



GP

**Open
refrigerant pumps**
*Installation and
operating instructions*

- GP 41**
- GP 42**
- GP 51**
- GP 51A**
- GP 52**
- GP 82**



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1. INTRODUCTION

Please read the entire manual careful before selecting, installing, commissioning and servicing the pump.

1.1 INTENDED USE

The WITT refrigerant pump with flanged motor type GP is designed to deliver exclusively refrigerant liquid at its boiling point. The pump is labelled with model and design limitation for pressure and temperature. Pump performance details are specified in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** "Technical data". The standard pump design uses an electric motor (type B5). Other types of drive are possible, e.g. hydraulic drive motor.

1.2 SAFETY REQUIREMENTS



All of the following specified work must be carried out by knowledgeable personnel experienced in installation and service of refrigeration systems. All personnel must be familiar with the national legal requirements and safety regulations. All safety regulations and codes of practice concerning the use of refrigerants must be adhered to, with special attention paid to protection clothing and wearing of safety glasses.



Service and maintenance only be carried out when the pump is stopped and the power supply disconnected.



Under no circumstances are the indicated temperature- and pressure limitations to be exceeded.



Important! The content of this manual must be adhered to. Deviation from the specified conditions will make any claim for liability or warranty void.



1.3 SAFETY ADVICE

The pump is designed for use in industrial refrigeration systems using primary refrigerants.



It is very important that everybody responsible for the safe operation and maintenance of the plant reads this manual.



The coupling protection must be in place at all times! (see chapter 8.2.2)

If you have any problems please do not hesitate to call our service department, who will be glad to assist you.

Make sure the ground area around the pump is clear, e.g. no incoming electric power cables. If you cannot avoid such obstruction, they should be marked with two-coloured warning tape (warning sign).

Correctly retighten all screw connections after maintenance and repair work.

If you have to disassemble any safety devices for maintenance and repair make sure that upon completion of said work the re-assembly and correct functioning is checked.

When operating at low temperatures ($< 0^{\circ}\text{C}$) freeze bites can occur when the surface is touched. Therefore always wear appropriate protection clothing.

1.4 DISCLAIMER

Even when using the pump for the intended purpose it cannot be entirely excluded that a danger may remain during its working lifetime.

Translations have been made to the best of our knowledge. We are unable to accept any liability for errors in translation.

We reserve the right to change descriptions, graphs and technical information due to future development of the refrigerant pump.

2. TERMS OF WARRENTY

In order to avoid accidents and ensure optimum performance, no modifications or conversions may be carried out to the refrigerant pump without the explicit written approval by TH. WITT KÄLTEMASCHINENFABRIK GMBH.

These instructions are based on internationally standardised SI units of measurements.

All data and information on the operation and maintenance of the refrigerant pump is provided based on our extensive experience and to the best of our technical knowledge.

Our liability or warranty is excluded, if:

- information and instructions in the operating manual are ignored,
- the refrigerant pump including accessories is operated incorrectly or is installed contrary to these installation instructions
- the refrigerant pump is used for applications other than that for which it was intended,
- safety devices are not used or disconnected
- there have been modifications made without written approval
- the safety regulations are not adhered to
- the refrigerant pump including its filters and required safety devices has not been maintained or repaired correctly with respect to frequency or competence this includes the use of approved spare parts.



Opening the pump within the warranty period will void all implied or explicit guarantees!

It is recommended to return the pump to the supplier for repair or order an exchange pump.

When exchanging any parts respective spare parts only genuine spare parts are to be used. Equipment must be used in accordance with the instructions in this manual.

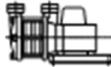
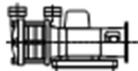
3. TECHNICAL INFORMATION

3.1 DESCRIPTION OF TYPES

Six WITT refrigerant pumps with flanged motor are available: GP 41, GP 42, GP 51, GP 51a, GP 52 and GP82.

Pumps can be delivered with or without standard flange-motor. To select your model please see table below.

3.2 SCOPE OF DELIVERY

GP... model 1	Replacement (bare shaft) pump with - gasket for flanges - coupling part on the pump side		
GP... model 2	Pump as model 1 with - complete coupling - motor connection		
GP... model 4	Pump as model 2 with - 1 motor 1500 min-1 for NH ₃		



Please specify for model 2 the motor size for correct selection of the motor coupling (and if required to be supplied with the intermediate ring for the motor flange).



The standard motor can be replaced by other sizes in accordance with the motor selection data sheet.

Optional Equipment

- Counter flange, suction side with screws, nuts and gasket
- Counter flange, pressure side with screws, nuts and gasket
- Shut off valve EA ... suction side with counter flange, screws, nuts and gasket
- Shut off valve EA ... pressure side with counter flange, screws, nuts, gasket and deaeration-valve EA 10 GB (manometer connection)
- Strainer KS .. P suction side, including shut-off device, with counter flange, screws, nuts and gasket
- Non return / shut off valve ERA ... pressure side, with counter flange, screws, nuts and gasket and deaeration valve EA 10 GB (manometer connection) pipe Ø 17,2 and hand regulating valve EE6 (loose)
- NH₃ manometer with stand B for 0 - 12,5 bar
- NH₃ manometer with stand B for 0 - 25 bar
- Strainer KS ... L

3.3 ORDER INFORMATION

Please specify the following data when ordering a pump:

- refrigerant
- type GP 41, GP 42, GP 51, GP 51a, GP 52 or GP82
- *For models 2 the required coupling size (or motor size of the motor to be fitted later)*
- For models 4 the selected motor
- Voltage and frequency.
- (Special requirements if applicable, e.g. PN 65 for HRP 3232)

If you are unsure about the selection, please provide the following additional information:

- evaporating temperature°C
- volume flow m³/h or capacity and re-circulation rate
- required pressure head m

3.4 CODES / CERTIFICATES / APPROVALS

The following certifications are available and can be downloaded from our website www.th-witt.com:

declaration of incorporation of a partly completed machinery according to EG machinery directive, conformity declaration according to EU- low voltage directive.



4. TECHNICAL DATA

4.1 GENERAL INFORMATION

DESCRIPTION	GP 41	GP 42	GP 51	GP 51a	GP 52	GP 82
Volume refrigerant side [litr.]	1,75	1,85	4,10	4,10	5,25	7,72
Reservoir oil content [litr.]	1,70	1,70	2,00	2,00	2,00	2,00
Flange connection [DN]	40,00	40,00	50,00	50,00	50,00	50/80
Weight [kg] for						
Model 1	41,00	45,00	63,00	63,00	73,00	91,00
Model 2	48,00	52,00	75,00	75,00	92,00	110,00
Model 4	dependent	dependent	dependent	dependent	dependent	dependent

4.2 MOTOR DATA

4.2.1 Motor data for 50 Hz - 1.500 RPM

	Density [kg/dm ³]	Motor size	Power [kW]	Voltage [V]		Weight [kg]	Remark
				Δ	Y		
GP 41	< 0,7 (NH3)	80	0,55	220 - 240	380 - 420	10	Standard
	< 1,4		0,75			12	
	< 1,6	90S	1,1			14	
	< 1,8						
GP 42	< 0,7 (NH3)	90S	1,1	220 - 240	380 - 420	14	Standard
	< 1,4	90L	1,5			17	
	< 1,6						100L
	< 1,8						
GP 51	< 0,7 (NH3)	100L	3	220 - 240 380 - 420	380 - 420 660 - 725	28	Standard
	< 1,4	112M	4			40	
	< 1,6	132S	5,5			66	Motor adapter ring necessary
	< 1,8						
GP 51a	< 0,7 (NH3)	100L	2,2	220 - 240	380 - 420	17	Standard
	< 1,4	112M	4	220 - 240 380 - 420	380 - 420 660 - 725	40	
	< 1,6						
	< 1,8						
GP 52	< 0,7 (NH3)	132S	5,5	220 - 240 380 - 420	380 - 420 660 - 725	66	Standard
GP 82	< 0,7 (NH3)	132M	7,5	380 - 420	660 - 725	64	Standard

4.2.2 Motor data for 50 Hz - 1.000 RPM

	Density [kg/dm ³]	Motor size	Power [kW]	Voltage [V]		Weight [kg]	Remark
				Δ	Y		
GP 41	< 0,7 (NH3)	80	0,37	220 - 240	380 - 420	9	
	< 1,4						
	< 1,6						
	< 1,8						
GP 42	< 0,7 (NH3)	80	0,37	220 - 240	380 - 420	9	
	< 1,4						
	< 1,6		0,55			11	
	< 1,8						
GP 51	< 0,7 (NH3)	100L	1,5	220 - 240	380 - 420	25	
	< 1,4						
	< 1,6	112M	2,2			38	
	< 1,8						
GP 51a	< 0,7 (NH3)	100L	1,5	220 - 240	380 - 420	26	
	< 1,4						
	< 1,6						
	< 1,8						
GP 52	< 0,7 (NH3)	100L	1,5	220 - 240	380 - 420	26	
	< 1,4	112M	2,2			38	
	< 1,6	132S	3	220 - 240	380 - 420	66	Motor adapter ring necessary
	< 1,8	132M	4	380 - 420	660 - 725	82	

4.2.3 Motor data for 60 Hz - 1.800 RPM

	Density [kg/dm ³]	Motor size	Power [kW]	Voltage [V]		Weight [kg]	Remark
				Δ	Y		
GP 41	< 0,7 (NH3)	80	0,9	254 - 280	440 - 480	12	
	< 1,4	90S	1,3			14	
	< 1,6	90L	1,8			17	
	< 1,8						
GP 42	< 0,7 (NH3)	90L	1,8	254 - 280	440 - 480	17	
	< 1,4	100L	2,6			22	
	< 1,6						
GP 51	< 0,7 (NH3)	112M	4,8	254 - 280 460	440 - 480	40	
	< 1,4	132S	6,6	460	---	66	Motor adapter ring necessary
GP 51a	< 0,7 (NH3)	112M	4,8	254 - 280 460	440 - 480	40	
	< 1,4	132S	6,6	460	---	66	Motor adapter ring necessary
GP 82	< 0,7 (NH3)	132M	7,5	460	---	64	



4.2.4 Motor data for 60 Hz - 1.200 RPM

	Density [kg/dm ³]	Motor size	Power [kW]	Voltage [V]		Weight [kg]	Remark
				Δ	Y		
GP 41	< 0,7 (NH3)	80	0,44	254 - 280	440 - 480	9	
	< 1,4						
	< 1,6		0,66				
	< 1,8					11	
GP 42	< 0,7 (NH3)	80	0,66	254 - 280	440 - 480	11	
	< 1,4	90S	0,9			13	
	< 1,6					90L	1,3
	< 1,8						
GP 51	< 0,7 (NH3)	100L	1,8	254 - 280	440 - 480	25	
	< 1,4	112M	2,6			38	
	< 1,6						
	< 1,8						
GP 51a	< 0,7 (NH3)	100L	1,8	254 - 280	440 - 480	26	
	< 1,4	112M	2,6			38	
	< 1,6						
	< 1,8						
GP 52	< 0,7 (NH3)	112M	2,6	254 - 280	440 - 480	38	
	< 1,4	132S	3,6	254 - 280		66	Motor adapter ring necessary
	< 1,6	132M	4,8	460		82	
	< 1,8		6,6	460		---	

4.3 MATERIAS

Pump housing:	EN-GJS-400-18-LT	Motor flange:	EN GJS-400-15
Coupling:	Stahl	Coupling bush:	Kunststoff
Coupling protection:	PVC Rohr transparent	Ball bearings:	Stahl
Shaft:	C 35	Shaft seal:	PTFE
Impellers:	EN GJS-400-15	Main bolts	8.8
Counter flanges:	P355NH	Bolts for counter flanges:	8.8
Gaskets:	Centellen NP	Reservoir oil:	MR 520
Painting system	W 9.1 + W 9.2 *		

* W9.1 + W9.2 = 2k epoxyd finish according DIN ISO 12944/5, RAL 7001

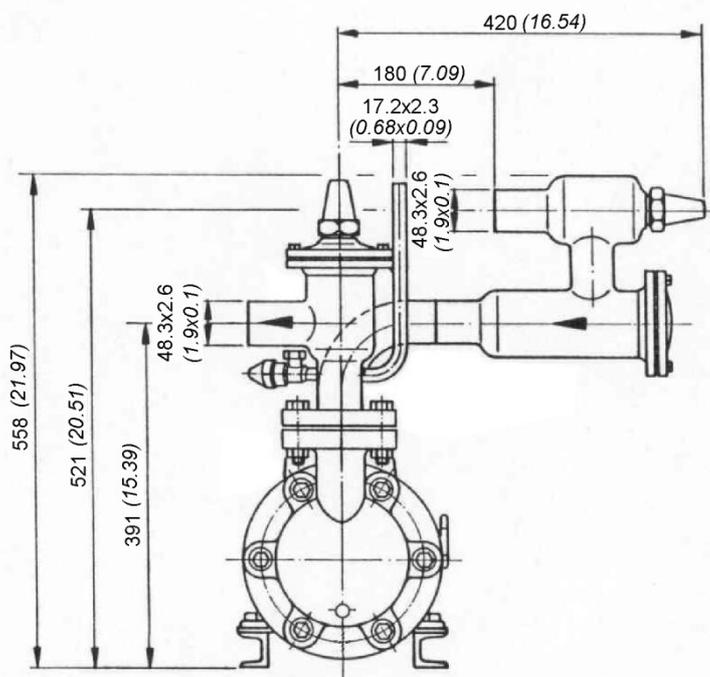
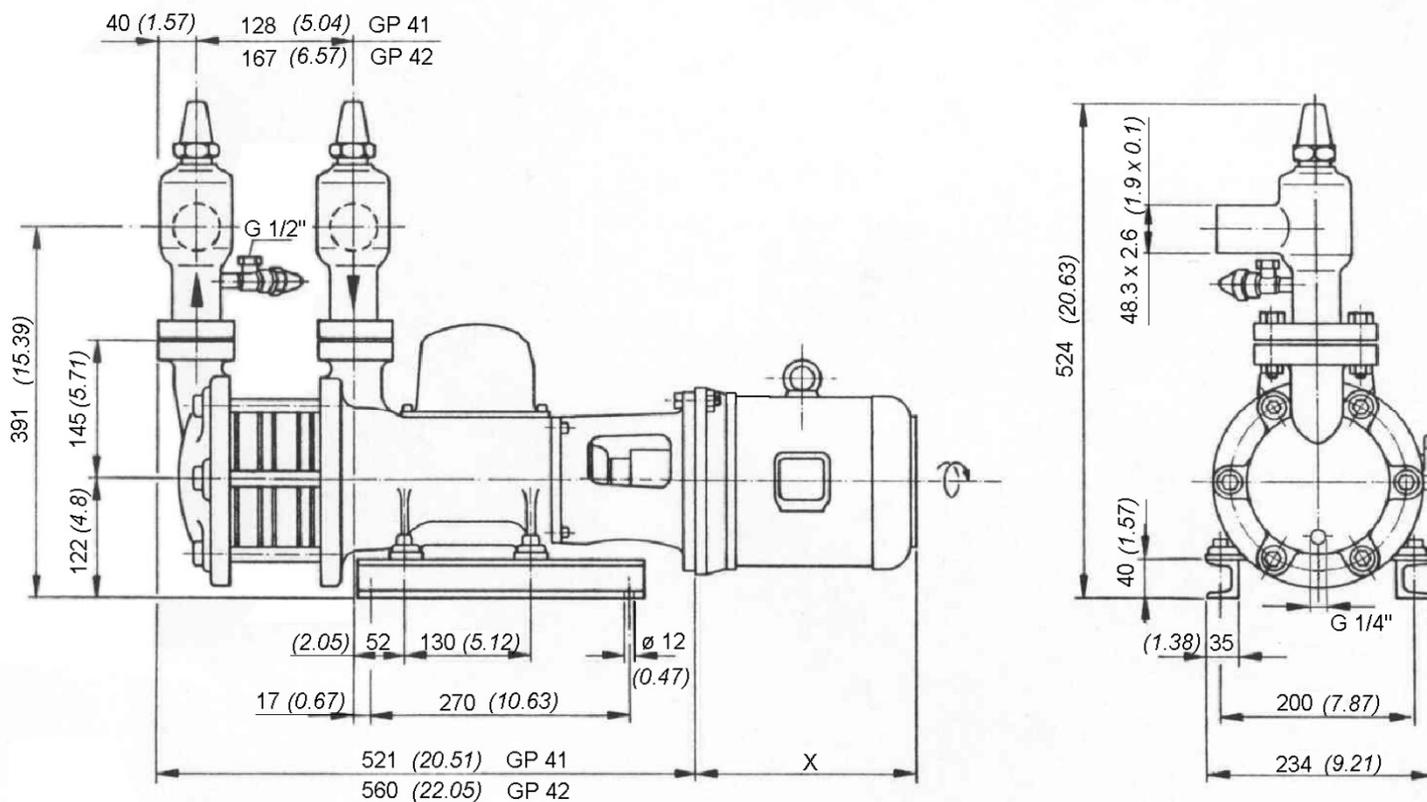
4.4 PRESSURE RANGE

Design pressure pump housing [bar]	16
Test pressure (air under water) [bar]	17,6
Permitted operating pressure range [bar]	16 (+50 / -10°C) 8 (-10 / -60°C)

4.5 DIMENSIONS

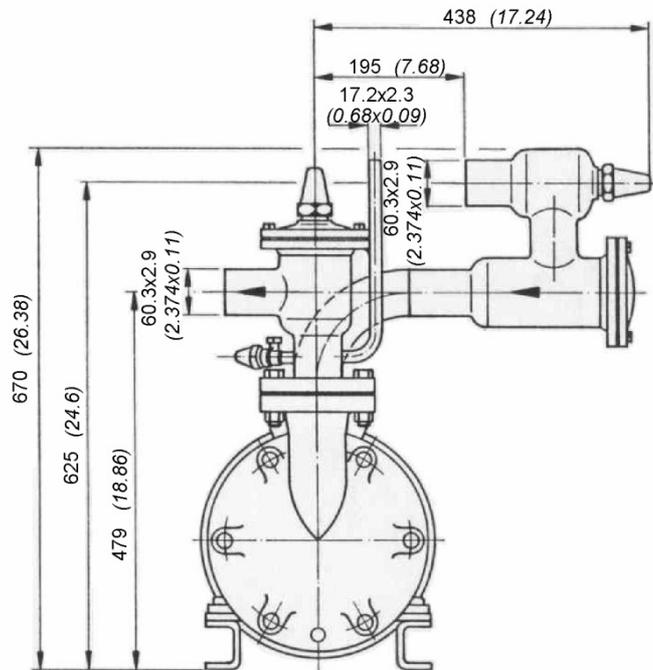
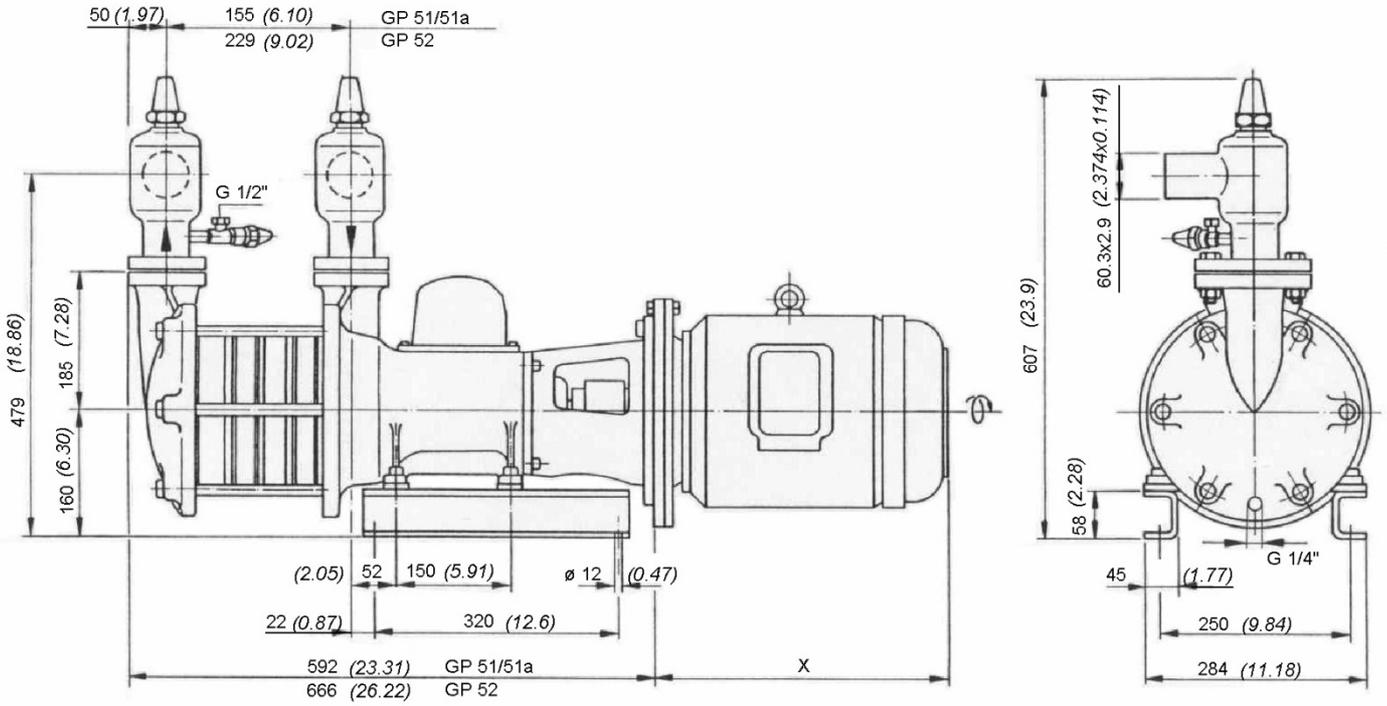
4.5.1 Dimensions GP 41 / GP 42

All dimensions in mm (inch)



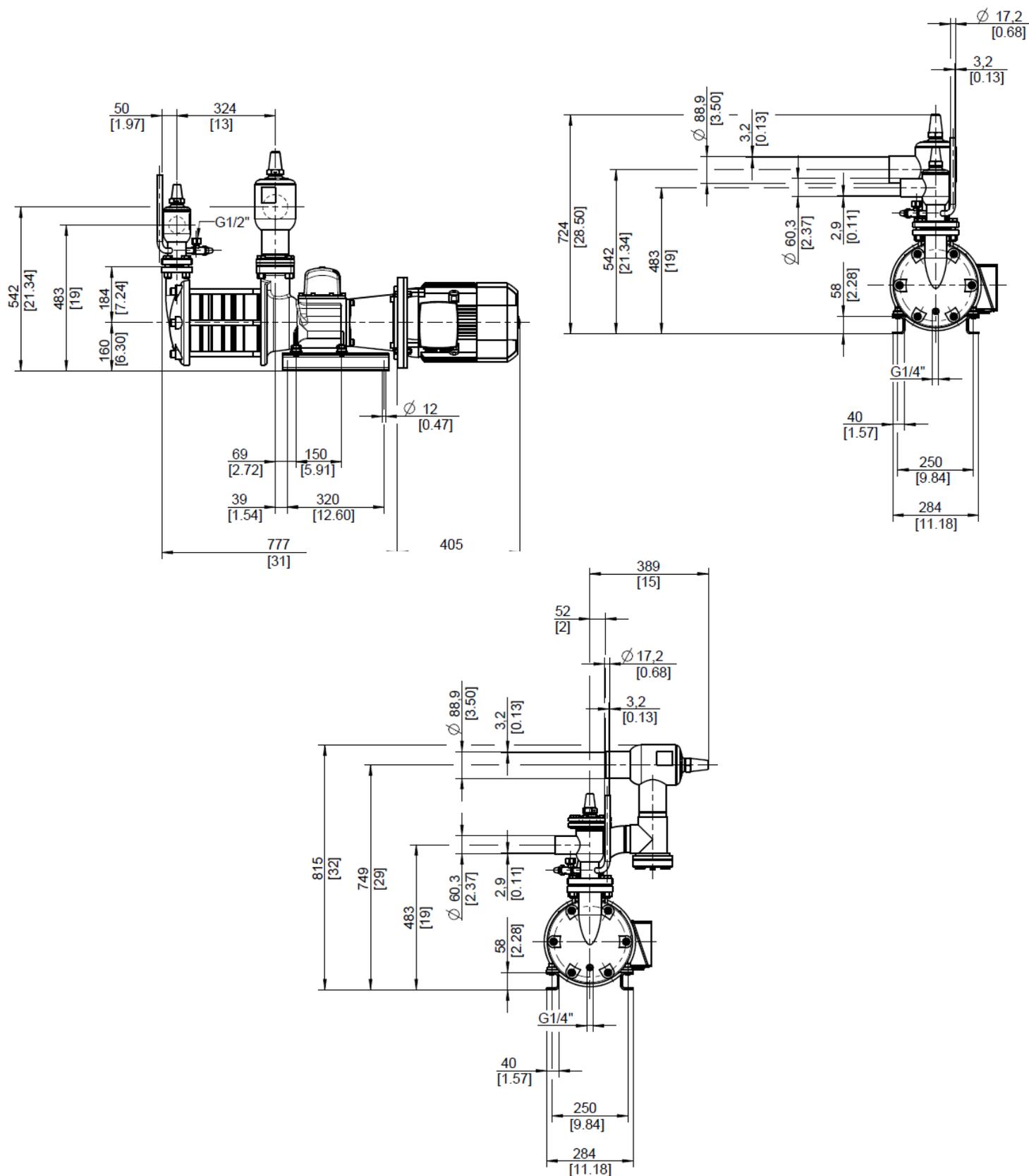
4.5.2 Dimensions GP 51 / GP 51a / GP 52

All dimensions in mm (inch)



4.5.3 Dimensions GP 82

All dimensions in mm (inch)



4.6 SECTIONAL VIEWS

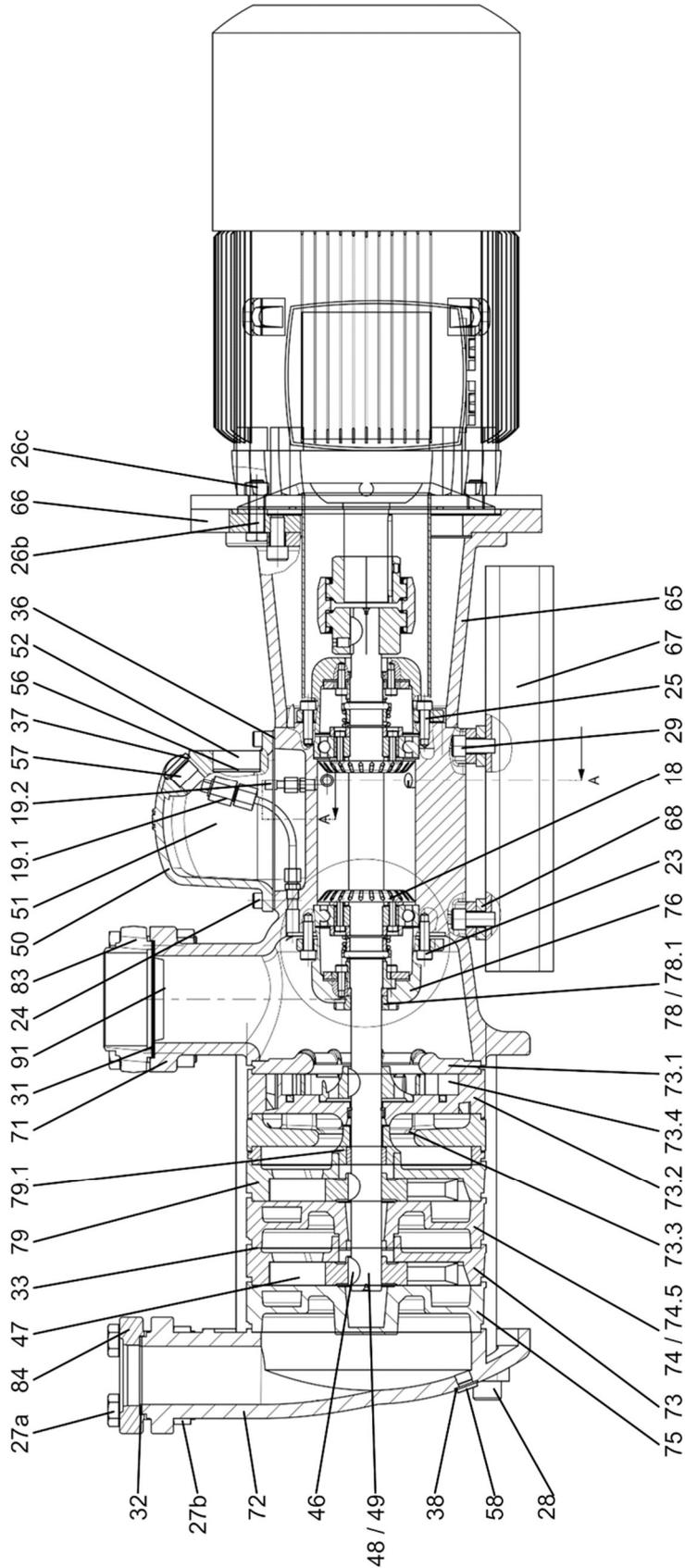


Figure 3a: GP 82 shown (Model GP 41 – GP 52 similar)

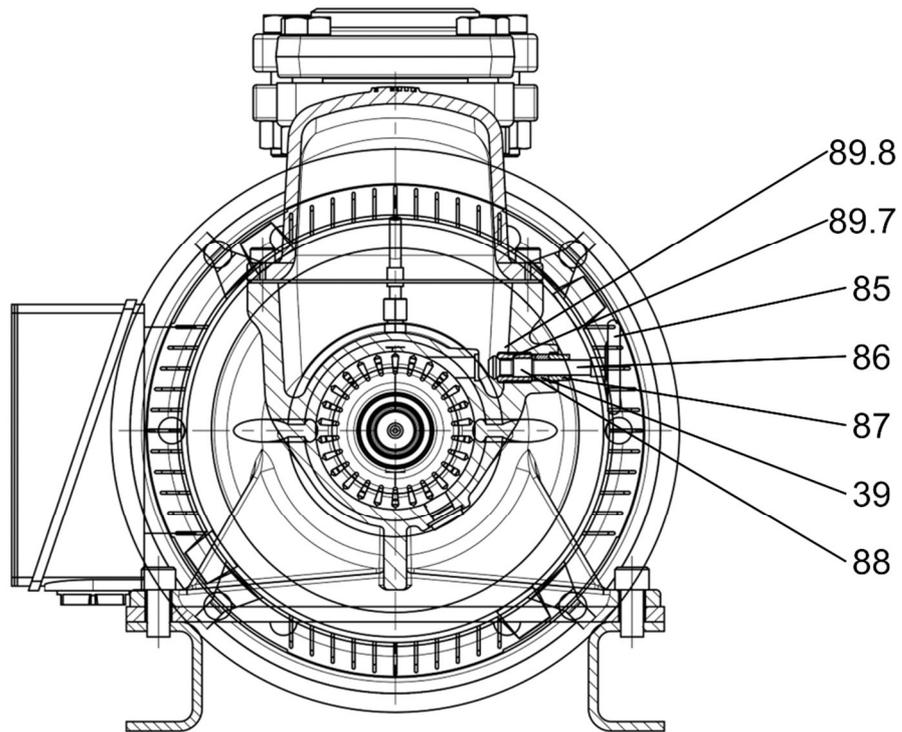


Figure 3b: Details of bearing

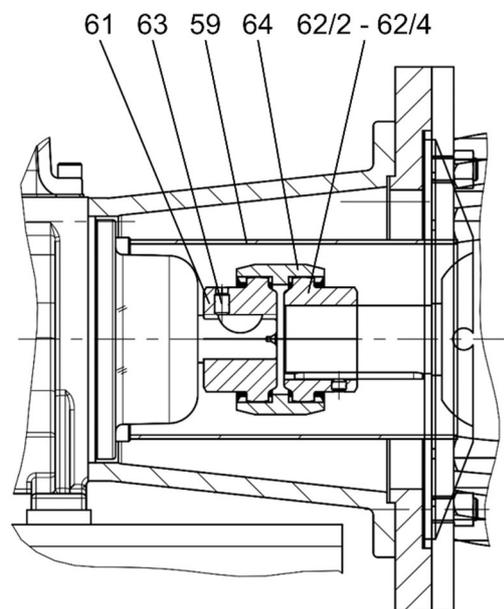


Figure 3c: Detail of coupling and motor connection

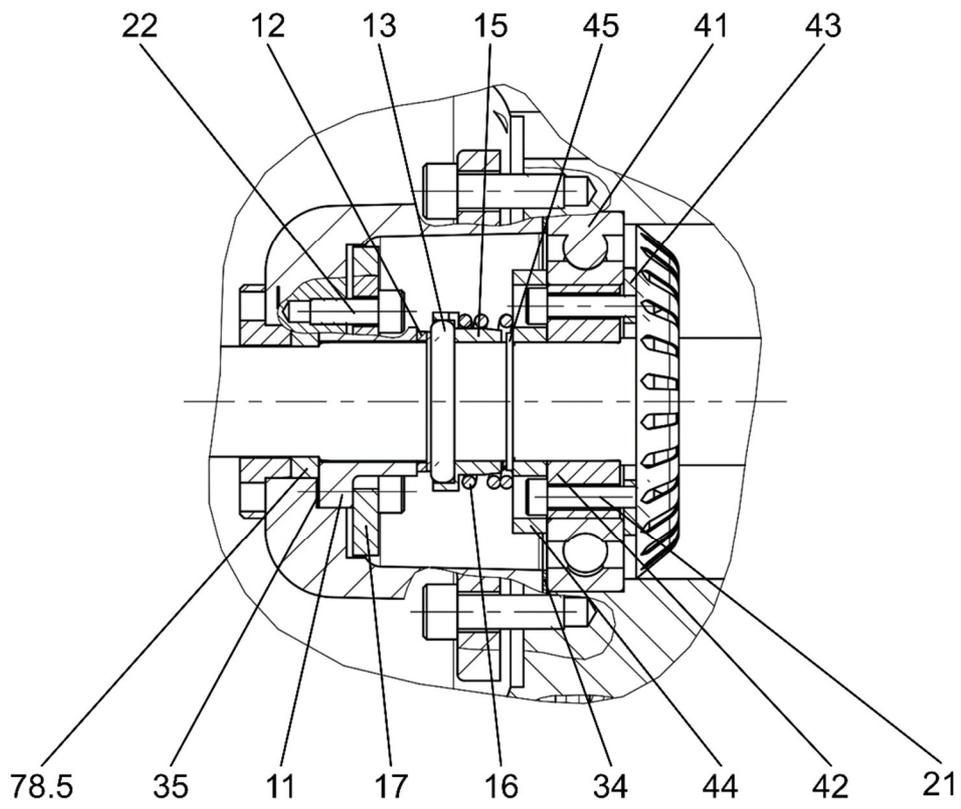


Figure 3d: Details of shaft seal

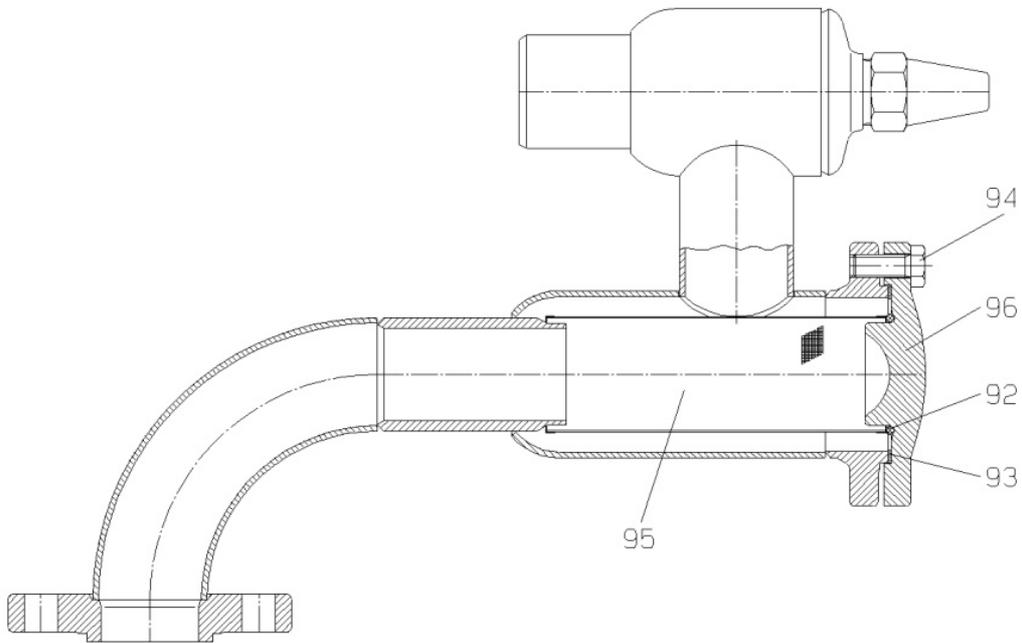


Figure 3e: Details of strainer KS 40-P / KS 50-P

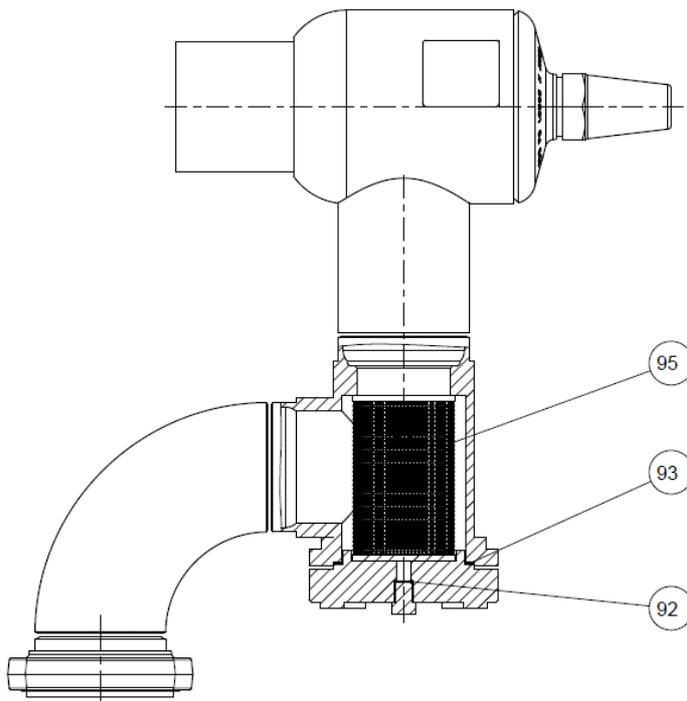


Figure 3f: Details of strainer KS 80-P

4.7 PARTS LIST

4.7.1 parts list for pump (part 1 of 2)

	part	GP 41/ GP 42			GP 51/ GP 51a/ GP 52			GP82		
		Dimension	Article-No.	weight [gr]	Dimension	Article-No.	weight [gr]	Dimension	Article-No.	weight [gr]
slide flange	11	Ø40	2161.001295	82	Ø50	2161.001296	120	Ø50	2161.001296	120
slide ring	12	Ø22	2161.001226	2	Ø28	2161.001265	3	Ø28	2161.001265	3
o-ring	13	Ø22 x 3,5	5642.ABBR01	1	Ø28 x 5	5642.ABCD01	3	Ø28 x 5	5642.ABCD01	3
pressure ring	15	Ø42	2161.001230	60	Ø42	2161.001269	40	Ø42	2161.001269	40
pressure spring	16	3 x 38 x 34	5512.WBD001	17	3 x 38 x 34	5512.WBD001	17	3 x 38 x 34	5512.WBD001	17
spring washer	17	Ø60	2161.001228	105	Ø73	2161.001267	127	Ø73	2161.001267	127
brake disc	18	Ø70	2161.001223	105	Ø86	2161.001260	23	Ø86	2161.001260	23
pressure-limitation valve	19.1		2161.002009	90		2161.002009	90		2161.002009	90
safety pressure-limitation valve	19.2		2161.001208	20		2161.001208	20		2161.001208	20
cylinder head screw with inner hex	21	M5 x 25	5112.BC41AO	5	M5 x 25	5112.BC41AO	5	M5 x 25	5112.BC41AO	5
cylinder head screw with inner hex	22	M6 x 16	5112.BC51AF	6	M6 x 16	5112.BC51AF	6	M6 x 16	5112.BC51AF	6
cylinder head screw with inner hex	23	M8 x 25	5112.BH61AO	15	M8 x 25	5112.BH61AO	15	M8 x 25	5112.BH61AO	15
cylinder head screw with inner hex	24	M8 x 20	5112.BH61AJ	13	M8 x 20	5112.BH61AJ	13	M8 x 20	5112.BH61AJ	13
cylinder head screw with inner hex	25	M10 x 25	5112.BH71AO	25	M12 x 30	5112.BH81AT	39	M12 x 30	5112.BH81AT	39
cylinder head screw with inner hex	26b	M10 x 35	5112.BH71AY	28	M12 x 50	5112.BH81BD	55	M12 x 50	5112.BH81BD	55
hex nut	26c	M10	5151.AH7100	10	M12	5151.AH8100	15	M12	5151.AH8100	15
hex bolt	27a	M16 x 55	5111.AHA1BI	110	M16 x 55	5111.AHA1BI	110	M16 x 65	5111.AHA1BS	126
hex nut	27b	M16	5151.AHA100	30	M16	5151.AHA100	30	M16	5151.AHA100	30
hexagon socket screw (GP 41 & 51)	28	M16 x 100	5112.BHA1CR	186	M16 x 150	5112.BHA1E5	266		---	
hexagon socket screw (GP 42, 52 & 82)	28	M16 x 140	5112.BHA1DV	250	M16 x 220	5112.BHA1G3	320	M16 x 300	5112.BHA3IB	440
cylinder head screw with inner hex	29	M10 x 25	5112.BH71AO	25	M12 x 25	5112.BH81AO	36	M12 x 25	5112.BH81AO	36
gasket suction connection	31	40/60 x 1	5632.1B3BNI	3	50/67 x 1	5632.1BDBUI	4	77/100x1	5632.1C4CRI	6
gasket pressure connection	32	40/60 x 2	5632.1B3BNK	6	50/67 x 2	5632.1BDBUK	7	50/67 x 2	5632.1BDBUK	7
gasket intermediate piece	33	138/149x0,3	5632.1DTE44	1	180/195x0,3	5632.1EZFE8	2	180/195x0,3	5632.1EZFE8	2
gasket cover	34	70/84 x 2	5632.1BXCCK	10	80/100 x 1	5632.1C7CRI	12	80/100 x 1	5632.1C7CRI	12
gasket slide flange	35	30/40 x 0,5	5632.1ATB38	1	38/50 x 0,5	5632.1B1BD8	1	38/50 x 0,5	5632.1B1BD8	1
gasket oil pot	36	125/155x1,5	5632.1DGAEJ	20	125/155x1,5	5632.1DGAEJ	20	125/155x1,5	5632.1DGAEJ	20
gasket oil-fill screw	37	22x27x1,5	5641.A11AL0	3	22x27x1,5	5641.A11AL0	3	22x27x1,5	5641.A11AL0	3
gasket oil-drain screw	38	14x20x1,5	5641.A11AD0	1	14x20x1,5	5641.A11AD0	1	14x20x1,5	5641.A11AD0	1
seal for stop valve	39	8/14 x 8	5643.ABAP01	1	8/14 x 8	5643.ABAP01	1	8/14 x 8	5643.ABAP01	1
ball bearing with steel cage	41		5341.000003	240		5341.000002	380		5341.000002	380
baring bush	42	Ø45	2161.001219	130	Ø55	2161.001256	220	Ø55	2161.001256	220
tightening ring	43	Ø55	2161.001220	77	Ø63	2161.001257	95	Ø63	2161.001257	95
spring cage	44	Ø55	2161.001229	110	Ø62	2161.001268	130	Ø62	2161.001268	130
safety ring (2 resp. 4 pcs.)	45	22 x 1,2	5541.AAL120	2	28 x 1,5	5541.AAR150	3	28 x 1,5	5541.AAR150	3
disc spring	46	5 x 7,5	5712.AGF001	4	6 x 10	5712.AHH001	9	6 x 10	5712.AHH001	9
impeller	47	Ø130	2161.001243	440	Ø165	2161.001285	1170	Ø165	2161.180101	1170
shaft GP 41 / GP 51	48	Ø23 x 370	2161.001210	1085	Ø30 x 400	2161.001251	1875	Ø30 x 400	---	1875
shaft GP 42 / GP 52 / GP 82	49	Ø23 x 410	2161.001211	1180	Ø30 x 474	2161.001252	2180	Ø30 x 590	2161.182102	2660
oil housing	50		2161.001303	3050		2161.001303	3050		2161.001303	3050

4.7.2 parts list for pump (part 2 of 2)

	part	GP 41/ GP 42			GP 51/ GP 51a/ GP 52			GP82		
		Dimension	Article-No.	weight [gr]	Dimension	Article-No.	weight [gr]	Dimension	Article-No.	weight [gr]
oil MR 520	51	1 ltr.	9831.100001	872	1 ltr.	9831.100001	872	1 ltr.	9831.100001	872
sight glass	52		2161.002001	45		2161.002001	45		2161.002001	45
gasket for sight glass	56	30/40 x 2		2	30/40 x 2		2	30/40 x 2		2
oil-fill screw	57	M22 x 1,5	5116.OG4510	48	M22 x 1,5	5116.OG4510	48	M22 x 1,5	5116.OG4510	48
oil-drain screw	58	G ¼"	5116.OG6210	15	G ¼"	5116.OG6210	15	G ¼"	5116.OG6210	15
coupling protection (transp. PVC pipe)	59	BG 80/90	2161.001215	165	BG 100/112	2161.001217	210		---	
coupling protection (transp. PVC pipe)	59	BG 100	2161.001216	185	BG 132	2161.001218	210	BG 132	2161.001218	210
coupling, pump side	61	Ø16	2494.000011	330	Ø22	2494.000051	670	Ø22	2494.000051	670
coupling- motor side	62/2	BG 80	2494.000012	430	BG 100	2494.000052	600		---	
coupling- motor side	62/3	BG 90	2494.000013	430	BG 112	2494.000052	600		---	
coupling- motor side	62/4	BG 100	2494.000014	430	BG 132	2494.000053	460	BG 132	2494.000053	460
threaded stud	63	M8 x 12	5121.ED60AB	2	M8 x 12	5121.ED60AB	2	M8 x 12	5121.ED60AB	2
coupling bush	64		2494.000005	110		2494.000006	130		2494.000006	130
motor connection part	65		2161.001309	4200		2161.001254	5900		2161.001254	5900
motor connection flange	66		2161.001214	4650		2161.001255	6900		2161.001255	6900
u-base	67		2161.001249	520		2161.001293	1680		2161.001293	1680
support plate	68		2161.001250	600		2161.001294	600		2161.001294	600
suction housing	71		2161.002206			2161.002406			---	
discharge housing (incl. 58 + 38)	72		2161.002207	5900		2161.002407	11400		---	
Intermediate piece narrow	73		2161.001238	1110		2161.001278	3150		2161.180402	
suction intermediate piece	73.1		---			---			2162.002015	2160
guide vane-interm. Piece	73.2		---			---			2162.002017	4860
return intermediate piece	73.3		---			---			2162.002020	3860
radial impeller	73.4		---			---			2161.180102	670
Intermediate piece large (only GP 42)	74		2161.001241	1260		---			---	
Intermediate piece with supporting bearing (only GP 52 and GP 82)	74.5		---			2161.001286	3835		2161.001286	
Intermediate piece without bore	75		2161.001240	1375		2161.001280	3800		2161.001280	3800
Intermediate piece without bore (GP 51a)	75		---			2161.001283			---	
bearing cover	76		2161.001306			2161.001307			2161.001307	
distance bushing	78		2161.001236			2161.001276			---	
clamp ring	78.1		---			---			2161.180201	
felt ring	78.5	20 x 30 x 4	5641.B03AJ0	1	25 x 37 x 5	5641.B0A00	1	25 x 37 x 5	5641.B0A00	1
Intermediate piece narrow	79		---			---			2161.180403	
support bearing housing complete	79.1		---			---			2161.180404	
counter flange, suction side	83	DN 40	---		DN 50	---		DN 80	---	
counter flange, pressure side	84	DN 40	---		DN 50	---		DN 50	---	
hand wheel	85	Ø50/6	5531.000001	25	Ø50/6	5531.000001	25	Ø50/6	5531.000001	25
valve spindle	86	DN 10	4191.G1DA00	25	DN 10	4191.G1DA00	25	DN 10	4191.G1DA00	25
stuffing box	87		6438.000001	8		6438.000001	8		6438.000001	8
base ring	88	Ø8	6438.000004	2	Ø8	6438.000004	2	Ø8	6438.000004	2
spindle guide bushing	89.7	M16x1,5x18	2161.001201	15	M16x1,5x18	2161.001201	15	M16x1,5x18	2161.001201	15
locking pin	89.8	3 x 30	5723.AA0302	1	3 x 30	5723.AA0302	1	3 x 30	5723.AA0302	1
conical suction strainer	91		2196.000001	15		2196.000002	20		2196.000004	20

4.7.3 parts list for strainers

	part	KS 40-P			KS 50-P			KS 80-P		
		Dimension	Article-No.	weight [gr]	Dimension	Article-No.	weight [gr]	Dimension	Article-No.	weight [gr]
o-ring	92	40 x 6	5642.ABDB01	5	50 x 6	5642.ABDV01	8	10x18x2	5642.A12A90	8
gasket	93	70/84 x 2	5632.1BXC BK	5	80/94 x 2	5632.1C7CLK	10	84/96x1	5632.3CBCNI	10
hexagon socket screw	94	M10 x 30	5111.CL71AT	25	M12 x 35	5111.CL81AY	35	---	---	---
inlet filter	95	40	4491.000003	155	50	4491.000004	165	80	4411.B10B07	58
cover	96		6416.D57BB0	975		6416.D62BB0	1345		?	

4.8 SPARE PART SETS

	part	GP 41		GP 42		GP 51 / GP 51a		GP 52		GP 82								
		Articel-No.	weight [gr]	Articel-No.	weight [gr]	Articel-No.	weight [gr]	Articel-No.	weight [gr]	Articel-No.	weight [gr]							
repair set complete 2 x part no. 11, 12, 13, 15, 16, 41, 45 1 x part no. E19.1, E19.2, E30, 47 1 x part no. 48 (GP 41 & 51) 1 x part no. 49 (GP 42, 52 & 82)	E	2161.002204	2.478	2161.002205	2.558	2161.002404	4.397	2161.002405	4702	2161.002605	4730							
shaft seal single (formerly 10) 1 x part no. 11, 12, 13, 35	E10	2161.002201	88	2161.002201	88	2161.002401	127	2161.002401	127	2161.002401	127							
shaft seal complete 2 x part no. 11, 12, 13, 15, 16 8 x part no. 22 1 x part no. E30	E11	2161.002212		2161.002212		2161.002412		2161.002412		2161.002612								
pressure-limitation valve 1 x part no. 19.1 and screwing	E19.1	2161.002009	90	2161.002009	90	2161.002009	90	2161.002009	90	2161.002009	90							
safety pressure-limitation valve 1 x part no. 19.2 and screwing	E19.2	2161.001208	20	2161.001208	20	2161.001208	20	2161.001208	20	2161.001208	20							
set of gaskets for GP 41 / GP 42 1 x part no. 32, 36 2 x part no. 31, 34, 35, 38, 78.5 3 x part no. 37 5 x part no. 33	E30	2161.002202	71	2161.002202	71													
for GP 51 / GP 52 1 x part no. 32, 36, 78.5 2 x part no. 31, 34, 35, 38 3 x part no. 37 5 x part no. 33													2161.002402	83	2161.002402	83		
for GP 82 1 x part no. 36, 78.5 2 x part no. 31, 32, 34, 35, 38 3 x part no. 37 9 x part no. 33																		
set of ball bearings 2 x part no. 41, 42, 43, 44 4 x part no. 45 2 x part no. 45 (GP 82) 8 x part no. 21	E41	2161.002213		2161.002213		2161.002413		2161.002413		2161.002413								
set shaft GP 41 / GP 51 1 x part no. 48 2 x part no. 46 2 x part no. 45 (GP 51) 4 x part no. 45 (GP 41)	E48	2161.002214				2161.002414												
set shaft GP 42 / GP 52 / GP 82 1 x part no. 49 2 x part no. 45 (GP 52 & 82) 4 x part no. 45 (GP 42) 3 x part no. 46	E49			2161.002215				2161.002415		2161.002615								
oil fill- / oil-drain-screw 1 x part no. 37, 38, 57, 58	E50	2161.002102		2161.002102		2161.002102		2161.002102		2161.002102								
coupling - motor side (unbored) 1 x part no. 61, 62/1, 63, 64	E60/1	2441.000006	895	2441.000006	895	2441.000007	1530	2441.000007	1530									
coupling - BG80, BG110/112 1 x part no. 61, 62/2, 63, 64	E60/2	2441.000001	895	2441.000001	895	2441.000004	1530	2441.000004	1530									
coupling - BG90, BG132 1 x part no. 61, 62/3, 63, 64	E60/3	2441.000002	895	2441.000002	895	2441.000005	1530	2441.000005	1530	2441.000005	1530							
coupling - BG100 1 x part no. 61, 62/4, 63, 64	E60/4	2441.000003	895	2441.000003	895													
counter flange, suction side 1x part no. 83, 31 4x part no. 27a, 27b (GP 51 - 82) 2x part no. 27a, 27b (GP 41 & 42)	E83	2161.000077	1000	2161.000077	1000	2161.000078	2000	2161.000078	2000	2162.000146	3000							
counter flange, pressure side 1x part no. 84, 32 4x part no. 27a, 27b (GP 51 - 82) 2x part no. 27a, 27b (GP 41 & 42)	E84	2161.000079	1000	2161.000079	1000	2161.000080	2000	2161.000080	2000	2161.000080	2000							
set conical suction strainer 1 x part no. 32, 91 2 x part no. 31	E91	2161.002216		2161.002216		2161.002416		2161.002416		2161.002616								
set impurity strainer 1 x part no. 92, 93 95 6 x part no. 94	E95	2161.002217		2161.002217		2161.002417		2161.002417		2161.002617								



4.9 DESCRIPTION OF OPERATION

From the surge drum refrigerant liquid flows into the suction chamber of the pump. A conical filter is positioned in the suction connection. A special design of the suction chamber reduces the inlet friction. The fluid pressure is increased by passing through one or two stage impellers and intermediate piece(s).

Due to the lateral channels in the intermediate pieces the pump can deliver a gas/liquid mixture without surging or reversing the flow.

The special double shaft seal with associated oil reservoir in the between ensures that no refrigerant will escape outside the system.

During standstill any gas that evaporates must be able to leave the pump and vent to the surge drum. If the pump can be isolated on the delivery side or if a return valve is mounted, a purge line with a diameter of 10 mm (0.4") must be installed between delivery flange and stop valve and connected to the wet suction return line.

The WITT stop/return valve ERA is provided with a purge connection pipe DN 10 and a hand regulating valve EE6, supplied loose. The EE6 should be fitted so that any gas may be purged to the surge drum. The valve should be left ½ - ¼-turn open depending on the differential pressure (see also fig. 6).

4.10 PERFORMANCE CHARACTERISTIC TABLE

1450 1/min (RPM)

LIQUID HEAD [m]	PRESSURE DIFFERENCE [bar]				VOLUME FLOW [m³/h]					
	NH ₃		R 22		GP 41	GP 42	GP 51A	GP 51	GP 52	GP 82
	EVAPORATING TEMPERATURE t ₀									
	+40°C	-40°C	+40°C	-40°C						
2	0,11	0,14	0,22	0,28	3,4	3,6	10,2	16,8	16,8	24
4	0,23	0,27	0,44	0,55	3,2	3,4	10	16,5	16,5	23,5
6	0,34	0,41	0,67	0,83	2,9	3,3	9,7	16,3	16,3	23
8	0,45	0,54	0,89	1,13	2,7	3,1	9,4	16,1	16,2	22,4
10	0,57	0,68	1,11	1,38	2,6	3	9	15,7	16,1	21,8
15	0,85	1,02	1,67	2,08	2,2	2,6	8,3	14,2	16	20,3
20	1,14	1,35	2,22	2,77	1,8	2,4	7,4	12,3	15,8	19
25	1,42	1,69	2,78	3,46	1,4	2,1	6,3	9,8	15,1	17,8
30	1,7	2,03	3,33	4,15	-	1,9	5,5	7	14,2	16,6
35	1,99	2,37	3,89	4,84	-	1,6	4,5	3,6	13,5	15,5
40	2,27	2,71	4,45	5,54	-	1,3	-	0	12,5	14,3
45	2,56	3,05	5	6,23	-	1,1	-	-	11,1	13
50	2,84	3,38	5,56	6,92	-	0,8	-	-	10,4	11,6
55	3,12	3,72	6,11	7,61	-	-	-	-	9,3	10
60	3,41	4,06	6,67	8,31	-	-	-	-	8	8,4
65	3,69	4,4	7,22	9	-	-	-	-	6,5	-
70	3,98	4,74	7,78	9,69	-	-	-	-	5	-

1 m = 3.281 ft | 1 bar = 14.504 PSI | 1 m³/h = 4.403 gal/min

5. APPLICATIONS

5.1 GENERAL

In industrial refrigeration systems pumps are used to deliver refrigerant to the evaporators. WITT refrigerant pumps are designed especially for this purpose.

The principle of a pump re-circulation system is shown in fig. 4.

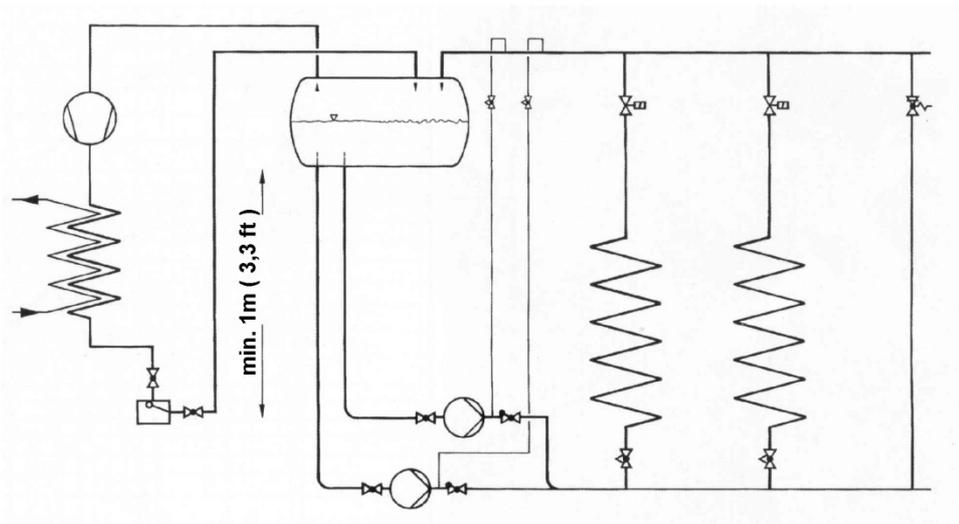


Fig. 4 principle of pump recirculation system

WITT refrigerant pumps differ from conventional centrifugal pump designs due to the fact that large volumes of entrained vapour (gas bubbles) do not completely stop delivery of the refrigerant liquid. Large volumes of gas occur in the pump suction when the evaporation temperature of the plant fluctuates during the production cycle, particularly during compressor start up (pull down period) and during the rapid loading or unloading of compressor steps of capacity.

Large amounts of gas bubbles in the pump suction line will cause the mass flow of liquid refrigerant to be reduced.

It is important to ensure the pump suction lines are sized generously.

With respect to the lifetime of the shaft seals the pump should only be operated in the pressure range below 10 bar (145 psi) in continuous operation. If higher pressures are expected, this should be specified when ordering.



Long periods of cavitation must be avoided, as this will cause premature failure of the pump. It is important the installation instructions in chapter. 6 are correctly understood and followed.

A horizontal separator is recommended: this gives greater surface area for the settlement of any oil and stable suction head conditions.

OPERATIONAL LIMITATIONS

GP refrigerant pumps are suitable for operation with all refrigerants.



GP 52 can be operated with ammonia up to 1450 RPM.



GP 52 is only permitted for operation with higher density refrigerants ($\rho > 800 \text{ kg/m}^3$) below 1200 RPM!

5.2 DETERMINATION OF THE DELIVERY HEAD

The required delivery head is the resistance the pump needs to overcome to supply the evaporator with the highest pressure loss with sufficient liquid refrigerant (in most cases this will be the furthest distant evaporator).

The delivery head is depending from:

- Height difference between pumps and evaporators
- Resistance of pipe work and evaporators
- Pressure losses of valves and fittings in the delivery line
- Density of the refrigerant

The max. allowable delivery head should never be exceeded, because otherwise the pump is operated outside the permitted range and will see internal damages (see chap. 6.5)

5.3 DETERMINATION OF THE REQUIRED FLOW

The evaporators have to be supplied with sufficient liquid refrigerant, so that

- The surface of the evaporators is fully used
- Supply to several evaporators with different duties is as even as possible.

The re-circulation rate is calculated as follows:

$$\text{Recirculation rate} = \frac{\text{mass flow pump}}{\text{evaporated refrigerant}} = \frac{M_{\text{pump}}}{MQ_0}$$

A re-circulation factor of 4 means that 3 parts refrigerant are returned as liquid and 1 part is evaporated.

The recirculation rate depends on the type of evaporator equipment and operation conditions.

The larger the duty, loading rate, the greater the recommended recirculation factor.

RECIRCULATION RATES AND PUMP CAPACITY

Refrigerant	Recirculation factor			Recirculation flow in m ³ /hr per 100 kW*		
	CO ₂	NH ₃	R22	CO ₂	NH ₃	R22
Air Cooler	1,2 – 2,0	3 - 4	2 - 3	1,4 – 2,4	1,3 – 1,8	2,8 – 4,3
Plate Freezer	5 - 10	7 - 10	5 - 10	6 - 12	3 – 4,5	6,5 - 13
Liquid Chiller	1,2 – 1,5	1,2 – 1,5	1,2 – 1,5	1,4 – 1,6	0,6	1,7

*) including re-circulation rate

5.4 ADAPTATION TO PLANT REQUIREMENTS

Fig. 5 shows different plant operating conditions. The delivery head H is shown in relation to the required plant capacity Q .

Performance curve characteristics of the refrigerant pump are shown in fig 5A. The different points W mark the varying plant conditions that may occur during operation.

If the required liquid flow does not correspond with the available pump capacity then the liquid flow to the system can be adjusted as follows:

pump capacity too large:



- switch off a pump
- open a liquid bypass valve, fig. 5B
- speed control of the pump, fig 5C

pump capacity too small:

- switch on an extra pump, fig 5D
- install a larger pump

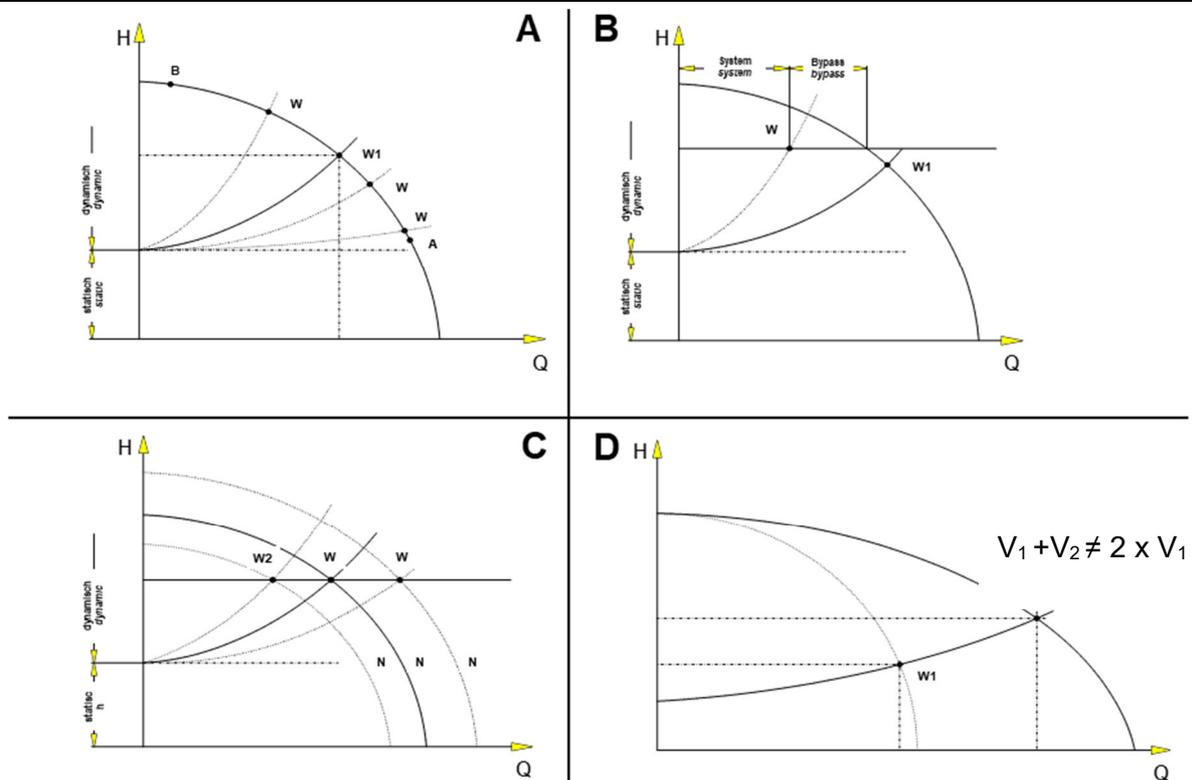


Fig. 5, A-D

6. INSTALLATION REQUIREMENTS

To ensure trouble free operation some basic rules need to be applied to the installation of the pumps.

6.1 PUMP ARRANGEMENT



The installation must be designed as compact as possible below the separator or low-pressure receiver. Allow sufficient access space around the pumps for removing or replacing the pump, servicing valves, setting pressure difference control, inspection and cleaning the conical strainer. Also allow space for normal frost/ice accumulation around the pump.



Vertical distance between bottom of the separator to the pump centre shall be at least 1 m. Greater distance will make the pump less sensitive to system pressure fluctuations.



The pump shall be aligned vertically on channel frame supports.

Please consider that

- a condensate trip tray can easily be placed and cleaned.
- the conical suction line filter can be cleaned easily.
- stress in the piping system is avoided.

6.2 PUMP CONNECTION

The top connection of the suction line to the separator can be made with a down pipe with vortex breaker.

The vortex breaker shall consist of crossed plates with a baffle plate on top to avoid any vortexing. Vortex breakers are available from TH. WITT.

Above the baffle plate of the vortex breaker there should be at least 15mm refrigerant level (in CO₂ systems a minimum coverage of 50mm is required).



When using non-soluble oils in ammonia systems special attention must be taken that any oil, which may settle, does not drain into the duty or stand-by pump.

Therefore, it is recommended that the suction downleg protrude into the surge drum by 30 - 40 mm, depending on the vessel diameter (see fig. 6).

A standard short oil drainage dome is not suitable for connecting a pump suction down leg.

Do not connect two or more pumps in operation by a single common pump suction line liquid header.

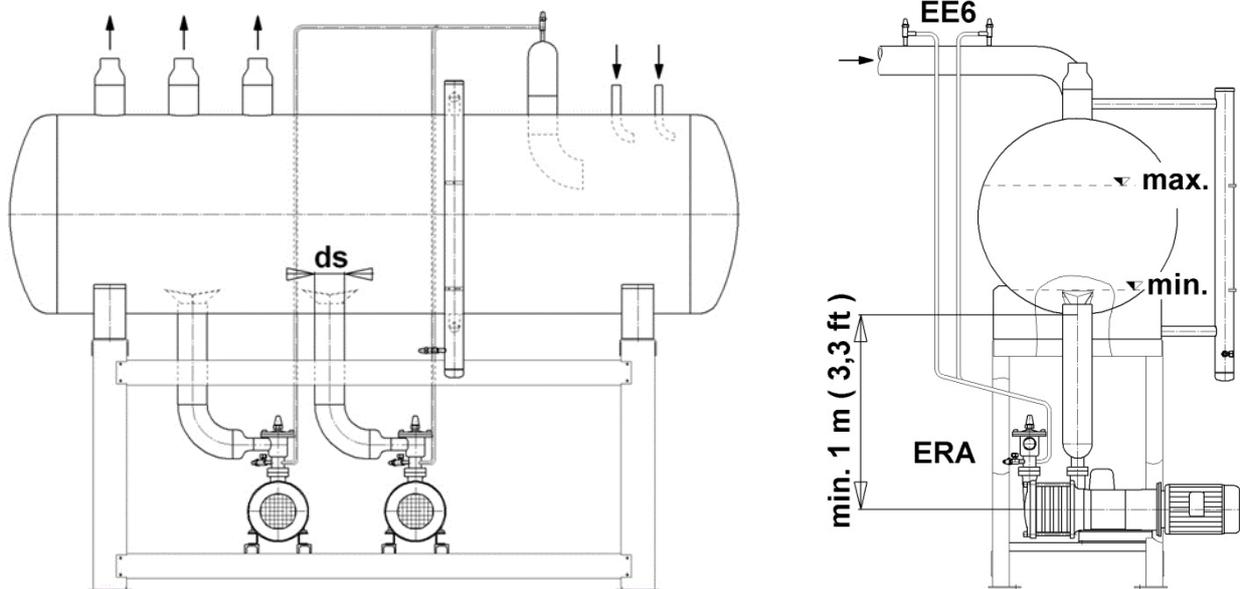


Fig.6 Application with two pumps in operation

6.3 DOWNLEG DESIGN

The pump shall be connected using a vertical pipeline to the separator. To prevent interaction between pumps it is advised that each pump be connected individually to the separator, see fig. 6.

Only when a stand-by pump is installed may two pumps be connected to a common downleg.

To avoid liquid vortexing the downleg should again protrude into the separator and be fitted with a vortex breaker.

An oil drainage dome around the down leg can be used to collect oil.

It is important that the vertical suction line is installed directly to the pump, avoiding additional elbows or horizontal run.

Any gas accumulation in the suction line and particularly in valves attached to the pump must be avoided. Gas bubbles should be able to flow back (counter flow) to the separator unhindered, particularly when the pump is not in operation.



When there is no separate vent line installed it is important the pumps can vent to the suction side, which means the suction downleg must be open during stand-still.

Shut off valves in the suction line shall be sized generously and without reducers to enable degassing. Installation of full-bore ball valves are recommended. Straight through valves must be installed with stem in horizontal position; ball valves should not have a reduced bore on the pump side connection.

Until now we have not recommend filters in the liquid downleg as these create additional pressure loss. However, positive experience has proven that the use of filters in systems with high levels of contamination (i.e. due to installation of non-shot blasted pipes and vessels) is better than contamination of the pump.

Filters with a mesh of 500 µm (e.g. Parker T5F-SS, AWP-SS, RFF FA or Danfoss FIA) should be installed in systems with a potential for contamination.



Upmost care should be taken to clean the filters as often as possible during the first weeks of operation, until they remain clean.

Since external filters have a larger filter surface and can be cleaned more easily, we recommend you keep these in place and remove the conical filter in the pump inlet to avoid two filters causing excessive pressure drop. A regular check (1 – 2 per year) should be included in the maintenance routine.



To be sure the pump will operate even at a low-pressure difference resulting in maximum capacity, the diameter of the downleg to the pump must be executed as mentioned in the table below as a minimum!

Required diameter of the downleg to the pumps

	GP 41	GP 42	GP 51 / GP 51a	GP 52	GP 82
50 Hz	DN 80	DN 80	DN 100	DN 150	DN 150
60 Hz	3"	3"	4"	6"	6"



Under no circumstances should the maximum velocity in the downleg exceed 0.3 m/s (1 ft/s)!

The conical suction filter supplied with the pump must be installed at all times to protect the pump from foreign material contamination!

6.4 PUMP DISCHARGE LINE

The sizing of the discharge line is less critical to the system operation. A liquid velocity of 1.5 m/s is normally recommended.



A non-return valve (this is usually a combined stop/check valve type ERA) in the discharge line is required when a backwards flow from the discharge to the suction side is possible. This may be the case, when:

- several pumps are connected to one discharge manifold.
- the static head to the coolers is high.

A non-return valve should be mounted as close as possible to the discharge flange. If a larger distance is required, an additional vent line should be installed to prevent a possible gas blockage.

Vent line

If the suction line needs to be closed during stand-still or the check valve is installed in a distance from the pump an additional vent line is required.

A minimum flow line is always recommended in CO₂ systems, which also vents the pump during stand-still.

To avoid backflow of refrigerant during stand-still it is important that each pump is individually connected with a separate vent line immediately in front of the check valve on the delivery side to the top of the surge drum.

The stop valve after the orifice shall be DN20 (3/4") respective DN25 (1") if installed in the part of the vent line that can contain liquid.

If the valve is installed in the gas part of the vent line, immediately in front of the connection point to the vessel a smaller valve is sufficient, e.g. DN10 (0.4"). The stop valve must be locked in an open position and marked "do not close during normal operation".



In application with a non-return valve or solenoid valve liquid may be trapped. When this liquid is warmed up, the pressure increases rapidly to an unacceptable value and the piping may fracture.

Adequate precautions must be taken by the installer to prevent any liquid from becoming trapped.

6.5 PROTECTION OF THE PUMP

GP refrigerant pumps with flanged motor are of a robust design and do not require special protection besides with common motor protection switch.

The following protections provide additional safety.

6.5.1 Safeguarding against too high pressure



Operating refrigerant pumps against too high pressure (e.g. against partially or fully closed throttled condition) is not allowed and will damage the refrigerant pump!

A **by-pass valve** (adjustable) has proven good practice to safeguard the pump against too high pressure.

To set the by-pass valve select the pressure difference across the pump according table 1 for the following de-livery head. (take into account the pressure losses in the pipework to the by-pass valve)

	960 RPM	1150 RPM	1450 RPM	1740 RPM
GP 41	11 m	16 m	25 m	36 m
GP 42	20 m	30 m	48 m	70 m
GP 51	13 m	19 m	31 m	47 m
GP 51a	16 m	23 m	37 m	50 m
GP 52	26 m	40 m	65 m	-
GP 82	-	-	55 m	85 m



A diameter of DN20 has been proven for the by-pass valve.

6.5.2 Dry-run protection

If a **minimum level cut out switch** is mounted on the separator, it shall be used to switch the pump off in case of a lack of refrigerant (dry run protection).

6.5.3 Pressure differential switch

A pressure differential switch - with time delay during start up - shall be used when there is insufficient discharge pressure.

The delay should be set at approx. 30 s, which means if the pump was not able to build up pressure (e.g. 0,3 – 0,5 bar) within 30 s, the pump will be stopped

This procedure can be repeated a maximum of four times. Then a malfunction message should be submitted and the pump switched off. After that a restart should only be made after investigation of the cause of failure and acknowledging the fault indicator.

The pressure differential switch does not protect the pump against too high pressure running (dead heading)!

6.5.4 Flow switch

A **flow switch** must be installed, when a bypass valve is not fitted in the refrigerant circuit. It is known when the bypass valve is not fitted, the pump is capable of producing a differential pressure without volume flow and has not been stopped by the differential pressure switch. The flow switch control in the pump discharge shall stop the flow as the flow drops below 0,2 m/s.

See also WITT information sheet W 4652-0.01

6.6 ELECTRICAL INFORMATION

Folgende Vorkehrungen im Steuerstromkreis sind zu berücksichtigen:

6.6.1 Overload protection

An overload protection switch shall protect the pump against too high current (amps) consumption. Maximum setting must be less than max. allowable current I_{max} shown on the type plate.

6.6.2 Hand switch

It is recommended the control panel incorporates a **H-0-A switch** for use during commissioning and maintenance operations.



It is important to take care that during manual operation of the pump all safety devices in the circuit are connected and in good working condition.

The length of the incoming power cables should be of sufficient length to enable the tilting and moving of the pump during inspection and replacement of the conical strainer in the pump suction connection.

7. TRANSPORT AND STORAGE

All connections are protected with yellow plastic caps to prevent any dirt, debris or water contaminates the regulator.

Storage shall be dry and protected from any dirt or debris.

Please lift the pumps according to the following photos.



8. INSTALLATION AND APPLICATION



Only qualified personnel must carry out installation work on the refrigerant pump!

8.1 PREPARING FOR INSTALLATION

Before the pump will be installed, the following functions should be carried out:

- Unpack the pump and check for possible damage during shipping and the correct scope of equipment supplied. In case of any damages, inform your supplier immediately.
- Remove all plastic caps or other sealings immediately prior to installation of the pump.
- Check that the conical suction strainer has been supplied and that the gaskets are on both sides of the suction strainer mounting ring.
- The gaskets must be lightly covered with oil.
- The gaskets must be clean.
- Make sure all equipment connections are clear of plastic caps and rags.
- The piping system is to be clean and free of any moisture.
- Electrical wiring and control systems as well as integration of the pump in the onsite protective conductor system should be carried out according to national regulations and codes of practice.



The pumps have undergone a short mechanical test run at ambient temperature with **mineral refrigerant machine oil** in the factory. If the pump is to be used in systems where contamination with mineral oil is not allowed, i.e. in cases with ester oil in the system, the residual oil must be removed and the pump cleaned by use of solvents.

8.2 MOUNTING INSTRUCTIONS

The pump is equipped with appropriate U-base to be used for assembly.

Align the pump horizontally and connect without inducing stress to the base frame and the pipe work. (see installation instructions for fitting pumps to a piping system, available on the WITT website). Special attention must be paid to the expected pipe contraction at low temperatures.



When welding to WITT stop valves, the valves should be in a half open position with wet cloths around the valve packing.

8.2.1 Flange alignment

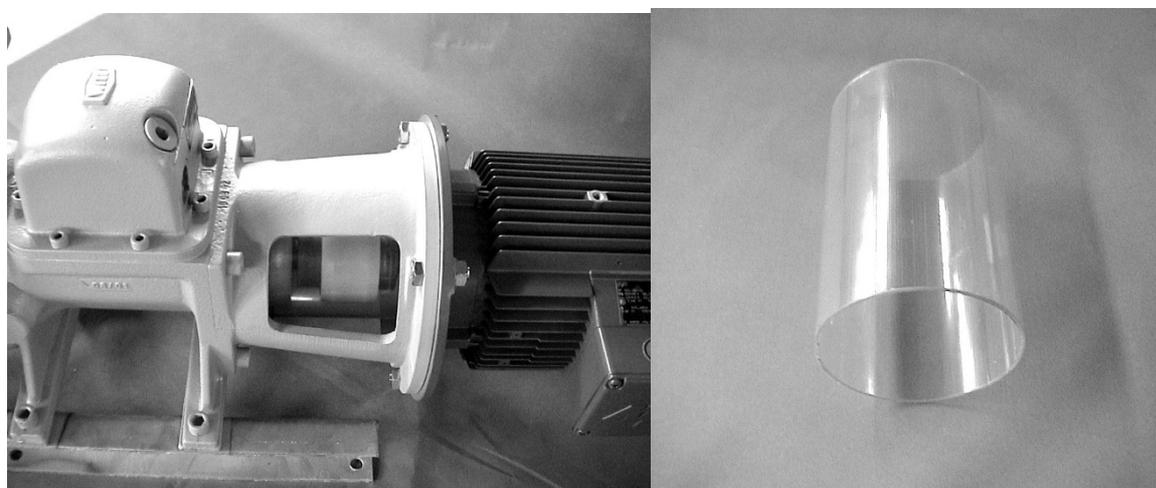
GP pumps are designed with a grooved (female) flange on the suction side and a tongue (male) flange on the delivery side. It is important to ensure the pump connection flanges are properly aligned before tightening.

Do not use the flange bolts to align or "stretch" the pipe. Using flange bolts to pull together a too large gap will cause undue stress in the pipework or distort the pump or the flange. Do not use the mounting bolts to pull down the pump on to the channel framework, the cast iron mounting foot pads will fracture.

Prior to mounting the pump it should be correctly aligned in height by the use of shim material.

The screws of suction- and delivery flange need to be tightened with a torque of 210 Nm.

8.2.2 Coupling protection



If the pump was not supplied with a motor you have to install a coupling protection (see right photo).

8.3 PREPARATION OF COMMISSIONING

- The refrigeration system must be pressure tested, vacuum tested and be fully charged with refrigerant.
- The suction- and discharge valves must be fully open.
- The valves of the pressure differential control, if fitted, must be fully open.
- The pressure differential switch, if fitted, must be set at a difference of at least 20 kPa above the system static height (static height means "liquid column + pressure difference between cooler inlet and separator").
- A sufficient volume of refrigerant must be present in the separator or low-pressure receiver for a minimum running time of approximately 2-3 minutes.
- The electrical control system including all safety controls must be pre-tested prior to starting the pump.
- Check whether the coupling protection is in place.

8.4 COMMISSIONING

- Check and record the pressures in the system.
- If the pressure difference is smaller than expected, the pump may be rotating in the wrong direction. The pump should rotate clockwise in the direction of the arrow indicated on the pump housing.
- Close the stop valve on the delivery side until the pressure difference has reached the maximum value as indicated in table 1 and set the flow switch accordingly.
- If you hear unusual, or unfamiliar sounds from the pump, switch off the pump immediately and investigate the cause.



The hand wheel (85) should always be turned fully open during operation!

When the pump operates normally, check after 2 hours, after 8 hours and later the pressure difference and note the measured values.

After 1 to 2 weeks of trouble free operation you should inspect the conical filter for dirt and contamination. Depending the degree of contamination the conical filter should be regularly inspected and cleaned at planned intervals.

If the pump is fitted in an existing refrigeration system special attention has to be taken to drain oil out of the the entire system within the first weeks.

If oil has collected in the pump, you can install an oil drain valve EA 10 GÜ/GB instead of plug (58). With this valve in combination with a quick acting valve the pump may carefully drained from oil by trained personnel (see chapter 9.6)

8.5 NORMAL OPERATION



When the pump has been installed properly a long lifetime is ensured.

It is strongly recommended that the following items are checked frequently:

- Conical suction filter for contamination
- Pump-circulation pipework for oil contamination
- Pressure differential of the pump
- Oil level in the oil chamber (see chapter 8.2)
- Running sound of the pump
- Once a year, or as dictated by the classification rules, the pump operation, settings and all safety provisions
- The date, time and results of each inspection should be recorded together with the serial number.

8.6 PUMP STANDSTILL (STAND-BY)



During periods of pump standstill, only one shut-off valve may be closed, preferably the discharge valve. When the suction and discharge valves are closed at the same time, the pressure of the trapped cold liquid in the pump will increase rapidly. As the liquid warms up to an unacceptable high value, it can very quickly damage the pump.



The pump shaft should be rotated once a day to avoid the shaft seal sticking to the shaft.

If there is oil contamination during standstill of the pump, the oil must be drained before re-starting the pump. Otherwise, a malfunction may occur which can lead to pump failure, which may lead to the failure of the pump.

9. SERVICE AND MAINTENANCE

9.1 REMOVING A PUMP

Follow all national and local safety requirements when re-moving the pump. Particular care must be taken of the following:

- Check the plant room layout and exit doors so you can evacuate the area quickly in case of an emergency.
- Seek assistance to handle and remove the pumps.
- Always wear the correct protective safety clothing. As a minimum use safety goggles and gloves. In case of NH3 have a safety gas mask ready to hand.



Isolate the pump by switching off and locking off the electrical supply and the electrical controls. A label should be fixed to control panel to indicate pumps are switched off and are being worked on. Note the sequence of electrical connections and disconnect the wiring.



A trained engineer or suitable qualified electrician in accordance with electrical engineering regulations should carry out any work on electrical equipment or controls.

Before moving or tilting the pump e.g. to access or to clean the conical suction filter, replace the shaft seal or other parts, the refrigerant must be discharged. It is recommend-ed that the refrigerant is purged to the dry gas side of the surge drum via the pressure gauge valve at the base of the discharge valve. Hot water may be used on the outside of the pump to accelerate the boiling off of the liquid refrigerant.



The use of an open flame is prohibited.

When there is no liquid refrigerant left in the pump, any remaining refrigerant gas can be purged through the pressure gauge valve or, if installed, the drain valve EA10 GÜ/GB with quick acting valve.

When there is no residual pressure inside the pump the flange bolts can be carefully unscrewed. Be aware of any trapped liquid or leaking valves seats.



Be aware of any trapped liquid or leaking valves seats.

9.2 OIL LEVEL CONTROL

The GP refrigerant pump is filled by the manufacturer with a special oil “MR 520” from FUCHS-DEA, which guarantees optimum performance and avoids carbonisation of the oil. This oil can be used at temperatures down to -50°C .

The oil level should be checked weekly. If you notice at standstill of the pump that the oil side glass shows a distinctly checkered marking under light, oil has to be replenished.



Only when filling oil the hand wheel (85) has to be turned close!

To fill oil carefully open the slotted screw (57) by hand $\frac{1}{4}$ turn. The surrounding of the screw shall be covered with a wet cloth to avoid any escaping refrigerant gas. (see first photo chapter 0). If liquid refrigerant has collected in the oil chamber (e.g. because of a leaking inner shaft seal) it may take several hours until the chamber has depressurized.



Never open the slotted screw (57) completely if there is any residual pressure remaining!

A lack of oil normally indicates that the inner shaft seal has started to leak and needs to be replaced. Particularly when the oil level drops after a short period of time (less than 14 days) the inner shaft seal must be replaced.



If the shaft seal has been replaced and you observe again a lack of oil, you should check whether hand wheel (85) is/was turned open the whole time, also when working on the pump side (except when filling oil).



If the hand wheel is closed, refrigerant is trapped in the chamber around the shaft. Evaporating refrigerant. When the pressure difference between oil chamber and pump suction chamber reaches an unacceptable high value, the pressure-limitation valve (19.1) will open and release an oil/refrigerant mixture to the pump suction side. In such an event you should replace the pressure limitation valve (19.1) and safety pressure limitation valve (19.2) and make sure the hand wheel (85) is turned open at all times!

The oil level shall be below the bottom thread of the oil filler plug. The maximum oil filling is for

- GP 40 pumps 1,7 ltr. (0.45 Gal) and for
- GP 50 pumps 2 ltr. (0.53 Gal).



Avoid an overfilling of oil. The inlet of the pressure limitation valve (19.1) should not be covered with oil.



When recharging oil and tightening oil filler screw (57) the hand wheel (85) must be turned open again!

9.3 OIL EXCHANGE

When exchanging oil the same procedure as described in Chapter 9.2 has to be adhered to.



If there is no significant oil consumption, the oil should be exchanged every 5 years.

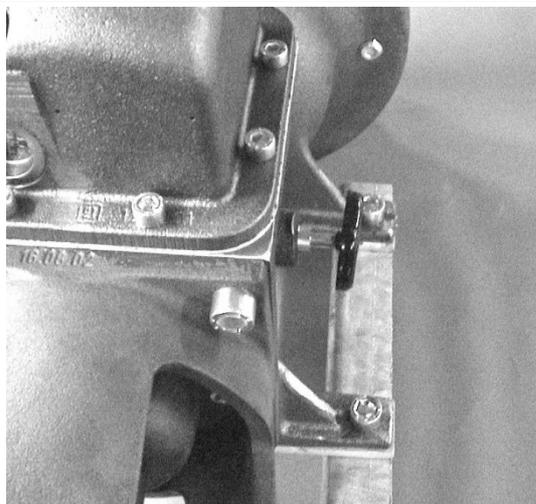
9.4 CHANGING THE SHAFT SEALS



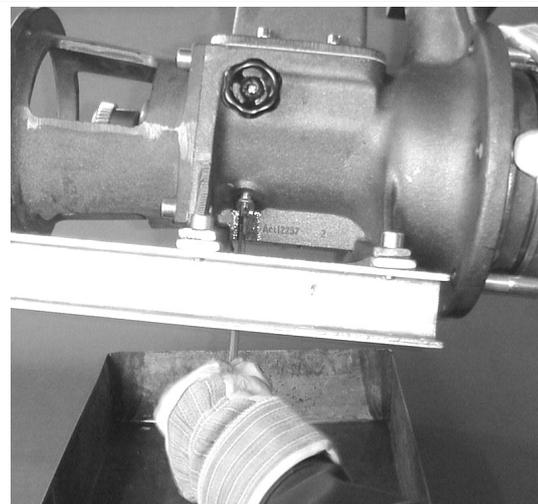
1. Carefully open the oil filler plug (57) ¼ turn and wait until the oil chamber is depressurized (this may take a while!) Use a wet cloth to protect the plug.



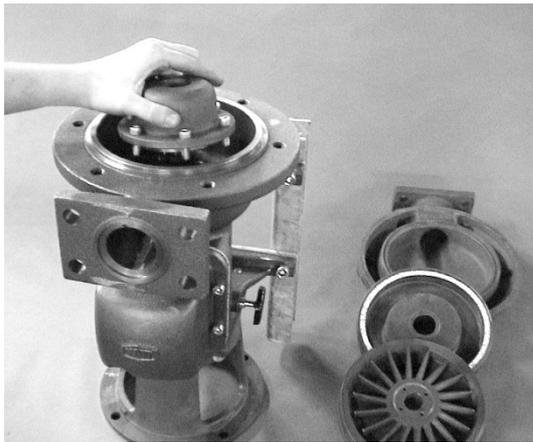
2. The oil fill plug (57) is slotted to avoid a sudden escape of refrigerant. Never use a power tool to open the plug!



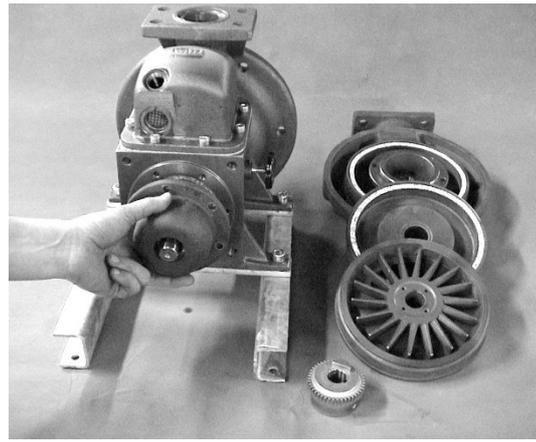
3. The hand wheel (85) must be completely open to ensure that the pressure may equalize between oil and pump chamber.



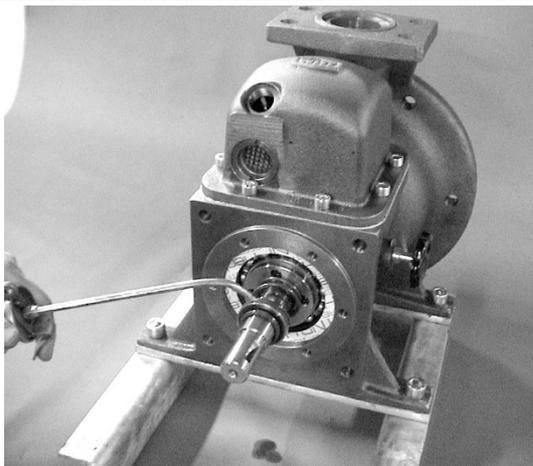
4. Drain oil in a suitable container.



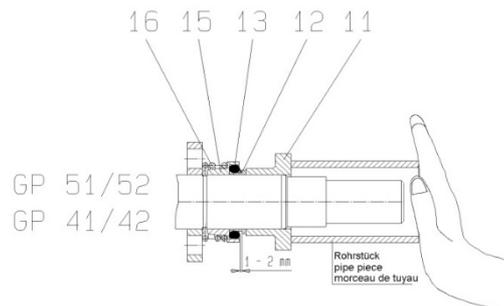
5. Dismantling pump parts and inner seal at the pump side.
 If bearings or shaft have to be replaced please proceed with Chapter 9.5 "Changing the bearing".
 For details of the shaft seal see also chapter 4.6



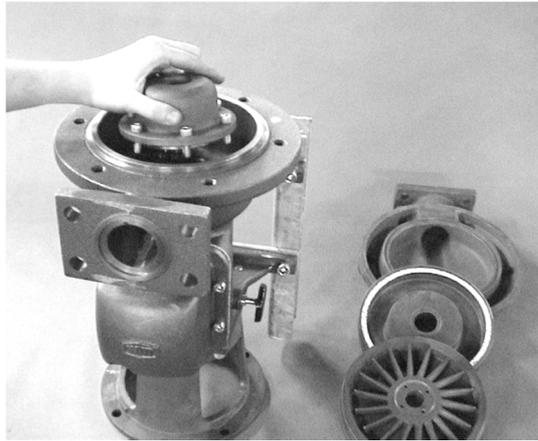
6. Removing the outer seal at the motor side



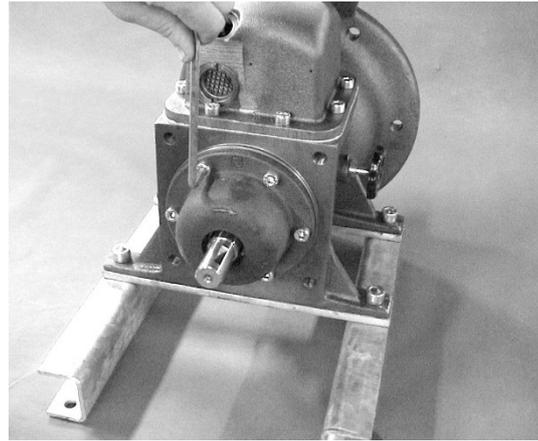
7. Outer sealing (motor side):
 Assemble spring (16) + pressure ring (15) and lightly oil the groove in the pressure ring. Protect the O-ring against the sharp edges of the key bed. Assemble the slide and lightly oil the entire shaft seal.



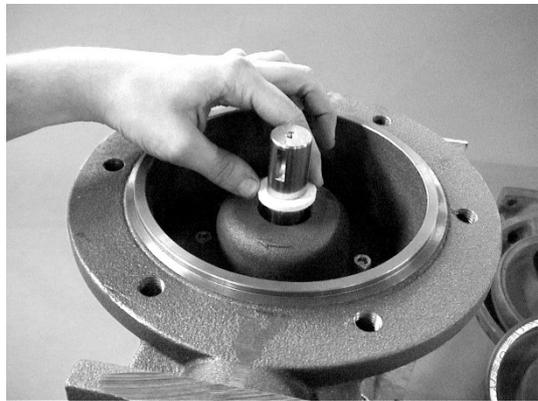
8. The O-ring must press the slide ring tightly onto the shaft. Therefore, use the loose slide flange (11) as an auxiliary tool.



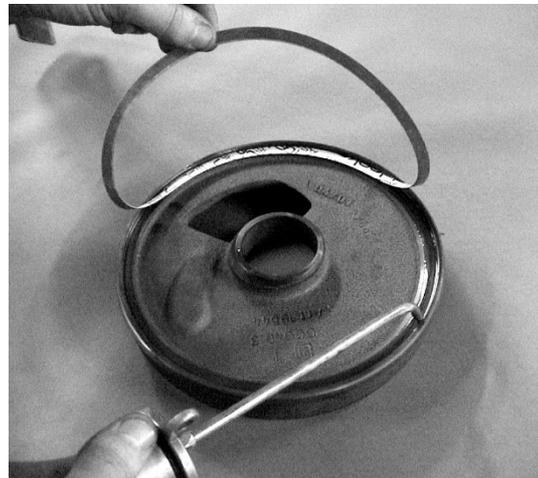
9. Inner Sealing: Use the same procedure as described in the two photos before.



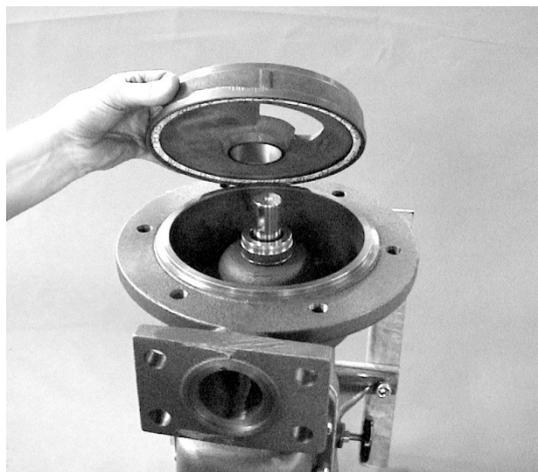
10. Insert the gasket (34) and slide on the housing. Always carefully tighten the screws crosswise.



11. Fit for GP 50 pumps 1 felt ring respective for GP 40 pumps 2 felt rings (78.5) and assemble part 78.



12. Lightly oil the grooves of the intermediate rings.



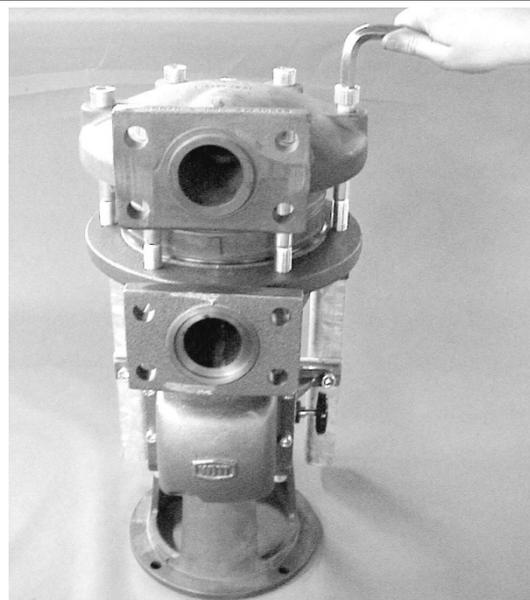
13.



14.

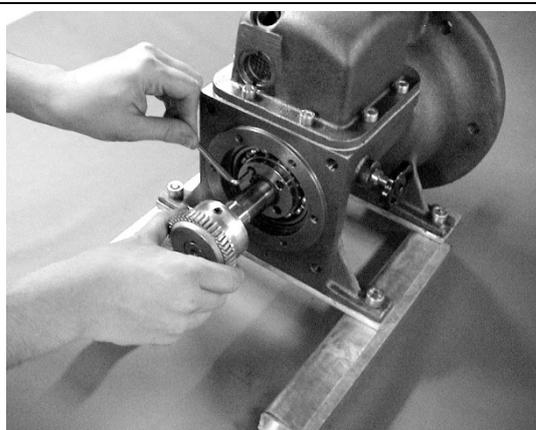


15. Assemble the intermediate rings and gaskets (33) in such a way that the marks align.

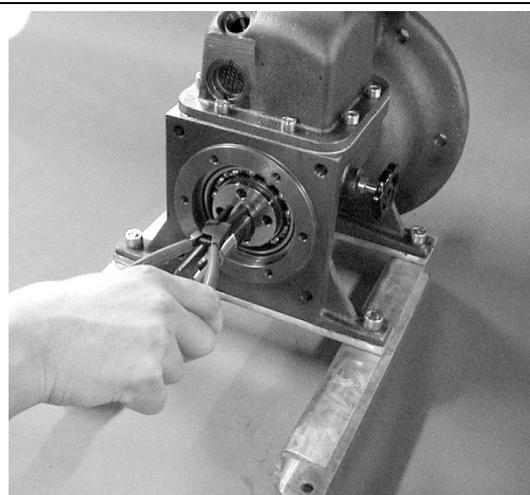


16. Tighten the screws crosswise.

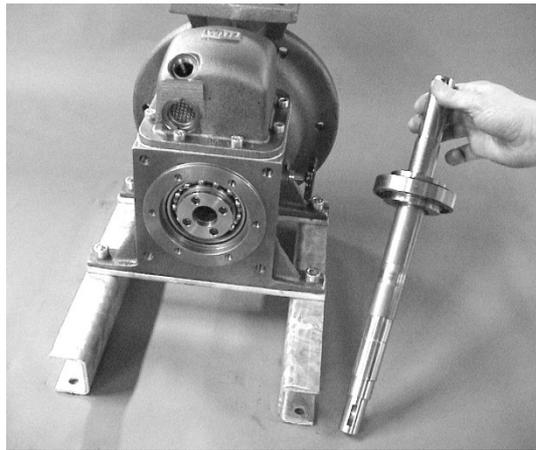
9.5 CHANGING THE BEARINGS



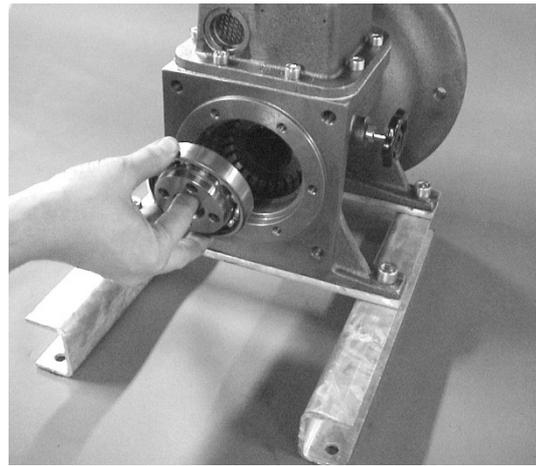
1. Loosen screws (21) in the tightening ring while holding against with the coupling.



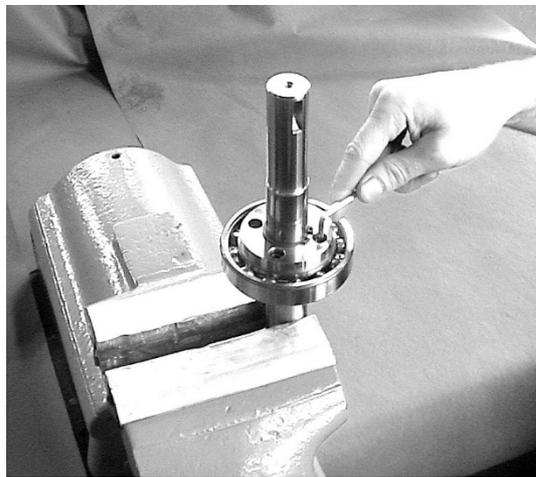
2. You can only remove the snap (Seeger) ring, if the screws in the tightening ring are loose!



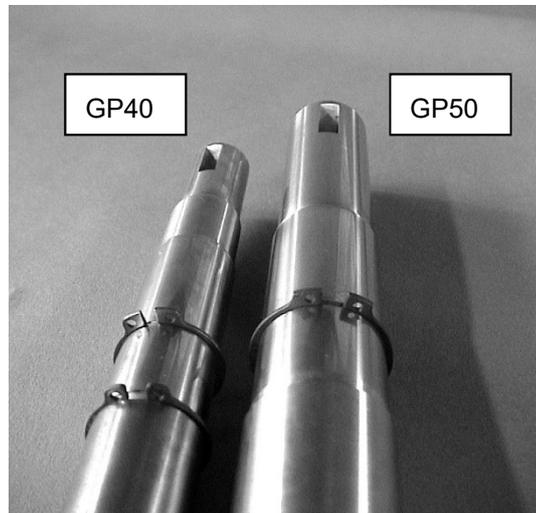
3. Push out shaft and inner bearing with a plastic hammer through the housing.



4. Replace the bearing.



5. Replace the inner bearing in vice.



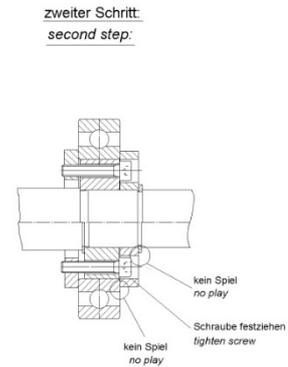
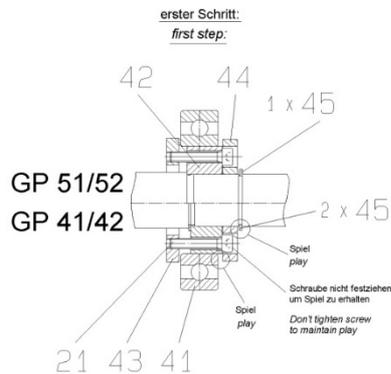
6. The bearing in GP 50 pumps is supported with only 1 snap ring. GP 40 pumps require 2 snap rings to fit the bearing.

The reassembly shall be executed in the reverse order.



the internal sheet metal discs (18) have the purpose to reduce the turbulence of oil. Checking the exact position is not required.

You can only install the snap (Seeger) ring if the screws of the tightening ring are loose!



The following Torques shall apply for assembly of the pump:

Hexagon socket screw DIN912, 8.8	Size	Torque [Nm]	Torque [Ft.lb]	part
ball bearing	M5 x 25	6	4	21
spring washer	M6 x 16	18	11	22
bearing cover	M8 x 25	30	21	23
oil pot	M8 x 20	30	21	24
U-base GP50	M12 x 25	86	63	29
U-base GP40	M10 x 25	49	36	29
housing screws	M16	120	89	28
motor connection GP50 / GP82	M12 x 30	86	63	25
motor adapter ring GP52 / GP82	M12 x 25	86	63	29
motor connection GP40	M10 x 25	49	36	25
motor adapter ring GP42	M10 x 25	49	36	29

Hexagon head cap screw EN24017 with hexagon nut EN24032, 8.8	Size	Torque [Nm]	Torque [Ft.lb]	part
Motor GP51/51A	M12 x 40	86	63	26a
Motor GP52	M12 x 50	86	63	26b
Motor GP41/42	M10 x 35	49	36	26a, b

9.6 OIL IN THE PUMP



When too much oil flows into the pump from the separator, the pump will not operate properly or may be damaged.

Oil can be removed through a WITT EA 10 GÜ/GB stop valve, which can be installed in place of the lower 1/4"-screw plug in the discharge chamber. In addition, a quick closing action valve must be installed behind the drain valve.

Oil from the suction chamber or in between the intermediate pieces can only be partly removed from the pump.



Make sure drain and quick acting valve are in-stalled in a safe manner to prevent accidents.



At low temperatures when oil removal is slow the pump should be closed at the inlet and warmed up on the outside with warm water to lower the viscosity of the oil making it flow more easily. The oil return system from the surge drum should be checked or modified to prevent further oil contamination of the pump.



When operating the pump under vacuum condition the oil drainage cannot be easily drained. Please ask for advise.

9.7 SHIPMENT OF PUMP



When a pump has to be returned to the supplier or the factory be sure the pump is free of refrigerant, dirt and oil. The risk of damages to goods or the environment by leaking oil during transport is at the senders risk. When returning the pump it is important that full information is provided stating the reason and cause of failure. Always return the conical suction filter, in condition found when the pump was opened, with the pump.

9.8 WARNINGS



WITT pumps are for refrigeration systems only.



Read these instructions completely before selecting, using, or servicing these pumps.



Only knowledgeable, trained refrigeration mechanics should install, operate, or service these pumps.



Stated temperature and pressure limits should not be exceeded.



Special attention must be paid to the national rules concerning the available materials.



Pump should not be removed unless system has been evacuated to zero pressure.



All local rules to refrigeration systems, and electric control and installation systems must be complied with.

10. TROUBLE SHOOTING

No.	symptom	possible causes
1	Pump does not run	No power connection Differential pressure switch has been activated Damaged coupling
1a	Pump does not prime	valve in the vent line not open vent line not individually piped to the low pressure side foreign material in pump
2	pump makes scratching noise	lack of refrigerant conical filter is blocked too fast decrease of the evaporating temperature impellers or intermediate pieces worn out bearings worn out a too big pump has been selected operation at maximum pressure of the pump direction of rotation wrong
3	capacity too low	frequency of the pump too low stop valves behind the pumps closed too much gas in liquid liquid level in separator too low valves on cooler closed regulating valve not opened far enough contamination is blocking the piping system non return valve of an other pump leaks power supply not right, working on only 2 phases impellers worn out oil in pump at low temperature not sufficient suction head Intermediate pieces do not align (see 9.4, fig 14+15) see number 2
4	switched off on pressure difference control	set value of pressure control not right hand control valves in system opened too much too quick start up or capacity steps of compressor(s) too quick switch off of big capacities see number 2
5	switched off on flow switch	set value of flow switch not right suction side or discharge side closed too quick start up or capacity steps of compressor(s) too quick switch off of big capacities
6	Oil leakage on the motor side	Outer shaft seal needs to be replaced
7	Damaged shaft seal	Lack of refrigerant Contamination in the system, felt rings are not in place Insufficient liquid head (see chapter 6.3) No or wrong oil filling Hand wheel (85) was closed Seal sticks to the shaft after a long stand-still(see 8.7)
8	life time of bearings too short	see also above points for damaged shaft seal too much dirt in system, e.g. small particles Set too low
9	Motor protection/fuses trip the pump	Pump is blocked (see above) Improper oil filling (too high viscosity) Damaged motor



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