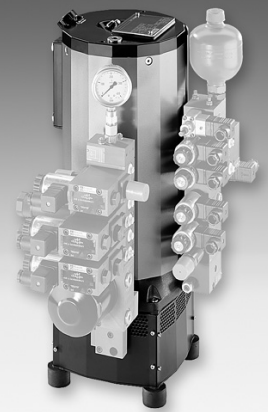


Clamping and drive module

RE 51147/10.05
Replaces: 04.02

1/14

Type UPE 3

Drive power 3.0 kW / 4.0 kW
Series 1X
Maximum operating pressure 700 bar

H6842•

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Application possibilities

- Clamping, releasing and indexing on machines
- Drives for hydraulic tools
- Drives for lifting and slewing mechanisms
- Drives for conveyors
- Use in general engineering
- Testing machines and test rigs

Information on available spare parts:
www.boschrexroth.com/spc

Features

- Duty, continuous duty S1
- Compact design
- Low noise
- High cooling capacity
- Wide range of applications
- Wide range of variants
- A complete hydraulic control is possible
(see RE 51144)
- Ready for connection

Description, symbols

The type UPE 3 clamping and drive modules form a complete drive system that is supplied ready to install. It is used to provide pressure fluid for hydraulic circuits and can be used for continuous duty applications. The maximum oil temperature of 80 °C must however not be exceeded!

The clamping and drive module basically comprises of the aluminium housing, the pumps (radial piston, external gear pump), an oil immersed motor and the cooler. The stator of the oil immersed motor is pressed into the aluminium housing. It transfers the winding heat directly onto the exterior wall of the aluminium housing.

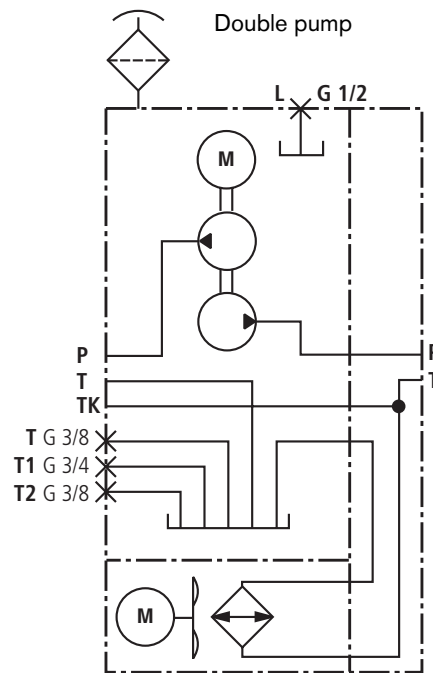
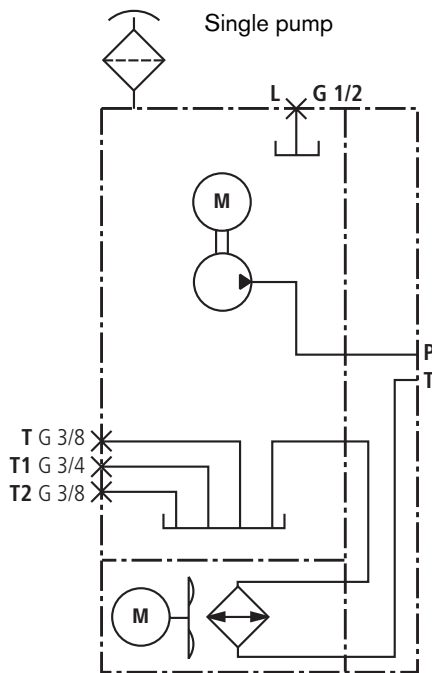
The pressure fluid returning from the controls is passed through the oil-air cooler. The cooled pressure fluid is then returned to the reservoir.

There are threads located in the anti-vibration mounts for assembling the type UPE 3 clamping and drive module.

Optionally the type UPE 3 clamping and drive module can be fitted with electrical monitoring of the oil level and the oil temperature, a breather filter and two complete controls (see RE 51144).

⚠ Attention!

The clamping and drive module can heat up during operation ⇒ **Danger of injury!**



Ordering details

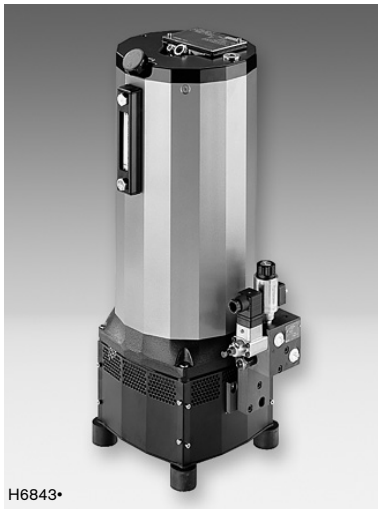
UPE 3-1X/ / / - V *

Series 10 to 19 (10 to 19: unchanged installation and connection dimensions)	= 1X
Drive power	
3.0 kW	= 3,0
4.0 kW	= 4,0
Pump for control 1 (see tables on pages 4 and 5) without pump	= 0
Pump for control 2 (see tables on pages 4 and 5) without pump	= 0
Reservoir nominal size	
Oil capacity 8.5 l	= 7
Oil capacity 11.0 l	¹⁾ = 9

¹⁾ Not possible with a „R4“ radial piston pump.

Further details in clear text
Seals
V = FKM seals
Built-on hydraulic control (see RE 51144)
0 = Without control
1 = With control
Filling plug
No code = Filler with dip stick
B = Breather filter
Oil monitoring
A = Sight glass
AN = Sight glass with float switch
AT = Sight glass with temperature switch
ANT = Sight glass with float and temperature switches

Overview of accessory modules



H6843•

Basic module „G“

Basic module „G“

- Basic module with integrated pressure relief valve for simple lifting/lowering or pressure maintaining functions
- When using the basic module „G“ it is not possible to fit any further stacking units
- For further details see catalogue sheet „Control blocks for clamping and drive modules type IH15A“ RE 51144



H6844•

Directional valve module „W“

Directional module „W“ ¹⁾

- Makes it possible to design controls using valves with a porting pattern to DIN 24340 form A
- The number of directional valve modules is dependent on the draw-off volume and the pump flow
- For further details see catalogue sheet „Control blocks for clamping and drive modules type IH15A“ RE 51144



H6845•

Poppet valve module „S“

Poppet valve module „S“ ¹⁾

- Poppet valve modules basically comprise of:
 - A pressure relief block
 - One or several control blocks
 - An end block
- The design of the control is dependent on the application
- The number of poppet valve modules is dependent on the draw-off volume and pump flow
- For further details see catalogue sheet „Control blocks for clamping and drive modules type IH15A“ RE 51144

¹⁾ The directional and poppet valve modules can be combined!

Technical data (for applications outside these parameters, please consult us!)

Pressure fluid	Mineral oil (HLP) to DIN 51524, part 2 Please take into account our specifications stated within catalogue sheet RE 07075!							
Pressure fluid temperature range °C	– 20 to + 80							
Max. permissible degree of contamination of the hydraulic fluid – cleanliness class to ISO 4406 (c)	Class 20/18/15 ⁵⁾							
Optimum viscosity range mm ² /s	10 to 200							
Drive module direction of rotation	Optional (type R); clockwise (types G, G/G, G/R, R/G)							
Fan direction of rotation	Clockwise							
Installation	Vertical							
Operating mode	All modes of operation where the oil steady state temperature remains under 80 °C							
Drive power 3.0 kW								
– Radial piston pump type R								
Flow ³⁾ l/min	0.82	1.36	1.66	2.08	2.83 ¹⁾	3.25	4.25 ¹⁾	
Nom. pressure ^{2) 3)} bar	700	700	700	450	600	350	390	
RPM min ⁻¹	1415	1415	2880	1415	2880	1415	2880	
– Gear pump type G								
Flow ³⁾ l/min	1.40	2.80	4.40	5.60	7.00	8.80	11.2	14.0
Nom. pressure ^{2) 3)} bar	260	260	260	250	220	170	130	110
RPM min ⁻¹	1415	1415 2880 ⁴⁾	1415	1415 2880 ⁴⁾	1415	1415 2880 ⁴⁾	1415 2880 ⁴⁾	1415 2880 ⁴⁾
Drive power 4.0 kW								
– Radial piston pump type R								
Flow ³⁾ l/min	0.82	1.36	1.66	2.08	2.83 ¹⁾	3.25	4.25 ¹⁾	
Nom. pressure ^{2) 3)} bar	700	700	700	450	700	350	450	
RPM min ⁻¹	1390	1390	2850	1390	2850	1390	2850	
– Gear pump type G								
Flow ³⁾ l/min	1.40	2.80	4.40	5.60	7.00	8.80	11.2	14.0
Nom. pressure ^{2) 3)} bar	260	260	260	250	250	230	170	140
RPM min ⁻¹	1390	1390 2850 ⁴⁾	1390	1390 2850 ⁴⁾	1390	1390 2850 ⁴⁾	1390 2850 ⁴⁾	1390 2850 ⁴⁾
Protection to VDE 0530 / EN 60034	IP 54 for the completely assembled unit.with exception of the fan (IP 54)							
Nominal reservoir size / type	7/R	7/G	9/G	9/R/G	9/G/R	9/G/G		
Weight (without pressure fluid) kg	47.0	46.1	46.5	58.6	58.6	51.6		

¹⁾ 60 Hz is not possible!

²⁾ Is only valid for single pumps, with double pumps the maximum nominal pressure is dependent on the pump combination and the valve controls (see calculation example on page 5)

³⁾ Relates to the RPM at 50 Hz

⁴⁾ Only in conjunction with radial piston pumps that require a speed of 2880 min⁻¹ or 2850 min⁻¹!

⁵⁾ The cleanliness class stated for the components must be adhered too in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.

For the selection of filters see data sheet RE 51144.

Pump combinations

Pump for control 1 \ Pump for control 2	Pump for control 2															
	Without pump	R 0.82	R 1.36	R 1.66	R 2.08	R 2.83	R 3.25	R 4.25	G 1.40	G 2.80	G 4.40	G 5.60	G 7.00	G 8.80	G 11.2	G 14.0
Without pump	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
R 0.82	•	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•
R 1.36	•	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•
R 1.66	•	-	-	-	-	-	-	-	•	•	-	•	-	•	•	•
R 2.08	•	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•
R 2.83	•	-	-	-	-	-	-	-	-	•	-	•	-	•	•	•
R 3.25	•	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•
R 4.25	•	-	-	-	-	-	-	-	-	•	-	•	-	•	•	•
G 1.40	•	•	•	-	•	-	•	-	•	•	•	•	•	•	•	•
G 2.80	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G 4.40	•	•	•	-	•	-	•	-	•	•	•	•	•	•	•	•
G 5.60	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G 7.00	•	•	•	-	•	-	•	-	•	•	•	•	•	•	•	•
G 8.80	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G 11.2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
G 14.0	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Pump combination: • possible, – not possible

Calculation example for determining the maximum nominal pressure in relation to the drive power:

With double pumps it has to be taken into account that both pumps are providing a flow of oil. The valve controls have to be so selected that the individual controls, during the time that no flow is required, can be switched to zero pressure circulation. The pressure fluid temperature increase in the reservoir is thereby reduced.

Examples:

- The pumps are pressurised one after the other, each of the pumps can be operated up to the nominal pressure. (For nominal pressures see page 4).
- The pumps are pressurised at the same time:

$$P \geq (p_1 \cdot q_{V1} + p_2 \cdot q_{V2}) \cdot \frac{1}{\eta \cdot 600} \text{ [kW]}$$

P = Electric motor drive power in kW

p_1 = Pump 1 pressure in bar

q_{V1} = Pump 1 flow in l/min

p_2 = Pump 2 pressure in bar

q_{V2} = Pump 2 flow in l/min

η = Efficiency approx. 85 % $\Rightarrow \eta = 0.85$

E.g.:

$p_1 = 480 \text{ bar}; q_{V1} = 1,66 \text{ l/min}; p_2 = 100 \text{ bar}; q_{V2} = 5,60 \text{ l/min}; \eta = 0,85$

$$P \geq (480 \text{ bar} \cdot 1,66 \text{ l/min} + 100 \text{ bar} \cdot 5,60 \text{ l/min}) \frac{1}{0,85 \cdot 600}$$

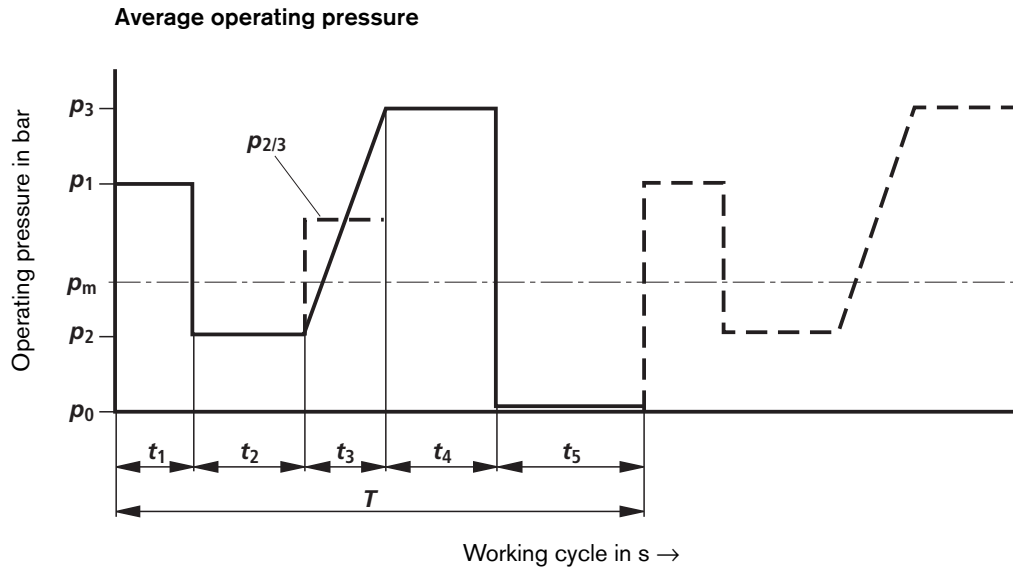
$$P \geq 2,66 \text{ kW}$$

\Rightarrow Selected electric motor with $P = 3 \text{ kW}$

Calculating the pressure fluid steady state temperature

The determination of the steady state temperature is used to estimate the expected pressure fluid temperature when in continuous operation. This is in relation to the operating pressure, the flow, the built-on controls as well as the machine which the drive module is fitted onto.

The steady state temperature is reached after approx. one hour of operation.



p_0 = Zero pressure operation in bar

p_1, p_2, p_3 = Operating pressure in bar

p_m = Average operating pressure in bar

t_1, t_2, t_3, t_4, t_5 = Time interval in s

T = Working cycle in s

$$p_m = \frac{1}{T} (p_1 \cdot t_1 + p_2 \cdot t_2 + p_{2/3} \cdot t_3 + p_3 \cdot t_4 + p_0 \cdot t_5)$$

$$p_{2/3} = \frac{p_2 + p_3}{2}$$

$$T = t_1 + t_2 + t_3 + t_4 + t_5$$

Example:

$t_1 = 15$ s; $t_2 = 20$ s; $t_3 = 15$ s; $t_4 = 20$ s; $t_5 = 30$ s;

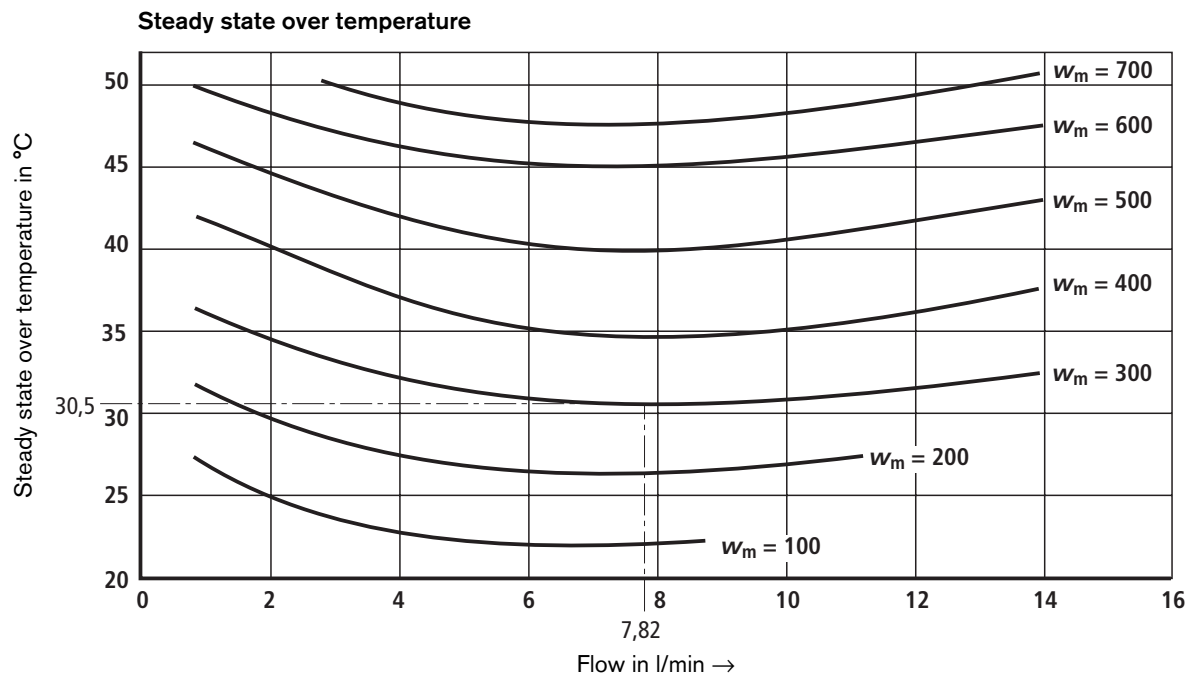
$p_1 = 180$ bar; $p_2 = 70$ bar; $p_3 = 250$ bar; $p_0 = 0$ bar

$$p_{2/3} = \frac{70 \text{ bar} + 250 \text{ bar}}{2} = 320 \text{ bar}$$

$$T = 15 \text{ s} + 20 \text{ s} + 15 \text{ s} + 20 \text{ s} + 30 \text{ s} = 100 \text{ s}$$

$$p_m = \frac{1}{100 \text{ s}} = (180 \text{ bar} \cdot 15 \text{ s} + 70 \text{ bar} \cdot 20 \text{ s} + 320 \text{ bar} \cdot 15 \text{ s} + 250 \text{ bar} \cdot 15 \text{ s} + 0 \text{ bar} \cdot 30 \text{ s}) = 102.5 \text{ bar}$$

Pressure fluid steady state temperature



w_m = Average flow

p_m = Average operating pressure in bar

p_{m1} = Average operating pressure of pump 1 in bar

p_{m2} = Average operating pressure of pump 2 in bar

q_v = Flow in l/min

q_{v1} = Flow of pump 1 in l/min

q_{v2} = Flow of pump 2 in l/min

ϑ_U = Ambient temperature in °C

$\Delta\vartheta$ = Steady state over temperature in °C

ϑ_B = Steady state temperature in °C

Single pump:

$$w_m = p_m \cdot q_v$$

Double pump:

For the double pump version of the clamping and drive module the average operating pressure for both pumps has to be determined. The average flow can be calculated by using the individual flows. The steady state temperature can be read from the diagram in relationship to the total flow.

$$w_m = p_{m1} \cdot q_{v1} + p_{m2} \cdot q_{v2}$$

$$q_v = q_{v1} + q_{v2}$$

$$\vartheta_B = \vartheta_U + \Delta\vartheta$$

Example:

$$p_{m1} = 100 \text{ bar}; p_{m2} = 30 \text{ bar}$$

$$q_{v1} = 0.82 \text{ l/min}; q_{v2} = 7.0 \text{ l/min}$$

$$\vartheta_U = 20 \text{ °C}; \Delta\vartheta = 31 \text{ °C from diagram}$$

$$w_m = 100 \text{ bar} \cdot 0.82 \text{ l/min} + 30 \text{ bar} \cdot 7.0 \text{ l/min} = 292$$

$$q_v = 0.82 \text{ l/min} + 7.0 \text{ l/min} = 7.82 \text{ l/min}$$

$$\vartheta_B = 20 \text{ °C} + 30.5 \text{ °C} = 50.5 \text{ °C}$$

Electric motor

Within the nominal power range the clamping and drive module is designed for use to VDE 0530 (EN 60034), for continuous operation S1. The electric motor complies with protection class F and the complete clamping and drive module is protected to class IP 54.

The electric motor direction of rotation is dependent on the pump fitted (see technical data on page 4). The fan direction of rotation is clockwise.

Clamping and drive module technical data

(for applications outside these parameters, please consult us!)

Voltage ¹⁾	<i>U</i>	V	230 / 400 ±6% Δ/Y
Frequency	<i>f</i>	Hz	50 / 60
Operating mode	S1 continuous		
Isolation class	F (winding)		
Protection	IP 54		
Polzahl	2 / 4		

Frequency 50 Hz

Power kW	Speed min ⁻¹	Power factor cos φ	Nom. current at	
			Δ 230V	Y 400V
3.0 ²⁾	1415	0.76	11.2 A	7.0 A
3.0 ³⁾	2880	0.86	11.1 A	6.4 A
4.0 ²⁾	1390	0.73	17.0 A	9.8 A
4.0 ³⁾	2850	0.85	15.0 A	8.6 A

Frequency 60 Hz

Power kW	Speed min ⁻¹	Power factor cos φ	Nom. current at	
			Δ 230V	Y 400V
3.0 ²⁾	1700	0.83	11.1 A	6.4 A
3.0 ³⁾	3450	0.92	9.4 A	5.4 A
4.0 ²⁾	1680	0.77	16.2 A	9.3 A
4.0 ³⁾	3420	0.90	12.5 A	7.2 A

¹⁾ Other voltages on request

²⁾ 4 poles

³⁾ 2 poles

Fan technical data (for applications outside these parameters, please consult us!)

Voltage ¹⁾	<i>U</i>	V	230
Frequency	<i>f</i>	Hz	50 / 60
Operating mode	S1 continuous		
Isolation class	B (winding)		
Protection	IP 54		

Frequency 50 Hz

Power W	Speed min ⁻¹	Nom. current at 230 V
45	2800	0.3 A

Frequency 60 Hz

Power W	Speed min ⁻¹	Nom. current at 230 V
39	3250	0.3 A

¹⁾ Other voltages on request

Electro-magnetic compatibility EMC

The clamping and drive module is, in accordance with the „Regulations regarding electro-magnetic compatibility of components (§2, section 4)“ EWG regulations, not a ready for use component. To avoid any possible electro-magnetic interference from occurring, the use of anti-interference components from Murr-Elektronik in 71570 Oppenweiler is recommended.

E.G.

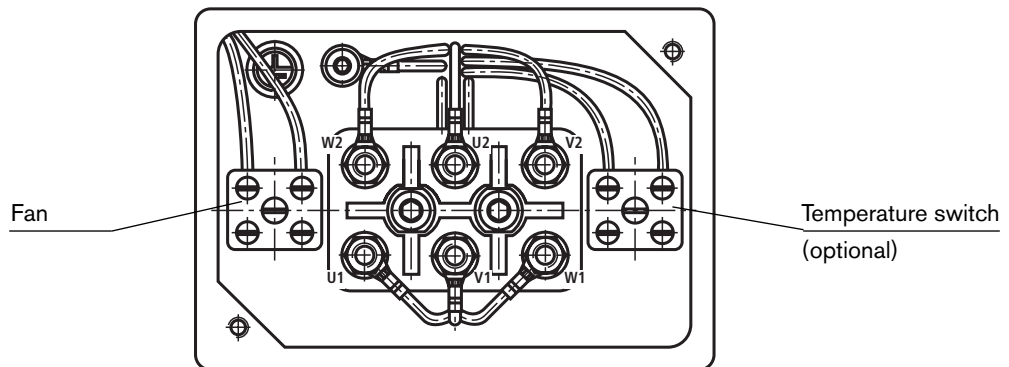
Type 23050, 3 x400 VAC, 50-60 Hz (motor)

Type 20002, 230 VAC (fan)

Terminal allocation

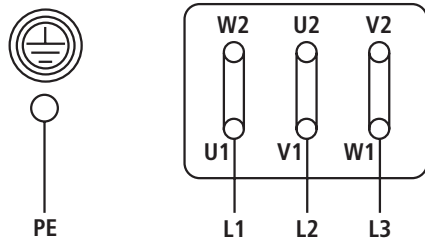
Terminal allocation within the clamping and drive module terminal box

Factory side:



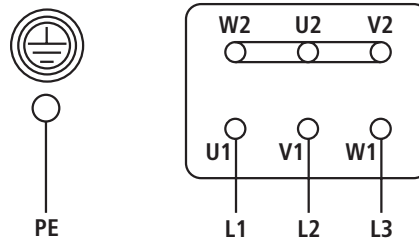
Customer side:

Δ Delta $U = 230\text{ V}$

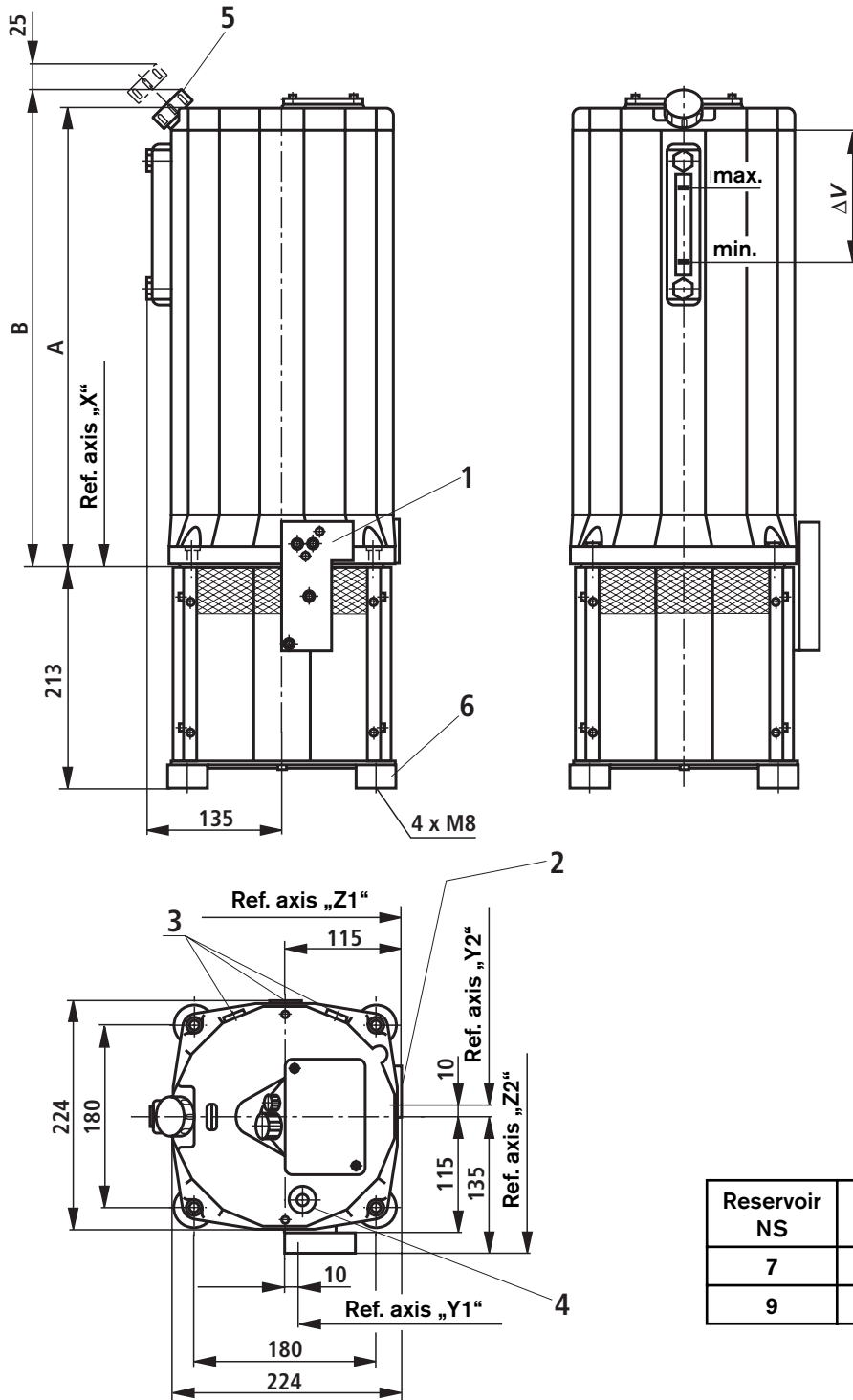


Customer side:

Y Star $U = 400\text{ V}$



Unit dimensions (Dimensions in mm)



Reservoir NS	A	B
7	455	470
9	575	590

X, Y and Z are ref. axes. These are used to determine the installation dimensions of the control block which is to be fitted.

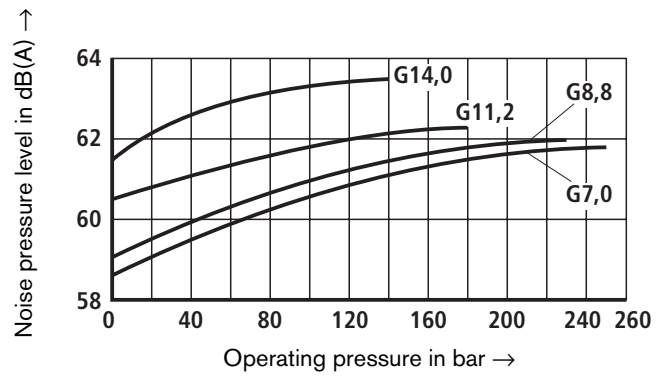
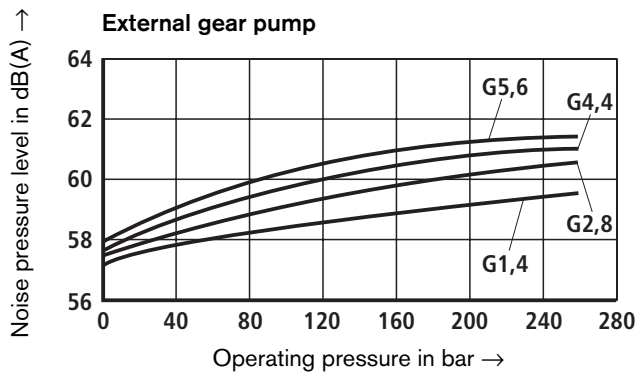
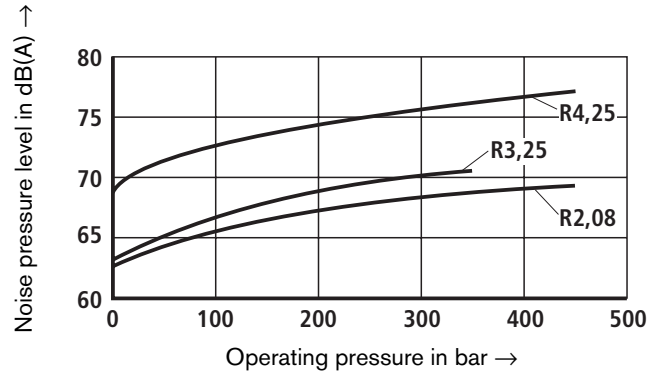
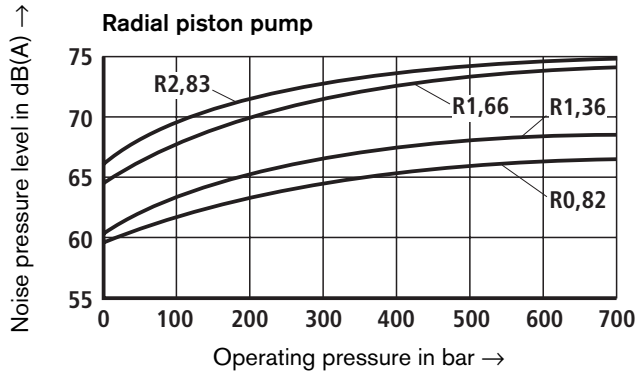
- 1 Control 1 mounting surface
- 2 Control 2 mounting surface
- 3 Oil drain plug (2 x G 3/8; 1 x G 3/4)
- 4 Drain oil connection G 1/2
- 5 Breather filter
- 6 Anti-vibration mount

Filling and draw-off quantities

	Reservoir NS	Qty. in litres
Filling quantity	7	8.5
	9	11.0
Draw-off quantity	7	3.5
	9	3.5
Draw-off quantity up to the float switch switching point	7	2.3
	9	2.3

Noise pressure level (measured at $v = 41 \text{ mm}^2/\text{s}$ and $\vartheta = 50 \text{ }^\circ\text{C}$)

Single pump:



Double pump:

The noise pressure level of the double pump version of the clamping and drive module increases by approx. 2 dB(A) when compared to the value of the single pump.

Float switch (optional)

Description

The float switch is used to electrically monitor the level of the pressure fluid. When the minimum oil level is reached the contact opens and a signal is given to the control system.

Electrical function



Technical data

Maximum voltage	V	50 AC / DC
Maximum current consumption	A	0.25
Maximum power consumption	W	3.0
Protection		IP 65
Contact type		NC

Temperature switch (optional)

Description

With the aid of the temperature switch the clamping and drive module is protected against unpermissibly high pressure fluid temperatures. The temperature switch has a fixed switching point, this switches at a pressure fluid temperature of 80 °C.

The reset switching hysteresis is approx. 10 K.

Electrical function



Technical data

Switching temperature	°C	80 ± 3K			
AC voltages	– Nominal voltage	V	250	110	60
	– Max. loading	A	6.3	8.0	1.0
Frequency	Hz	50 / 60			
Power factor	cos φ	1.0			
DC voltages	V	42 = 1.2 A			
	V	6; 12; 24 = 1.5 A			

Breather filter (optional)

When using the clamping and drive module in a highly contaminated environment we recommend the use of a breather filter.

The breather filter has a filtration rating of 10 µm.

Commissioning guidelines

- Check to see whether the clamping and drive module is correctly fitted to the machine which is to be driven (hydraulically and electrically).
- For the motor electrical connections, the washers and connection bridges provided must be used.
- Take the fan (clockwise) direction of rotation into account, as the air will be blown out of the bottom of the clamping and drive module. (Practical check: Hold a sheet of paper to the perforated steel fan cover, the paper must be sucked onto the cover.)
- The electric motor must be protected by a system with overload relays.
This must be set to the nominal current, this stated on the type/performance label.
- When installing the clamping and drive module fitted with an external gear pump particular care must be taken with the motors direction of rotation, see the direction of rotation arrow.
(Practical check: Briefly switch the motor on and check to see if the pump provides a flow of oil.)
- Only fill the pressure fluid via a filter with the required minimum retention rate.
- The clamping and drive module has to be filled with pressure fluid until the correct level on the dip stick has been reached.
- Under no circumstances allow the clamping and drive module to run without pressure fluid.
- Start-up the clamping and drive module without load and allow it to supply oil without pressure for a few seconds so that adequate lubrication is ensured.
- The fluid level in the clamping and drive module has to be checked, after bleeding the hydraulic control as well as the actuators by moving them in and out repeatedly or via the bleed points provided, and filled to the required level if required.
- The clamping and drive module must only be used within the permissible data limits. It must also only be used in good condition.
- Before any work is carried out on the clamping and drive module, the system must be depressurised and the power supply switched off.
- Any unauthorised changes and conversions which effect the safety and function are not permitted.
- Protective measures provided must not be removed.
- Keep the oil-air cooler clean and do not cover as, otherwise the pressure fluid and electric motor will over heat.
- The general current safety and accident prevention regulations are to be taken into account and complied with.

Note: With reference to the EC machinery guidelines 89/392 EWG, annex II, section B:

The assemblies have been manufactured in accordance with the harmonised standards prEN 982, prEN 983, DIN EN 292 and DIN EN 60204-1.

Commissioning may not take place until it has been confirmed that the machine, into which the assembly is to be installed, conforms with the regulations stated with the EC guidelines.

Attention!

The clamping and drive module can heat up during operation
⇒ **Danger of injury!**

Adjustments, maintenance and service of the clamping and drive module may only be carried out by authorised, trained and supervised personnel.

For repairs only use original Bosch Rexroth spare parts!