

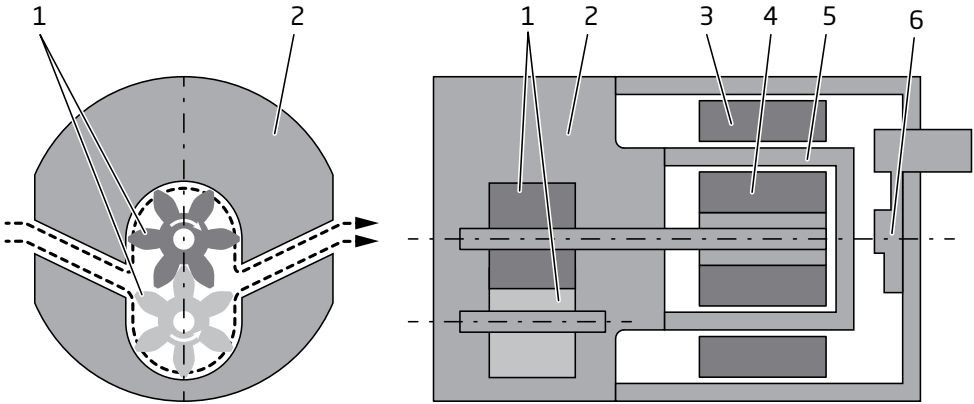
Technical Documentation  
Gear Pump with Canned Motor

ZY-2009-MM



# ZY-2009-MM

## Gear pump with canned motor



### Function of a gear pump

An external gear pump featuring an involute gear profile has two gear wheels (1) which rotate in a casing (2) with suction and pressure connection. One of the gear wheels is driven by a motor. The medium to be pumped is transported in the cavities between teeth and casing.

Gear pumps are displacement pumps. This displacement principle allows for the delivery of clear viscous liquids.

They are self-priming and robust due to their simple design.

### Function of the drive

The power transmission from motor to shaft is produced by a rotating field generated by coils (3) directly to the inner magnet (4). The can (5) separates the pumping chamber from the atmosphere. An integrated electronic circuit (6) provides for the rotating field and controls the pump speed.

The drive is free from bearings and rotating components. No maintenance is necessary in standard operation.

### Application

The pump can be used in the following application, e.g:

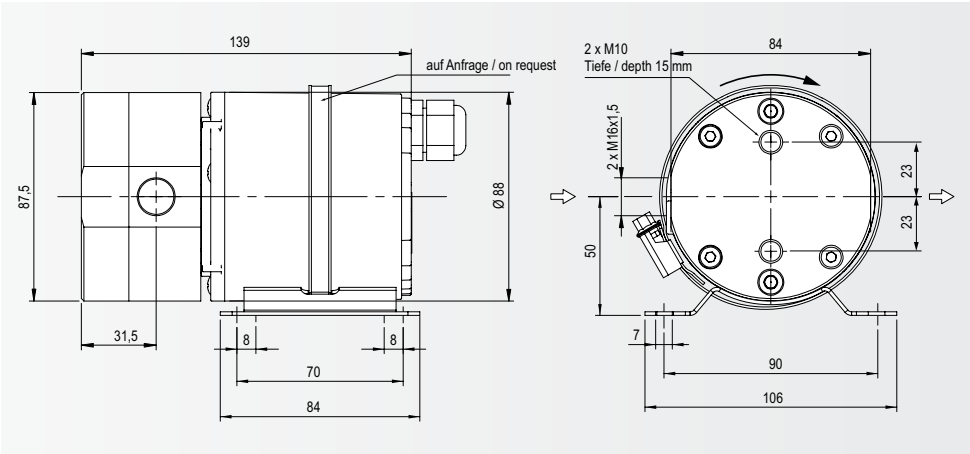
» delivery of fuel in motor vehicles and railcars

## Technical data

|                                |                                                                                                                                                                                                      |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pumped media                   | Diesel and oils; other non-corrosive media on request.                                                                                                                                               |
| Temperature of delivery        | - 35 °C up to + 80 °C (liquid media)                                                                                                                                                                 |
| Installation                   | Dry installation in buildings or in roofed places outdoors.<br>Not permitted in Ex-zones.                                                                                                            |
| Ambience                       | - 35 °C up to + 40 °C (-22 °F up to +176 °F) ambient temperature, max. 80 % air humidity.<br>Protect the pump against ambient atmosphere or vapours with high concentrations of acids or solvents..  |
| Static system pressure         | max. 2.5 bar (max. 36.3 psi)                                                                                                                                                                         |
| Motor power                    | max. 180 W (0.23 HP), depending on load and speed                                                                                                                                                    |
| Nominal voltage                | 24 V                                                                                                                                                                                                 |
| Operating voltage              | 18 to 28 V                                                                                                                                                                                           |
| Current consumption            | max. 7.5 A, depending on load and speed                                                                                                                                                              |
| Fuse                           | 10 A                                                                                                                                                                                                 |
| Speed                          | 1,000 to 4,000 rpm (possible parameters set by factory)                                                                                                                                              |
| Protection class               | IP 54, higher degree of protection on request                                                                                                                                                        |
| Sound pressure level           | max. 46 db (A) n a distance of 1 m (3.3 ft) to all sides                                                                                                                                             |
| Connecting wire                | 1,000 mm +/- 20 mm (39.3" +/- 0.8") insulating hose with loose wire-endings 50 mm (1.9"), isolated without ferrules, 5 mm (0.2") stripped.<br>See detailed information in table „wire specification“ |
| Cable connection               | M 16 x 1.5 plastics black                                                                                                                                                                            |
| Pumping capacity               | $p_{max}$ 8 bar, $Q_{max}$ 4.5 l/min                                                                                                                                                                 |
| Lifetime                       | 20,000 hours of operation according to standard mode of operation                                                                                                                                    |
| Protection against dry running | Not existing, the pump has to be protected against dry running by the user.                                                                                                                          |
| Blocking protection            | In the state of a blocked impeller the starting attempts will be continued indefinitely.                                                                                                             |
| Overload protection            | Integrated electronics automatically reduce motor speed when reaching max. admissible motor temperature.                                                                                             |
| Max. surface temp..            | approx. 90 °C (+194 °F)                                                                                                                                                                              |
| Storage temperature            | + 5 °C up to + 35 °C, for short time period (< 8h) -50 °C up to + 120 °C                                                                                                                             |
| Lacqueur                       | Motor casing powder-coated RAL 9005 black mat,<br>pump casing without lacqueur                                                                                                                       |
| Weight                         | 2.8 kg (6.18 lbs)                                                                                                                                                                                    |

# Description

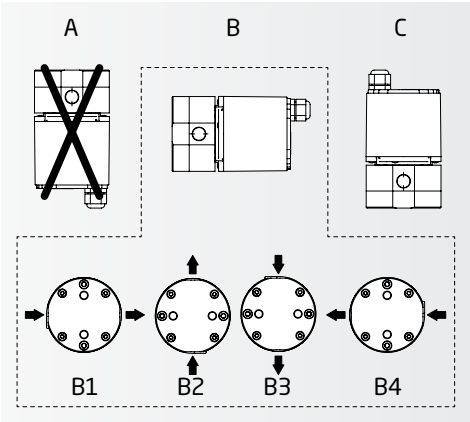
## Dimensional drawing



## Materials

|                |                                                |
|----------------|------------------------------------------------|
| Casing         | EN-GJS-400-15 / spheroidal graphite cast iron  |
| Gear wheel     | Steel                                          |
| Separating can | PPS (polyphenylensulfide with 40% fibre glass) |

EN-GJS-400-15 = EN-JS 1030 = GGG-40



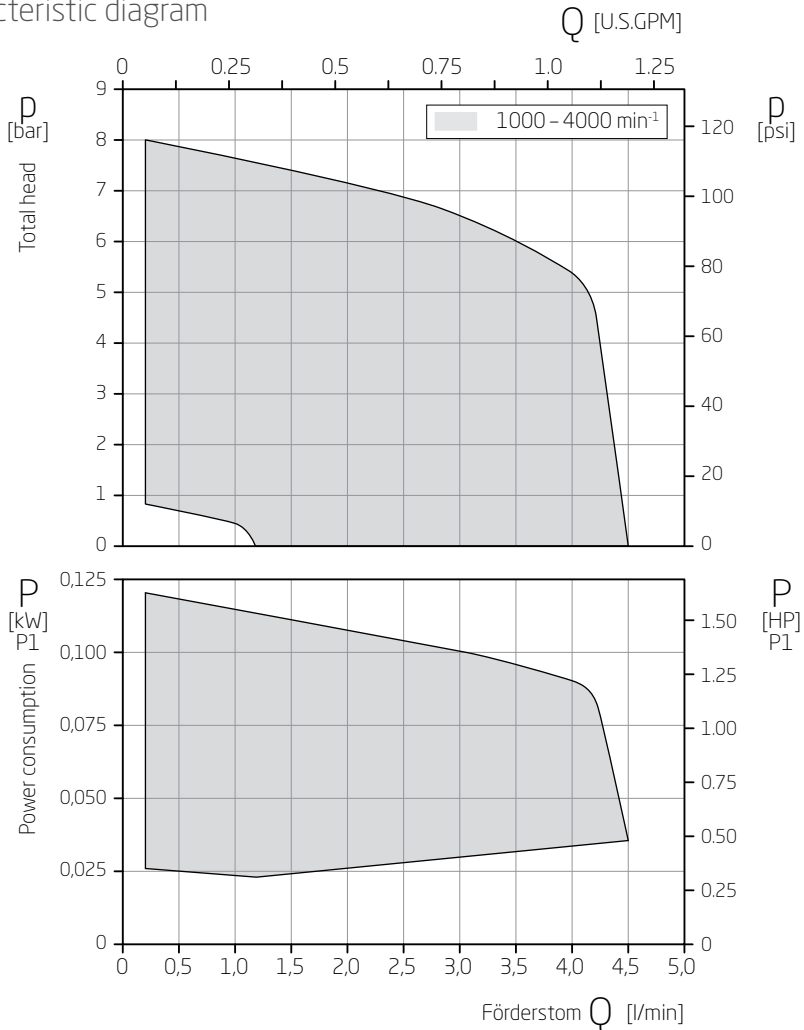
## Permissible installation positions

A = not permissible

B = permissible and recommended

C = permissible

## Characteristic diagram



Every operating point can be reached within these characteristic diagrams by setting different drive parameters.

The characteristic fields are applicable for the delivery of diesel oil of 20 °C (68 °F) temperature and an ambient temperature of 20 °C (68 °F).

The tolerance of total head and capacity is  $\pm 10\%$ , performance tolerance is  $+ 10\%$ . If the property of the pumped media differs, the characteristic fields change.

The power consumption P1 specifies the electrical power input.

## Fixing and installation

### Installation positions

refer to preceding page

### Assembly with casing bore holes

On the front side of the casing there are two M 10 holes, which are used for fixing.

### Assembly with tension clamp (optional)

Foot fixed with four M 6 screws:

By loosening the tension clamp, the position of the pump can be relocated.

Clamping torque is 3 - 5 Nm.

### Installing instructions

An open and well-ventilated place has to be chosen for the installation of the pump. The connections of suction and delivery pipe to the pump casing and the pump connections in general should be assembled tension-free. The pump connections are not to be loaded. Line size not less than ¼ inch. Do not use any kind of insulating material around the pump. Check all pipes according to fixed position and tightness.

### Electrical connections

The connecting wire has to be installed tension-free.

## Electrical Installation

Connect the red strand 2.5 mm<sup>2</sup> with the 24 V positive pole of the power supply unit.

Connect the black / blue strand 2.5 mm<sup>2</sup> with the 24 V negative pole of the power supply unit.

Pay attention to use well-dimensioned cable connections.

## Optional features

### Option: Adjustable speed

Motor speed is defined by the control lines proportional to applied voltage (0 - 10 V) or current (0 - 20 mA). Speed depends on the particular

programming of the motor. If the control lines are not connected, the motor runs with a programmed speed for 0 V, respectively for 0 mA. Connect the yellow strand 0.75 mm<sup>2</sup> with the 0 - 10 V-positive pole of the control voltage source or the grey strand with the 0 - 20 mA-positive pole of the control power source. Connect the black strand 0.75 mm<sup>2</sup> with the negative pole of the control voltage or power source.

### Option: Turn on/off

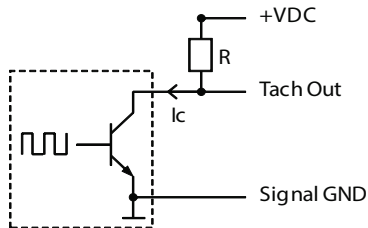
The motor can be turned on and off by the control line „Active Low“ without cutting off power supply.

Connect the green strand (Active Low) with Signal GND (black strand 0.75 mm<sup>2</sup>) to turn off the motor.

### Option: Speed signal

A speed proportional open collector square signal is issued by the brown control line (Tach Out), referring to signal GND.

Speed [Hz] = frequency of rectangular signal [Hz].



Resistance R has to be selected according to applied voltage VDC, that the current  $I_c$  may not exceed 20 mA. At VDC = 10 V, R usually is approx. 1 kΩ.

### Notice

Supply ground (Power GND) and signal ground (Signal GND) are connected internally!

### Inverse-polarity protection

Supply lines (+ 24 VDC and Power GND) are not protected against inverse polarity, but resistant to inverse polarity for a short term. In this case the inverse polarized supply voltage is short-circuited (max. 100 A for 100 ms).

For this reason, a fuse (10 A) is obligatory when connecting the batteries/vehicle electric systems.  
When connecting to electronic power supplies (power of less than 500 W), a fuse is not required.  
Control lines are protected up to  $\pm 25$  V (right and inverse polarized).

## Initial operation

The hydraulic system has to be completely filled and bled before the first start up. The pump has to be filled with the pumped medium. For bleeding the system please pay attention to the instructions by the manufacturer.  
Shut-off valves on suction side and on pressure side have to be opened completely.  
The delivery of the pump medium has to be initiated immediately after commissioning the pump (no more than 5 seconds). If priming does not occur, the pump has to be turned off to avoid damages of dry running.

## Wire specification

|                      | Function        | Cross sections                        | Colour        | Remark                          |
|----------------------|-----------------|---------------------------------------|---------------|---------------------------------|
| <b>Supply lines</b>  | + 24 VDC        | AWG 14 $\hat{=}$ 2.5 mm <sup>2</sup>  | red           |                                 |
|                      | Power GND       | AWG 14 $\hat{=}$ 2.5 mm <sup>2</sup>  | black or blue |                                 |
| <b>Control lines</b> | Signal GND      | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | black         | option available                |
|                      | Active Low      | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | green         | option available                |
|                      | Tach Out        | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | brown         | option available                |
|                      | Control Voltage | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | yellow        | option available                |
|                      | Control Current | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | grey          | option available                |
|                      | Interface       | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | white         | only applicable by Speck Pumpen |
|                      | Interface       | AWG 22 $\hat{=}$ 0.75 mm <sup>2</sup> | blue          | only applicable by Speck Pumpen |

## Trouble shooting

| Defect                           | Cause                                                                           | Rectification                               |
|----------------------------------|---------------------------------------------------------------------------------|---------------------------------------------|
| Pump does not deliver            | Supply or suction pipe and pump are not bled correctly or not filled completely | Fill or bleed pump and/or pipes completely  |
|                                  | Motor does not run                                                              | Connect motor to the power supply correctly |
|                                  | Hydraulic parts of the pump are blocked or stuffed by solids                    | Disassemble pump, remove solids             |
|                                  | Hydraulic parts of a pump are dirty, sticky, incrustated or worn out            | Disassemble pump, clean pump parts          |
| Pump delivers with interruptions | Supply suction pipe and pump are not bled correctly or not filled completely    | Fill or bleed pump and/or lines completely. |
| Delivery performance too low     | Electronical parts too hot:<br>Motor reduces speed                              | Keep motor ventilated                       |

## UL approvals of material used

| Component        | Material, manufacturer, note                                                                                                         | UL                                   |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Motor electronic | Circuit board, plug and plastic material contacting the leads                                                                        | UL 94 V-0                            |
| Casting compound | WEVO casting compound PD 4431 FL<br>The electronic components are covered, only electrolyte capacitors and terminal pins stick out.. | UL 94 V-0<br>(UL / CSA-File E108835) |
| Motor casing     | Aluminium die cast<br>Coating powder polyester resin Interpon® 610                                                                   | Irrelevant<br>UL 1332                |
| Separating can   | ALBIS PLASTIC GmbH, Tedur® L 9107-1 (PPS-GF40)                                                                                       | UL 94 V-0<br>(UL / CSA-File E80168)  |
| Gear wheel       | Steel                                                                                                                                | Irrelevant                           |
| Pump casing      | EN-GJS-400-15 / spheroidal graphite cast iron                                                                                        | Irrelevant                           |
| Strands          | The connecting wire is executed as single strands bundled in an insulating hose                                                      | UL 3266 / CSA AWM I A/B              |
| Insulating hose  | Isotex (combination of glassfibre and silicone)                                                                                      | UL 1441 / UL 94 V-0                  |
| Wire connection  | Jacob GmbH, polyamide PA6                                                                                                            | UL 514 B<br>(UL / CSA-File E140310)  |

**speck**



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