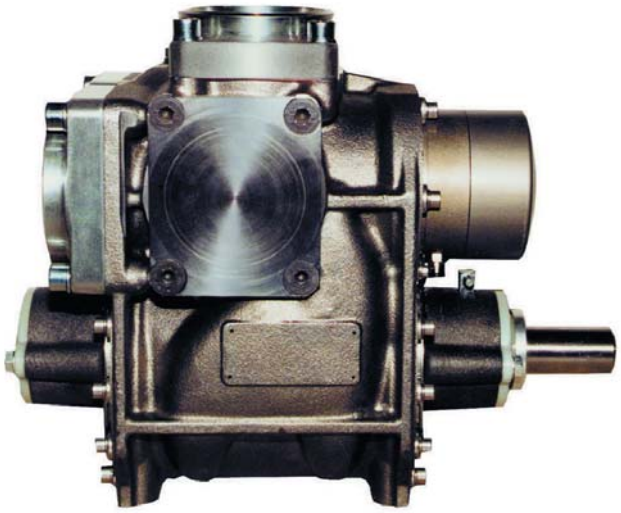
TruckFIT

Vane pump with integrated multiple slide control

Alfons Haar

Operating instructions

FPTC 80 - ... FPTG 80 - ...
FPTS 80 - ... FPTJ 80 - ...
FPTN 80 - ...



Ex II 2G cT3 CE

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Edition 03/2005

Subject to alteration!

Index **Seite**

1. Proper use

People and material may be put at risk in the event of any deviation from the intended form of application. The limits contained in these instructions may not be exceeded.

The vane pump is used to pump low-viscosity mineral oil products and non-corrosive and/or suspension-free liquids up to a viscosity of approx. 76 cSt. In the case of positively actuated vanes (Z designs), it is also possible to pump viscous mineral oil products. It is suitable for installation for zone 1 according CD 1999/92/EC. measures for explosion proofness:
These operating instructions describe the necessary measures for safe operation (e.g. prevention of excessive temperature, excessive run time of dry pumping). If this can not be assured, additional measures shall be taken (e.g. deactivation by temperature switch, safeguarding the connected systems by flame arrestors). For use at speeds of less than 600 rpm it is advisable to deploy ducted vanes (Z versions).

Each modification of the vane pump and every alteration of the use, that was arranged at the sale, requires consultation with Alfons Haar.

2. Type cope

Example: **FP T C 80 - 700 Z R**

FP: Vane-type pump

T: Housing design (dimensional)
T = Integrated directional slide control

C: Shaft design (dimensional)
C = Free cylindrical drive shaft end with feather key
S = Shaft end with internal toothing for HyPOWER motor
N = Two shaft ends for hydraulic motors MZFS
G = As C but other shaft end for additional drive with hydraulic pump
J = For hydraulic motor drive MZFS

80: Nominal bore of suction and discharge end

700: Theoretical volumetric flow in litres per 1000 revolutions or cm³/revolutions

Z: Special version
Z = Positive actuation of the vanes

R: Direction of rotation (as seen on drive shaft)
R = Right-handed rotation (standard, for left-hand auxiliary drive)
L = Left-handed rotation (pipe connections on drive side)

3. Technical data

Speed:	n_{max}	= 1500 r.p.m.
	n_{min}	= 600 r.p.m.
Viscosity:	ν_{max}	= 76 cSt
Nominal pressure:	PN	= 10 bar
Max. pressure difference (Continuous operation)	Δ p	= 8 bar
Temperature range:	t	= - 20 °C to + 70 °C

(Temperatures up to -32 °C and in excess of 70 °C in consultation with Alfons Haar)

Operating pressure (pneumatics) = 3 to 8 bar

(with interlock 4 to 8 bar)

For positive actuation of vanes: Version “Z”

Speed: (Dependent on viscosity)	n	= 0 to 1500 r.p.m.
max. viscosity	ν_{max}	= 50.000 cSt.

4. Application notes

Installation position: The shaft of the pump is to be positioned horizontally; the maximum permissible inclination is 5°.
The housing can be aligned to suit; the pump can be installed upright, inverted or horizontally.

Intake characteristic: Because of their very good intake characteristics, vane-type pumps are well suited for self-filling vehicles using underground tanks.

Residual drainage: The special positive-displacement characteristics mean that it is possible to empty the system practically down to the measuring chamber volume level without using an additional discharge pump, e.g. when changing products. (See installation examples)

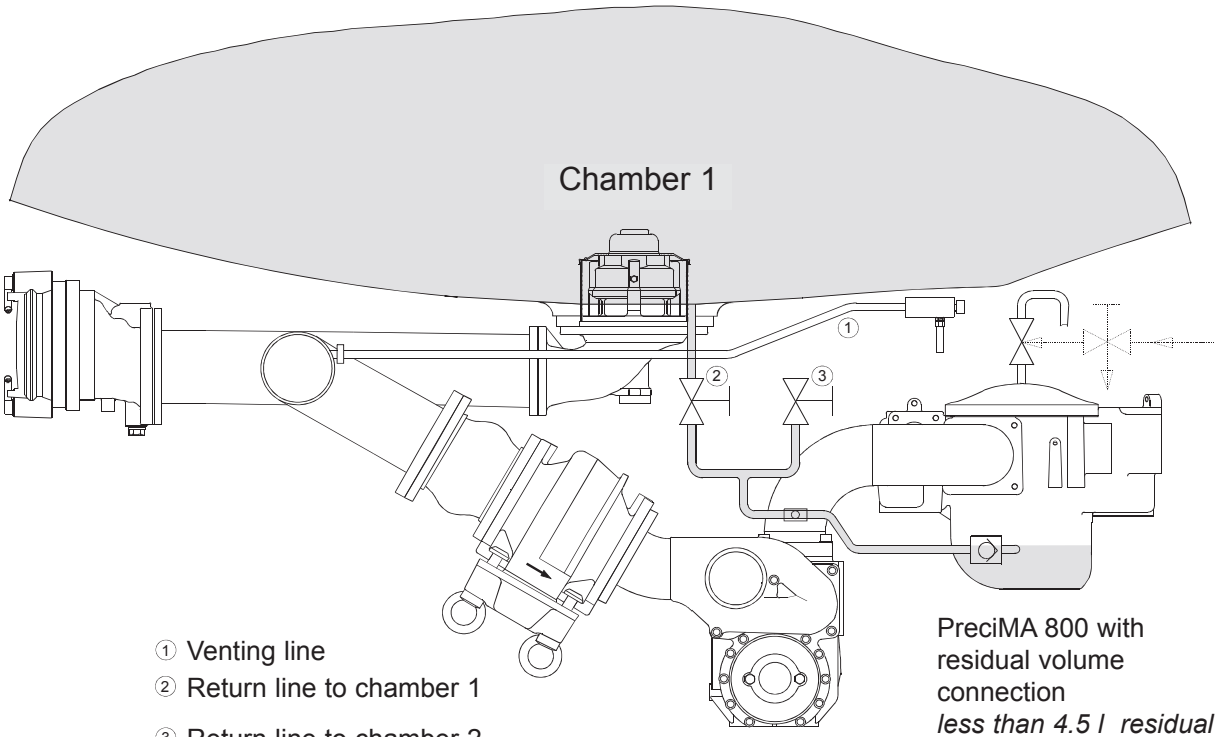
Pneum. control: The pneumatic control on the overflow valve can be used to influence the pump pressure and volumetric flow.
(See Overflow valve control)

Interlock: When switching from **“SB”** (self-fill) to **“AP”** (pumped delivery) the auxiliary drive should be switched off or the overflow valve should be opened when switching over via an interlock.
(See pneumatics schematics)

5. Installation examples

With PreciMA 800: Installation example for A III vehicles; A I vehicles should be equipped with an additional explosion-proof device.

- return pumping without drainage pump
- low residual quantity (less than 4.5 l)
- excellent intake characteristic
- low noise development



① Venting line
② Return line to chamber 1
③ Return line to chamber 2

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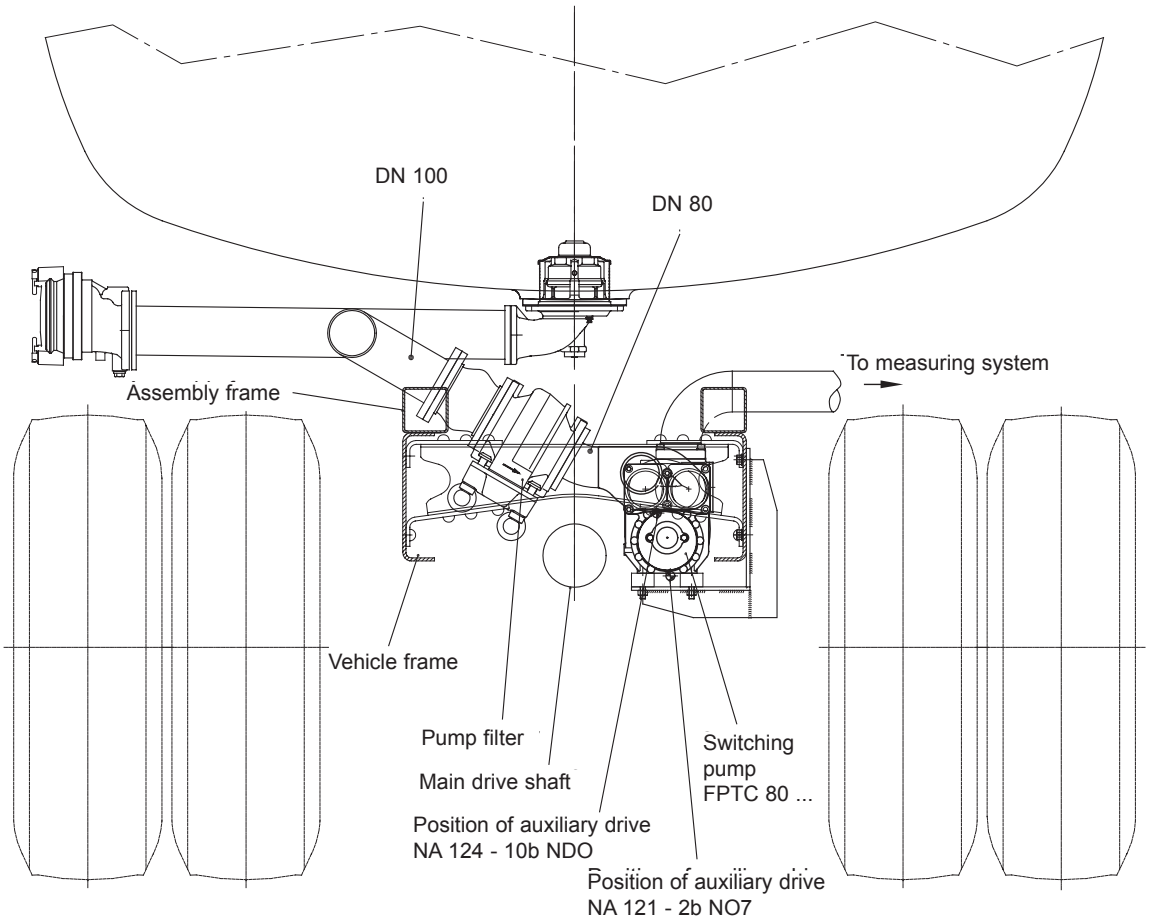
PreciMA 800 with residual volume connection
less than 4.5 l residual quantity

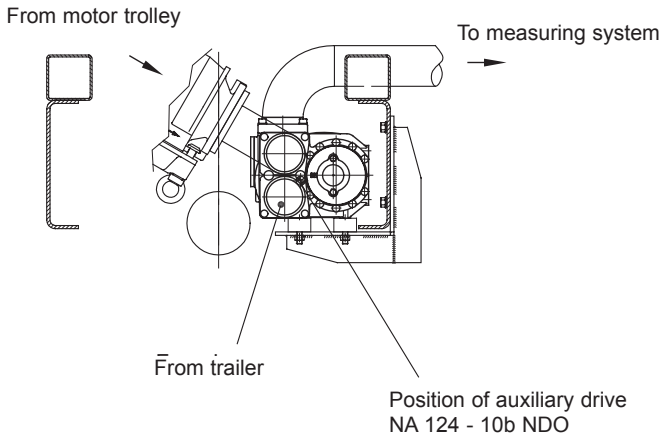
Return pumping of residual volume WITHOUT additional drainage pump

Note Similar design also possible for other measuring systems!

Mercedes Actros 1835...



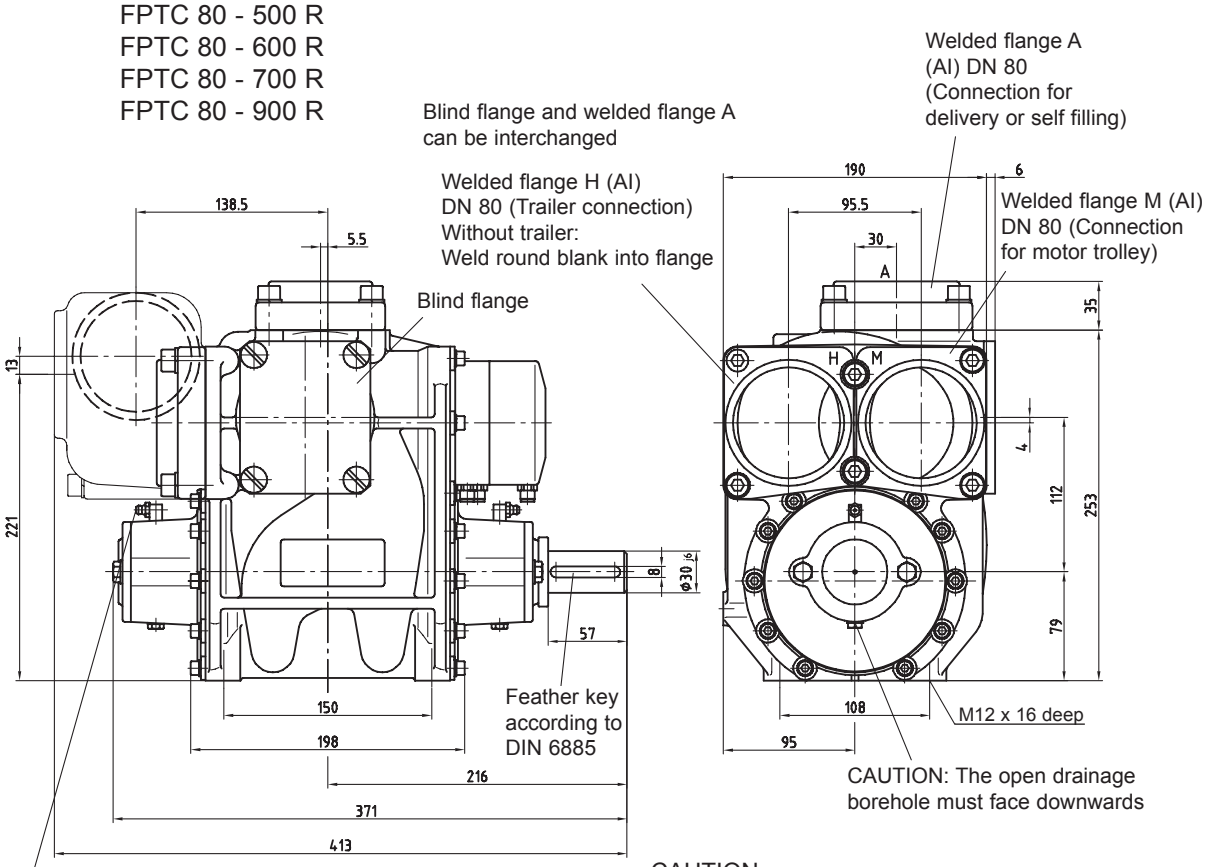
Installation position "upright"



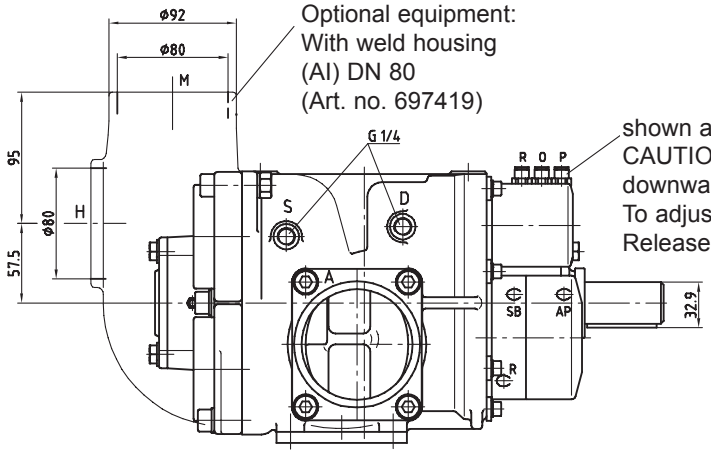
Installation position "horizontal"

6. Dimensions

FPTC 80 - 500 R
FPTC 80 - 600 R
FPTC 80 - 700 R
FPTC 80 - 900 R



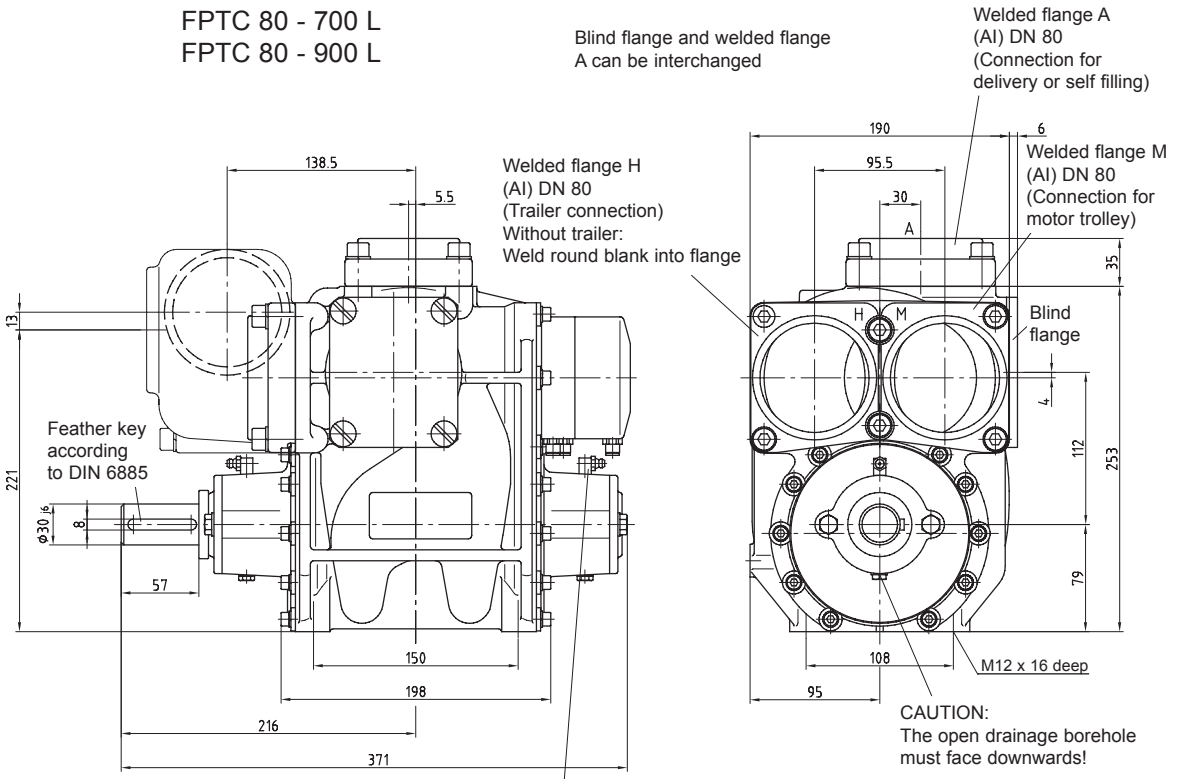
CAUTION:
For horizontal or inverted installation the M4 threaded pin for each respective drainage borehole facing downwards must be removed. The other boreholes must be sealed up.

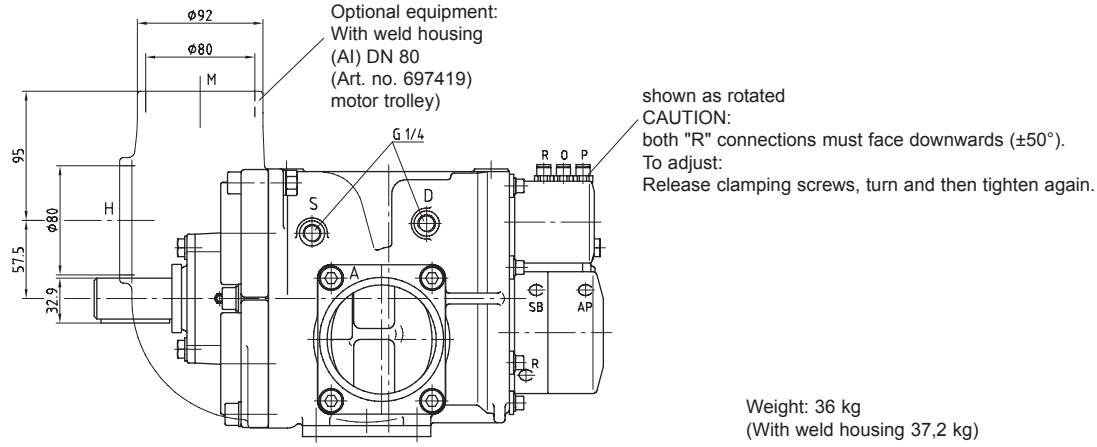


shown as rotated
CAUTION: both "R" connections must face downwards (±50°).
To adjust:
Release clamping screws, turn and then tighten again.

Weight: 36 kg
(With weld housing 37.2 kg)

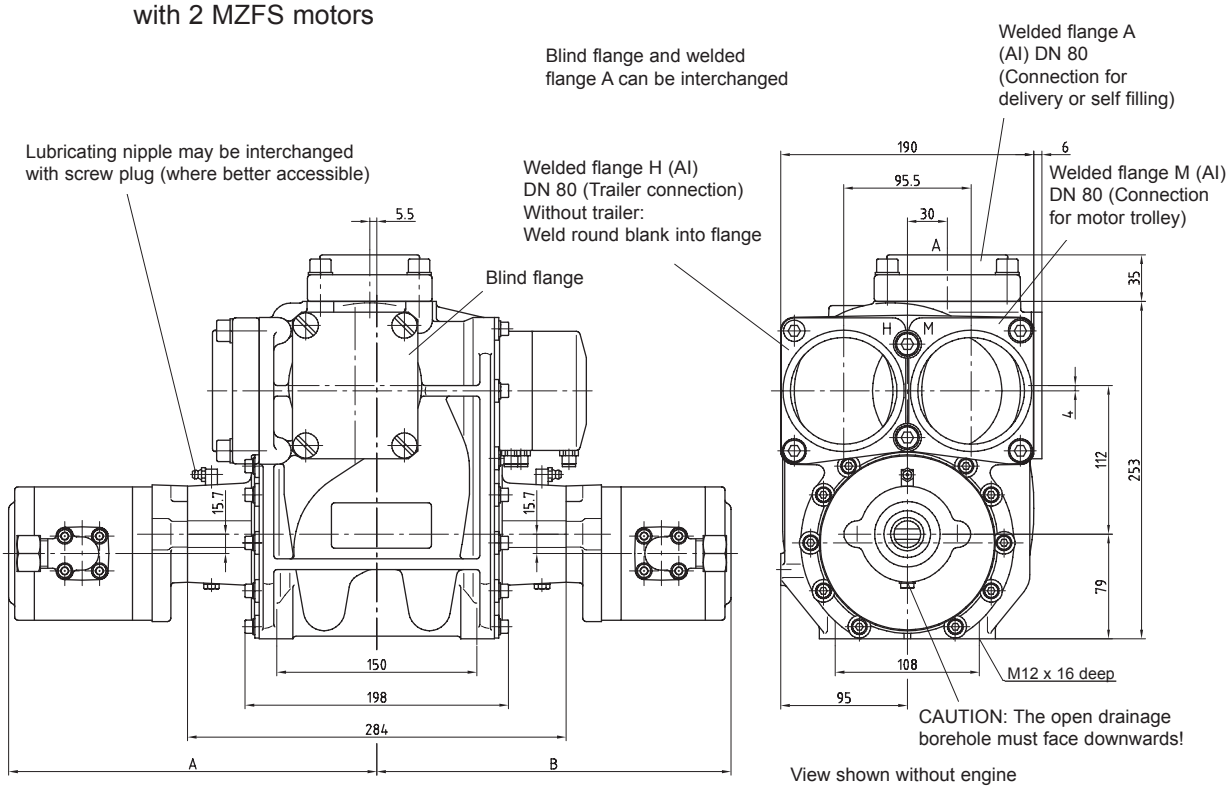
FPTC 80 - 500 L
FPTC 80 - 600 L
FPTC 80 - 700 L
FPTC 80 - 900 L





Weight: 36 kg
(With weld housing 37,2 kg)

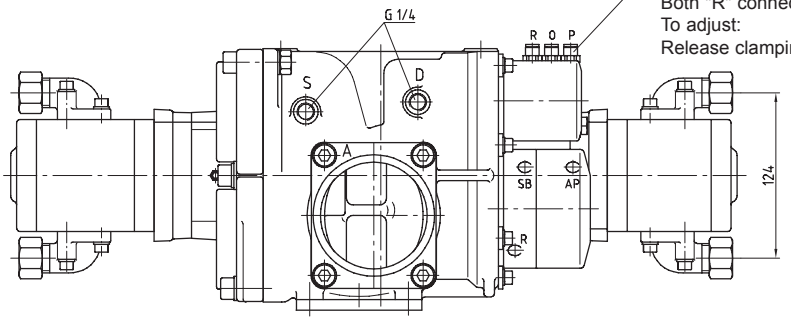
FPTN 80 - 700 R
with 2 MZFS motors



View shown without engine

Motor type	Size A (mm)	Motor type	Size B (mm)
MZFS 0/22.5 R	276.5	MZFS 0/16 L	266
MZFS 0/19 R	271	MZFS 0/11 L	257.5
MZFS 0/16 R	266	MZFS 0/8 L	252.5

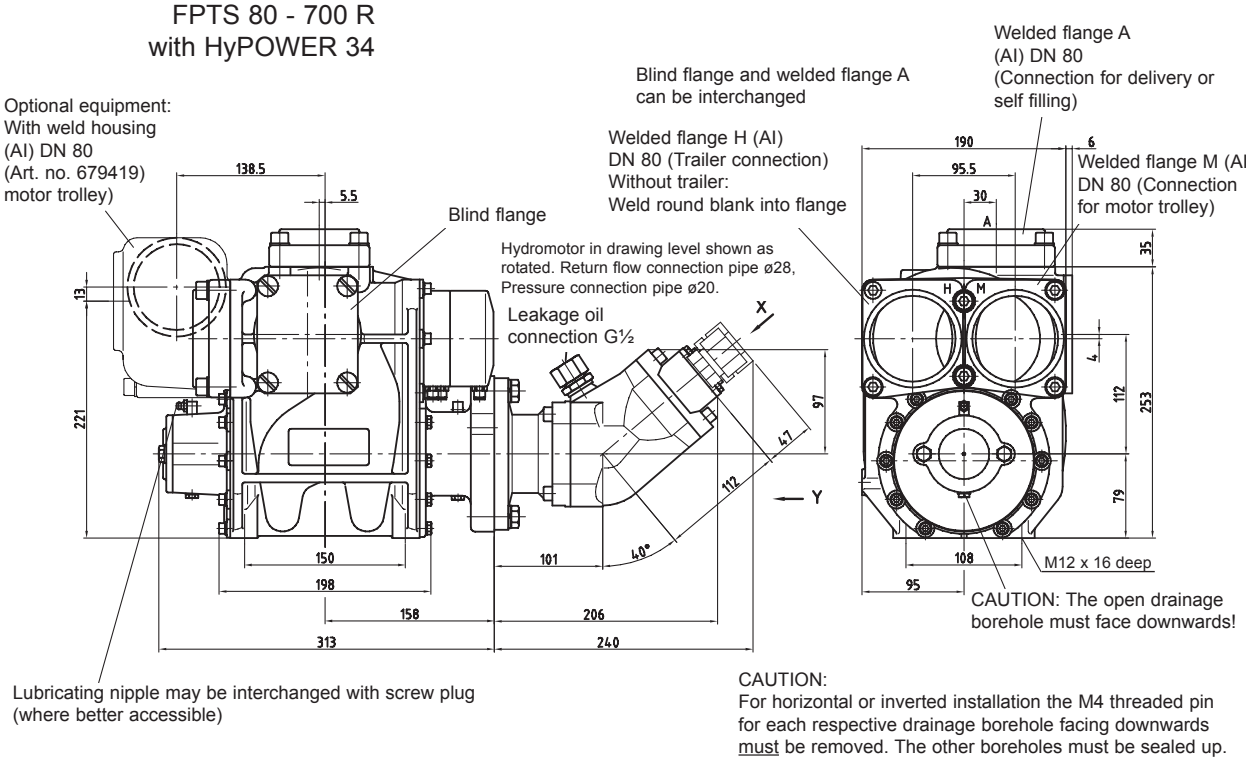
CAUTION:
For horizontal or inverted installation the M4 threaded pin for each respective drainage borehole facing downwards must be removed. The other boreholes must be sealed up.

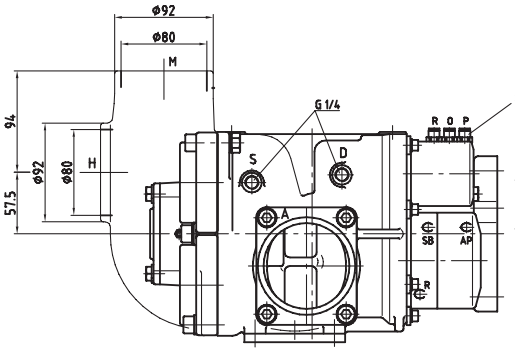


Here always the smaller MZFS

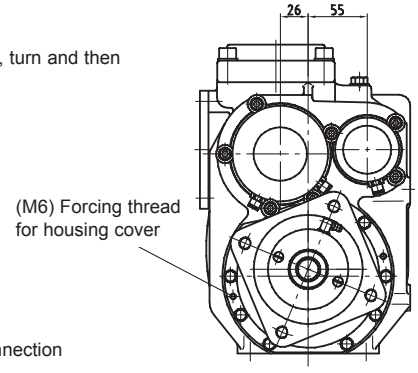
Weight: 43.3 kg
(With MZFS 22.5 and 16)

FPTS 80 - 500 R
FPTS 80 - 600 R
FPTS 80 - 700 R
with HyPOWER 34





View Y
shown without hydromotor

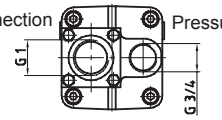


Axial-piston motor "HY-Power 34"

cc/rev=	34.2
Rated pressure=	400 bar
Max. const. speed=	2300 r.p.m.

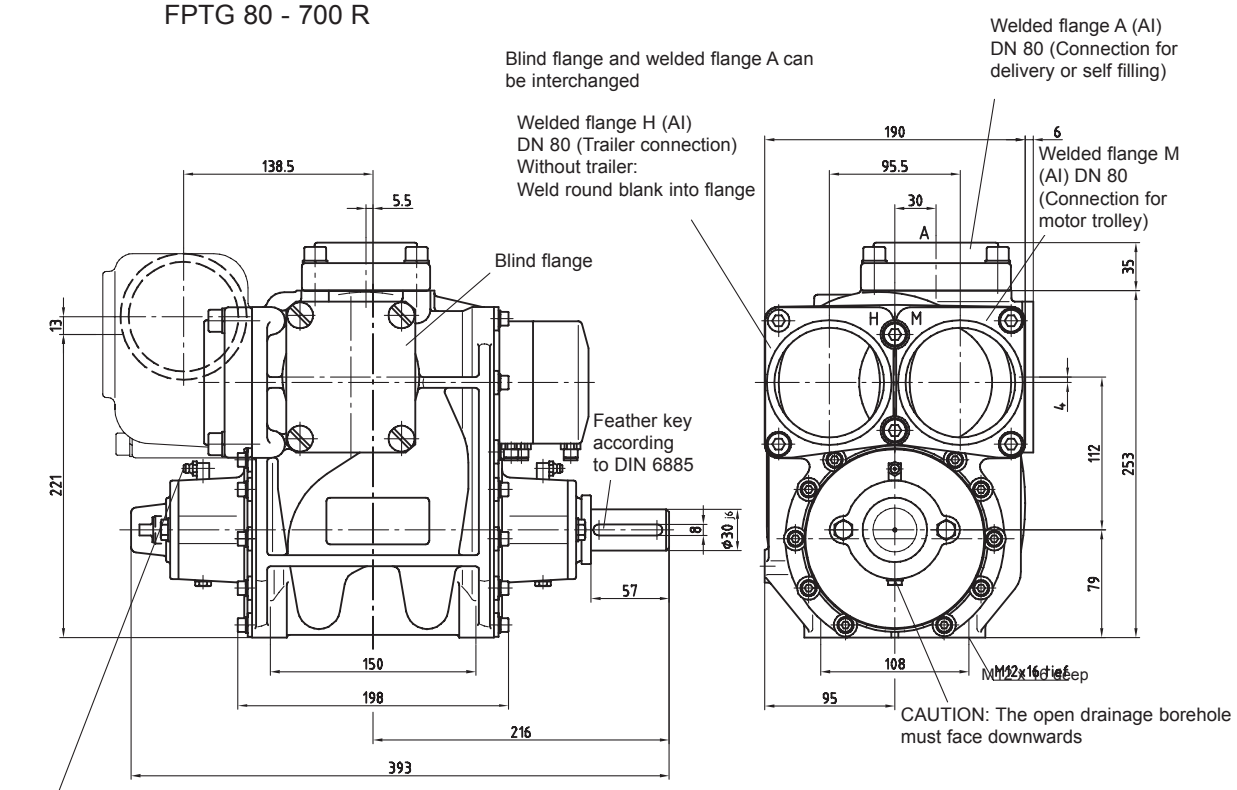
Where an oil tank is used of at least 35 l
an oil cooler can be dispensed with!

View X
shown without pipe fittings

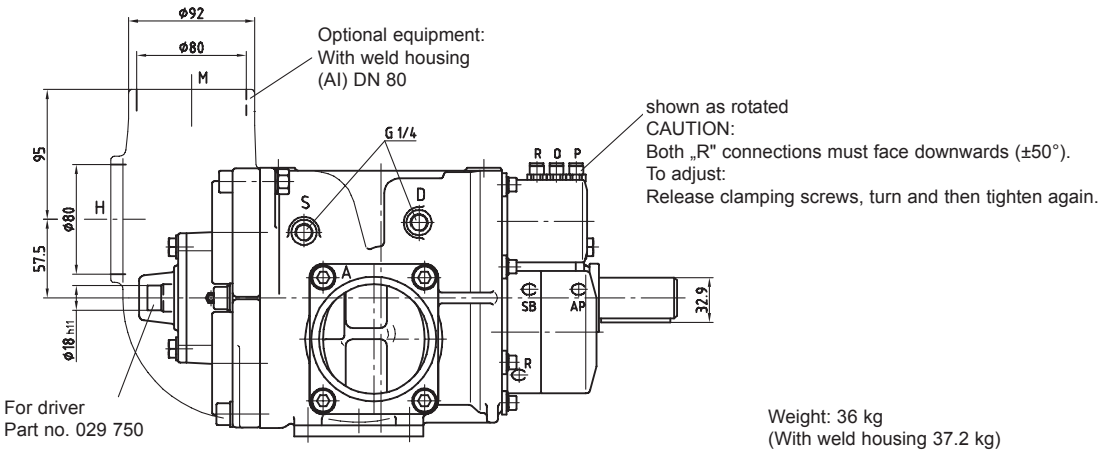


Weight: 45.5 kg
(With weld housing 46.7 kg)

FPTG 80 - 600 R
FPTG 80 - 700 R



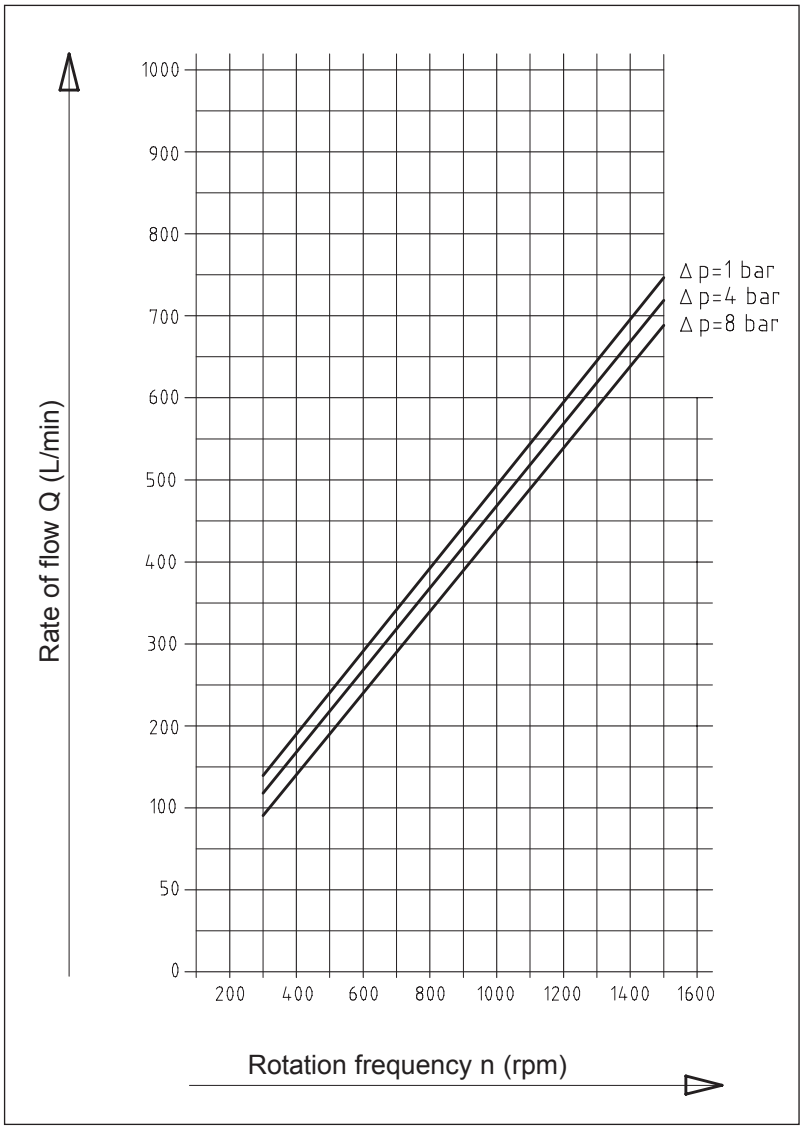
CAUTION:
For horizontal or inverted installation the M4 threaded pin for each respective drainage borehole facing downwards must be removed. The other boreholes must be sealed up.



Weight: 36 kg
(With weld housing 37.2 kg)

7. Flow rate diagrams

FPT_80-500

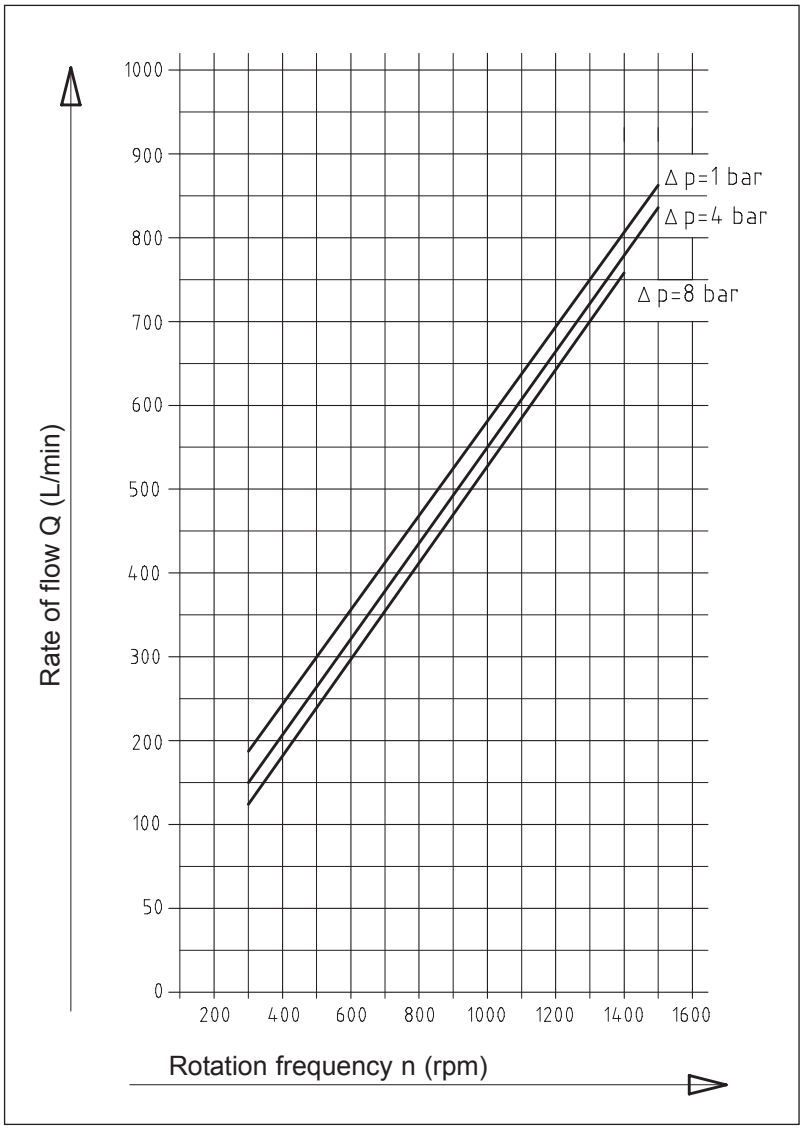


Notes: The delivery curve of Δp = 8 bar is reached at a pneumatic pressure of 5 bar on the overflow valve. Here, when closing the delivery valve (full overflow) a, still permissible, Δp = 9 bar is not exceeded.

For a de-energised overflow valve (pneumatics pressure = 0) the maximum rate of flow up to a pressure of Δp = 1.5 bar is retained; anything above and the overflow valve opens.

At a volumetric flow of Q < 100 l and unpressurised overflow valve (pneumatic pressure = 0), a pressure of Δp > 2 bar is available.

FPT_80-600



Notes: The delivery curve of Δp = 8 bar is reached at a pneumatic pressure of 5 bar on the overflow valve. Here, when closing the delivery valve (full overflow) a, still permissible, Δp = 9 bar is not exceeded.

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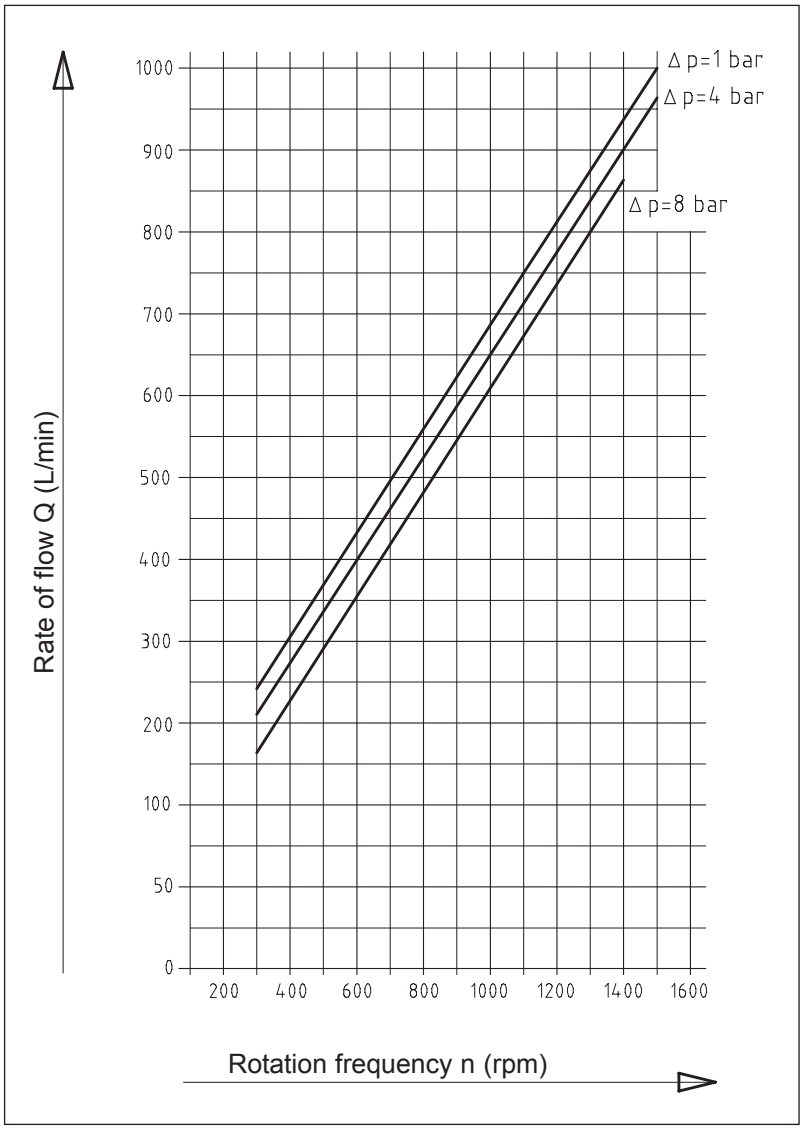
At a volumetric flow of Q < 100 l and unpressurised overflow valve (pneumatic pressure = 0), a pressure of Δp > 2 bar is available.

FPT_80-700

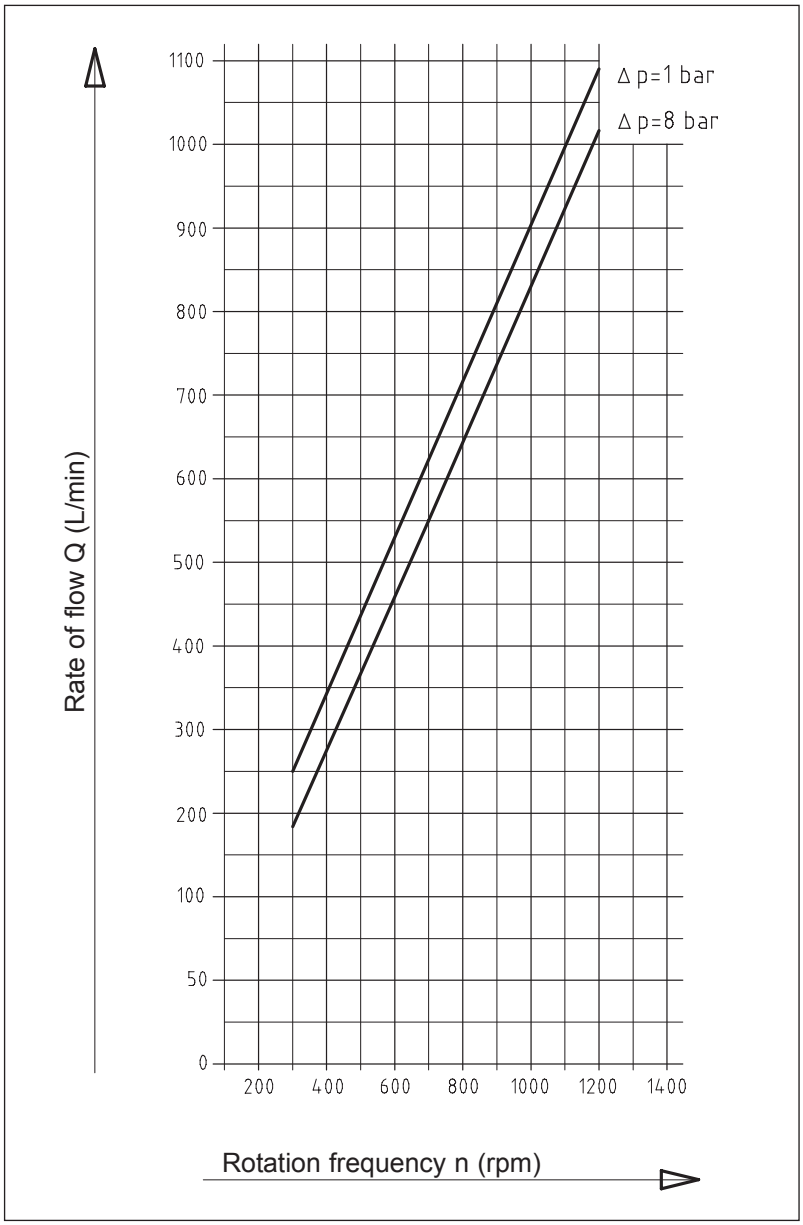


Notes: The delivery curve of Δp = 8 bar is reached at a pneumatic pressure of 5 bar on the overflow valve. Here, when closing the delivery valve (full overflow) a, still permissible, Δp = 9 bar is not exceeded.

For a de-energised overflow valve (pneumatics pressure = 0) the maximum rate of flow up to a pressure of Δp = 1.5 bar is retained; anything above and the overflow valve opens.

At a volumetric flow of Q < 100 l and unpressurised overflow valve (pneumatic pressure = 0), a pressure of Δp > 2 bar is available.

FPT_80-900



Notes: The delivery curve of Δp = 8 bar is reached at a pneumatic pressure of 5 bar on the overflow valve. Here, when closing the delivery valve (full overflow) a, still permissible, Δp = 9 bar is not exceeded.

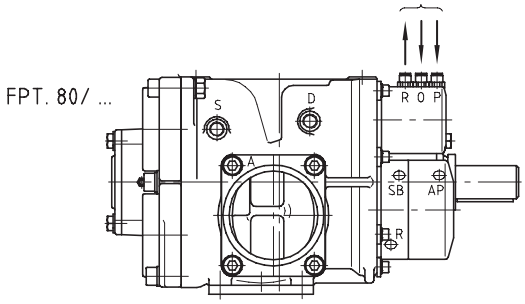
For a de-energised overflow valve (pneumatics pressure = 0) the maximum rate of flow up to a pressure of Δp = 1.5 bar is retained; anything above and the overflow valve opens.

At a volumetric flow of Q < 100 l and unpressurised overflow valve (pneumatic pressure = 0), a pressure of Δp > 2 bar is available.

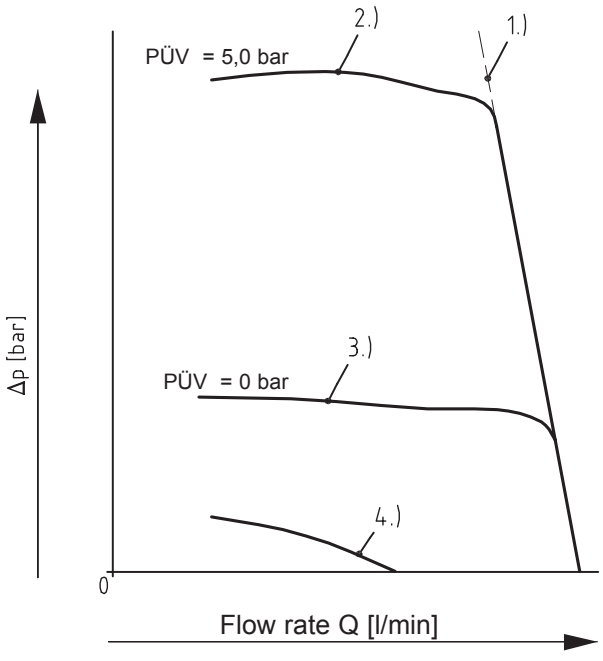
8. Control of overflow valve

Effect on rate of flow

Overflow valve connections



The overflow valve can release a connection internally between the pressure and the suction sides. It is held closed by means of a pressure-adjusting spring and, where applicable, additional pneumatic pressure (via "P") or pneumatically opened (via "O"). Depending upon the actuation the flow rate can be influenced as follows:



1.) possible curve if no overflow valve present.

2.) pressure adjusting spring and pneumatic pressure to “P” (approx. 5.0 bar) provide the pump`s max. Δp.

3.) pneumatic pressure at “P”, switched off e.g. through flow monitor. Only the pressure adjusting spring exerts an influence.

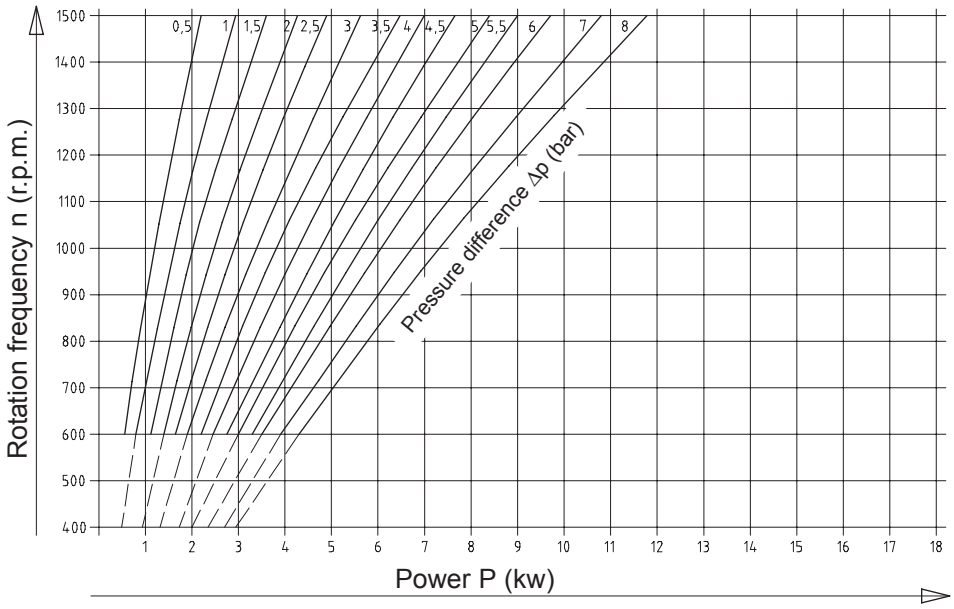
4.) pneumatic pressure at “P”, switched off and at “O” min. 4 bar pneumatic pressure the overflow valve opens and it sets the Δp only relative to the pressure loss.

9. Flow control

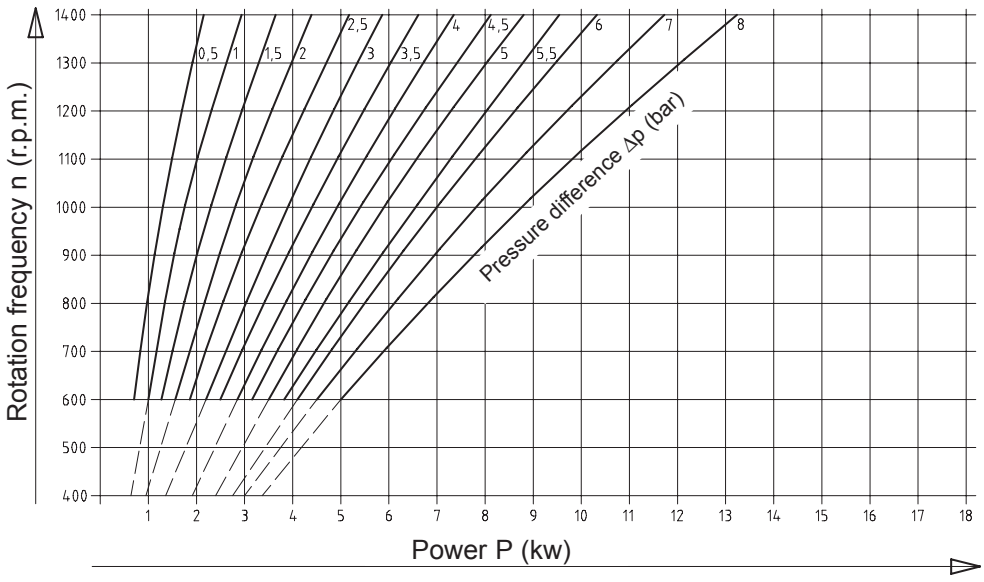
At full-hose delivery a pressure control can be applied for continuous adjustment of the rate of flow. (see pneumatics schematics)

9. Power consumption diagrams

FPT_80-500

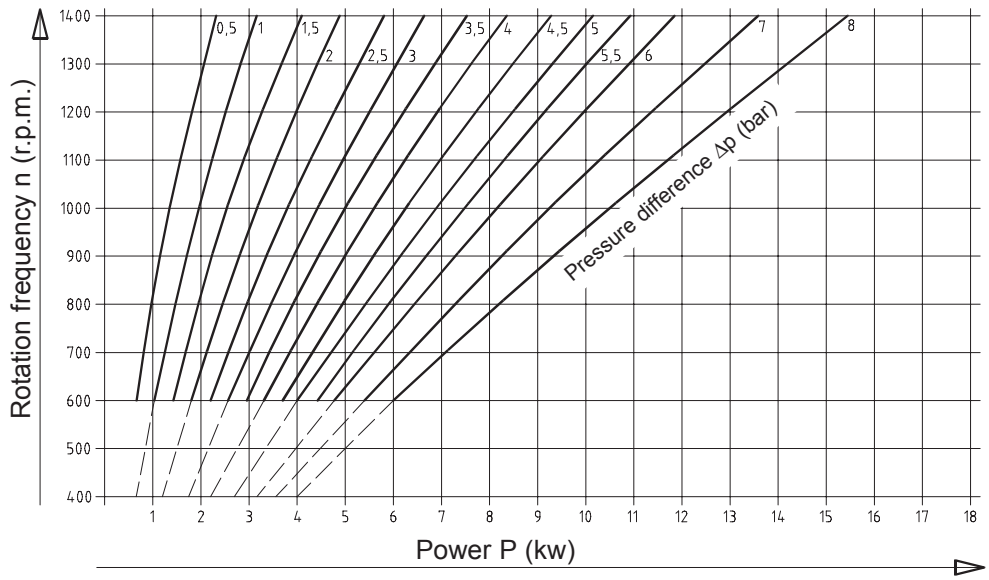


FPT_80-600

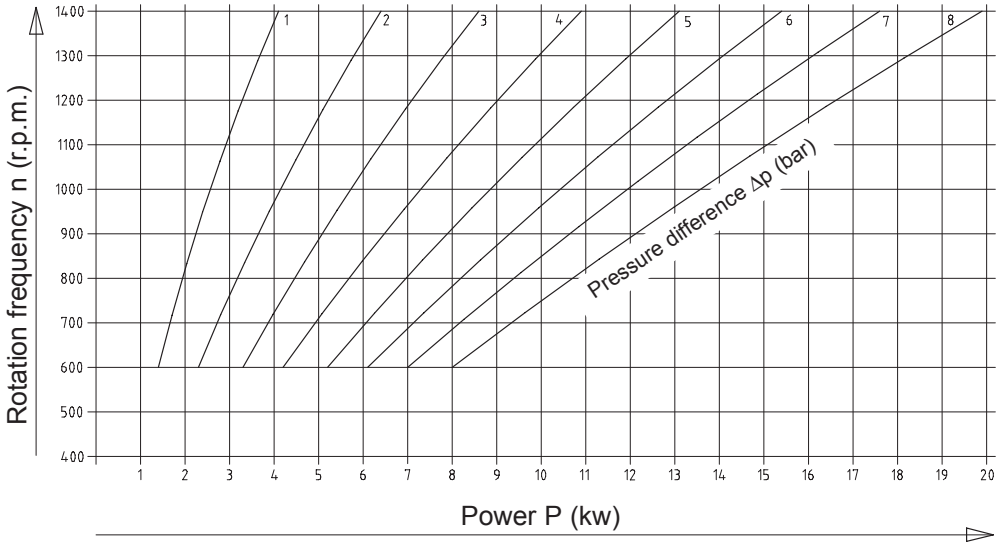


The pump power consumptions are minimum values for low-viscosity media with viscosities up to approx. 12 cSt. Such as, e.g. fuel oil EL, diesel fuel and carburettor fuel.

FPT_80-700



FPT_80-900



The pump power consumptions are minimum values for low-viscosity media with viscosities up to approx. 12 cSt. Such as, e.g. fuel oil EL, diesel fuel and carburettor fuel.

10. Installation

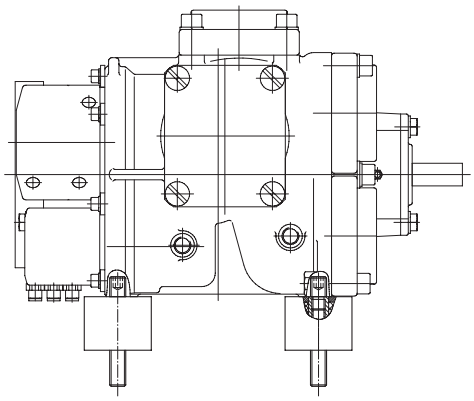
Preparation:

- Remove all transport packaging.
- Check pump for signs of any external transportation damage.

Installation position:

- Install pump stress-free in horizontal shaft bearing. Deviations of 5° to the horizontal are permissible.
- The pump can be installed upright, inverted or horizontally.
- In the event of horizontal or inverted installation then the M4 threaded pins must be removed from the discharge bores facing downwards. The other bores must be sealed or left as such.
- Both compressed-air lines “R” should be facing downwards (±50°). To set, loosen the clamping screw, twist the inserts and tighten the screws again.
  Connection “R” (and connection “O”, if not used) must be routed with splash-protection using a PA-hose (ø6mm).
- The housing cover opposite the drive should be accessible for service reasons.

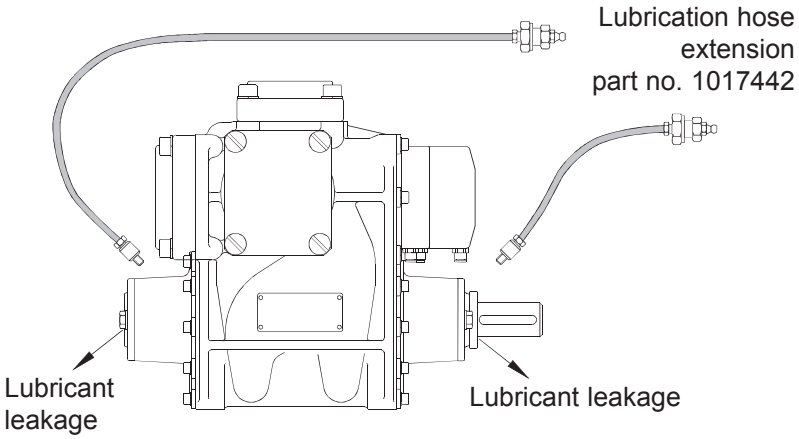
Fastening: If required the pump can be flexibly suspended on silent bearings at its base fastening to dampen noise and vibrations.
For this purpose a complete set consisting of 4 rubber-bonded metal suspension elements and the attendant threaded pins is available. **Part no. 1696676**



Weight of the set: 0.76 kg

Assembly at inaccessible positions:

Position pump lubricating points such that maintenance can be conducted without any risk.

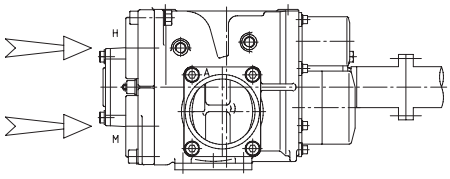


Pipeline connection:

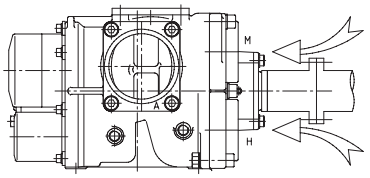
- Pipelines can be connected using flexible connecting pipes. The pump is to have a filter fitted, mesh width ≤1000 µm, on the suction side to protect it against mechanical damage caused by foreign bodies.
- Where possible the suction line should be short, straight and routed in a sufficient nominal width (to prevent cavitations).
- All pipelines are to be connected in accordance with the pump designations.
- For safety reasons the vane-type pump may only be operated with the overflow valve integrated into the system.

Pipe routing:

Version Right (standard)



Version Left



Prop shaft drive: **During installation and maintenance of the propeller shaft, the manufacturer's specifications are to be adhered to!**

- Do not mount the propeller-shaft flange onto the pump shaft using hard impacts (use lubricant and plastic hammer).
- Use propeller shaft with linear compensation.
- The propeller shaft heads must be located on a single level (see Fig. 1). The propeller-shaft flange from the auxiliary drive and pump must be parallel (see Fig. 2).

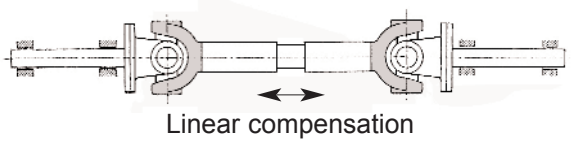


Fig. 1

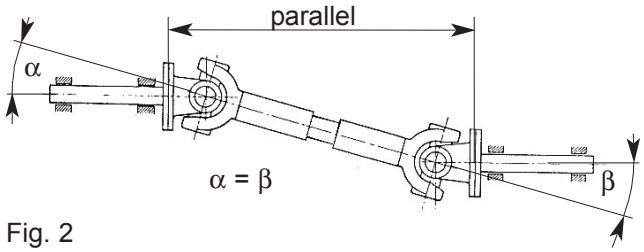


Fig. 2

- A Z layout (see Fig. 2) should be strived for.
- Where possible angles α and β should be equal.
- If, depending on the speed, no other values have been specified by the propeller shaft manufacturer for bending angles (α or β), we would advise you not to exceed 10°.
- The drive may not transmit any thrust to the pump drive shaft.
- If drive is provided by a vehicle engine then it must be ensured that the pump's drive is switched off when driving.

Prevention of impermissible heating up:

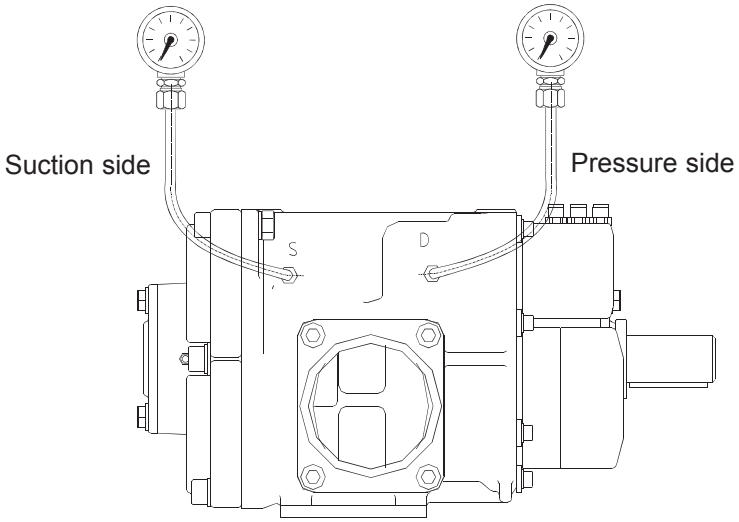
Extended operation (> 5min) of the pump against the closed pressure side should be avoided due to impermissible build-up of heat.

Pressure monitoring:

For adjustment and monitoring of the pump a pressure gauge can be mounted on the pressure side.
A measurement point is available on the suction side.

Pressure gauge -1 to +9 bar
part no. 1167118

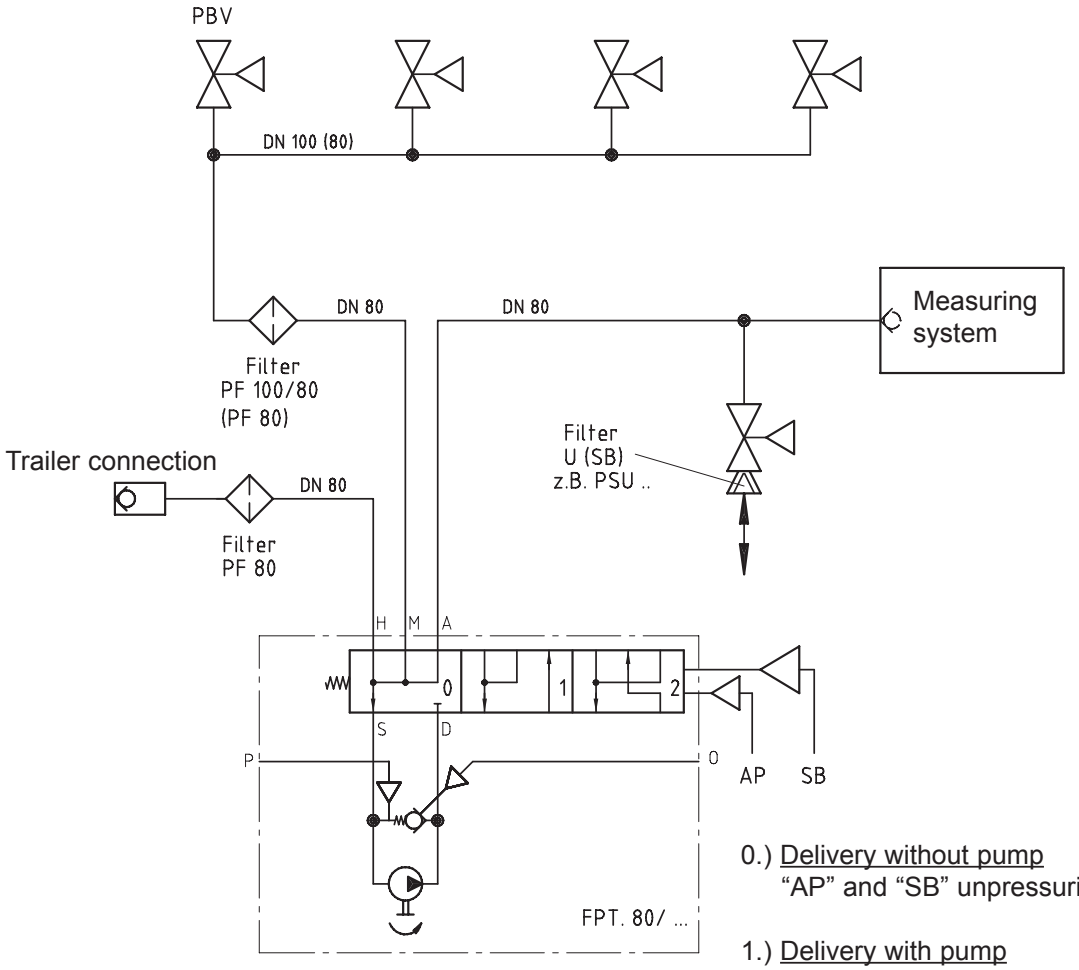
Pressure gauge 0 to +10 bar
part no. 1167100



Speed adjustment at hydraulic drive:

To set the speed the shaft covering on the side opposite the drive can be removed.
This cover has to be mounted again after the measurement in order to avoid any bearing drift.

11. Functional schematic



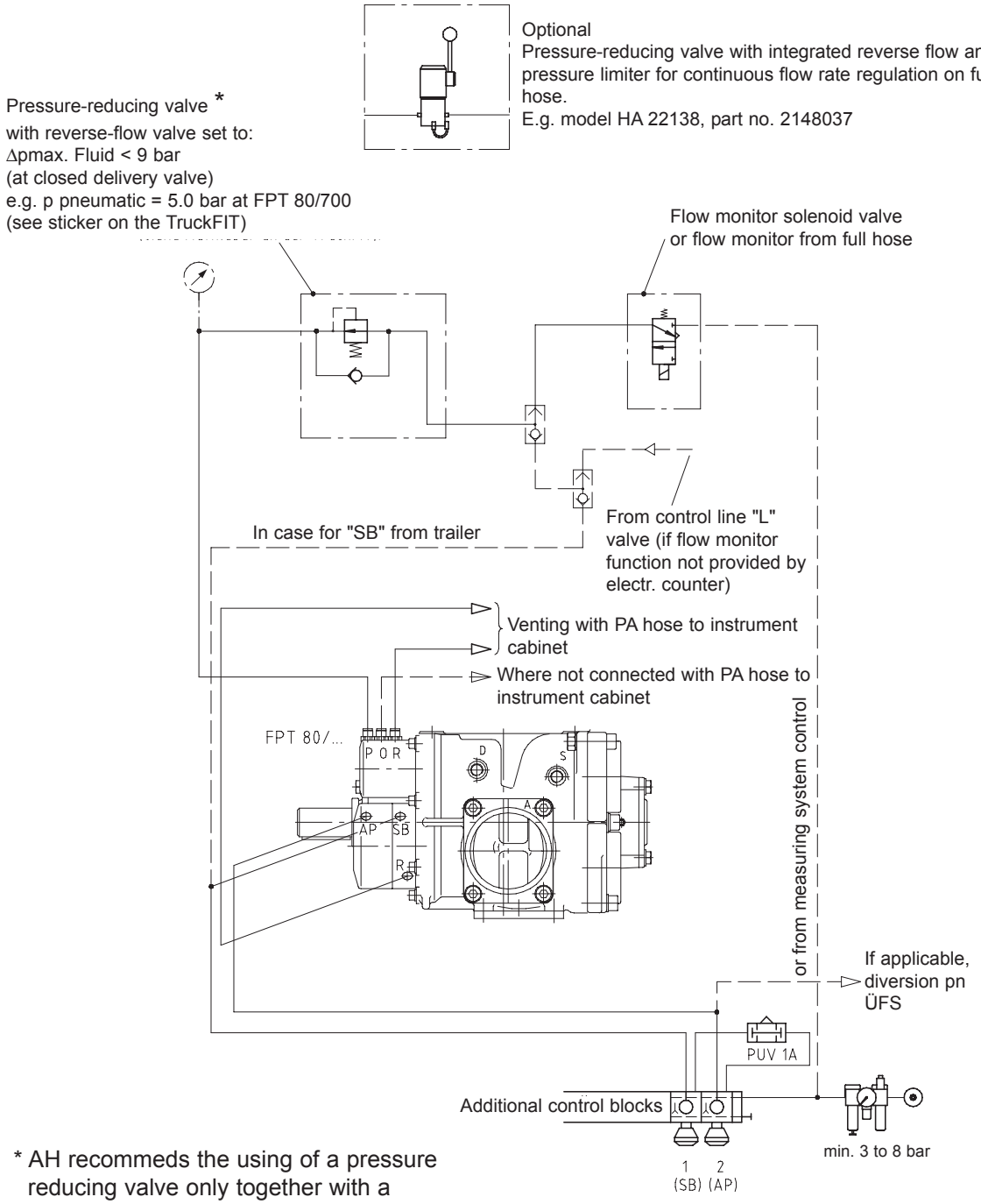
0.) <u>Delivery without pump</u>
"AP" and "SB" unpressurized

1.) <u>Delivery with pump</u>
"AP" applied
a) measured / not measured from motor vehicle
b) measured / not measured from trailer

2.) <u>SB and transferring by pump</u>
"SB" applied
a) "SB" via "U" in motor vehicle
b) transfer by pump from trailer to motor vehicle

12. Pneumatics schematic

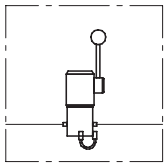
Without interlock: When switching from “SB” to “AP” the auxiliary drive must be switched off.



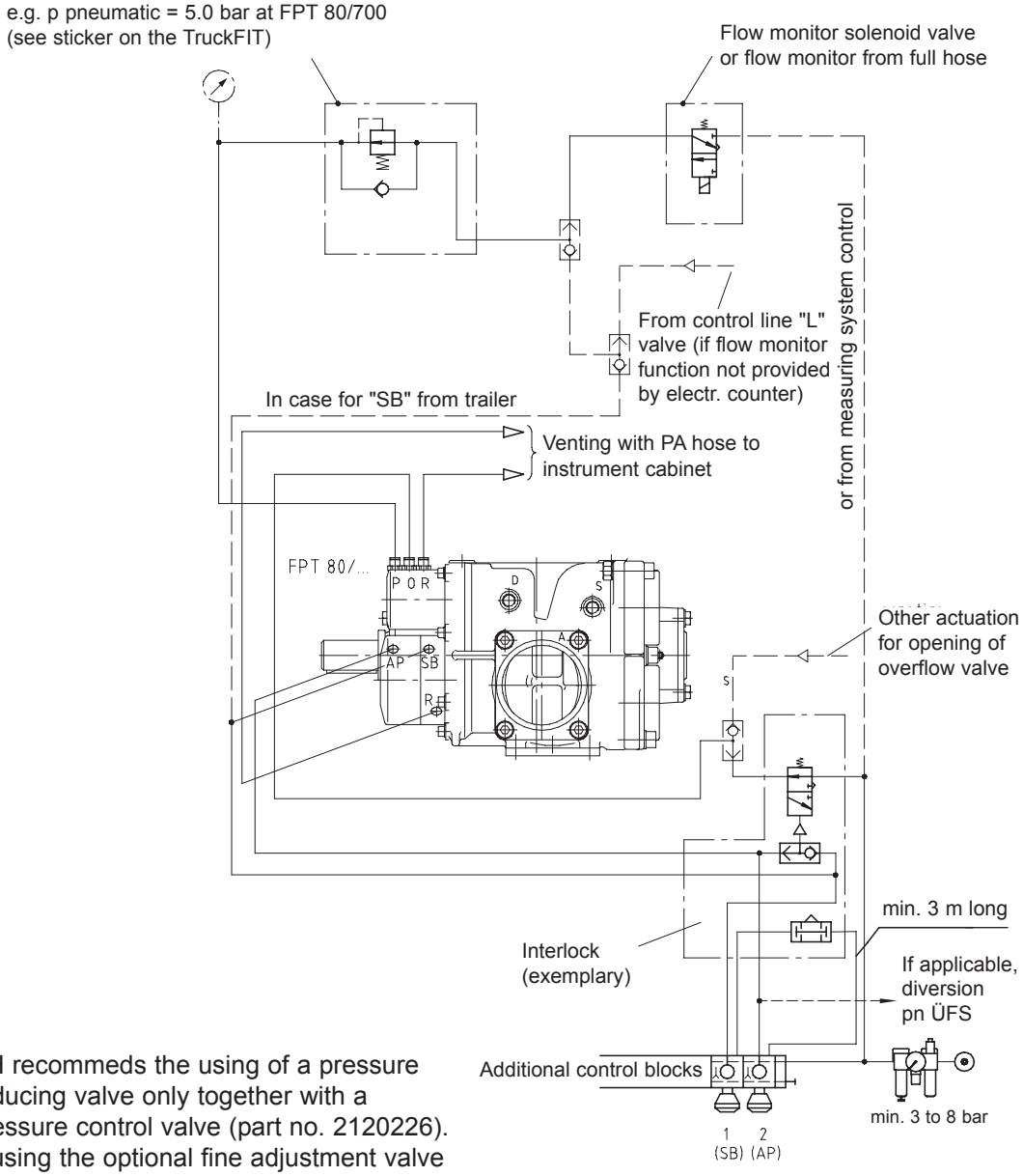
* AH recommeds the using of a pressure reducing valve only together with a pressure control valve (part no. 2120226). If using the optional fine adjustment valve HA 22138 (part no. 2148037) the additional control valve is not required.

With interlock: To switch over from “SB” (e.g. from the trailer) to “AP”, with auxiliary drive switched on.

For example:



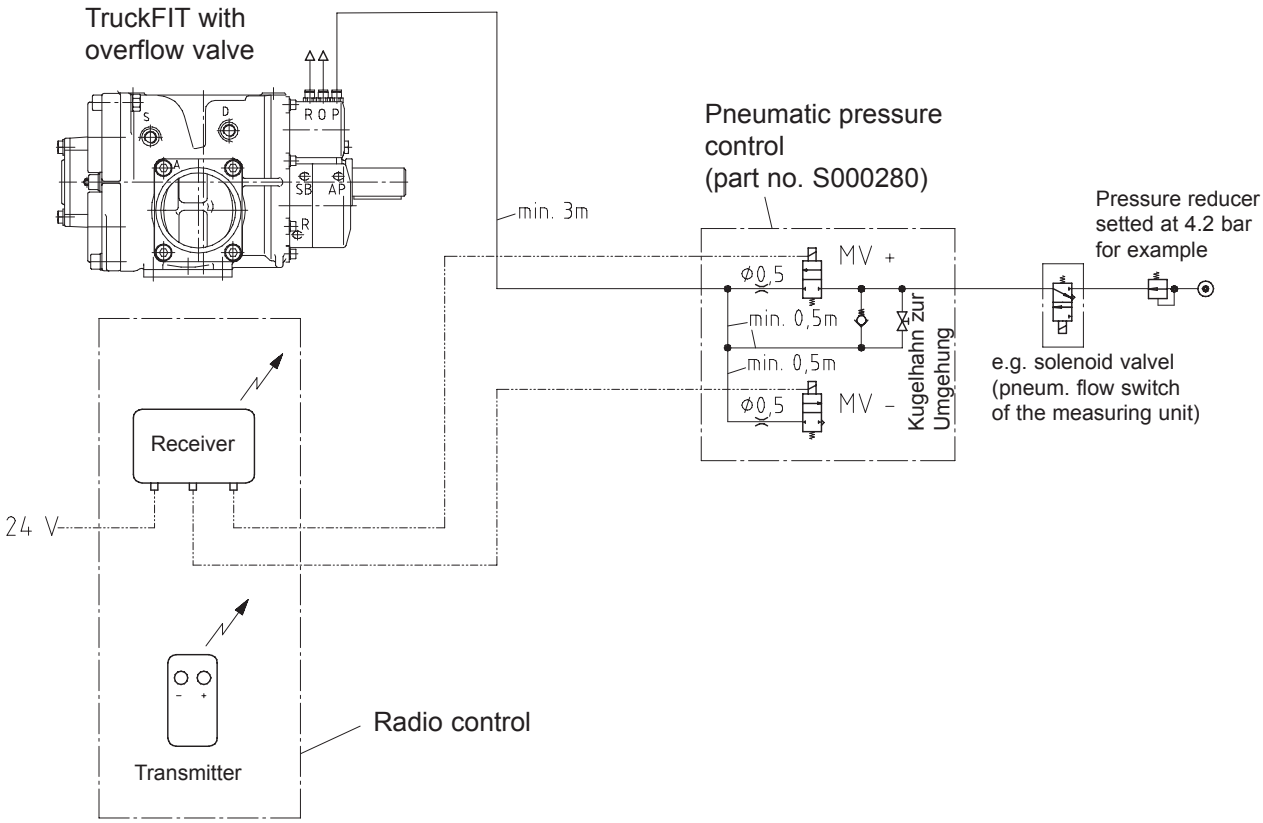
Optional
Fine adjustment valve with integrated reverse flow and pressure limiter for continuous flow rate regulation on full hose.
E.g. model HA 22138, part no. 2148037



* AH recommeds the using of a pressure reducing valve only together with a pressure control valve (part no. 2120226). If using the optional fine adjustment valve HA 22138 (part no. 2148037) the additional control valve is not required.

With radio controlled pressure control: Radio control e.g. by *LRC-Charger* from manufacturer *Niehüser*. Special solutions with or without explosion proofness are also available.

For example:



13. Start-up

If this is not observed people and material will be put at risk! Pump operation without any product will lead to an impermissible build up of heat.

Checking direction of rotation:

The drive's direction of rotation must match that of the pump.

Initial start-up:

- Remove plugging for venting (connection "R").
- Check the installation in accordance with the operating instructions!
- Check the pipelines and all connections!
- Make sure that the pump speed does not exceed the maximum permissible speed.
- The overflow valve is to be relieved before switching on the pump. To this end, the applied air pressure should be reduced to zero and, once the pump has started, increased again.

Adjustment of pump pressure:

The maximum pump pressure is set using the pneumatic pressure in the overflow valve.
To this end a gauge must be connected to the pump's pressure side. The gauge pressure is monitored to help gradually regulate the rate of delivery.
This can be done either by closing off the fuel nozzle or by making a bend in the delivery hose.

The air pressure on the overflow valve is gradually increased until the pressure-side gauge reaches the desired pump pressure.

In doing so the maximum pump pressure of 8 bar (briefly 9 bar) may not be exceeded.

14. Repairs and maintenance

Lubrication:	The vane-type pump is to be lubricated at the bearing positions.
Intervals:	Every 600 operating hours or 3 years, whatever happens earlier.
Lubricant:	For standard operations: Beacon EP2 (part no. 1000189). For low temperature operations (e.g. for type X1): Molyduval Aero 14 (part no. 2067578).
Procedure:	Apply lubrication to the lubricating points during pump is running (without load, min. 300 rpm) until the grease is discharged at the exit points. **Danger - Be careful for running pumps!**
Central lubrication:	This is permitted providing a suitable lubricant is used.

15. Troubleshooting

Fault:	**Cause:**	**Remedy:**
No pump suction / pump grows louder	Protective filter clogged	Clean filter
	Pump worn (high gap leakages)	Send pump to Service change vanes if necessary
Drive motor stops at pressure-side shutoff	Overflow valve setting too high	Check setting of overflow valve and set if necessary
Pump makes knocking noises and has reduced output	Delivery elements (vanes) broken	Send pump to Service
		Check pump's protective filter for signs of damage
Pump pressure too high	Overflow valve setting too high	Check setting of overflow valve and set if necessary
Pump pressure too low or not available	Overflow valve setting too low or faulty	Set overflow valve, replace if necessary
	Speed too low	Increase speed (n_{max})
No output	No venting	Remove plugging for venting (connection "R").