Single- and Multicircuit Pumps

for Circulating and Hydrostatic Lubrication as Gear, Gerotor and Vane Pump Units, Reservoir Units

Gear pump unit

Gerotor pump unit

Multicircuit pump unit

The pump units specified in this leaflet are lubricant delivery pumps without pressure relief fixtures and are designed for continuous operation in circulating and hydrostatic lubrication systems.

These pump units may also be used for hydraulic tasks to the extent permitted by the pressure and viscosity ranges stated in the tables.

The drive is provided by a three-phase motor designed for a rated voltage of 230/400 V to DIN IEC 38. State special voltages, if required, when ordering.

Units with one to twenty lubrication circuits are available.

- **Multicircuit gear pumps ensure a uniform delivery rate to individual feed lines and lubrication points against varying resistances.**
- **Smooth running and good suction performance are the characteristic features of gerotor pumps.**

The indicated delivery rate refers to an operating viscosity of 140 mm^2/s at a back pressure of p = 5 bars.

The permissible pressure and delivery rates vary with the viscosity.
Pay attention to the respectively permissible viscosity!

When using oils with viscosities outside the indicated ranges (spindle oils and highly viscous oils), please ask for further information.

Please note that even standard oils may become extremely thin-bodied or highly viscous due to changes in temperature.

Ambient temperature
max. +40 °C,
Lubricant temperature
0 °C to +80 °C

Pump unit with reservoir

Single-circuit flange-mounted units with integral cast valve chambers (mini-units)

Type **M** units for mounting separately from oil reservoir

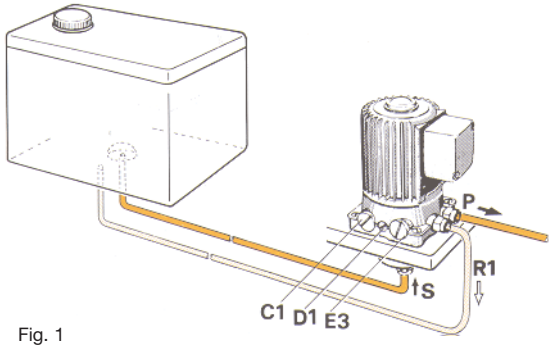


Fig. 1

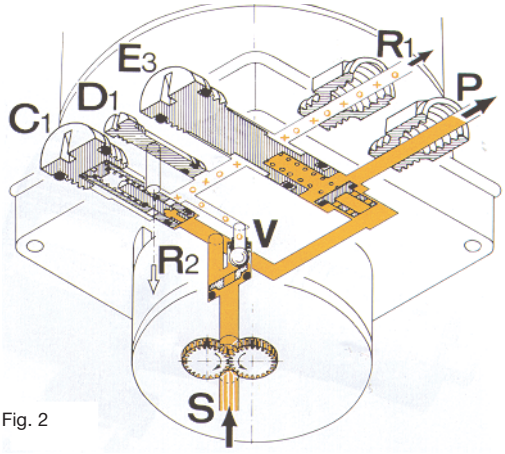


Fig. 2

Type **MF** units for flange-mounting on oil reservoir

Use a special sealed pump for horizontal flange-mounting of the unit **beneath the oil level**

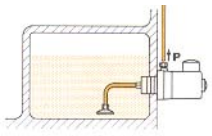


Fig. 3

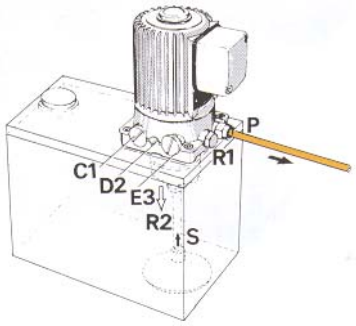


Fig. 4

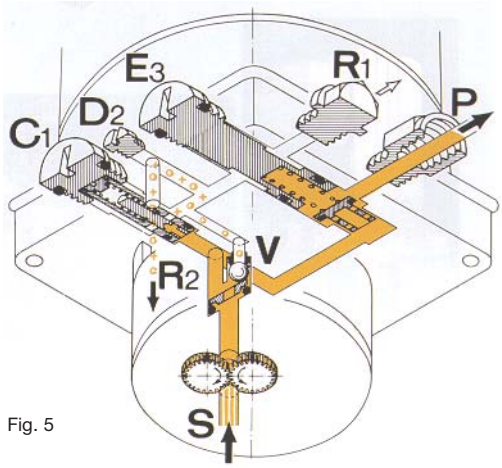


Fig. 5

Explanation of the hydraulic function

Both versions (M and MF) have the same hydraulic function.

Oil is sucked in at **S** and flows through the pressure duct in direction **P**. The oil pressure closes valve **V** and opens valve **E3** against spring tension. If air is entrained (due to low oil level in the reservoir), valve **V** remains open and bleeds the air or the air-intermixed oil into the return duct (see circle (o) marking the flow in directions **R1** and **R2** respectively). Valve **C1** allows the excess-pressure oil to flow into the return duct (see cross (+) marking).

Explanation of the structural differences

With **type M** the long screw plug **D1** blocks flanged port **R2** of the return duct. The oil returning from the valves **V** and **C1** flows via **R1** through a line of tubing into the separate oil reservoir (see Fig. 1 and 2).

With **type MF**, the short screw plug **D2** leaves flanged port **R2** open – contrary to **D1** with type M – and a plug seals external port **R1**. Flanged port **R2** of the return duct discharges directly into the reservoir without any threaded connections (see Fig. 4 and 5).

Circulating lubrication

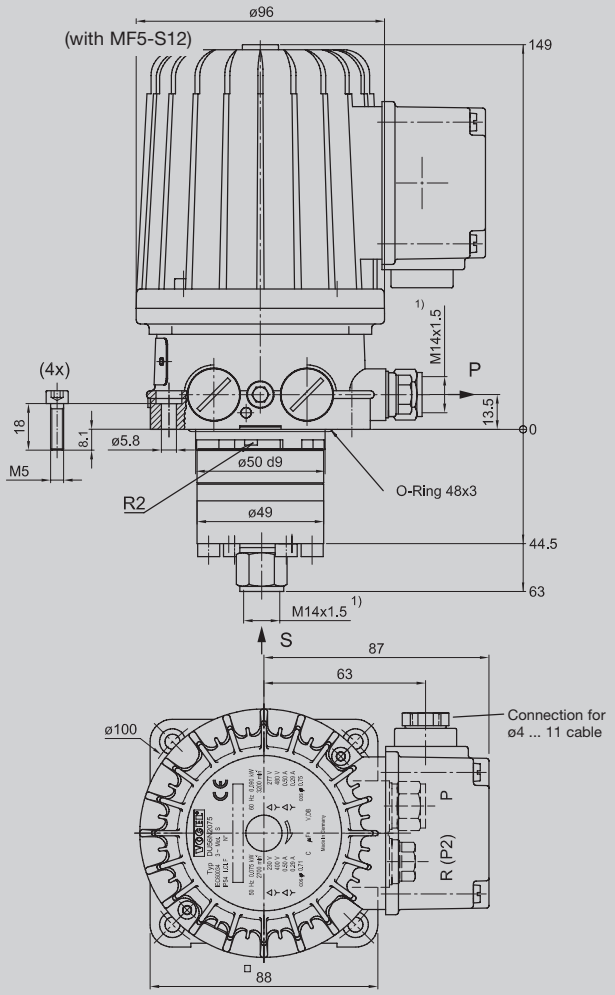


Fig. 6 Example **MF5-2000**

S = suction port
P = pressure port
P2 = 2nd pressure port for two-circuit units
R1 = oil return with type **M**
R2 = oil return with type **MF**

1) Ports tapped for solderless tube connection

Single-circuit gear pump units – choice of equipment

For mounting separate from oil reservoir **Order No.**	For flange-mounting on oil reservoir **Order No.**	**Output** 1) [l/min]	Max. back pressure [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase-motor 2) rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 230/400 V [A]	Suction port **S** thread d1
M1-2000	**MF1-2000**	**0.12**	27	20 - 2000	500	0.075	2700	0.5/0.29	M14x1.5
	MF1-2006	**0.12**	6	20 - 2000	500	0.075	2700	0.5/0.29	M14x1.5
M2-2000	**MF2-2000**	**0.2**	27	20 - 2000	500	0.075	2700	0.5/0.29	M14x1.5
M2-S14		**0.2**	1…65	20 - 1000	500	0.18	2700	0.87/0.5	M14x1.5
	MF2-S12	**0.2**	1…65	20 - 1000	500	0.12	2700	0.79/0.46	M14x1.5
M2-2127	**MF2-2127**	**0.2**	60	140 - 1000	500	0.075	2700	0.5/0.29	M14x1.5
M5-2000	**MF5-2000**	**0.5**	27	20 - 1000	500	0.075	2700	0.5/0.29	M14x1.5
M5-2013		**0.5**	16	5 - 500	500	0.075	2700	0.5/0.29	M14x1.5
	MF5-2014	**0.5**	1…12	5 - 500	500	0.075	2700	0.5/0.29	M14x1.5
M5-S12	**MF5-S12**	**0.5**	60	140 - 1000	500	0.12	2600	0.68/0.39	M14x1.5
	124-012-211	**0.75**	100	20 - 750	700	0.18	1400		M10x1
	124-012-210	**1.0**	150	20 - 750	700	0.37	1400		M10x1
Vane cell pumps									
FLM12-2000	**FLMF12-2000**	**1.2**	6	20 - 850	3000	0.075	2700	0.5/0.29	M16x1.5
FLM24-2000	**FLMF24-2000**	**2.4**	3	20 - 500	1000	0.075	2700	0.5/0.29	M16x1.5

1) Output based on an operating viscosity of 140 mm²/s at a back pressure of p = 5 bars.
2) Also see leaflet 1-1202-US page 4: Multirange voltage motors.

Single-circuit units complete with reservoir see page 14.

Dimensions in mm

Single-circuit gear pump units

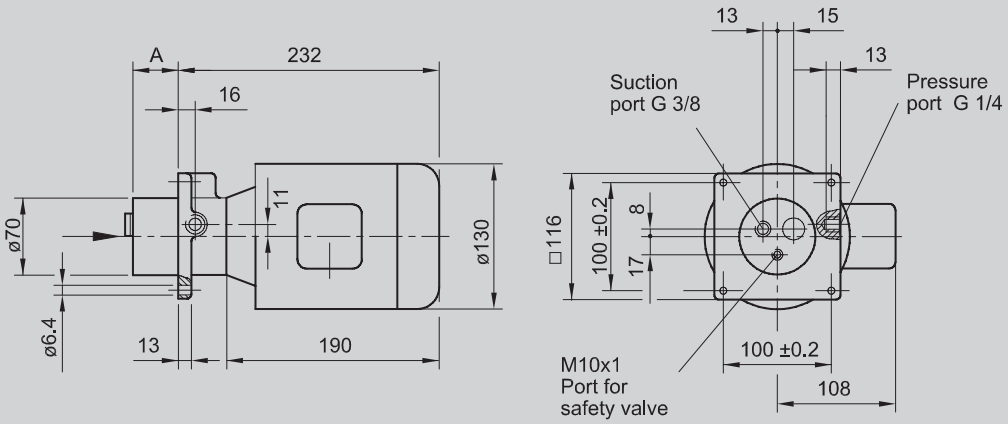
Circulating lubrication

Single-circuit gear pump units – choice of equipment

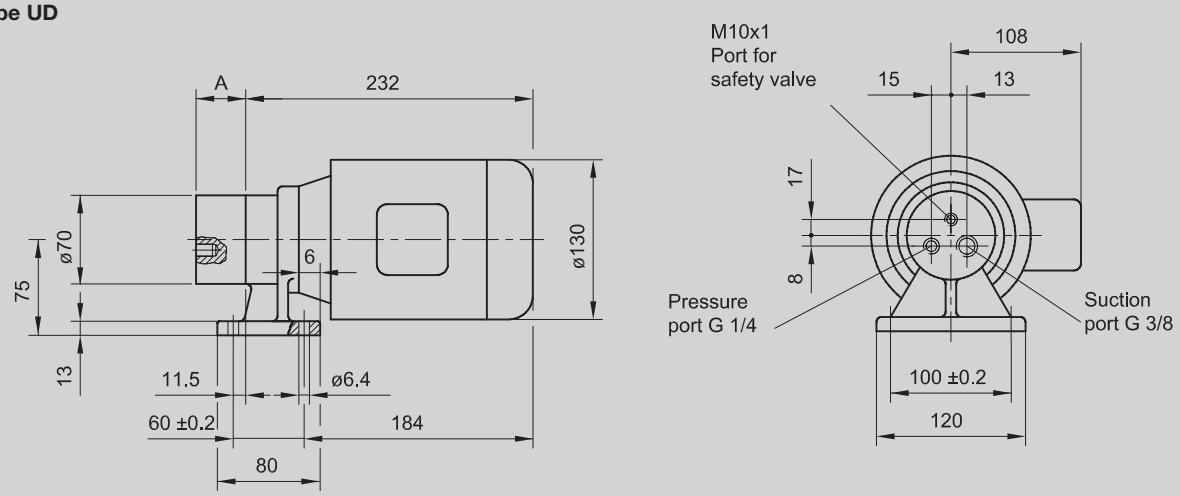
For flange-mounting on oil reservoir **Order No.**	For mounting separate from oil reservoir **Order No.**	**Output** [1] [l/min]	Max. back pressure [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase motor [2] rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 230/400 V [A]	Dimension A [mm]
UC0.06-60	**UD0.06-60**	**0.06**	60	20 - 1000	700	0.18	1500	see motor rating plate	37
UC0.75-60	**UD0.75-60**	**0.75**	60	20 - 1000	700	0.18	1500		45
UC1.00-60	**UD1.00-60**	**1.0**	60	20 - 1000	700	0.18	1500		45
UC1.50-50	**UD1.50-50**	**1.5**	50	20 - 1000	700	0.18	1500		48
UC3.00-65	**UD3.00-65**	**3.0**	25	20 - 1000	700	0.25	1500		57

[1] Output based on an operating viscosity of 140 mm²/s at a back pressure of p = 5 bars.
[2] Also see leaflet 1-1202-US page 4: Multirange voltage motors.

Type UC

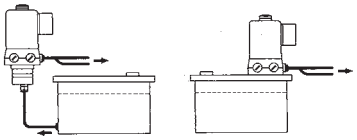


Type UD



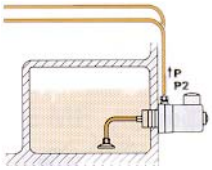
Two-circuit flange-mounted units, valveless (mini units) — Circulating lubrication

Units for mounting separately from oil reservoir or for flange-mounting on oil reservoir



When a third gear is added to the pump, these units have a second delivery circuit (see **P2**) Unlike **single-circuit units M** and **MF** described on page 2, these pumps are valveless (see changes in **C2** and **E4**).

Since there is no internal oil return, there are no structural differences of the kind specified on page 2 for **M** and **MF**.



A special sealed pump must be used for horizontal flange-mounting of the unit in a position **beneath the oil level**.

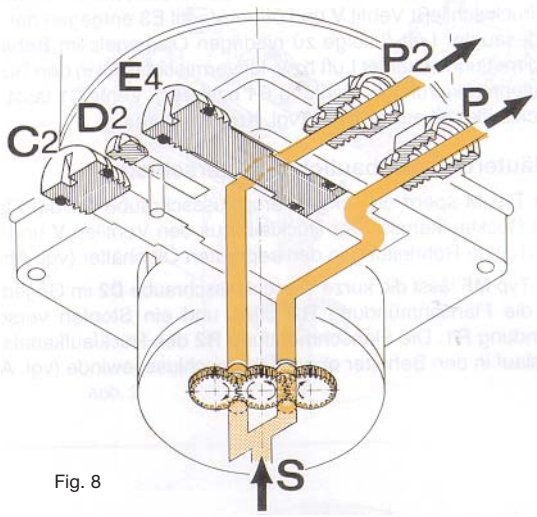


Fig. 8

Two-circuit gear pump units

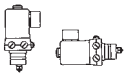
Order No.	Output [l/min]	Max. back pressure [bars]	Permissible operating viscosity range [mm²/s)]	Suction head (with open pressure line) [mm]	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 230/400 V [A]	Suction port **S** (see Fig. 6, page 3) thread d1
M202	2 x **0.2**	12	20 – 1500	500	0.07	2700	0.5 /0.29	M14x1.5 for 8 mm diam. tube
M205	2 x **0.5**	12	20 – 500		0.07	2700	0.5 /0.29	M16x1.5 for 10 mm diam. tube

For two-circuit units complete with reservoir see pages 14 and 15.

S = suction port
P and **P2** = pressure ports

For dimensions see Fig. 6, page 3.

Mounting positions



Type of enclosure IP 54, DIN 40050

Layout of a circulating system with two-circuit gear pump unit

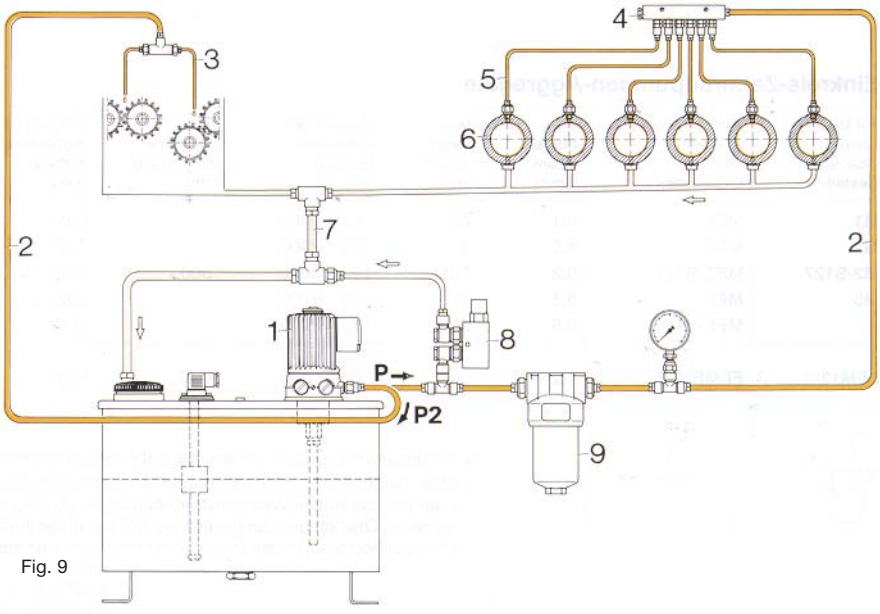


Fig. 9

1 = two-circuit gear pump unit
2 = main line (two delivery circuits)
3 = restrictor tube
4 = manifold with metering valve distributors
5 = lubrication line
6 = lube point
7 = return line
8 = safety valve
9 = micro filter

Dimensions in mm

Single-circuit foot- and flange-mounted units, valveless

Circulating lubrication

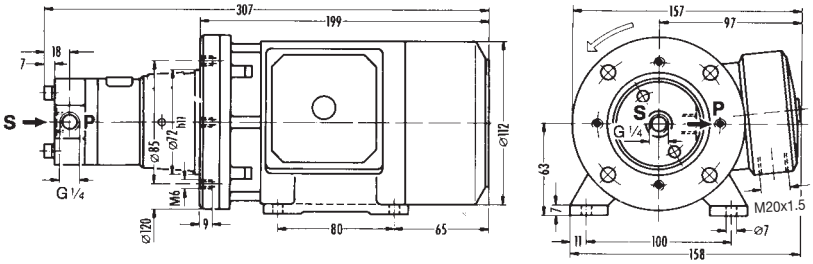
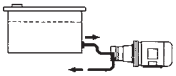


Fig.10

Single-circuit gear pump units (suitable as priming pumps)

Foot-mounted units	Flange-mounted units							
for separately mounted oil reservoir	for flange-mounting on oil reservoir			Permissible operating viscosity range	Suction head (with open pressure line)	Three-phase motor rated output	rated speed	rated current at 50 Hz, 400 V
Order No.	**Order No.**	**Output** [l/min]	Max. back pressure [bars]	[mm²/s]	[mm]	[kW]	[rpm]	[A]
ZM12-21	**ZM12-31**	**1.2**	30	20 – 2000	500	0.18	≈ 1350	0.6
								

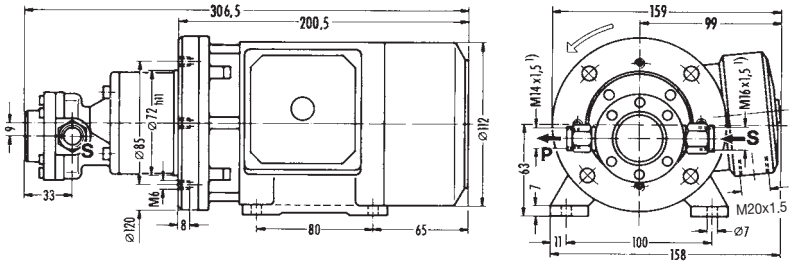
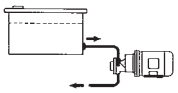
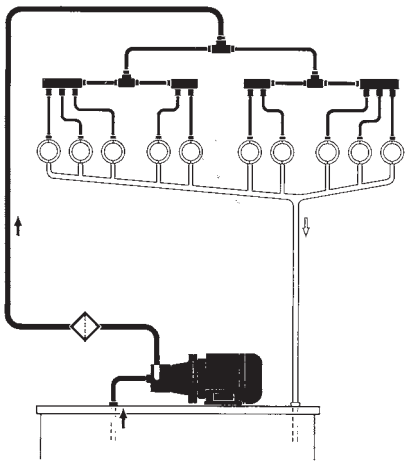


Fig. 11

Single-circuit gear pump units (suitable as priming pumps)

Foot-mounted units	Flange-mounted units							
for separately mounted oil reservoir	for flange-mounting on oil reservoir			Permissible operating viscosity range	Suction head (with open pressure line)	Three-phase motor rated output	rated speed	rated current at 50 Hz, 400 V
Order No.	**Order No.**	**Output** [l/min]	Max. back pressure [bars]	[mm²/s]	[mm]	[kW]	[rpm]	[A]
ZM25-2	**ZM25-3**	**2.5**	20	20 – 2000	1000	0.18	≈ 1350	0.6
								



1) Ports tapped for solderless tube connection:
M14x1.5 for 8 mm diam. tube, M16x1.5 for 10 mm diam tube.

S = suction port
P = pressure port

Type of enclosure IP 54, DIN 40 050

Units without foot have the same dimensions.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

When special pressure relief and safety valves are used, the **single-circuit pump units** specified here may also be used for **intermittently operated distributor systems**, if the units specially designed for this purpose, specified in leaflet 1-1202-US, do not meet the quantity requirements.

Please pay attention to special notes on page 7.

Single-circuit foot- and flange-mounted units, valveless

Circulating lubrication

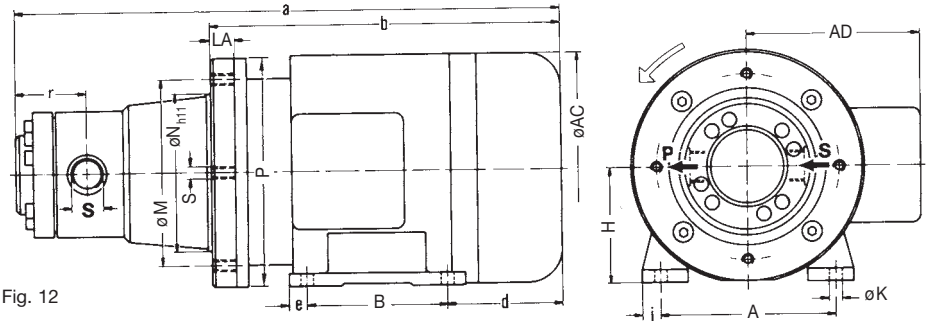
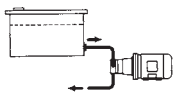


Fig. 12

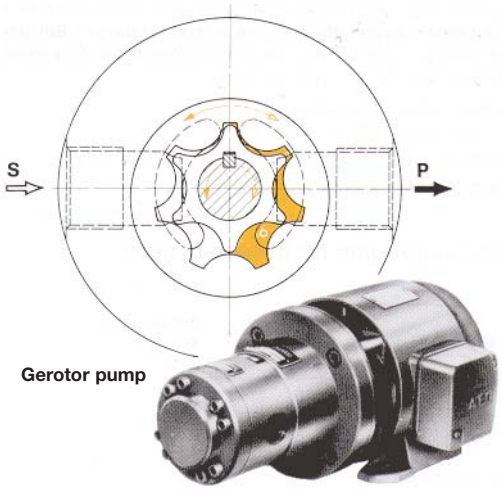
Single-circuit gerotor pump units (suitable as priming pumps)

Serial No.	Foot-mounted units: for separately mounted oil reservoir **Order No.**	Flange-mounted units: for flange-mounting on oil reservoir **Order No.**	**Output** [l/min]	Max. back press. [bars]	Permissible operating viscosity range [mm²/s)]	Suction and pressure port **S** **P**	Suction head (with open pressure line) [mm]	Compression gland thread	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]
1	**143-012-131**	**143-012-231**	**0.85**	30		G 1/4		M20x1.5	0.18	1300	0.6
2	**143-012-141**	**143-012-241**	**1.7**	30		G 1/4		M20x1.5	0.37	2810	1.0
3	**143-012-150** [1)]	**143-012-250** [1)]	**2.5**	20		G 3/8		M20x1.5	0.18	1300	0.6
4	**143-012-151** [1)]	**143-012-251** [1)]	**2.5**	50		G 3/8		M20x1.5	0.37	1390	1.0
5	**143-012-100**	**143-012-200**	**5.25**	20		G 1/2		M20x1.5	0.37	1390	1.0
6	**143-012-161**	**143-012-261**	**5.25**	50	20 – 1000	G 1/2	1000	M25x1.5	0.75	1390	2.0
7	**143-012-172**	**143-012-272**	**9.0**	12		G 1/2		M20x1.5	0.37	1390	1.0
8	**143-012-170**	**143-012-270**	**9.0**	20		G 1/2		M25x1.5	0.55	1390	1.5
9	**143-012-171**	**143-012-271**	**9.0**	50		G 1/2		M25x1.5	1.1	1390	2.7
10	**143-012-180**	**143-012-280**	**12.5**	20		G 3/4		M25x1.5	0.75	1390	2.0
11	**143-012-181**	**143-012-281**	**12.5**	50		G 3/4		M25x1.5	1.5	1390	3.5
12	**143-012-501**	**143-012-601**	**19.0**	20		G 1		M25x1.5	1.5	1390	3.5




[1)] Direction of rotation contrary to illustration.

Serial No.	**Dimensions** a	b	B	d	e	AD	A	H	i	AC	borehole for bolt K	centering N	hole circle M	flange thickness LA	tapped hole S	flange diam. P	r
1	287	197	80	63	10	91	100	63	12.5	130	M 6	72	85	14	M 6	120	36.5
2	315	218	90	66	12.5	108	112	71	13	143	M 6	95	115	12	M 8	140	36.5
3	302	197	80	63	10	91	100	63	12.5	130	M 6	85	100	14	M 6	120	45
4	328	218	90	66	12.5	108	112	71	13	143	M 6	95	115	17	M 8	140	45
5	331	218	90	66	12.5	108	112	71	13	143	M 6	95	115	17	M 8	140	50.5
6	379	249	100	82	12.5	122	125	80	14	158	M 8	110	130	17	M 8	160	50.5
7	344	218	90	66	12.5	108	112	71	13	143	M 6	95	115	17	M 8	140	57
8	387	249	100	82	12.5	122	125	80	14	158	M 8	110	130	17	M 8	160	57
9	406	261	100	88	15	139	140	90	15	176	M 8	110	130	17	M 8	160	57
10	398	249	100	82	12.5	122	125	80	14	158	M 8	110	130	17	M 8	160	71
11	442	286	125	88	15	139	140	90	15	176	M 8	110	130	17	M 8	160	71
12	462	286	125	88	15	139	140	90	15	176	M 8	110	130	17	M 8	160	84



Gerotor pump

Dimensions in mm

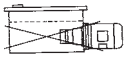
S = suction port; **P** = pressure port

Type of enclosure IP 54, DIN 40 050

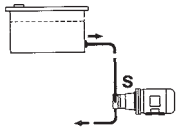
Units without foot have the same dimensions.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Special notes!



1. Pay attention to direction of rotation, marked by arrow.
2. **When units are flange-mounted on the oil reservoir in a horizontal position make sure the pump is not lower than the oil level** (intermediate flange is not sealed.)
   If the unit is mounted separately from the oil reservoir, the suction side of the pump (**S**) may be connected to a higher oil reservoir (max. 2000 mm).



When special pressure relief and safety valves are used, the **single-circuit pump units specified here may also be used for intermittently operated distributor systems**, if the units specially designed for this purpose, specified in leaflet 1-1202-US, do not meet the quantity requirements.

Two-circuit and five-circuit units, max. 20 bars, **self-priming, without priming pump connection**

Circulating lubrication

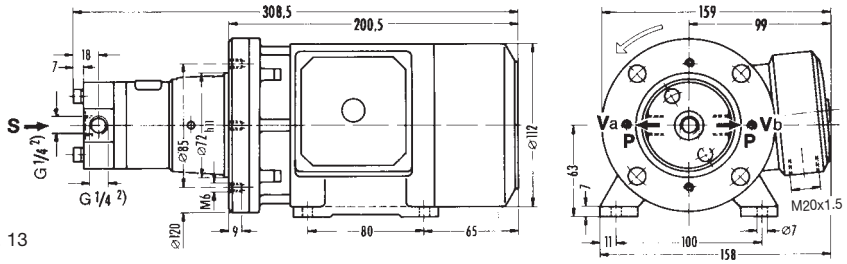
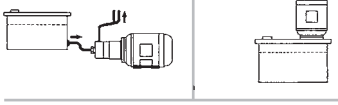
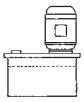


Fig. 13

Two-circuit units

Foot-mounted units for separately mounted oil reservoir **Order No.**	**Flange-mounted units** for flange-mounting on oil reservoir **Order No.**	**Output** at **V**a [l/min]	**V**b [l/min]	Max. back pressure [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]
ZM212-21	**ZM212-31**	**1.2**	**1.2**	12	20 – 2000	500	0.18	1300	0.6





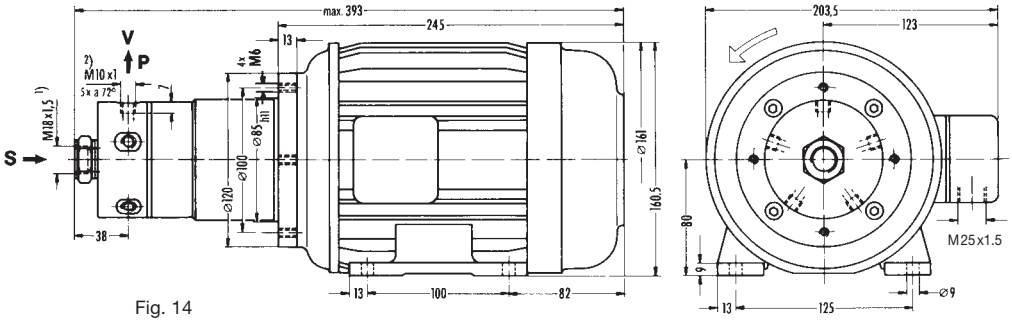
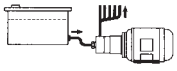
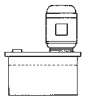


Fig. 14

Five-circuit units

Foot-mounted units for separately mounted oil reservoir **Bestell-Nr.**	**Flange-mounted units** for flange-mounting on oil reservoir **Order No.**	**Output** at **V** [l/min]	Max. back pressure [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase motor rated leistung [kW]	rated drehzahl [rpm]	rated current at 50 Hz, 400 V [A]
ZM502	**ZM502-3**	5 x **0.2**	20	20 – 1000	500	0.25	670	1.22
ZM505	**ZM505-3**	5 x **0.45**	10	20 – 500				





If it is necessary to protect the individual pressure lines by safety valves, **distributor manifolds, order No. 243-025.60** are available on inquiry.

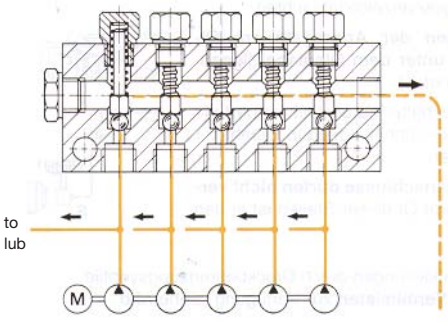


Fig. 15 **five-circuit** unit return line

1) Ports tapped for solderless tube connection M18x1.5 for 12 mm diam. tube.

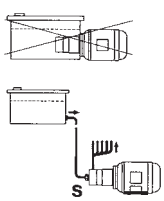
S = suction port
P = pressure port

Type of enclosure IP 54, DIN 40 050
Units without foot have the same dimensions.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Special notes!

1. Pay attention to direction of rotation, marked by arrow.
2. **When units are flange-mounted on the oil reservoir in a horizontal position make sure the pump is not lower than the oil level** (intermediate flange is not sealed).
   If the unit is mounted separately from the oil reservoir, the suction side of the pump (**S**) may be connected to a higher oil reservoir (max. 2000 mm).
3. **Any delivery ports not required must not be blanked off.** The oil delivered through these ports must be returned to the oil reservoir.



Ten-circuit units, max. 20 bars, **self-priming, without priming pump connection**

Circulating lubrication

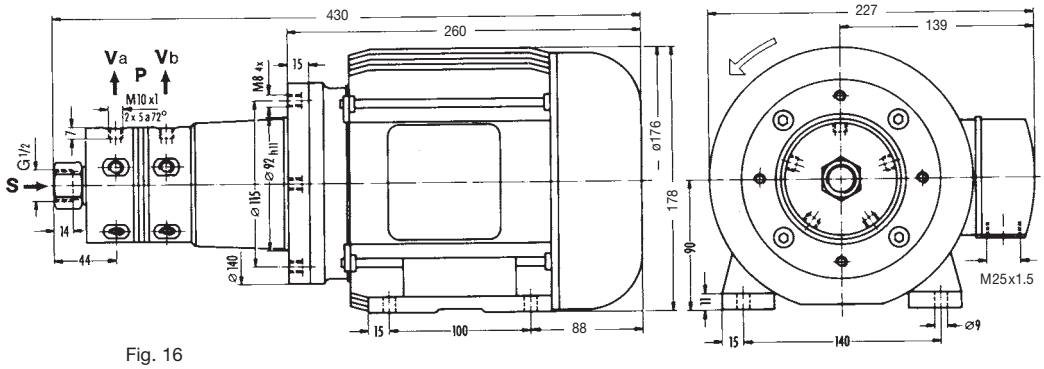
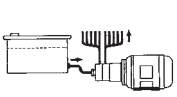
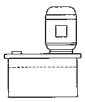


Fig. 16

Foot-mounted units for separately mounted oil reservoir **Order No.**	**Flange-mounted units** for flange-mounting on oil reservoir **Order No.**	**Output** at **Va** [l/min]	**Vb** [l/min]	Max. back pressure [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]
ZM1002	**ZM1002-3**	5 x **0.2**	5 x **0.2**	20	20 – 1000				
ZM1005	**ZM1005-3**	5 x **0.45**	5 x **0.45**	10	20 – 250	500	0.37	690	1.3
ZM1025	**ZM1025-3**	5 x **0.2**	5 x **0.45**	15	20 – 500				





S = suction port
P = pressure port
Type of enclosure IP 54, DIN 40 050

Units without foot have the same dimensions.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Special notes!

When units are flange-mounted on the oil reservoir in a horizontal position make sure the pump is not lower than the oil level (intermediate flange is not sealed).

If the unit is mounted separately from the oil reservoir, the suction side of the pump (S) may be connected to a higher oil reservoir (max. 2000 mm).

Any delivery ports not required must not be blanked off. The oil delivered through these ports must be returned to the oil reservoir.

Hydrostatic lubrication

In the case of hydrostatic bearings the oil pressure appropriate to the bearing's load-carrying capacity is generated in pumps outside the bearing, the oil being delivered at this pressure to the bearing recesses. From there the oil escapes through the bearing gaps.

The smaller the output per circuit, the lower the oil viscosity and the greater the pump pressure, the more the flow rates of the circuit will differ from each other.

The pressure difference within a multicircuit pump can be kept very small by utilizing a priming pump, which also helps to provide for uniform delivery rates.

The total capacity of the multicircuit pump and the recess pressure required per delivery circuit, with due consideration given to the permissible difference in pressures, is decisive when it comes to the choice of this priming pump.

By choosing the appropriate recess size it is possible to keep the recess pressure within the desired limits, and a medium-viscosity oil should be selected unless special tasks are involved.

With bearings that are subject to great pressure fluctuations a proportioning pressure valve can be used to adapt the priming pressure to the particular pressure of a characteristic recess.

When a priming pump is used, a suitable filter can be installed in the priming pump's pressure line.

One pump delivery circuit per recess

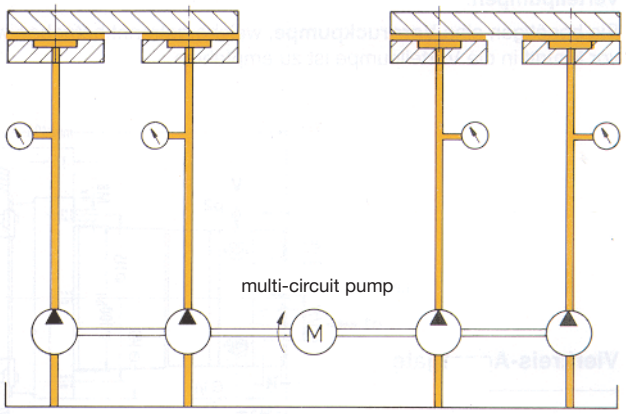


Fig. 19

Dimensions in mm

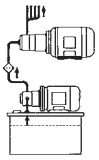
Four-circuit and five-circuit units, max. 55 (80) bars, **for operation with separate priming pump**

Unlike the multicircuit pumps specified on pages 7 and 8, the pumps shown in figures 20-25 are operated as **distribution pumps**.

They require a **priming pump**, which is operated separately.

(For a selection of priming pumps see the tables below.) It is advisable to filter the oil upstream of the distribution pump inlet.

Four-circuit units



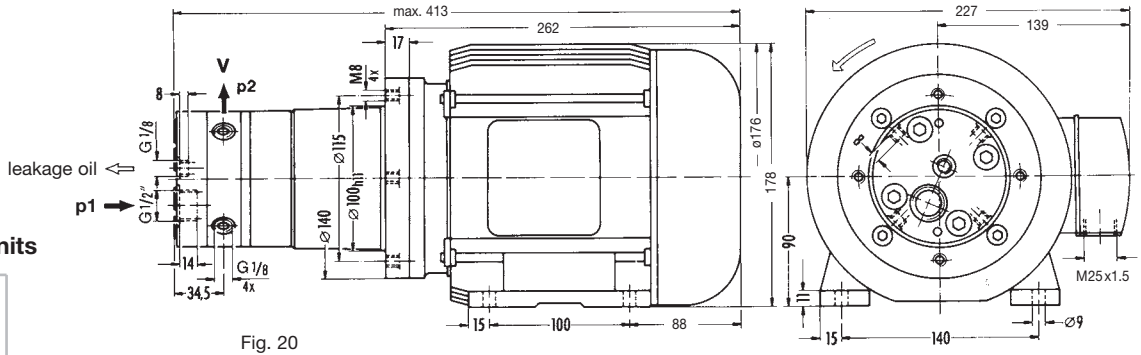
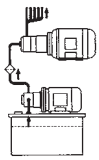


Fig. 20

Order No.	Output at **V** [l/min]	Pump inlet max. p1 [bars]	Pressure port max. p2 [bars]	Permissible operating viscosity range [mm²/s]	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]	Single-circuit units suitable here as priming pumps [2] Order No.	Order No.
ZM402-2-S2	4 x **0,2**	**50** (75) [1]	**p1** ±5	20 – 500	0.37	690	1.3	**ZM12-21**	**143-012-151**
ZM405-2-S2	4 x **0,45**							**143-012-150**	**143-012-151**

Five-circuit units



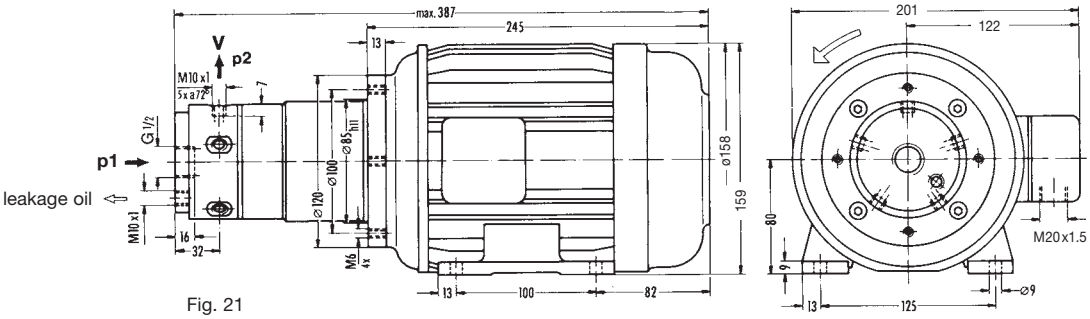


Fig. 21

Order No.	Output at **V** [l/min]	Pump inlet max. p1 [bars]	Pressure port max. p2 [bars]	Permissible operating viscosity range [mm²/s]	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]	Single-circuit units suitable here as priming pumps [2] Order No.	Order No.
ZM502-S2	5 x **0.2**	**30**	**p1** ±5	20 – 500	0.25	690	1.05	**143-012-150**	**143-012-151**
ZM505-S2	5 x **0.45**							**143-012-100**	**143-012-161**

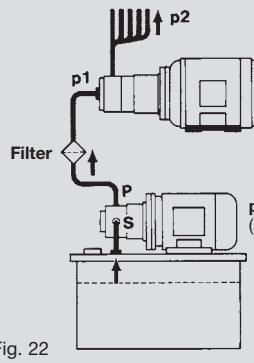


Fig. 22

[1] Values shown in brackets ( ): priming pump on inquiry.

[2] The priming pumps shown in the tables are foot-mounted units. For technical data see pages 6 and 7.

Type of enclosure IP 54, DIN 40 050

Pay attention to direction of rotation, marked by arrow.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Please pay attention to special notes on page 11.

Eight-circuit units, max. 55 (80) bars, **for operation with separate priming pump**

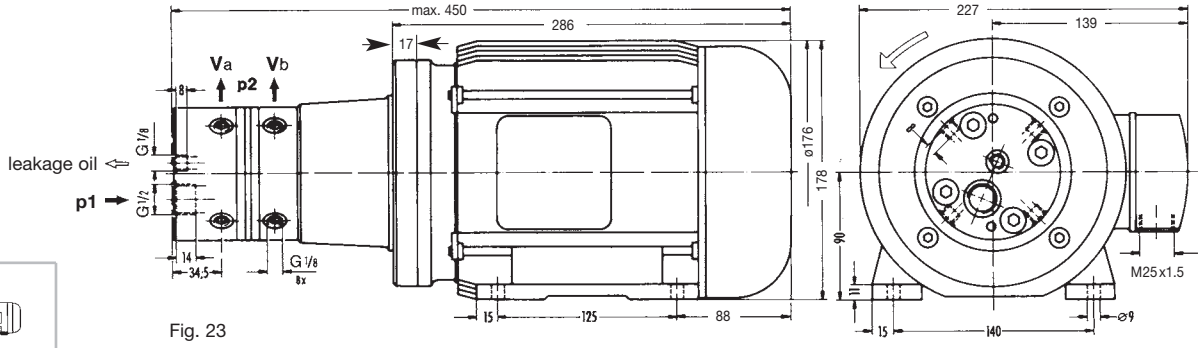
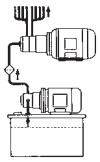


Fig. 23



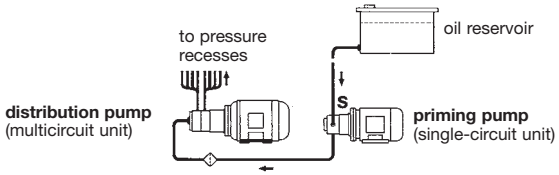
Order No.	Output at **V**a [l/min]	at **V**b [l/min]	Pump inlet max. p1 [bars]	Pressure port max. p2 [bars]	Permissible operating viscosity range [mm²/s]	Three-phase motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]	Single-circuit units suitable here as priming pumps [2] Order No.	Order No.
ZM802-2-S2	4 x **0.2**	4 x **0.2**	**50** (75) [1]	**p1** ±5	20 – 500	0.55	690	1.7	**143-012-150**	**143-012-151**
ZM805-2-S2	4 x **0.45**	4 x **0.45**							**143-012-100**	**143-012-161**

Type of enclosure IP 54, DIN 40 050

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Special notes!

1. Pay attention to direction of rotation, marked by arrow.



2. If the **priming pump** is mounted separately from the oil reservoir, the suction side of the pump (**S**) may be connected to a higher oil reservoir (max. 2000 mm).
3. **Any unneeded delivery ports of the multicircuit pump (distribution pump) must not be blanked off.** The oil delivered through these ports must be returned to the oil reservoir.

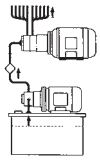
[1] Values shown in brackets ( ): priming pump on inquiry.

[2] The priming pumps shown in the table are foot-mounted units. For technical data see page 7.

Dimensions in mm

Ten-circuit and twenty-circuit units, max. 35 bars, **for operation with separate priming pump**

Ten-circuit units



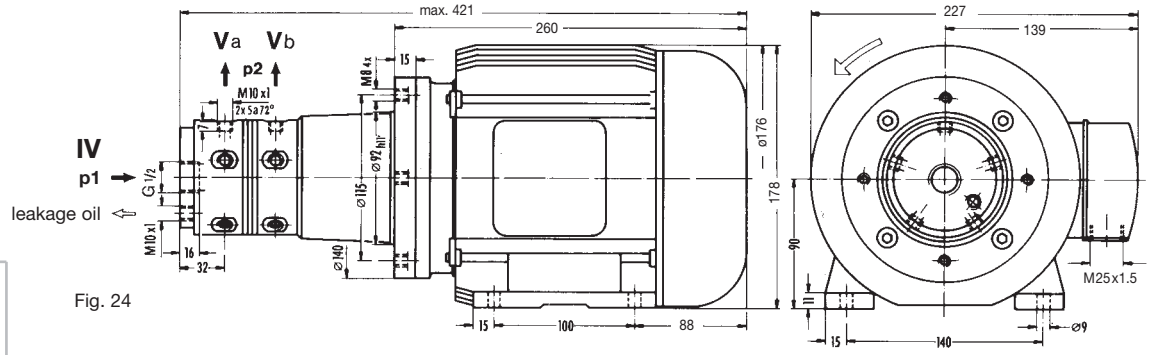
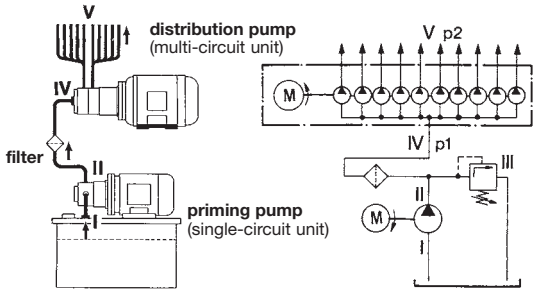


Fig. 24

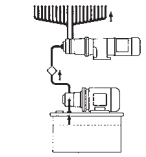
Order No.	Output at Va [l/min]	Output at Vb [l/min]	Pump inlet p1 max. [bars]	Pressure port p2 max. [bars]	Permissible operating viscosity range [mm²/s]	Three-phase-motor rated leistung [kW]	Three-phase-motor rated drehzahl [rpm]	Three-phase-motor rated current bei50 Hz, 400 V [A]	Single-circuit units suitable here as priming pumps [1] Order No.	Order No.
ZM1002-S2	5 x **0.2**	5 x **0.2**	**30**	**p1** ±5	20 – 500	0.37	690	1.3	**143-012-150**	**143-012-151**
ZM1005-S2	5 x **0.45**	5 x **0.45**							**143-012-170**	



Hydraulic layout

I = suction side (priming pump)
II = pressure side (priming pump)
III = safety valve
IV = pump inlet (distribution pump)
V = pressure ports (distribution pump)

Twenty-circuit units



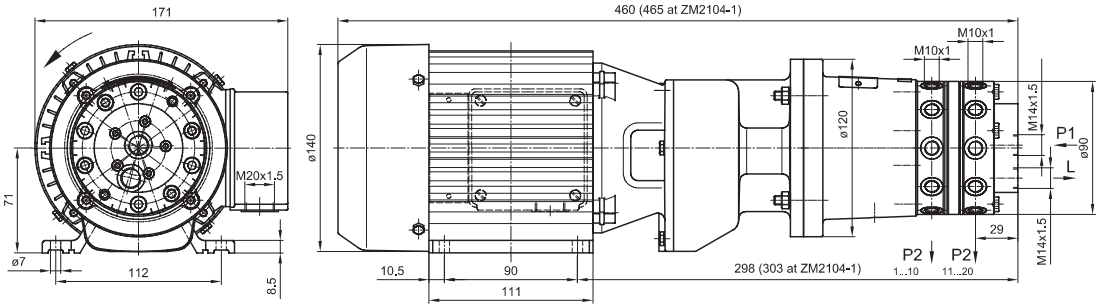


Fig. 25

Order No.	Output [2] [l/min]	Pump inlet p1 max. [bars]	Pressure port p2 max. [bars]	Permissible operating viscosity range [mm²/s]	Three-phase-motor rated output [kW]	Three-phase-motor rated speed [min⁻¹]	rated current at 50 Hz, 400 V [A]	Single-circuit units suitable here as priming pumps [1] Order No.
ZM 2101-1	20 x **0.015**							**ZM12-21**
ZM 2102-1	20 x **0.03**	**30**	**p1** ±5	20 – 1000	0.18	1400	0.54	**ZM12-21**
ZM 2103-1	20 x **0.05**							**143-012-150**
ZM 2104-1	20 x **0.1**							**143-012-150**

horizontal mounting position

Type of enclosure IP 54, DIN 40 050

Pay attention to direction of rotation, marked by arrow.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Please pay attention to special notes on page 11.

[1] The priming pumps shown in the tables are foot-mounted units. For technical data see pages 6 and 7.

[2] Based on an operating viscosity 140 mm²/s at a Δ p = 2 bars.

Ten-circuit and twenty-circuit units, max. 20 bars, **with built-in priming pump and adjustable safety valve**

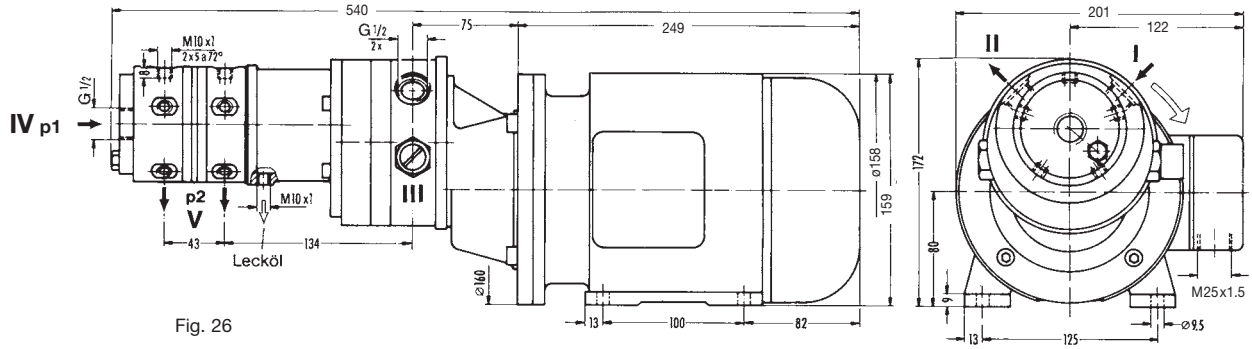
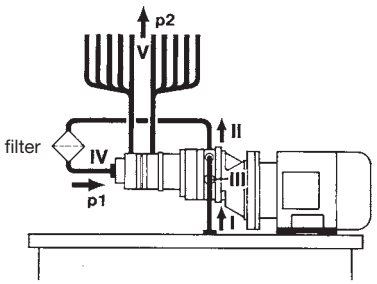
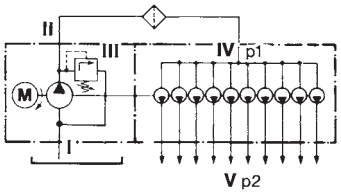


Fig. 26

Ten-circuit unit

Order No.	Output at **V** [l/min]	**Pump inlet** p1 max. [bars]	**Pressure port** p2 max. [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase-motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]
ZM1035	10 x **0.45**	**16**	**20**	20 – 500	500	0.75	1400	2.0





Hydraulic layout

I = suction side (priming pump)
II = pressure side (priming pump)
III = safety valve, adjustable from 1 to 20 bars
IV = pump inlet (distribution pump))
V = pressure ports (distribution pump)

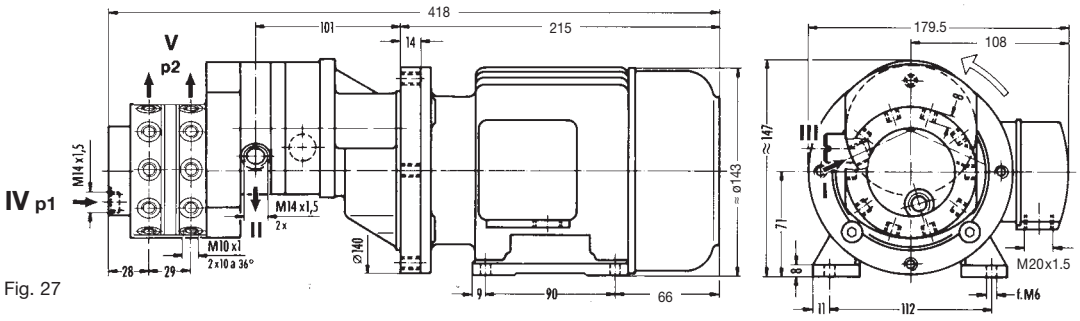


Fig. 27

Twenty-circuit units

Order No.	Output at **V** [l/min]	**Pump inlet** p1 max. [bars]	**Pressure port** p2 max. [bars]	Permissible operating viscosity range [mm²/s]	Suction head (with open pressure line) [mm]	Three-phase-motor rated output [kW]	rated speed [rpm]	rated current at 50 Hz, 400 V [A]
ZM2201	20 x **0.025**					0.12	680	0.67
ZM2202	20 x **0.035**	**18**	**20**	20 – 500	500	0.18	915	0.73
ZM2203	20 x **0.05**					0.37	1360	1.1

Type of enclosure IP 54, DIN 40 050

Pay attention to direction of rotation, marked by arrow.

The dimensions and data indicated for the electric motors are recommended values and can be different in the case of individual manufacturers.

Any delivery ports not required must not be blanked off.
The oil delivered through these ports must be returned to the oil reservoir.

Dimensions in mm

Units complete with reservoir

Circulating lubrication

Pump units are also available mounted on reservoirs. Capacities of reservoirs: 3, 6, 15, 50, 100, 200, 400 liters.

Pump units complete with reservoir may comprise the following:

- one or more pump units
- directional or safety valves
- pressure relief valves (when used for intermittent lubrication)
- filters
- return oil connections (R)
- oil level sight glass
- float switch (WS)
- cooling units
- pressure switches
- thermometers
- flow monitors
- pressure gauges
- pressure gauge protection valves
- pressure gauge selector valves (5 or 10 connections)
- heating elements

Please state your wishes when ordering.

Examples of standard units with reservoir

Order No. [1]	Reservoir capacity [Liter]	Reservoir material
...-BW3-2	3	metal
...-BW7	6	metal
...-BW16	15	metal
...-KW3-2	3	plastic
...-KW6	6	plastic

[1] *The order number must be completed with the selected single- or two-circuit unit as detailed on page 3 and 5.*

Order example:

Single-circuit gear pump unit MF2-2000
with 6 liter plastic reservoir,
Order No.: MF2-2000-KW6

Two-circuit gear pump unit M202
with 15 liter metal reservoir,
Order No.: M202-BW16

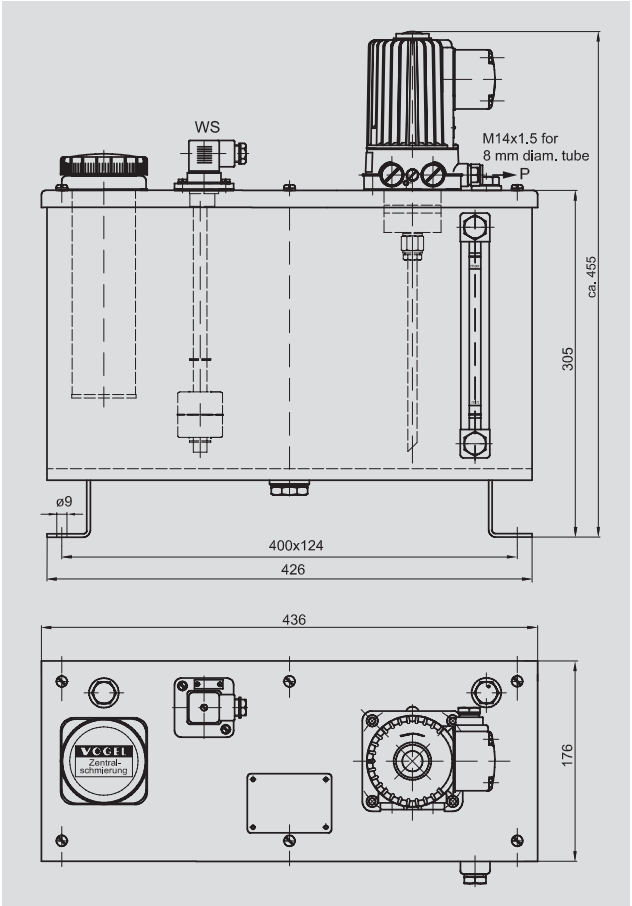
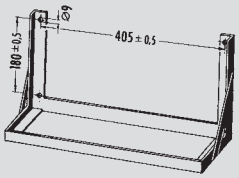
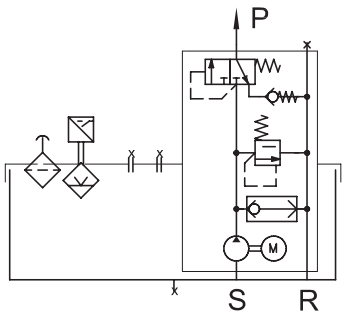


Fig. 28 **Examples of a standard unit with metal reservoir**

support bracket for 15 liter reservoir (for wall mounting)
Order No. 249-032.10





P = pressure port
R = return line
S = suction tube
WS = float switch

Standard dimensions of reservoirs starting at 30 liters

Reservoir dimensions [mm]

Reservoir capacity [liters]	Hight h	h2	h3	Width b1	Depth d1	Center distance b2	Center distance d2	Hole ø
30	375	245	237	510	320	430	240	14
50	480	310	300	570	350	490	270	14
100	510	340	326	710	500	630	420	14
200	650	480	460	880	590	740	460	18
400	850	650	626	995	711	900	620	18

30 and 50 liter reservoirs available, also without legs, for wall-mounting.

The complete order number for “completion according to customer’s request” (in accordance with the information on page 14) must be specified when the order is placed.

① = oil filler cap
② = oil strainer
③ = float switch
④ = gear or oil strainer gerotor pump unit
⑥ = oil level indicator
⑦ = oil drain plug

Reservoir and cover: hammered enamel finish

The complete reservoir units are also available in conformity with the regulations of the automobile industry.
DIN and special reservoirs on request.

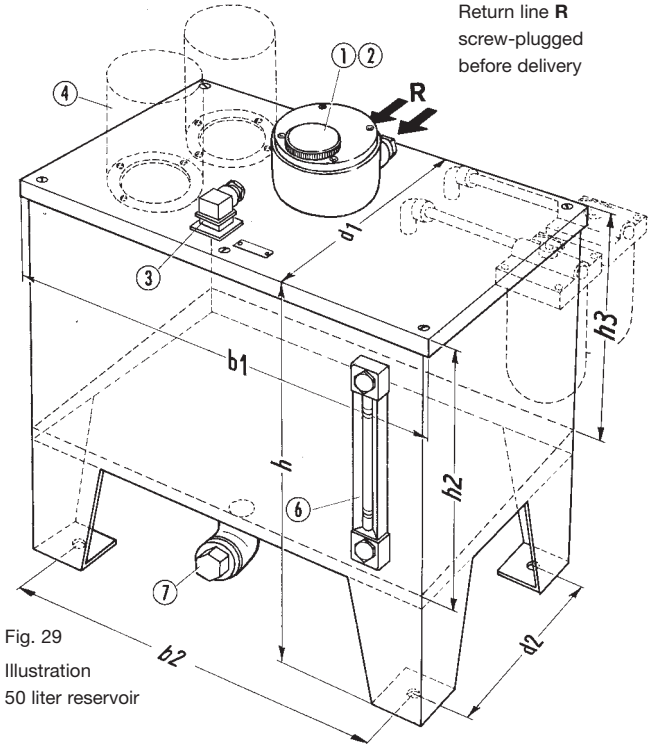
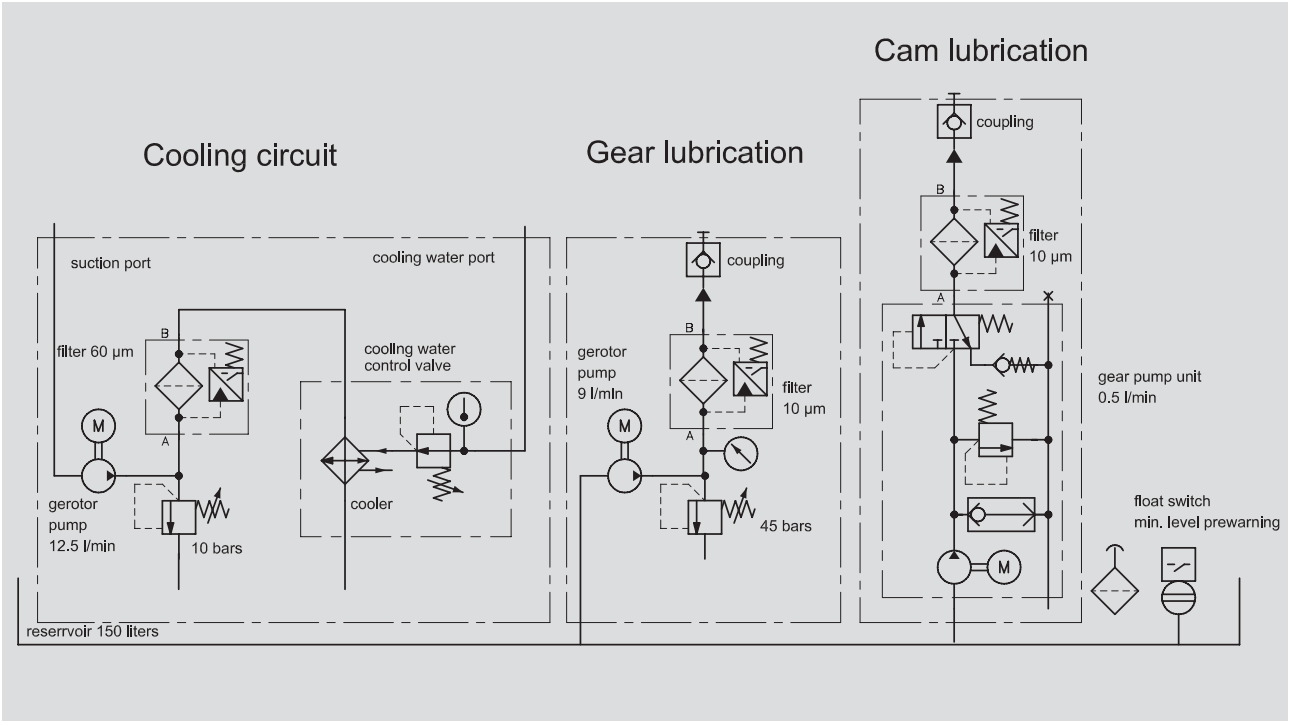


Fig. 29
Illustration
50 liter reservoir



3-fold reservoir unit serving as a supply unit for a printing machine

The gerotor pump (delivery rate 9 l/min) is used to supply the gears in a circulating lubrication system and to provide for dissipation of heat at the same time.

The geroto pump (delivery 12.5 l/min) sucks the hot oil off again and feeds it back into the supply unit’s reservoir via a cooler. That makes sure that accordingly coolled oil is always available for the gear circuit.

Another MFE5 unit is used to supply the cams with corresponding amounts of oil at specified intervals by way of piston distributors.

Dimensions in mm

Further leaflets

Leaflet 1-1200-US: Gear, gerotor and rotary piston pumps
Leaflet 1-5006-US: Circulating lubrication systems (screw-in metering valves, distributor manifolds, flow control valves, metering valve distributors)
Leaflet 1-1202-US: Gear pump units for central lubrication systems with piston distributors
Leaflet 1-1203-US: Compact units (for oil)
Leaflet 1-1702-US: Float switches
Leaflet 1-1700-US: Control and monitoring units
Leaflet 1-1701-US: Pressure switches
Leaflet 1-0103-US: Fittings and accessories (pressure gauges, filters)

Notice!

All products from VOGEL may be used only for their intended purpose. If operating instructions are supplied together with the products, the provisions and information therein of specific relevance to the equipment must be observed as well.

In particular, we call your attention to the fact that hazardous materials of any kind, especially the materials classified as hazardous by EC Directive 67/548/EEC, Article 2, Par. 2, may only be filled into VOGEL centralized lubrication systems and components and delivered and/or distributed with the same after consultation with and written approval from VOGEL.

All products manufactured by VOGEL are not approved for use in conjunction with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1013 mbars) by more than 0.5 bar at their maximum permissible temperature.

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V00 02/2006