# OPERATING INSTRUCTIONS

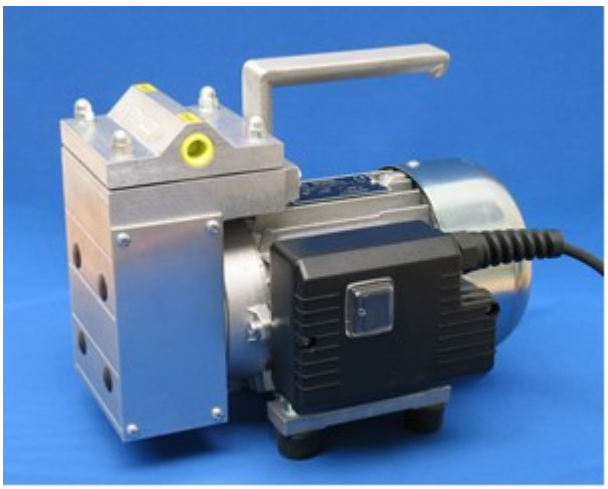
## Lab Diaphragm

## pump PB-18

**Range with connection rod**

**drive, models:**

**LAB-11, LAB-21, LAB-31**



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**Thank you for purchasing a hyco product. You have bought a functional, application-oriented product for solving your problems.**

A quality programme, specially tailored to hyco and that also incorporates our suppliers, implements continuous improvements in all business processes and customer satisfaction.

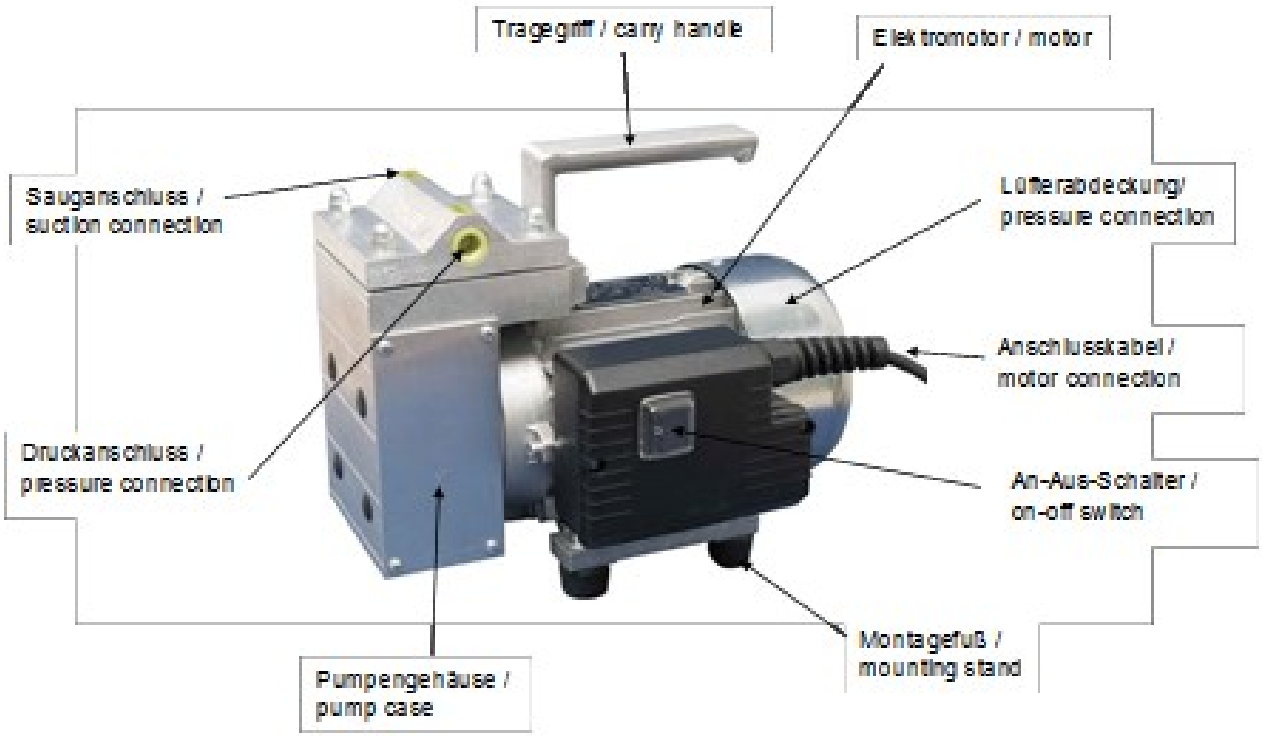
# Table of Contents:

# Series PB-18

## Lab Diaphragm connectiong rod pumps for transporting gaseous media.

The 1-cylinder diaphragm pump with connecting rod drive is to be used exclusively for the transportation of gaseous media within the temperature limits cited in the datasheet.
Density of the gaseous media: Max. 6-times as dense as air under normal conditions.

The diaphragm pumps with connecting rod drive are produced to order. The materials used are selected in accordance with the media/concentrations provided in the order.
For this reason, only the media cited in the order shall be transported.



**Definition of terms for warnings:**

| | |
|---|---|
| **NOTE** | Signal word for important information for the product. |
| **CAUTION** | Signal word for identifying a hazard with minor risk that could result in property damage or minor to moderate injuries if not avoided. |
| **WARNING** | Signal word for identifying a hazard with moderate risk that could potentially result in death or serious injuries if not avoided. |
| **DANGER** | Signal word for identifying a hazard with high risk that can result in death or serious injuries if not avoided. |

| | | | |
|---|---|---|---|
|  | Warning of a general hazard |  | Always wear face protection |
|  | Warning: Hot surfaces |  | Wear gloves |
|  | Warning of electrical voltage |  | Remove mains plug |

## 3 Transportation and storage:

All components are properly tested, checked and packaged before shipping. When the goods are received they must be checked for transport damage. The responsibility for the transport lies with the shipping agent and any visible transport damage must be reported to them immediately. Report hidden transport damage within seven days of receiving the component from the shipping agency.

**hyco will not provide a replacement in the event of shipping damage.**

We use environmentally friendly packaging material. The complete packaging material can be disposed of by means of the Duale System.

**We do not take back products.**

The diaphragm or piston pumps shall be stored in a dry and dust-free location. The room temperature shall be +5°C to +30°C with a humidity level of < 70% and a max. temperature change of 10°C/day.

## 4 Correct use:

Ensure that the diaphragm or piston pumps are operated at a location with an ambient temperature of +5°C to max. +40°C and max. 1000 m above sea level. With ambient temperatures over 30°C, the motors shall not be in direct sunlight. Deviations from the permissible environmental temperatures and altitudes must be reported to hyco and a release must be obtained from hyco.

| | |
|---|---|
|  | **DANGER** |
| | The diaphragm or piston pumps shall not be exposed to toxic, potentially explosive or radioactive gases. hyco custom products are required for this. |

Media that aluminium or VITON (FKM) is not resistant to, shall not be allowed to enter the gas routing components or the pump casing and motor. Versions with gas-routing components made from Ni, VA or PTFE are required for such media.

| | |
|---|---|
|  | **CAUTION** |
| | Liquids shall not be drawn in by the pump as media that cannot be compressed will destroy the pump. |

## 5 Motor monitoring:

External motor protection is provided, whereby if the motor draws more than 10% more power than stipulated on the motor, the motor will be immediately shut down.

## 6 Overheating:

The max. operating temperature of the pump casing, the cylinder heads and the motor shall not exceed +90°C with standard pumps as otherwise bearing damage may occur. In the case of pumps with the additional designations **-THR-** and **-VB-** , the cylinder heads are thermally separated from the pump casing. Depending on the design, this may enable the **cylinder heads alone** to operate at temperatures up to max. +180°C.

| | | |
|---|---|---|
|  | **CAUTION** |  |
| | Caution when touching, risk of burns! | |

The max. permissible operating temperature of the cylinder heads will likewise be stipulated with these pumps. The motor temperature shall not exceed +90°C here too.

If the cooling of the drive motor is inadequate due to installation conditions or environmental conditions and the drive motor or pump casing temperature rises above +90°C, an external fan must be attached above or on the motor (please enquire with hyco for instructions for this). Overheating damage can be verified by hyco due to the thermal measurement points attached in the interior of the pump casing and motor.

## 7 Diaphragm material:

VITON (FKM) is used as diaphragm material in all standard diaphragm pumps. In the case of pumps with the additional designation **-TM-** , PTFE-coated VITON diaphragms are installed. Other diaphragm materials are possible on request.

## 8 Gas-tightness:

The gas-tightness of the serial diaphragm pumps is max. 1 x $10^{-3}$ mbar x l/s (untested). In the case of diaphragm pumps with the additional designation **-GD-** , ca. 1 x $10^{-5}$ mbar x l/s (untested).

## 9 Vacuum operation:

The diaphragm or piston pumps can be started and operated against atmospheric pressure (1013 mbar abs.). Condensable vapours can be drawn in.

| | |
|---|---|
|  | **NOTE** |
| | A gas ballast valve with microfilter should be attached in order to ensure that any condensate remaining in the pump chambers will be blown out. |

## 10 Compression or combined vacuum-pressure operation:

| | |
|---|---|
|  | **NOTE** |
| | The standard diaphragm-piston pump will not start against pressure.<br>Special versions (on request) should be used for this. |

The hoseline must therefore be fee of pressure (1013 mbar abs.) as otherwise there is a risk that the motor will not start resulting in the motor windings burning out.

| | |
|---|---|
|  | **NOTE** |
| | Standard diaphragm pumps shall not be employed for compression above **2 bar (abs.)**<br>(unless otherwise stipulated in the datasheet). |

If diaphragm pumps are used for compression above **2 bar (abs.)** special versions with the additional designation **-PR- / -THR-** should be used.

## 11 Improper use:

Never operate hyco built-in pumps without fastening or unsupervised.

| | |
|---|---|
|  | **CAUTION** |
| | The pump could "wander" without fastening, due to vibrations, e.g. fall from a table and cause damage. |

| | |
|---|---|
|  | **WARNING** |
| | Never switch on and operate diaphragm or piston pumps with the pressure output closed!! Sealing plugs and plastic seals in the case of new pumps in particular can be ejected with considerable force and cause serious injuries. |

The ventilation grill of the motor shall **not** be covered in order to ensure trouble-free cooling of the motor and the pump.

When installing the pump in a housing, ensure that the wall of the housing or other component has a **clearance of at least 60 mm** to the ventilation grill of the motor. If this clearance is too small, the motor cannot draw in cooling air. The housing must be designed such that there is adequate cooling air available and such that the waste heat can escape without causing a thermal build-up.

If the pump is operated without motor protection and inadequate cooling or is used improperly, the motor could burn out and cause a fire.

| | | |
|---|---|---|
|  | **CAUTION** |  |
| | Caution when touching, risk of burns! | |

## 12 Installation – assembly:

hyco diaphragm and piston pumps can be installed in any position. They are normally fastened by means of the motor base. To ensure an adequately large contact area, fit a washer under each nut or under each screw head.

| | |
|---|---|
|  | **CAUTION** |
| | Ensure that the fastening screws are adequately dimensioned. |

It is essential that the diaphragm and piston pumps are mounted on vibration dampers (provided with the built-in pumps) due to vibrations arising.

Other types of fastening with the additionally required fastening holes are possible with special versions but must be agreed with hyco beforehand.

## 13 Pneumatic connection:

Sealing stoppers, with which the pump inlets and outlets are sealed on new pumps, must be removed before commissioning.

| | |
|---|---|
|  | **WARNING** |
| | Sudden ejection with risk of injury!! |

Route the hoselines such that the inlet and outlet lines remain elastic over an adequate length. All hose connections for the pump must be properly executed and adequately dimensioned (see table in the next page).

The connection threads shall **not** be wrapped with **PTFE tape or hemp** (for sealing) **under any circumstances**. Any PTFE tape or hemp fibres that shear off could be drawn into the pump and interfere with the function of the valves. This could lead to a reduction in the transport performance, in the final vacuum and in the final pressure.

PTFE tape or hemp fibres can usually only be removed by dismantling the cylinder heads. Removal without disassembly can be attempted (see "Maintenance and fault rectification" chapter).

| | |
|---|---|
|  | **NOTE** |
| | **Never throttle the pump on the pressure side!** |
| | Severe throttling reduces the service life of the pump. |

## 14 Recommended hose diameter:

## Recommended hose diameter in mm (internal diameter)

| Pump type | Pressure side | Vacuum side |
|---|---|---|
| PB-01 (MP48) | >3 | >4 |
| PB-02 (KP25) | >3 | >4 |
| PB-03 (MP86) | >5 | >6 |
| PB-04 (ML48.22) | >4 | >6 |
| PB-05 (MLH48.45) | >5 | >6 |
| PB-06 (ML86.22) | >6 | >8 |
| PB-07 (ML86.45) | >8 | >10 |
| PB-08 (ML130.45) | >13 | >16 |
| PB-09 (ML86.85) | >12 | >15 |
| PB-10 (ML130.85) | >19 | >25 |
| PB-18 (LAB-31) | >5 | >6 |
| PB-19 (MP38) | >2.5 | >3 |
| PB-20 (LAB-345) | >8 | >10 |
| PB-21 (LAB-322) | >6 | >8 |
| PB-22 (KL25.22) | >4 | >5 |
| PB-23 (MPZ86.22) | >6 | >8 |
| PB-24 (MPZ130.22) | >11 | >13 |
| PB-25 (MML86.85) | >12 | >15 |
| PB-28 (T-MPZ86.22) | >6 | >8 |
| PB-29 (CA2-ML86) | >5 | >6 |
| PB-30 (ML86-SA) | >5 | >6 |
| PB-31 (MPS86) | >5 | >6 |
| PB-32 (MP48-THR) | >3 | >4 |
| PB-33 (MP130) | >8 | >10 |
| PB-34 (MMPZ86.45) | >8 | >10 |
| PB-35 (KP50) | >5 | >6 |
| PB-36 (KP60) | >6 | >8 |
| PB-38 (KPZ50.22) | >6 | >8 |
| PB-39 (KPZ60.22) | >8 | >10 |
| PB-40 (ML86.22) | >6 | >8 |
| PB-41 (ML86.45) | >8 | >10 |

Valid for hose lengths up to 2 m.

**Important!**
Correctly dimensioned hoses and screw fittings are an important part of the vacuum-pressure system. In order to be able to get the best performance out of the respective pump, please note the information in the table.

## 15 Electrical connection:

| | |
|---|---|
|  | **WARNING** |
| | Connection shall be carried out exclusively by trained specialists. |
|  | **CAUTION** |
| | Incorrect mains voltage can destroy the device.<br>Ensure that the mains voltage matches with the motor type plate information before connecting. |

The electrical installation is to be carried out in accordance with the terminal plan (see the inside of the terminal box lid) or the connection diagram provided and in accordance with the applicable regulations (e.g. wire cross-section, fuses/breakers, earth line connection). There shall be no foreign objects, dirt or moisture in the terminal box. Unused cable feed-throughs in the terminal box shall be sealed.
Check that mains voltage and current type match with the information on the motor. 3-phase and AC motors are suitable for 50 Hz operation and also for 60 Hz operation in the case of motors that are identified accordingly.

| | |
|---|---|
|  | **NOTE** |
| | Speed regulation for 3-phase motors implemented by means of a frequency converter, shall not be higher than 60 Hz (ca. 1700 rpm). Speed control < 60 Hz is possible. |

The local regulations from the electricity supply company and the VDE [German electrical association] shall be observed.

## 16 Commissioning:

The accident prevention regulations from the employers' mutual insurance association "Compressors" (previously "VBG 16" [accident prevention & insurance association safety regulation], repealed since 1.1.2004 and replaced by BGR chapter 2.11 [accident prevention & insurance association safety regulation]), in particular "Installation" and "Operation" shall be observed. **Ensure that all safety regulations and safety instructions are fulfilled!**

| | |
|---|---|
|  | **NOTE** |
| | Pumps with protection rating < IP54 shall not be used outdoors under any circumstances! |

## 17 Maintenance and fault rectification:

| | | |
|---|---|---|
|  | **CAUTION**<br>Work shall only be carried out on the pump after the<br>mains voltage has been interrupted and the pump has cooled down, due to risk of injury. |  |

**All hyco pumps are maintenance-free as a matter of principle!!**

| | |
|---|---|
|  | **NOTE**<br>Any noise suppressors or air filters fitted to the pump must be checked at regular intervals for unimpeded flow. |

Only remove pneumatic connections when the entire system is at atmospheric pressure (1013 mbar abs.).

| | |
|---|---|
|  | **CAUTION**<br>Risk of deflagration and risk of icing!! |

Contamination reduces the pump performance and in some circumstances could result in the destruction of the pump. Foreign objects drawn in may be able to be removed by **introducing a little** water or a solvent such as petrol, trichloroethylene or similar into the suction inlet whilst the **pump is running** and then carefully blowing the pump out carefully with compressed air whilst it is **still running**. The pressure output must be open at this time!

| | | |
|---|---|---|
|  | **CAUTION**<br>Wear face protection!! |  |

Have repairs carried out exclusively by hyco. It is not permitted to repair hyco equipment yourself or have it repaired by third parties who are not authorised by hyco. Only use original hyco replacement parts.

A diaphragm or sleeve replacement can be carried out by an appropriate professional (instructions available from hyco).

Always quote the serial number when ordering spare parts! This is embossed into the pump head and is a combination of letters and numbers. You can also quote the invoice number or delivery note number.

**The motor number will not help us and will not enable us to identify your pump.**

## 18 Returns - general:

**NOTE**

If the pump has been in contact with aggressive, radioactive or toxic media, it must be decontaminated before being returned!!

**If the pump has been used to transport aggressive, radioactive or toxic media, hyco must be informed about the extent and type of the media before the product is sent in.**

There is a clearance certificate in these operating instructions. This must be filled in by the customer and must accompany the return. If this is not included with the return, your repair request cannot be processed!

If the clearance certificate is no longer present, further examples can be requested from hyco by email: **vertrieb@hyco.de**.

## 19 Returns for repairs – returns to the factory:

The pump is to be sent in at the expense of the sending party (**free**).

## 20 Returns of sample and loan pumps:

Sample and loan pumps should be sent in at the expense of the sending party (**carriage paid**). Hyco reserves the right to check these pumps and to invoice for the rectification of any damage or contamination.

## 21 Company address for returns:

hyco Vakuumtechnik GmbH
Konrad-Zuse-Bogen 1
D – 82152 Krailling (bei München)
GERMANY

## 22 Restrictions and liability disclaimer:

hyco shall be liable to the extent stipulated in the general terms of delivery and service. Be aware of the following in addition.

The customer is hereby informed that diaphragm or sleeve defects can be caused in particular through unsuitable characteristics of the gaseous transport media, higher compression pressure than stipulated, suction of uncompressable liquids, overheating or operation of the pump with higher speeds than stipulated, whereby other mechanical components of the of the pump could be damaged as a result.

Standard diaphragm pumps from hyco are equipped with diaphragms made from VITON (FKM). Information on the service life of **VITON diaphragms** always assumes media compatibility, pump operating speeds of 1400 rpm and no additional negative influences. In comparison, VITON diaphragms in vacuum operation at operating speeds of 2800 rpm achieve ca. 75% and in pressure operation ca. 50% of the service life stipulated for operating speeds of 1400 rpm.

As a result of their lesser ability to absorb mechanical loads and their cold deformation, **PTFE diaphragms** only achieve ca. 70% of the service life stipulated with VITON diaphragms at 1400 rpm.
As a result, it is only permitted to operate pumps with PTFE diaphragms (-**TM**-) up to speeds of max. 1700 rpm.
hyco accept no liability for defects arising from a disregard of this information.

## 23 EC Declaration of Conformity

# EC Declaration of Conformity

**Diaphragm piston pump**

Pump type: KL25 . ML46-. , MLH48,,,, ML65..,, ML75.. ML86 ML13C. KP25. ,, KP50.. .. KP60..., MP38... MP48.. .. MP65... MP75. .. MP86... MP130.. V1PS65. ., MPS75 ... MPS86.. , MPZ65 .., MPZ75. MPZ86 MPZ130

We hereby declare that the design and construction of the device designated above, as well as the design marketed by us, conforms to the basic requirements of the applicable EC directives. The commissioning of this product is forbidden until the machine or system into which this product is to be installed or which it will be a component of, complies with the provisions of all relevant directives. If changes are made to the device without consulting us, this declaration becomes invalid.

Machinery Directive (with amendments)

2006/42/EC

- Low Voltage Directive

  2014/35/EU

- Electromagnetic Compatibility Directive

  2014/30/EU

Applied harmonised standards:

DIN EN 1012-2:2011, DIN EN ISO 12100:2011, DIN EN 61010-1:2011, DIN EN 61326-1:2013

Management systems
EN ISO 9001:2015, EN ISO 14001 (1997-2006)

Krailling, den 17.06.2016

Otto Hayn, Geschäftsführer

Christian Heilzer, Techn. Leiter

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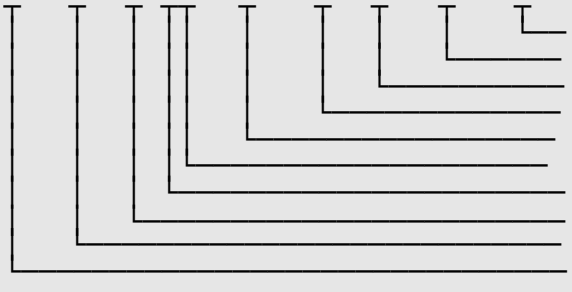
# TYPE KEY

**EXAMPLE:**

***C*** **- ML- 86 4 5 - PR - TM - ZV - GD - D14 / 37**




| **MATERIAL GAS-ROUTING COMPONENTS:** | |
|---|---|
| | **Without:** Aluminium per manufacturer's selection |
| | **C** : 15µm chemically nickel-plated |
| | **E** : 25µm anodised and re-compressed |
| | **CA4** : Austenitic steel (1.4571, 1.4438) |
| | **CA2** : Austenitic steel (1.4301, 1.4541) |

| **PUMP DESIGN:** | |
|---|---|
| | **ML** : Diaphragm pump linear drive |
| | **MP** : Diaphragm pump connecting rod drive |
| | **LAB** : Portable laboratory pump |
| | **TH** : Heated measuring gas piston pump |
| | **TD** : Tandem pump (2 x ML on base plate) |

| **DIAPHRAGM Ø (NOT LAB)** | |
|---|---|
| | Membrane diameter: 65 mm, stroke: 5 mm |
| | Membrane diameter: 75 mm, stroke: 6 mm |
| | Membrane diameter: 86 mm, stroke: 8 mm |
| | Membrane diameter: 100 mm, stroke: 8 mm |
| | Membrane diameter: 130 mm, stroke: 10 mm |

| **SIZE (WITH LAB)** | |
|---|---|
| | **1:** Membrane diameter: 65 mm, stroke: 5 mm |
| | **2:** Membrane diameter: 75 mm, stroke: 6 mm |
| | **3:** Membrane diameter: 86 mm, stroke: 8 mm |

| **NUMBER OF CYLINDERS:** | |
|---|---|
| | **Without:** 1-cylinder housing |
| | **2** : 2-cylinder housing |
| | **4** : 4-cyl. flange housing |
| | **8** : 2x4-cyl. flange housing |

| **CONNECTION OF THE CYLINDERS:** | |
|---|---|
| | **0:** Unconnected for all pump types |
| | **2:** Parallel connection for 2-cylinder housing |
| | **3:** Series connection for 2-cylinder housing |
| | **5:** Parallel connection (4/8-cyl. FG) |
| | **6:** 2-stage series connection (4/8-cyl. FG) |
| | **8:** 3-stage series connection (4/8-cyl. FG) |

| **DEVICE TYPES:** | |
|---|---|
| | **Without:** KG cage gear (up to 2.5 bar overpres.) |
| | **PR** : Prism gear (from 2.5 bar overpres.) |
| | **PL** : Connecting rod gear (extreme compressor) |

| **SPECIAL INTERIOR DESIGN:** | |
|---|---|
| | **VV** : Viton valves |
| | **TV** : Teflon valves |
| | **TM** : Teflon diaphragm |
| | **EM** : EPDM diaphragm |
| | **H...** : Eccentric stroke ...mm |
| | **V...** : Volumetric flow adaptation ...l/min |

| **CYLINDER COVER:** | |
|---|---|
| | **Without:** Standard cylinder cover with small plates |
| | **ZV** : Tongue valve |
| | **ZVA** : Tongue valve, bored out to 7 mm |
| | **ZVK** : Tongue valve, condensate compatible |
| | **LS...** : Air flushing ...mm, condensate tolerant |

| **ADDITIONAL DESIGNS:** | |
|---|---|
| | **DK** : Pressure-side chamber |
| | **CDK** : Pressure-side chamber, nickel-plated |
| | **SK** : Suction-side chamber |
| | **CSK** : Suction-side chamber, nickel-plated |
| | **FG** : Flange housing |
| | **GD** : Gas-tight up to 1•10-5 mbar•l/s |
| | **Mü** : Diaphragm monitoring with dbl. |
| | **MüL** : Diaphragm monitoring (M5 in the bearing cover) |
| | **SBL** : Flushing bore (2 x M5 in the bearing cover) |
| | **THR** : Thermal separation through pipe |
| | **MLG** : Only housing |
| | **SWC** : Swagelok screw fitting |
| | **SA** : Custom design per specification |
| | **VB** : Ventilation bores |

| **MOTORS:** | |
|---|---|
| | **00** : Pump head (without motor) |
| | **D...** : 3-phase motor |
| | **W...** : AC motor |
| | **ALD...** : External rotor 3-ph. motor |
| | **ALW...**: External rotor AC motor |
| | **EX...** : Ex-protected motor |



Status: 06/2016

## 25 Overview of hyco diaphragm and piston pumps:

# Competence and quality in every detail

**Made in Germany since 1968 – ISO 9001 certified**

| Suction performance in l/min | | Final pressure abs. mbar (vacuum) | | Compression bar (absolute) | min | Page no.: |
|---|---|---|---|---|---|---|
| 3.0 | | 125 | | 3 | + | (1) |
| 3.5 | * | 120 | | 4 | + | (2) |
| 3.5 | * | 40 | | 5 | + | (22) |
| 4.5 | * | 25 | | 5 | + | (22) |
| 4.5 | | 120 | | 3 | + | (1) |
| 5.0 | | 125 | | 3 | ~ | (1) |
| 5.0 | * | 160 | | 5 | + | (22) |
| 5.0 | * | 110 | | 8 | ~ | (2) |
| 6.0 | | 110 | | 3 | ~ | (1) |
| 6.0 | | 10 | | 3 | + | (4) |
| 6.5 | * | 40 | | 3 | ~ | (22) |
| 6.5 | * | 120 | | 4 | ~ | (2) |
| 7.0 | * | 95 | | 6 | + | (2) |
| 8.0 | | 120 | | 3 | ~ | (1) |
| 8.0 | | 125 | | 5 | + | (3) |
| 8.0 | * | 110 | | 8 | ~ | (2) |
| 8.0 | * | 25 | | 3 | ~ | (22) |
| 8.0 | | 125 | | 5 | + | (3) |
| 8.5 | | 140 | | 5 | + | (22) |
| 10 | | 160 | | 3 | ~ | (22) |
| 10 | | 20 | | 4 | + | (23) |
| 10 | | 15 | | 5 | + | (6) |
| 10 | | 110 | | 3 | ~ | (1) |
| 10 | | 10 | | 3 | + | (4) |
| 12 | * | 95 | | 6 | ~ | (2) |
| 12 | | 5 | | 3 | + | (5) |
| 12 | | 95 | | 3 | + | (4) |
| 12 | | 10 | | 3 | + | (5) |
| 15 | | 9 | | 3 | + | (5) |
| 15 | | 125 | | 5 | ~ | (3) |
| 15 | | 6 | | 4>>>>12 | + | (7) |
| 16 | | 140 | | 3 | ~ | (22) |
| 18 | | 120 | | 5 | + | (6) |
| 18 | | 125 | | 4 | + | (23) |
| 18 | | 125 | | 5 | ~ | (3) |
| 20 | | 95 | | 3 | ~ | (4) |
| 20 | | 3 | | 3 | ~ | (5) |
| 22 | | 110 | | 4 | + | (3) |
| 22 | | 10 | | 3 | ~ | (5) |
| 22 | | 10 | | 4 | + | (6) |
| 23 | | 15 | | 3 | + | (23) |
| 23 | | 28 | | 5 | + | (7) |
| 25 | | 90 | | 3 | ~ | (5) |
| 27 | | 7 | | 3 | ~ | (5) |
| 30 | | 110 | | 5>>>>>8 | + | (7) |
| 30 | | 6 | | 5 | + | (9) |
| 30 | | 4 | | 4 | + | (25) |
| 32 | | 80 | | 3 | + | (18) |
| 33 | | 100 | | 3 | + | (3) |
| 33 | | 8 | | 1 (PTFE) | + | (21) |
| 33 | | 8 | | 1 (PTFE) | + | (28) |
| 33 | | 10 | | 1 | + | (23) |
| 35 | | 7 | | 3 | + | (6) |
| 37 | | 2 | | 4 4>>>>12 | + | (7) |
| 40 | | 110 | | 4 | ~ | (3) |
| 44 | | 90 | | 3 | + | (23) |
| 44 | | 85 | | 4 | + | (6) |
| 44 | | 28 | | 5 | + | (9) |
| 44 | | 28 | | 2 | + | (25) |
| 45 | | 100 | | 3 | ~ | (5) |
| 47 | | 10 | | 4>>>>12 | + | (7) |
| 47 | | 110 | | 4 | ~ | (3) |
| 55 | | 1 | | 3 | + | (7) |
| 55 | | 100 | | 3 | ~ | (3) |
| 57 | | 110 | | 1 | + | (25) |
| 65 | | 100 | | 3 | ~ | (3) |
| 65 | | 75 | | 3 | + | (6) |
| 65 | | 7 | | 3 | + | (7) |
| 65 | | 80 | | 1 (PTFE) | + | (21) |
| 65 | | 80 | | 1 | + | (23) |
| 65 | | 80 | | 1 (PTFE) | + | (28) |
| 70 | | 2 | | 4 | + | (9) |
| 70 | | 2 | | 5 | + | (25) |
| 80 | | 85 | | 4>>>>8 | + | (7) |
| 85 | | 10 | | 4 | + | (9) |
| 85 | | 10 | | 3 | + | (25) |
| 90 | | 20 | | 3 | + | (24) |
| 104 | | 1 | | 3 | + | (9) |
| 104 | | 1 | | 4 | + | (25) |
| 112 | | 9 | | 3 | + | (24) |
| 115 | | 75 | | 3>>>>8 | + | (7) |
| 126 | | 7 | | 3 | + | (9) |
| 126 | | 7 | | 4 | + | (25) |
| 140 | | 110 | | 3 | + | (24) |
| 150 | | 1 | | 3 | + | (8) |
| 150 | | 85 | | 4>>>>8 | + | (9) |
| 150 | | 85 | | 4 | + | (25) |
| 170 | | 100 | | 3 | + | (24) |
| 175 | | 7 | | 3 | + | (8) |
| 220 | | 75 | | 3>>>>>>8 | + | (9) |
| 220 | | 75 | | 4 | + | (25) |
| 300 | | 1 | | 3 | + | (10) |
| 350 | | 75 | | 3 | + | (8) |
| 350 | | 7 | | 3 | + | (10) |
| 650 | | 75 | | 3 | + | (10) |

Atmospheric pressure

Atmospheric pressure

Atmospheric pressure

Atmospheric pressure

**Overview of hyco diaphragm and piston pumps**

\+ Motor speed 1400 rpm

~ Motor speed 2800 rpm

* Piston pump

All data are approximate values

The performance data can be significantly changed by increasing or decreasing the diaphragm or piston stroke, or by changing the speed of the motor by means of a frequency converter.
This enables adaptations to suit individual desired performance characteristics.

We would be happy to send you detailed product descriptions on request, quoting the page number.

Discover more about the design details and the **technology** of the diaphragm and piston pumps at:
**www.hyco.de**

Status: 06/2016

## 26 Information for sending in to factory:

Returns - general **18**
and returns for repair **19**

Fill out the **clearance certificate** overleaf and enclose it with the pump for repair!

To do so, remove this sheet from the operating instructions!

If the clearance certificate is not included or if has not been completely filled out, we reserve the right to reject the shipment!

Pack the pump securely for shipping! Packaging fillers such as polystyrene chips are unsuitable as these will not fasten the pump in place securely enough.

Transport damage resulting from insufficient packaging shall be borne by the shipping party.

Important! Seal the suction and pressure ports on the pump before packaging!

Shipping must be sent to the following address, free of charge for the recipient:

hyco Vakuumtechnik GmbH
Konrad-Zuse-Bogen 1
D – 82152 Krailling

Cot estimates can be prepared if desired and are charged for. In the event of the repair order being placed or the purchase of a new pump, there will be no charge for the cost estimate, or any costs already charged will be credited. If you decide against a repair as a result of the cost estimate, we will return the pump to you at your expense and poss. in a disassembled state.

Scrapping and disposal:
Stringent regulations require orderly scrapping and disposal of a product that is no longer capable of operation or repair.
You can authorise us to dispose of the pump at your own expense.

( ) Yes ( ) No, please return the pump/parts at my expense.

This **clearance certificate** must be enclosed with every return for repair. It serves as a declaration of safety and harmlessness! **Repair is not possible** if the questionnaire is not present and fully filled in! This is necessary for the health and safety of our employees, the hazardous substances ordinance and industrial safety regulations.
Missing or incomplete information will result in significant delays in the processing of the repair. So, please answer the following questions fully!
Return to:

Fax.: +49 (0) 89-85661901 Sent by:

hyco-Vakuumtechnik GmbH
Konrad-Zuse-Bogen 1

D-82152 Krailling

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1. hyco-Pumpe – Type: ..... Serial number: .....

---

2. Media that this product has been in contact with or that may have occurred as a result of the process:

---

3. Name
   Chemical designation, or chemical formula:

---

4. Important information and precautionary measures e.g. hazard class:

---

5. Declaration of the substance hazard. Please mark as appropriate:

   5.1. **For non-hazardous substances:** For the aforementioned product, we hereby attest that

   ( ) No toxic, irritant, microbiological, explosive, radioactive or other hazardous contamination occurred and that the pump is free of hazardous substances and that any media residue has been removed.

   5.2. **For hazardous substances:** For the aforementioned product, we hereby attest that

   ( ) All toxic, irritant, microbiological, explosive, radioactive or other hazardous substances that the pump came into contact with are listed in **2.** and that all information is complete.
   The product has been ( ) cleaned, ( ) decontaminated, ( ) sterilised in accordance with regulations.

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**We assure** hyco that we indemnify them against any damages arising from incorrect information and against any third party claims that may arise.
**We hereby acknowledge** that we are directly liable for third parties, in particular employees of hyco-GmbH who are tasked with the handling/repair of the product, per § 823 BGB [German civil code]:

| ..... | ..... | ..... | ..... | ..... |
|---|---|---|---|---|
| Signature: | Name: | Position: | Company stamp: | Date: |

# Datenblatt / Data Sheet

**Kunde/Customer: Standard**

**Pumpen Type: PB-18, LAB-11**

| hyco-Vakuumtechnik-Pumpenspezifikation / Pumpspecification | |
|---|---|
| **Leistungsdaten bei 20°C / Performance at 20°C** | |
| Freier Volumenstrom / Free flow | 8,5 l/min |
| Enddruck / Final pressure | max. 4 bar ◄ (Bitte beachten /watch out) |
| Endvakuum / Final vacuum abs. | < 150 mbar |
| Prüfmedium / Test medium | Luft / air |
| Schlauchanschluß / hose coupling | G1/4" |
| **Arbeitspunkt / Working point** | |
| bei Druck / at Pressure | |
| Volumenstrom / Flow | |
| bei Vakuum / at vacuum | |
| Volumenstrom / Flow | |
| **Dichtheit / Tightness** | $1x10^{-3}$ mbar x l/sek. (ungeprüft / unexamined) |
| Δp | |
| Δt | |
| Prüfvolumen / Testing volume | |
| Anfangsdruck / Initialpressure | |
| **Elektrische Daten / Electrical Data** | |
| Motor | ATMA |
| Betriebsspannung / Connected Voltage | 230 V |
| Frequenz / Frequency | 50 Hz |
| Drehzahl / speed | 1250 $min^{-1}$ |
| Stromaufnahme / Current consumption | 1,7 A |
| Thermoschalter / thermalprotector | |
| Ex-Schutzart / Ex-Protection | |
| Schutzart / Type of protection | IP 54 |
| Isolationsklasse / isolation class | F |
| cos φ | 0,9 |
| **Membrane / Diaphragm** | Viton (FKM) |
| **Ventile / Valve** | 1.4305 / High-grade steel |
| **Mediumführende Teile / mediumleading-parts** | Alu |
| **Anlaufverhalten / Starting ability** | |
| bei Spannung / at Voltage | |
| bei Frequenz / at Frequency | |
| gegen Druck / against pressure | |
| gegen Vakuum / against vacuum | |
| **Betriebsbedingungen / Operating conditions** | |
| Umgebungstemperatur / ambient temperature | +5°C – +40°C |
| Gaseintrittstemperatur / gas admission temperature | +5°C – +40°C |
| Max. Pumpenkopftemperatur / max. pumphead temperature | +90°C |
| Max. zulässiger Eingangsdruck / max. inlet pressure | 500 mbar ◄ (Bitte beachten /watch out) |
| Dauerbetrieb / Continuous operation | zulässig / admissible |
| Takt ein/aus / Cycle on/off | |
| **Datenblatt erstellt / Data Sheet prepared** | 25.10.16 / H. Heitzer |

**hyco Vakuumtechnik GmbH – Konrad-Zuse-Bogen 1 – D-82152 Krailling**
**Tel.: +49 (0)89 / 85661900 - Fax.: +49 (0)89 / 85661901**
info@hyco.de - www.hyco.de

# Datenblatt / Data Sheet

**Kunde/Customer:** Standard

**Pumpen Type:** PB-18, LAB-21

| hyco-Vakuumtechnik-Pumpenspezifikation / Pumpspecification | |
|---|---|
| **Leistungsdaten bei 20°C / Performance at 20°C** | |
| Freier Volumenstrom / Free flow | 23,5 l/min |
| Enddruck / Final pressure | max. 3 bar ◄ (Bitte beachten / watch out) |
| Endvakuum / Final vacuum abs. | < 100 mbar |
| Prüfmedium / Test medium | Luft / air |
| Schlauchanschluß / hose coupling | G1/4" |
| **Arbeitspunkt / Working point** | |
| bei Druck / at Pressure | |
| Volumenstrom / Flow | |
| bei Vakuum / at vacuum | |
| Volumenstrom / Flow | |
| **Dichtheit / Tightness** | 1x10⁻³ mbar x l/sek. (ungeprüft / unexamined) |
| Δp | |
| Δt | |
| Prüfvolumen / Testing volume | |
| Anfangsdruck / Initialpressure | |
| **Elektrische Daten / Electrical Data** | |
| Motor | ATMA |
| Betriebsspannung / Connected Voltage | 230 V |
| Frequenz / Frequency | 50 Hz |
| Drehzahl / speed | 1250 min⁻¹ |
| Stromaufnahme / Current consumption | 1,7 A |
| Thermoschalter / thermal protector | |
| Ex-Schutzart / Ex-Protection | |
| Schutzart / Type of protection | IP 54 |
| Isolationsklasse / isolation class | F |
| cos φ | 0,9 |
| **Membrane / Diaphragm** | Viton (FKM) |
| **Ventile / Valve** | 1.4305 / High-grade steel |
| **Mediumführende Teile / mediumleading-parts** | Alu |
| **Anlaufverhalten / Starting ability** | |
| bei Spannung / at Voltage | |
| bei Frequenz / at Frequency | |
| gegen Druck / against pressure | |
| gegen Vakuum / against vacuum | |
| **Betriebsbedingungen / Operating conditions** | |
| Umgebungstemperatur / ambient temperature | + 5°C – + 40°C |
| Gaseintrittstemperatur / gas admission temperature | + 5°C – + 40°C |
| Max. Pumpenkopftemperatur / max. pumphead temperature | + 90°C |
| Max. zulässiger Eingangsdruck / max. inlet pressure | 500 mbar ◄ (Bitte beachten / watch out) |
| Dauerbetrieb / Continuous operation | zulässig / admissible |
| Takt ein/aus / Cycle on/off | |
| **Datenblatt erstellt / Data Sheet prepared** | 25.10.16 / H. Heitzer |

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# Datenblatt / Data Sheet

**Kunde/Customer: Standard**

**Pumpen Type: PB-18, LAB-31**

| hyco-Vakuumtechnik-Pumpenspezifikation / Pumpspecification | |
|---|---|
| **Leistungsdaten bei 20°C / Performance at 20°C** | |
| Freier Volumenstrom / Free flow | 33 l/min |
| Enddruck / Final pressure | max. 2 bar ◄ (Bitte beachten /watch out) |
| Endvakuum / Final vacuum abs. | < 100 mbar |
| Prüfmedium / Test medium | Luft / air |
| Schlauchanschluß / hose coupling | G1/4" |
| **Arbeitspunkt / Working point** | |
| bei Druck / at Pressure | |
| Volumenstrom / Flow | |
| bei Vakuum / at vacuum | |
| Volumenstrom / Flow | |
| **Dichtheit / Tightness** | $1 \times 10^{-3}$ mbar x l/sek. (ungeprüft / unexamined) |
| Δp | |
| Δt | |
| Prüfvolumen / Testing volume | |
| Anfangsdruck / Initialpressure | |
| **Elektrische Daten / Electrical Data** | |
| Motor | ATMA |
| Betriebsspannung / Connected Voltage | 230 V |
| Frequenz / Frequency | 50 Hz |
| Drehzahl / speed | 1250 $min^{-1}$ |
| Stromaufnahme / Current consumption | 1,7 A |
| Thermoschalter / thermal protector | |
| Ex-Schutzart / Ex-Protection | |
| Schutzart / Type of protection | IP 54 |
| Isolationsklasse / isolation class | F |
| cos φ | 0,9 |
| **Membrane / Diaphragm** | Viton (FKM) |
| **Ventile / Valve** | 1.4305 / High-grade steel |
| **Mediumführende Teile / mediumleading-parts** | Alu |
| **Anlaufverhalten / Starting ability** | |
| bei Spannung / at Voltage | |
| bei Frequenz / at Frequency | |
| gegen Druck / against pressure | Kein Anlauf gegen Druck / no start against pressure |
| gegen Vakuum / against vacuum | Kein Anlauf gegen Vakuum / no start against vacuum |
| **Betriebsbedingungen / Operating conditions** | |
| Umgebungstemperatur / ambient temperature | +5°C – +40°C |
| Gaseintrittstemperatur / gas admission temperature | +5°C – +40°C |
| Max. Pumpenkopftemperatur / max. pumphead temperature | +90°C |
| Max. zulässiger Eingangsdruck / max. inlet pressure | 500 mbar ◄ (Bitte beachten /watch out) |
| Dauerbetrieb / Continuous operation | zulässig / admissible |
| Takt ein/aus / Cycle on/off | |
| **Datenblatt erstellt / Data Sheet prepared** | 25.10.16 / H. Heitzer |

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