

Power units Series D 8.0115

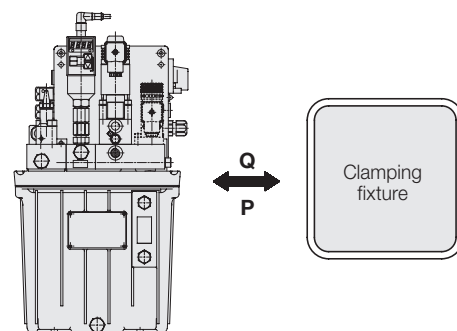
ready for connection*, energy-saving intermittent cycling

max. flow rate 0.82/2.1/3.5 l/min, max. operating pressure 500/250/160 bar



Advantages

- Very compact design
- Energy-saving intermittent cycling
- Many control variants
- Electronic pressure switch
- Digital pressure display
- Quick pressure adjustment by teach-in function
- Electric control optimally adapted
- High-quality leakage-free poppet valves
- Pressure generator also without valves available
- Useful accessory already mounted
- Alternatively manual switch or foot switch
- Ready for connection*



Application

These power units are especially suitable for the operation of small to medium-sized hydraulic clamping fixtures.

Maximally two clamping circuits for single or double-acting cylinders are available, that can be controlled independently of each other.

Thereby also "shuttle machining" is possible, i.e. that during machining of the workpiece in one fixture, workpiece change on the second fixture can be made.

Description

A special feature is the mounting of pump and electric motor in the reservoir. Thus hydraulic and electric control can be arranged in a space-saving way and easily accessible on the reservoir cover. The modular design enables a multitude of control variants.

The radial piston pump is available with three different flow rates and operating pressures.

To allow an energy-saving intermittent cycling only leakage-free poppet valves are used.

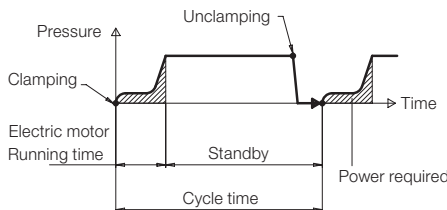
Energy-saving intermittent cycling

The electric motor is only running, as long as hydraulic oil is really required, that means to

- extend and retract the clamping cylinder
- build up the operating pressure

Example

Pressure-time diagram for single-acting clamping cylinders



In this example of a hydraulic clamping fixture the running time of the electric motor corresponds to the clamping time, which is only a few seconds.

In standby mode the power consumption is relatively low (see Electrical data).

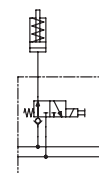
Prerequisites are leakage-free clamping elements, valves and accessories.

The pressure control is made by an electronic pressure switch, that switches on the electric motor for a short time in case of a pressure drop.

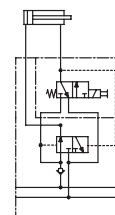
Control variants

1 clamping circuit

single acting

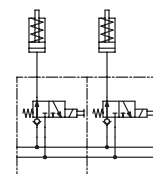


double acting

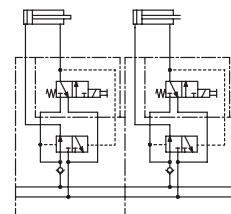


2 clamping circuits

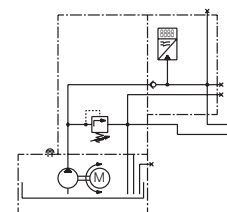
single acting



double acting



Without valve



Important notes

These power units are exclusively designed for the industrial use of pressure generators for hydraulic clamping fixtures that allow intermittent cycling (see example).

All connected hydraulic components must be leakage-free and designed for the maximum operating pressure of the power unit.

The power unit supplies very high pressures. The connected clamping cylinders generate very high forces so that there is a permanent danger of crushing in the effective area of the piston rod. The manufacturer of the fixture or the machine is obliged to provide effective protection devices.

Installation, start up and maintenance have to be made according to the supplied operating instructions by authorised experts.

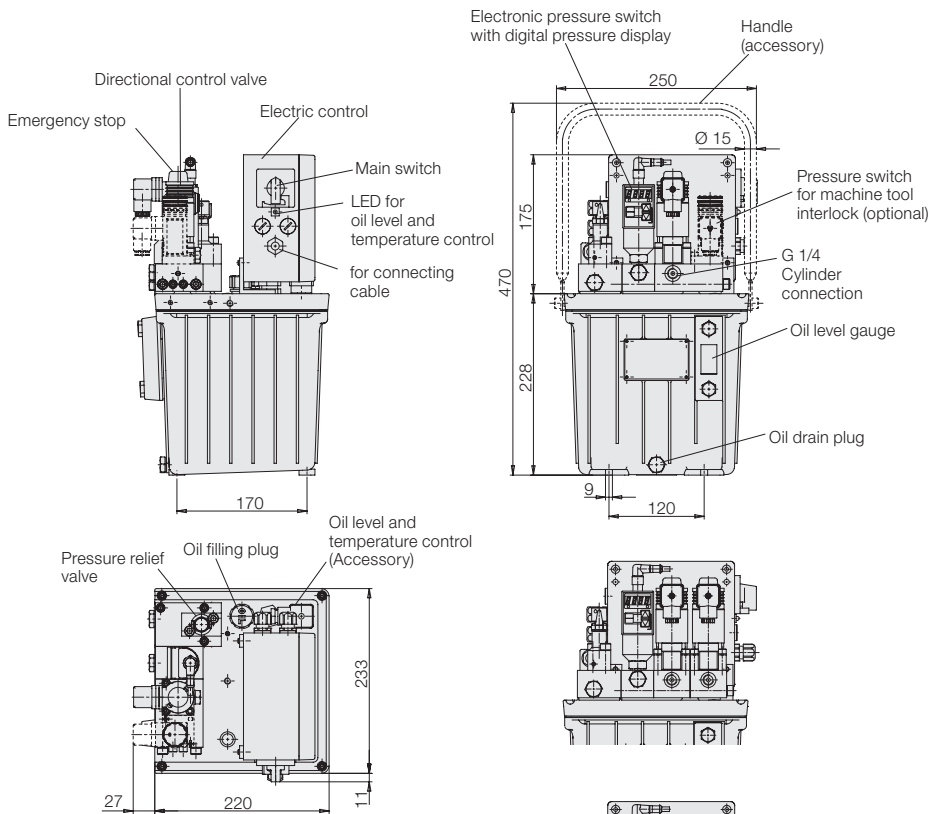
Safety features

- Operating pressure infinitely adjustable, therefore precisely defined clamping force
- Electronic pressure switch with digital pressure display
- Repeatability ± 1 bar
- Pressure drop max. 10 %
- Hermetically sealed poppet valves
- Screen disks in the valve ports
- No pressure drop in case of power failure (see page 4)
- Control voltage 24 V DC
- Machine tool interlock (optional)
- Oil level and temperature control (optional)

* Delivery

The power units are delivered ready for connection, i.e. after filling of hydraulic oil and connection of the hydraulic and electric lines they are ready for operation.

Dimensions Technical data



Switch (Clamping-Unclamping)

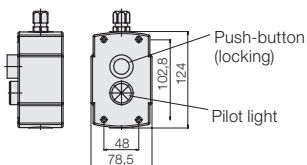
The power units are alternatively delivered with connected manual or foot switch (see chart). The pilot light in the switch signals:

1. Switch in clamping position
2. The adjusted clamping pressure is available

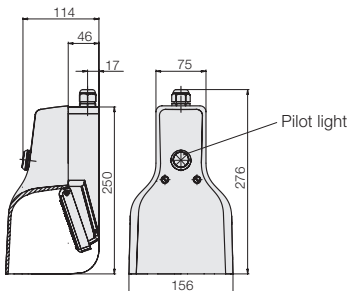
Important note!

This message signals that the clamping pressure is available at the electronic pressure switch of the power unit. The actual pressure of the clamping fixture can only be controlled by an installed pressure switch installed on the fixture (see machine tool interlock).

Manual switch



Foot switch



For start up it is imperative to pay attention to the supplied operating instructions!

Note

Power unit with manual switch for coupling systems see ROEMHELD data sheet F 9.425.

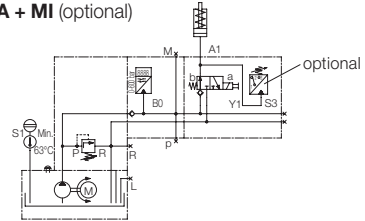
Hydraulic circuit diagrams

SA = Single-acting cylinders

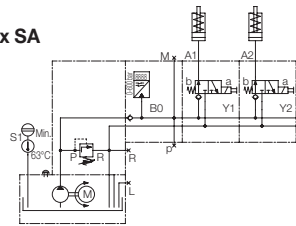
DA = Double-acting cylinders

MI = Machine tool interlock by additional pressure switch

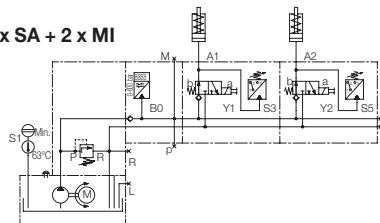
SA + MI (optional)



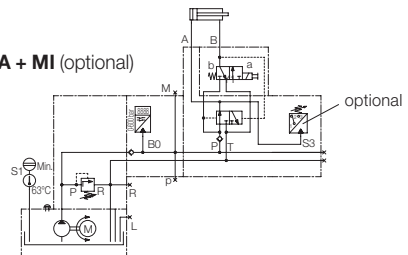
2 x SA



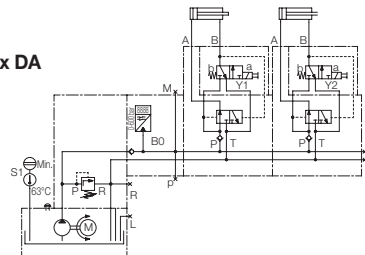
2 x SA + 2 x MI



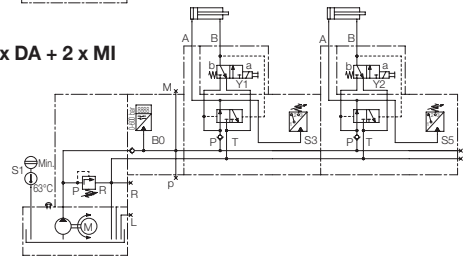
DA + MI (optional)



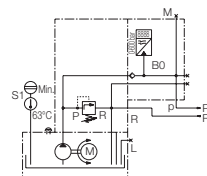
2 x DA



2 x DA + 2 x MI



Without valves



Versions Options • Accessories

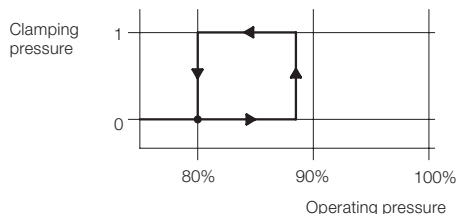
| Cylinder type SA / DA without / with Pressure switch MI* (at power unit) | Directional control valve | | Electric control | Terminal box | Manual switch | Foot switch | with- out | Flow rate / max. operating pressure | | | Weight [kg] |
|---|---------------------------|-----|------------------|--------------|---------------|-------------|--------------|-------------------------------------|-----------------|-----------------|-------------|
| | 3/2 | 4/2 | | | | | | 13.67 | 35 | 58.5 | |
| | | | | | | | | 0.82 | 2.1 | 3.51 | |
| | | | | | | | | 500 | 250 | 160 | |
| | | | | Part no. | Part no. | Part no. | | | | | |
| | 1 | | • | | 1 | | | 8405 121 | 8405 221 | 8405 321 | 29.5 |
| | 1 | | • | | | 1 | | 8405 122 | 8405 222 | 8405 322 | 30.5 |
| | 1 | | • | | | | • | 8405 131 | 8405 231 | 8405 331 | 28.5 |
| | 1 | | • | • | | | • | 8405 141 | 8405 241 | 8405 341 | 28 |
| | 1 | | • | | 1 | | | 8405 181 | 8405 281 | 8405 381 | 30.5 |
| | 1 | | • | | | 1 | | 8405 182 | 8405 282 | 8405 382 | 31.5 |
| | 1 | | • | | | | • | 8405 187 | 8405 287 | 8405 387 | 29.5 |
| | 1 | | • | • | | | • | 8405 143 | 8405 243 | 8405 343 | 29 |
| | 2 | | • | | 2 | | | 8405 105 | 8405 225 | 8405 325 | 31.5 |
| | 2 | | • | | | 2 | | 8405 106 | 8405 226 | 8405 326 | 33.5 |
| | 2 | | • | | | | • | 8405 113 | 8405 233 | 8405 333 | 29.5 |
| | 2 | | • | • | | | • | 8405 142 | 8405 242 | 8405 342 | 29 |
| | 2 | | • | | 2 | | | 8405 185 | 8405 285 | 8405 385 | 32.5 |
| | 2 | | • | | | 2 | | 8405 186 | 8405 286 | 8405 386 | 33.5 |
| | 2 | | • | | | | • | 8405 189 | 8405 289 | 8405 389 | 31.5 |
| | 2 | | • | • | | | • | 8405 145 | 8405 245 | 8405 345 | 29 |
| | | 1 | • | | 1 | | | 8405 109 | 8405 209 | 8405 309 | 30 |
| | | 1 | • | | | 1 | | 8405 111 | 8405 211 | 8405 311 | 31 |
| | | 1 | • | | | | • | 8405 112 | 8405 212 | 8405 312 | 29 |
| | | 1 | • | • | | | • | 8405 147 | 8405 247 | 8405 347 | 28.5 |
| | | 1 | • | | 1 | | | 8405 117 | 8405 217 | 8405 317 | 31 |
| | | 1 | • | | | 1 | | 8405 118 | 8405 218 | 8405 318 | 32 |
| | | 1 | • | | | | • | 8405 119 | 8405 219 | 8405 319 | 30 |
| | | 1 | • | • | | | • | 8405 148 | 8405 248 | 8405 348 | 29.5 |
| | | 2 | • | | 2 | | | 8405 107 | 8405 207 | 8405 307 | 32.5 |
| | | 2 | • | | | 2 | | 8405 108 | 8405 208 | 8405 308 | 33.5 |
| | | 2 | • | | | | • | 8405 115 | 8405 215 | 8405 315 | 31.5 |
| | | 2 | • | • | | | • | 8405 146 | 8405 246 | 8405 346 | 31 |
| | | 2 | • | | 2 | | | 8405 137 | 8405 237 | 8405 337 | 34 |
| | | 2 | • | | | 2 | | 8405 138 | 8405 238 | 8405 338 | 35 |
| | | 2 | • | | | | • | 8405 139 | 8405 239 | 8405 339 | 33 |
| | | 2 | • | • | | | • | 8405 140 | 8405 240 | 8405 340 | 33 |
| - | - | - | • | | | | • | 8405 110 | 8405 210 | 8405 310 | 27.5 |

*) Machine tool interlock

As an option, every clamping circuit is checked by an additional pressure switch, which has to be electrically connected directly to the control of the processing machine.

Messages:

- Clamping pressure available
→ Workpiece can be machined
- Clamping pressure dropped below 80 %
→ Stop machining immediately



The switching point must be adjusted to 80% of the adjusted clamping pressure.

Note

If the pressure must be frequently changed, the electronic pressure switch is easier to adjust (identification letter "E").

Handle "B"

With the handle, the power unit can be easily transported by two persons to different places of installation.

Example of ordering

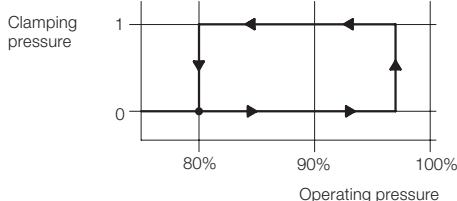
Power unit 8405 221 with handle

Part no. 8405 221 B

Electronic pressure switch for machine tool interlock "E"

(instead of the mechanical pressure switch)

The lower switching point (80 % of the clamping pressure) of electronic pressure switches is firmly programmed and can be stored in teach mode for every desired clamping pressure by pressing a button.

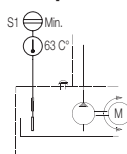


Example of ordering

Power units 8405 185 with two electronic pressure switches for machine tool interlock

Part no. 8405 185 E

Oil level and temperature control "T"



The oil level and temperature control is installed in the reservoir cover and electrically connected to the control box. In case of an error message, the control LED below the main switch is lit.

Possible errors:

- Oil filling quantity < 2.3 l
Shortage 0.7 l below the minimum oil level gauge.
Required refilling quantity min.1.5 l
- Oil temperature > 63°C

Important note!

As long as the error message is available the electric motor does no longer start to avoid damages due to overheating. This means that in the case of a pressure drop the pump does not deliver!!!

Recommendation

Above all with automated operation the oil level and temperature control should only be used for machine tool interlock in combination with pressure switches. This is the only way to ensure that during the switch-off of the electric motor the workpiece machining will be interrupted in the case of a pressure drop of more than 20 %.

Example of ordering

Power unit 8405 238 with machine tool interlock and oil level and temperature control

Part no. 8405 238 T

Different combinations

The three options described above are also available in combination. When placing the order please stick to the following sequence :

"T" + "B" 8 4 0 5 X X X T B
 "T" + "E" 8 4 0 5 X X X T E
 "B" + "E" 8 4 0 5 X X X B E
 "T" + "B" + "E" 8 4 0 5 X X X T B E

Technical data Relative duty cycle

General data

| | |
|-------------------------|---|
| Design | radial piston pump |
| Direction of rotation | any |
| Porting connection | fittings with G1/4 with screw-in plugs form B or E as per DIN 3852 |
| Mounting | 3 screws M 8 |
| Mounting position | upright |
| Environment temperature | +5...+35 °C |
| Max. oil temperature | +60 °C |
| Noise level | max. 82 dB(A) (at a distance and height of 1 m above the ground standing on insulation felts) |

Hydraulic data

| | |
|-----------------------------|--|
| Min. operating pressure | 30 bar |
| Viscosity range | 4...800 mm ² /s |
| Recommended viscosity range | 10...200 mm ² /s |
| Recommended viscosity class | ISO VG 22 as per DIN 51524 |
| Recommended hydraulic oil | HLP 22 as per DIN 51524-2 (not suitable for liquids of type HFA, HFB, HFC and HFD) |

| | Filling quantity | usable quantity |
|-------------------------------|------------------|-----------------|
| Content of the reservoir max. | 5.0 l | 3.2 l |
| Oil level gauge max. | 3.8 l | 2.0 l |
| min. | 3.0 l | 1.2 l |
| Electrical oil level control | 2.3 l | 0.5 l |

Electrical data

| | |
|-------------------------------|---|
| Motor type | 2-pole three-phase motor |
| Rating power | 0.75 kW |
| Rated speed | 2830 min ⁻¹ |
| Supply voltage | 3 ~ 230/400 V ΔY 50 Hz ± 10 % |
| Nominal current at 400 V | 2 A |
| Power factor cos φ | 0.82 |
| Standby | |
| Power consumption | "Clamped" 5 W "Unclamped" 28 - 50 W |
| Isolation class | B as per VDE 0530 |
| Main switch | with thermal overload protection, can be padlocked |
| Control Electric motor | circuit breaker, control by pressure switch |
| Control voltage | 24 V DC |
| 3/2 directional control valve | controlled by manual switch or foot switch |
| Fuses | external required 3 x 6 A slow internal primary 2 x 4 A slow (5x30mm) secondary 1 x 2 A slow (5x20mm) |
| Code class | IP 54 |
| Supply line required | 4 x 1 mm ² |
| Manual switch | 5 x 1 mm ² approx. 3m long |
| Foot switch | 4 x 1 mm ² approx. 3m long |
| EMC | tested |

Hydraulic control

The hydraulic control is designed for direct manifold mounting without pipes and consists of the following components:

The connecting block with pressure relief valve to adjust the desired operating pressure. The maximum operating pressure (chart page 3) is mechanically limited in the factory.

Series mounting plate with electronic pressure switch and digital pressure display to adjust the switch-off pressure for the electric motor. The adjustment is made in teach-in mode independent of the adjustment of the pressure relief valve.

A pressure drop of approx. 10 % will cause the pump motor to start again.

Series mounting plate with directional control valve for control of single or double-acting cylinders.

Alternative:

Series mounting plate with directional control valve and pressure switch for machine tool interlock (see page 3)

Valves

Only leakage-free poppet valves are used to allow the energy-saving intermittent cycling (see page 1). The electric control is designed for maximally two solenoid valves.

Single-acting cylinders

One 3/2 directional control valve per clamping circuit is directly operated by a manual switch or a foot switch.

Double-acting cylinder

The 4/2 directional control valve is a combination of an electrically and a hydraulically operated 3/2 directional control valve. The control is made by a manual switch or a foot switch.

Operation of two clamping fixtures

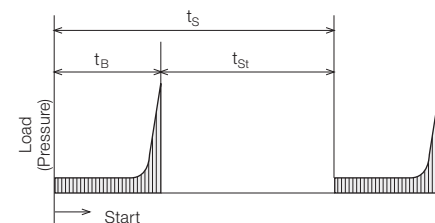
The control enables the operation of two clamping fixtures by means of two manual switches or two foot switches. Prerequisite is the same operating pressure of both fixtures.

Safety in case of power failure

The solenoid valves are de-energized in "clamping position". In the case of power failure this switching position is remained and thereby also the hydraulic pressure in the clamping line. A pressure drop is only to be feared with leaking clamping elements or valves.

Relative duty cycle

These power units are only suitable for intermittent cycling (intermittent cycling S3 as per VDE 0530).



t_B = Running time of the electric motor from start to switching off (clamping time)

t_{St} = Downtime (workpiece machining time)

t_S = Cycle time

The relative duty cycle is

$$\% ED = \frac{t_B}{t_B + t_{St}} \cdot 100 = \frac{t_B}{t_S} \cdot 100$$

Example

Clamping fixture with double-acting cylinders

| | |
|--------------------------|-----------------|
| Clamping time | $t_{B1} = 5s$ |
| Unclamping time | $t_{B2} = 3s$ |
| Workpiece machining time | $t_{St1} = 60s$ |
| Workpiece changing time | $t_{St2} = 12s$ |
| Cycle time | $t_S = 80s$ |

Relative duty cycle

$$ED = \frac{t_{B1} + t_{B2}}{t_S} \cdot 100 = \frac{5s + 3s}{80s} \cdot 100 = 10 \%$$

The maximum duty cycle is a function of the motor load. Apart from the load, the motor winding temperature of the submerged motor is in principle dependent on oil temperature and oil level. With maximum oil level, the complete winding is submerged in oil and optimally cooled. With decreasing oil surface a part of the winding is in the air. Since air is a poor heat conductor, the winding temperature increases considerably. Therefore the load of the motor must be reduced. The following chart indicates the relative cycle time as a function of the oil level in the reservoir. The maximum oil temperature of 60 °C must not be exceeded (see "Oil level and temperature control").

Maximum relative cycle time [%ED]

(at room temperature 23 °C)

| Oil level | 8405 1XX | 2XX | 3XX |
|-----------|----------|-----|-----|
| maximum | 5.0 l 40 | 25 | 20 |
| minimum | 3.0 l 25 | 20 | 16 |

Maximum running time of the electric motor [s]

(with different oil levels)

| Reservoir | 5.0 l | 3.2 l | 3.0 l | 2.0 l |
|-----------|-------|-------|-------|-------|
| maximum | 120 s | 91 s | 87 s | 54 s |
| usable | 3.2 l | 2.0 l | 1.2 l | 0.5 l |
| Anzeige | | | | |
| maximum | 3.8 l | 2.0 l | 1.2 l | 0.5 l |
| usable | 2.0 l | 1.2 l | 0.5 l | 0.5 l |
| Anzeige | | | | |
| minimal | 3.0 l | 2.0 l | 1.2 l | 0.5 l |
| usable | 1.2 l | 0.5 l | 0.5 l | 0.5 l |