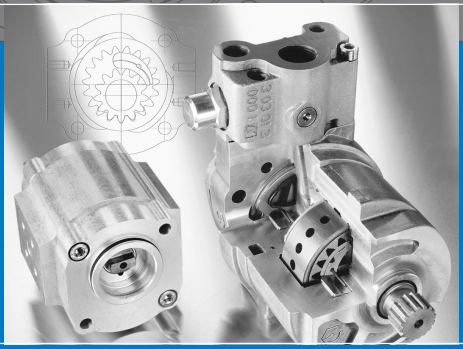
eckerle
HYDRAULIC DIVISION

Bedienungsanleitung
Innenzahnradpumpe EIP

Instruction Manual
Internal Gear Pump Type EIP

Manuel de service
Pompe à engrenages intérieurs EIP

Manuale d'istruzione
Pompe ad ingranaggio interno EIP



Commissioning and Maintenance of ECKERLE internal gear pumps

An unobjectionable operation of **ECKERLE** internal gear pumps can be guaranteed only if the following instructions are strictly adhered to. You can check the structure and function of the pump in the relevant single brochures.

In the following sections, we will give some alternative examples of how a hydraulic pump can be operated within an aggregate. Other operating conditions that deviate from the instructions given are permissible only after prior consultation of and release by the manufacturer.

A technical data sheet for clarifying technical operating conditions has been prepared and made available by us on the internet under **www.eckerle.com**. If you have any queries, please feel free to use the template provided there.

We do not provide any warranty in case of failure to comply with the specifications.

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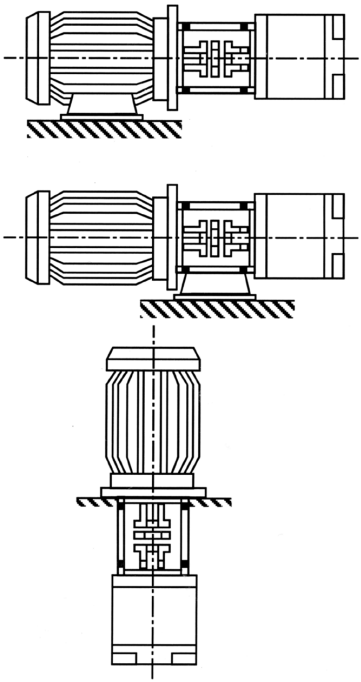
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English

1. Installing the Pump

1.1 Installation position

ECKERLE internal gear pumps can be installed in any position you like. They can be installed in a vertical or horizontal position.



Note:

ECKERLE internal gear pumps are self-priming. They can be arranged both above and below the tank level, but only if a shaft sealing ring is used.

The permissible pressure values at the inlet side of the pump must be absolutely adhered to (see technical specifications).

1.2 Installation instructions

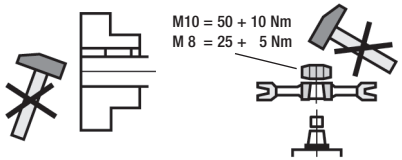
Important Note!
Prior to installing and commissioning the pump, it must be filled with oil from the suction side.

When installing the pump, make sure that:

- the drive's and pump's rotation direction, marked by an arrow on the housing or name-plate, correspond to each other. For example, a drive running counter-clockwise requires a pump running clockwise.
- the pump and motor shaft are aligned.
- compensating couplings (flexible or curved-gear couplings) are used.
  If propeller shafts are used, it must be taken in account that:
  1. the propeller shaft is designed for the maximum diffraction angle.
  2. the shaft end and driven end are aligned in parallel.
  3. the required length compensation is possible.
- the pump is driven without axial and lateral force. A drive via gear wheels, belts or chains without an adapter bearing is possible only to a limited extent and basically requires the approval by **ECKERLE**.

In case of hollow shaft connections, grease the shaft toothing.

- no bracing of the pump occurs caused by an uneven pump support.
- no bracing occurs caused by pipings mounted improperly.
- coupling parts are installed without using force, that is striking or pressing.



Sealing faces must not be damaged.
Permissible tightening torques for mounting screws at the pump and piping connectors must be obeyed.

As for the O-ring packing, obey the inlet bevel at the counterpart as well as the O-ring being greased.

English

1.3 Noise emission of ECKERLE internal gear pumps

The sound pressure level values specified in the individual brochures have been measured following DIN 45 635, sheet 26, meaning that it is shown the acoustic emission of the pump only. Ambient effects, such as the place of installation, the structure of the complete plant (reflecting areas), pipings etc. have not been taken in account.

The sound pressure characteristics given in the brochures have been determined using serial pumps in the sound measurement room (sound-reduced room).

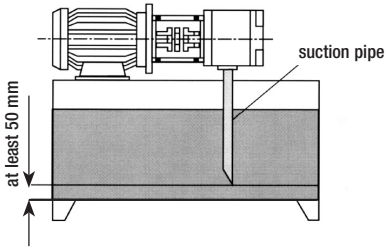
Due to the low delivery rate and pressure pulsation of **ECKERLE** internal gear pumps, excitation of pipings, machine parts, reservoirs, valves etc. is very low.

In unfavourable installation and pipework settings, the plant's sound pressure level might exceed the value for the pump itself by 5 to 10 dB(A).

For removing sound problems, refer to the appendix. Make sure flexible lines are used as connection to the tank.

2. Oil Reservoir

- The amount of oil required in the reservoir depends on relevant operating conditions. It should be equal to at least two to five times (in case of intermittent operation and correspondingly long cooling phases) the amount of the pump's delivery rate per minute.
- If the reservoir is too small, cooling of the oil may be required, if necessary.
- The reservoir has to be provided with a ventilation filter and a sieve in the filler opening.
- Prior to filling the reservoir with oil, it must be thoroughly cleaned.
- Varnished reservoirs must have an oil resistant paint.
- As for the reservoir design, it must be taken into account that, between the oil being primed and the return flow, sufficient region of steady flow for separating air from the oil (baffles) is ensured.
- Recommended suction speed 0.5 to 1.5 m/s
  maximum return flow speed 2 to 3 m/s



3. Operating Medium

3.1 Mineral hydraulic oil

3.1.1 Selection

- We basically prescribe the use of branded hydraulic oil according to DIN 51534, part II. The oil used should have been approved by **ECKERLE** and the machine manufacturers.
- It is not allowed, under any circumstances, to blend several types of oil, or oil of different manufacturers, without previously checking it for compatibility. We normally recommend to consult the manufacturer or supplier in advance.

3.1.2 Operating temperature

- The most favourable operating temperature is from 40 to 60°C – a short-time maximum temperature from 80°C to 100°C is permissible.

3.1.3 Viscosity

Minimum permissible operating viscosity is	10 mm^2/s (cSt)
Optimum operating viscosity is	25-100 mm^2/s (cSt)
Maximum permissible starting viscosity is	**2000 mm^2/s (cSt)**

When determining the operating medium's viscosity, the average operating temperatures must be observed subject to the permissible viscosity values.

3.2 Flame-resistant fluids and other fluids

On request.

4. Filtration

Careful filtration of the pressure fluid is an essential condition for a long operating life and trouble-free operation of the hydraulic system.

Pollution level:

- Maximum permissible pollution of the operating medium: according to NAS 1638, Class 9; filter with $\beta_{10} > 100$

English

- In order to ensure a longer operating life, we recommend a maximum pollution
  according to NAS 1638, Class 7 or better
  according to ISO 4406, Code 18/16/13 or better.
- We recommend to use a filter with a minimum retention rate of $\beta_{10} > 100$.

- The filter or filter elements have to be maintained regularly and be replaced, if necessary.
- In order to be able to monitor the operability of the filters, they must be equipped with a visual, or even better, with an electrical pollution display.

5. Pressure Limiting

5.1 Pressure control valve

- In order to avoid impermissible, high pressure rates in the pump, the pressure control valve should be positioned directly after the pumps' outlet, if possible, but in any case, between the pump and the downstream hydraulic system.
- A setting has to be selected so that the pump's permissible peak pressure will not be exceeded (see technical specifications).

5.2 Bleeding of pressure control valves

On commissioning the pump, it is absolutely necessary to carry out sufficient bleeding so that the pump does not run dry, get overheated or breaks down early due to lack of oil.

6. Functional Test and Commissioning

6.1 Rotation direction

ECKERLE internal gear pumps can be delivered in clockwise and anti-clockwise designs. The pump's rotation direction is determined with a view to the drive shaft and marked by an arrow on the pump housing or the name-plate.

Prior to commissioning the pump, check if the rotation directions of drive and pump comply with each other!

6.2 Rotational speed

The permissible threshold rotational speeds can be taken from the brochures.

CAUTION!

When operating a combination of pumps, especially when different pump series or sizes are combined, the permissible rotational speed of the relevant pump increment must be observed!

6.3 Commissioning

- It must be possible for the pump to be started without load, that is with a consumer being unloaded.
- During **initial system checkout**, it is **absolutely necessary to bleed** the pressure line.
- The system has to be bled until no cracking noise or formation of foam can be determined any more.
  In the process, the fluid level in the reservoir must be observed until the system has been bled completely. Under no circumstances may the oil level fall below the minimum level.
- After bleeding the pump, it is to be loaded using the projected pressure, and the pressure control valve be secured against being readjusted.
- Prior to switching off the pump, the pressure load must be disconnected so that pressureless circulation prevails.
- After some operating hours, check the filter and oil temperature.

English

7. Monitoring ECKERLE internal gear pumps in operation

ECKERLE internal gear pumps have a clearance-compensated design with a high volumetric efficiency. If **ECKERLE** IP pumps are operated properly according to the permissible technical specifications and the operating medium used is regularly and carefully checked, they excel by an extremely long operating life. If malfunctions occur during the operation of a hydraulic system, this indicates typical signs of incipient wear and tear of the hydraulic pump.

7.1 Signs of incipient wear and tear of a hydraulic pump

- increase of driving power
- increase of the pump's running noise
- increase of the cycling time / decrease of working speed
- pressure loss before the consumer
- increase of temperature differences of operating medium between the pump's inlet and outlet with determined amount of cooling water
- increase of difference between the pump housing temperature and the admission temperature of the operating medium
- increase of cooling water consumption

7.2 Measures

If one has to assume that the characteristics mentioned under 7.1 cannot be attributed to components linked to the hydraulic circulation, the pump must be immediately checked.

We recommend that inspections or potentially necessary repair work is carried out by authorized, qualified and skilled personnel only.

Basically, repairs may only be carried out by **ECKERLE** or by their authorized dealers and branches.

We do not provide any warranty in case you repair a pump yourself.

8. Inspection and Maintenance Scope

The inspection and maintenance scope depends on the type of hydraulic system, components, ambient impacts, operating conditions as well as the manufacturer's specifications.

The inspection and maintenance plan has to be included in the instruction manual of the hydraulic system.

8.1 Regular inspection scope

- general check of the pump condition
  visual and functional check, including safety devices and feedback control equipment
- tightness and screwed connections
- mounting screws
- final check of inspection work using measurement and documentation of measuring and test results

8.2 Demand-dependant maintenance scope

The following has to be checked:

- setting value of the pressure control valve
- oil filter: to be cleaned according to manufacturer's specifications; filter element to be replaced, if necessary
- quality of operating medium:
  operating medium to be replaced according to operating conditions and recommendations made by the manufacturer
- replacement of wear parts
- final check of inspection work using measurement and documentation of measuring and test results

The period for the maintenance work mainly depend on the operating conditions. Within the bounds of the demand-dependent inspection scope, preventive repair measures for retaining functional safety should also be carried out.

9. Conservation

Standard IP pumps delivered ex works can be stored for about one year without having to take particular measures. At the same time it is assumed that the pressure and suction connectors are properly covered using seal plugs.

If more than 1 year of storage time is calculated in advance, we recommend to carry out conservation using "Tectyl 511", for example. While doing so, the unit is sprayed using Tectyl and then shrink-wrapped by adding drying agent (e.g. Kieselguhr pads or similar). This protection will be sufficient for about 2 years.

For longer storage periods - not longer than 4 years, however – the unit, prior to being sprayed and shrink-wrapped, must be additionally flushed at an ambient temperature of 20 to 30°C using a highly fluid hydraulic oil such as ISO VG 22.

10. Important Notes

- **ECKERLE** GmbH will provide guarantee for their pumps only if they have been installed and maintained fully in accordance with the specifications compiled in this document and if installation and operating conditions deviating from these specifications have been approved by **ECKERLE**.
- Pumps delivered by **ECKERLE** have been subjected to functional and performance testing. The pump must not be modified by the client, otherwise the warranty claim will expire.
- Repairs may only be carried out by **ECKERLE** or by their authorized dealers and branches. We do not provide any warranty in case you repair a pump yourself.
- Installation, maintenance and repair of the pump may be carried out by authorized and trained personnel only.
- Commonly valid regulations for the prevention of accidents as well as safety regulations must be strictly adhered to.

11. Potential Causes of Malfunctions and Trouble Shooting

Operation Breakdown	Possible Cause	Trouble Shooting
1. Pump does not start to suck	1.1) Locking plug at pump's inlet socket not removed	Remove plug
	1.2) Shut-off unit closed	Open suction-side shut-off unit
	1.3) Wrong rotation direction of pump and driving unit	Reverse or adjust rotation direction
	1.4) Oil level in reservoir too low (suction pipe above operating medium level)	Fill up oil level

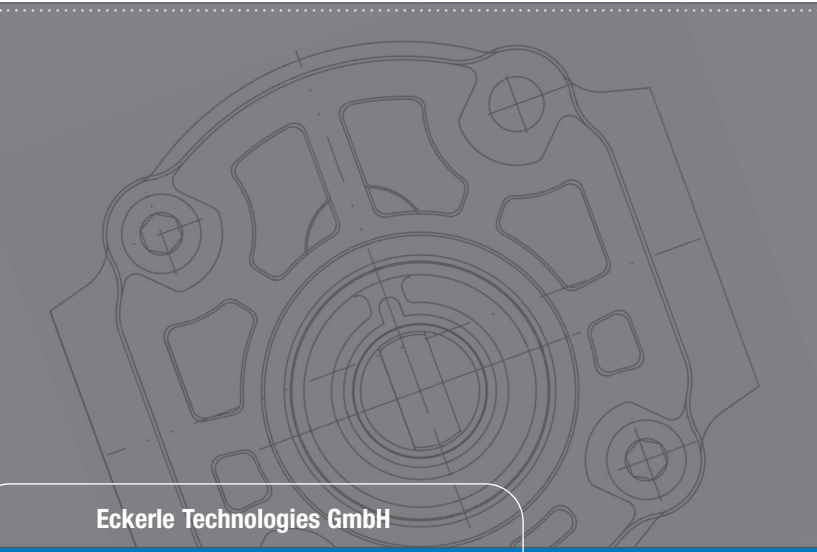
Operation Breakdown	Possible Cause	Trouble Shooting
1. Pump does not start to suck	1.5) Suction pipe above permissible minimum operating medium level	Extend suction pipe
	1.6) Leaky suction pipe	Make piping tight, retighten screwed connection
	1.7) Pressure pipe is shut or preloaded by a valve; therefore the pump cannot bleed	Valve in position: switch to **pressureless circulation** or bleed pump on pressure side
	1.8) Viscosity of operating medium is accordingly too high	Use operating medium according to permissible viscosity values
	1.9) Low pressure in suction pipe too strong, flow resistance too high	Increase suction transverse section, clean suction filter, straighten suction pipe, decrease suction height, reduce suction length
2. Pump delivers, but but there is no pressure build-up	2.1) Air entering suction pipe	Fill up oil level
	2.2) Pressure valve does not close due to dirt or wear at the packet seal	Clean pressure valve or replace defective parts
	2.3) Way valve is in position: **pressureless circulation**	Set valve to corresponding operating position; with solenoid valves, check electric connection
	2.4) Pipe fracture	Repair damage
	2.5) Strong wear of the pump	Have the pump repaired by the manufacturer

Operation Breakdown	Possible Cause	Trouble Shooting
3. Pumping delivery interrupted in spite of drive being intact	3.1) Pump shaft is shorn off	Have the pump repaired by the manufacturer
	3.2) Leaky suction pipe	See 11.1.5
	3.3) Oil level in reservoir dropped below minimum suction level	Fill up operating medium; see also 11.1.3 and 11.1.4
	3.4) Coupling destroyed	Replace coupling
4. Pump is too noisy	4.1) Pump take in air	See 11.1.3 to 11.1.5
	4.2) Defective shaft seal	Replace shaft seal
	4.3) Cavitation in pump	See 11.1.7 and 11.1.8
	4.4) Defective coupling	Replace coupling and install new one properly
	4.5) Defective pump	Have the pump repaired by the manufacturer
	4.6) Rigid pipework	Switch to flexible hose fitting

Notes

English

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