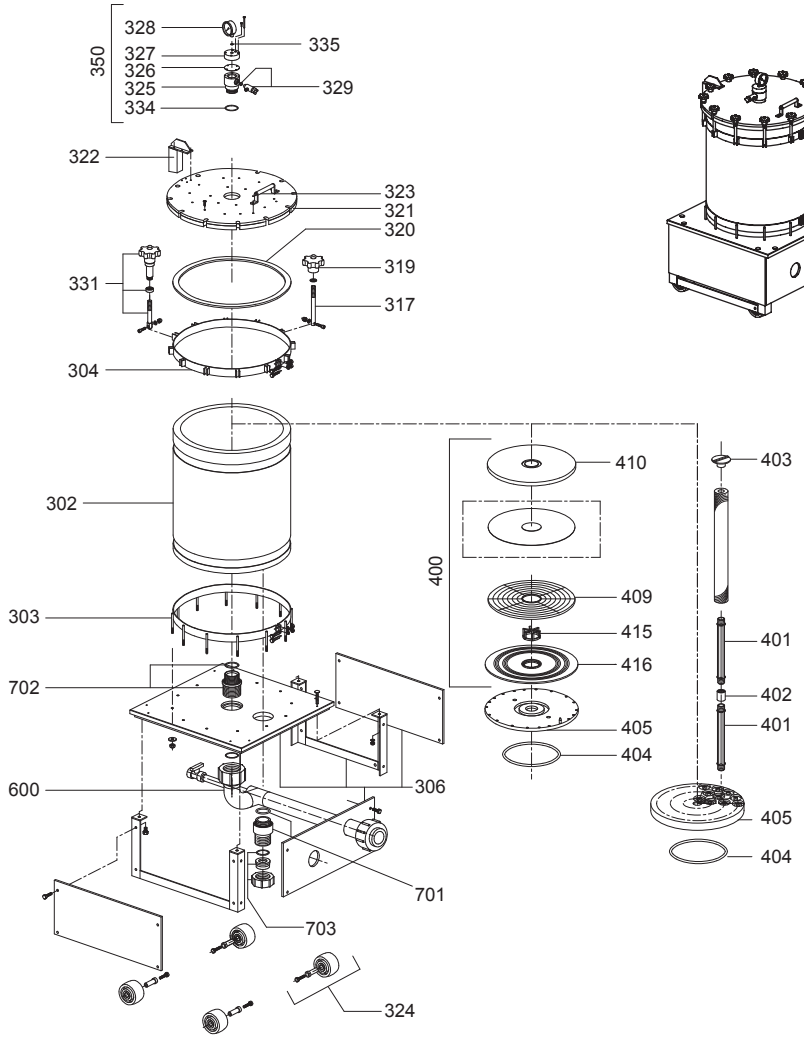


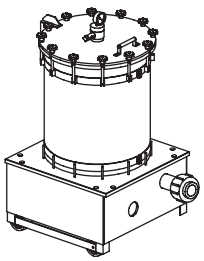
301 Mounting plate
302 Filter housing
303 Bottom ring
304 Top ring
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
406A O-ring
406B O-ring
407 Base disc holder
408 Rod disc holder
409 Disc
410 Top disc holder
411 Nut disc holder
701 Connection
702 Connection
703 Connection

151/152A-K/P-S-PP



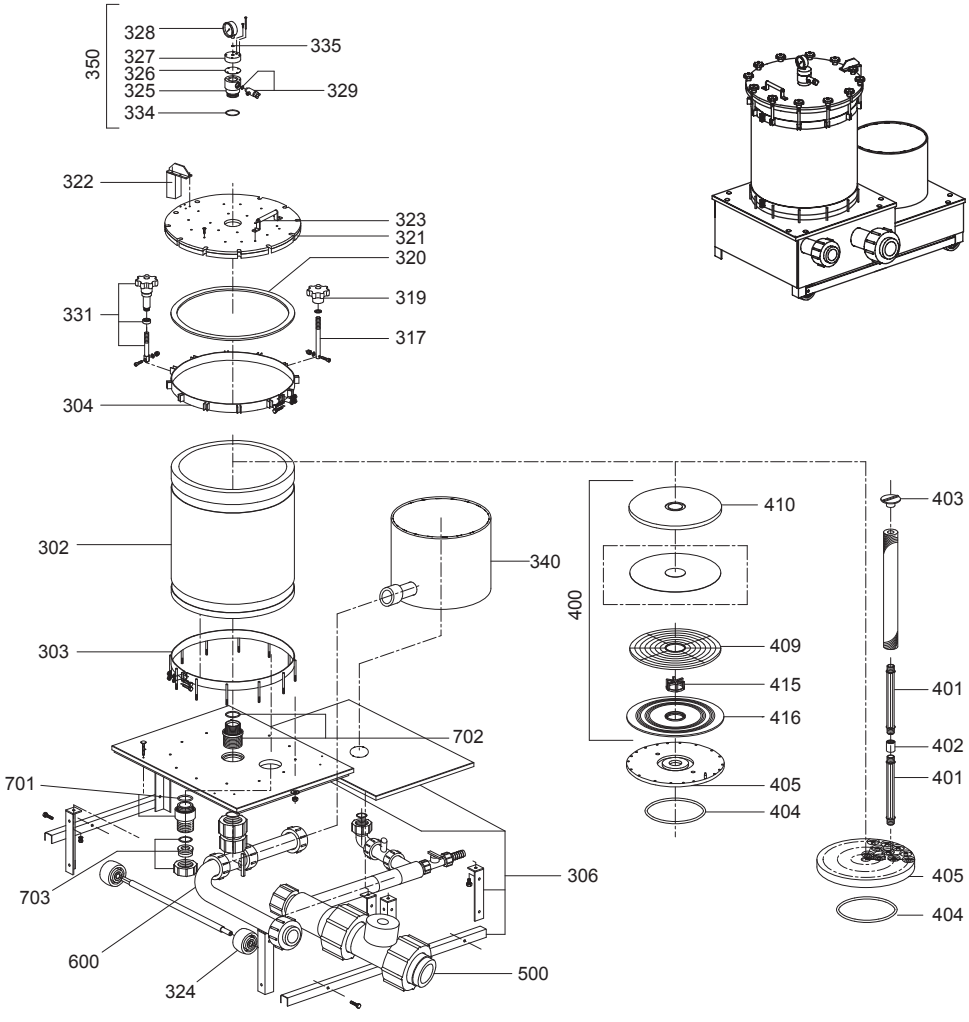
302 Filter housing
303 Bottom ring
304 Top ring
305 Chassis
317 Rod
319 Star knob
320 Gasket
321 Cover
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
334 O-ring
335 O-ring
340 Slurry tank
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
406A O-ring
406B O-ring
407 Base disc holder
408 Rod disc holder
409 Disc
410 Top disc holder
411 Nut disc holder
500 Pipe work suction
600 Pipe work discharge
701 Connection
702 Connection





F-362A-K/P-PP

302 Filter housing
303 Bottom ring
304 Top ring
306 Pedestal
317 Rod
319 Star knob
320 Gasket
321 Cover
322 Tilt stop
323 Handle
324 Wheel set
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
331 Tilting set
334 O-ring
335 O-ring
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
409 Disc
410 Top disc holder
415 Crown
416 Sealing plate
600 Pipework discharge
701 Connection
702 Connection
703 Connection



362A-K/P-S-PP

302 Filter housing
303 Bottom ring
304 Top ring
306 Chassis
317 Rod
319 Star knob
320 Gasket
321 Cover
322 Tilt stop
323 Handle
324 Wheel set
325 Gauge housing
326 Membrane
327 Cover gauge housing
328 Pressure gauge
329 Air release valve
331 Tilting set
334 O-ring
335 O-ring
340 Slurry tank
350 Assembly pressure gauge
375 O-ring kit (all O-rings)
400 Filter element
401 Support rod
402 Extension bushing
403 Knob support rod
404 O-ring
405 Baseplate disc/cartridge
409 Disc
410 Top disc holder
415 Crown
416 Sealing plate
500 Pipework suction
600 Pipework discharge
701 Connection
702 Connection
703 Connection