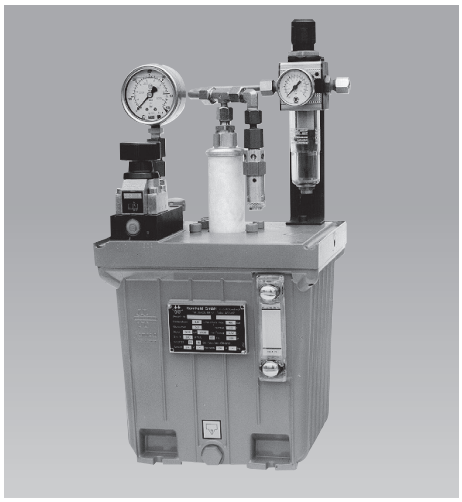
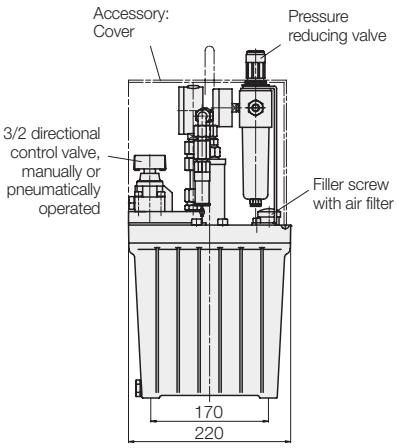
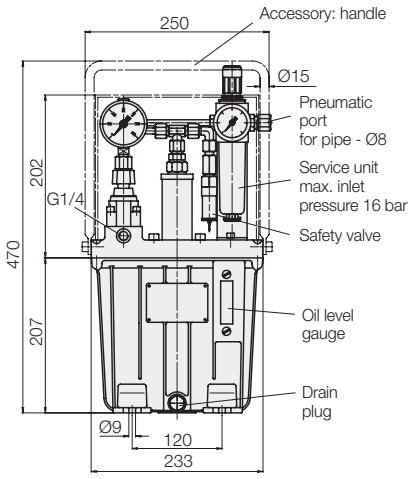
Hydro-Pneumatic Pumps
max. flow rate 1.5 l/min, max. operating pressure 500 bar



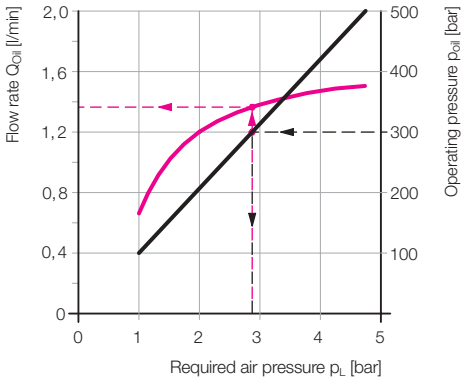




Application
The hydro-pneumatic pump is particularly suitable for small to medium-sized clamping and assembly fixtures with single or double-acting cylinders, which mainly operate in intermittent mode (pressure build up and pressure holding).

Description
The tandem plunger pump is built into the oil reservoir in a space-saving manner. It operates with oscillating movements and automatic stroke reversing control by a pilot-operated 4/2 directional control valve. The stroke frequency and thereby the flow rate depend on air pressure and hydraulic counter pressure.

Flow rate without counter pressure (idle running)



Example:
For an operating pressure of p_{oil} = 300 bar an air pressure of p_L = 2.8 bar is adjusted at the pressure reducing valve. The flow rate Q_{oil} without counter pressure is approx. 1.35 l/min.

Control variants
Manually-operated 3/2 directional control valve
This valve is equipped with a turning handle for direct operation at the power unit.

Pneumatically-operated 3/2 directional control valve
This valve is mounted on the power unit allowing for pneumatic remote control, which, however, requires an additional hand lever valve (accessory). According to the length of the pneumatic piping between both valves, there is a longer or shorter time delay for the clamping and unclamping operation.

Without valve as pressure generator
For external valve controls (P and R ports only) The pump unit maintains constant the adjusted pressure.

With attached valve control
For single and double-acting cylinders
Examples see page 3 and 4

Technical data

Max. flow rate	[cm^3/s] [l/min]	25 1.5
Max. operating pressure	[bar]	500
Min. operating pressure	[bar]	100
Max. air pressure	[bar]	4.7
Min. air pressure	[bar]	1.0
Intensification ratio		1:108
Max. air consumption	[l/min]	1200
Min. control pressure for pneumatic valve	[bar]	3
Max. oil charge	[l]	4.0
Usable oil volume	[l]	1.8
Viscosity range	[$10^{-6}m^2$/s]	10...500
Recom. viscosity class as per DIN 51519		ISO VG 22
Recom. hydraulic oil as per DIN 51524		HLP 22
Noise level	[dBA]	78
Weight, approx.	[kg]	20

Hydro-pneumatic pumps with deviating pressure or flow rate on request.

Delivery
The power units are delivered complete and ready for connection. On the pneumatic side there is a service unit with pressure reducer and filter. An additional pressure relief valve prevents increase of pressure over 4.8 bar, and thus operating pressures over 500 bar on the hydraulic side. With valve control fitted, the customer must ensure that the valves are controlled.

	Part no.
Pump with manual valve	**8600110**
Pump with pneumatic valve	**8600111**
Pump without valve as pure pressure generator	**8600112**
Pump as basic power unit for attachable valve control	**8600113**

When selecting this pump, the valves for single or double-acting cylinders must be determined additionally.
Examples see page 3 and 4

Accessories for 8600110, -111 and -112

Handle	**0353217**
Cover	**0353714**

Accessories for pneumatic remote control of 8600111

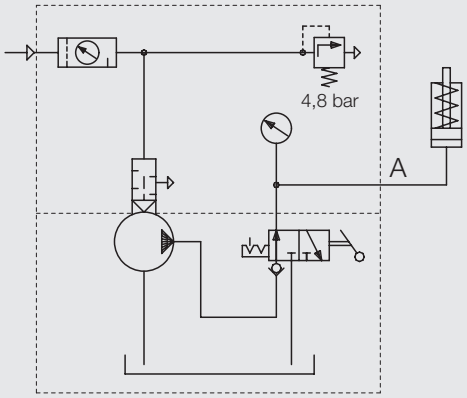
Hand lever valve with catch	**3812005**
Sound absorber for hand lever valve	**3887015**
Foot valve with catch including cover	**0381206**
Air hose ND 6	**3890059**
Screwed socket G1/4	**3890071**
Tube clamp	**3890076**

Example of ordering

Pump with manual valve	**8600110**
Handle	**0353217**
Cover	**0353714**

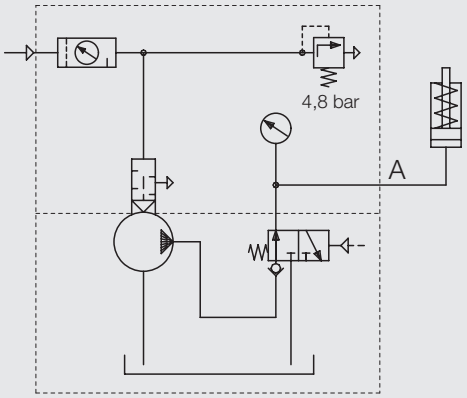
Hydro-pneumatic pump with manual valve
Part no. 8600110

Control:
manually-operated 3/2 directional control poppet valve
for single-acting elements



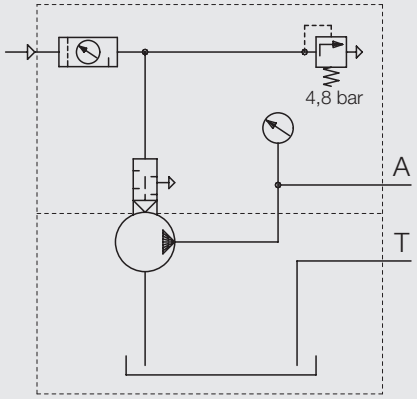
Hydro-pneumatic pump with pneumatic valve
Part no. 8600111

Control:
Pneumatically-operated 3/2 directional control poppet valve
for single-acting elements
Accessories for pneumatic remote control see page 1.



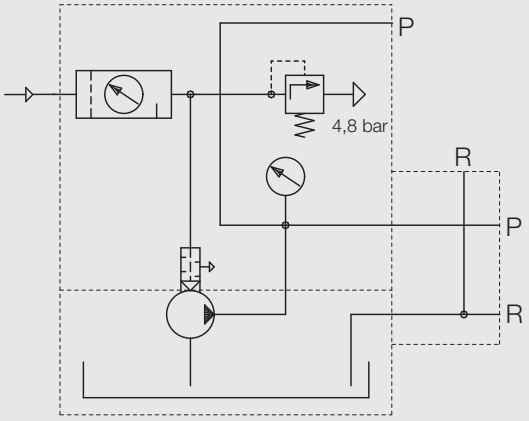
Hydro-pneumatic pump as pressure generator
Part no. 8600112

Without valve for external valve control



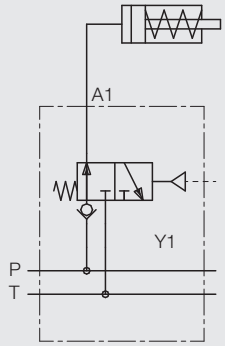
Hydro-pneumatic pump as basic power unit
Part no. 8600113
for attachable valve control
for single or double-acting elements

For this basic power unit, the valves for single or
double-acting cylinders must be determined additionally.
For clamping pressure monitoring, electrically evaluable piston
pressure switches can be selected.
The valves and pressure switches are manifold-mounted on
series mounting plates.
The series mounting plates are firmly mounted to the basic
power unit via tie rods.
Examples see page 3 and 4.



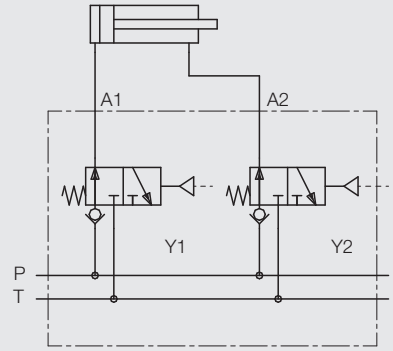
Examples for valve controls up to 500 bar

Single acting



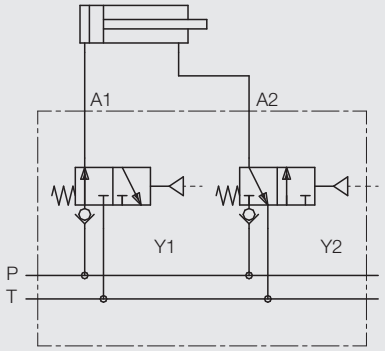
1 x 3/2 directional control poppet valve,
clamped without control air

Double acting
with 2 identical valve positions



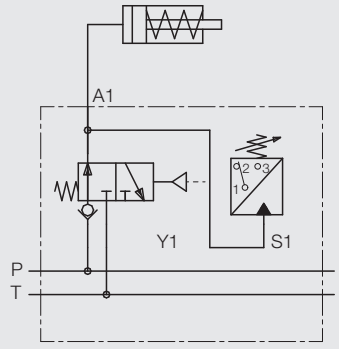
2 x identical 3/2 directional control
poppet valves,
alternating control air supply

Double acting
with 2 different valve positions



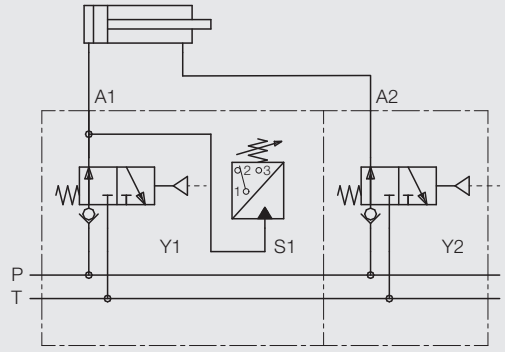
2 x inverse 3/2 directional control
poppet valves,
simultaneous control air supply

Single acting
with machine tool interlock



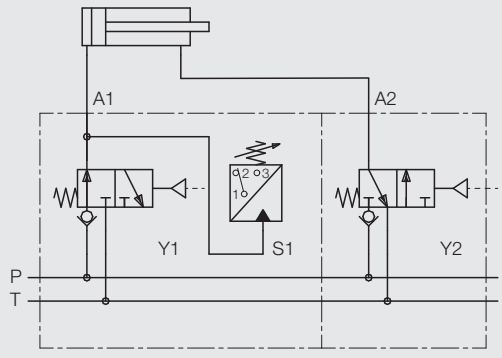
1 x 3/2 directional control poppet valve,
clamped without control air,
with 1 x piston pressure switch in the clamping outlet

Double acting
with 2 identical valve positions
with machine tool interlock



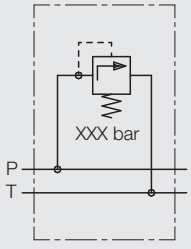
2 x identical 3/2 directional control poppet valves,
alternating control air supply,
with 1 x piston pressure switch in the clamping outlet

Double acting
with 2 different valve positions
with machine tool interlock



2 x inverse 3/2 directional control poppet valves,
simultaneous control air supply,
clamped without control air,
with 1 x piston pressure switch in the clamping outlet

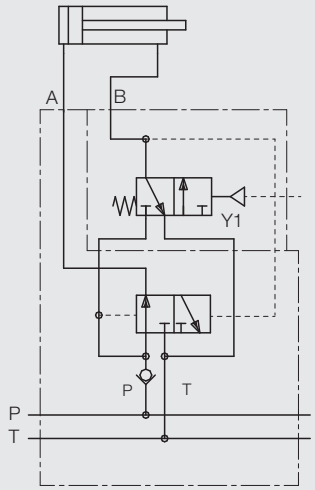
Pressure limitation
in the hydraulic circuit



1 x adjustable pressure relief valve
as additional safety valve

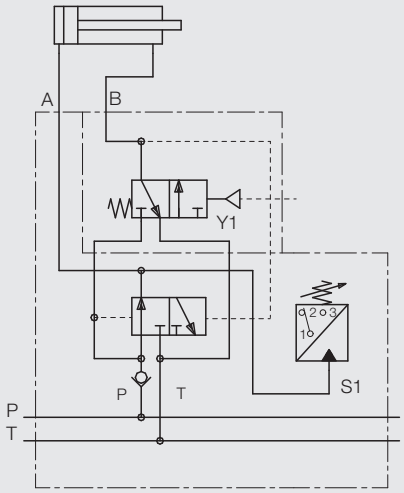
Note
The pressure relief valve must be set to
the operating pressure + 15 % as a minimum.
This prevents the hydro-pneumatic pump from
being permanently switched on.
Adjustment of the operating pressure
see example on page 1.

Double acting via 4/2 directional function *1)



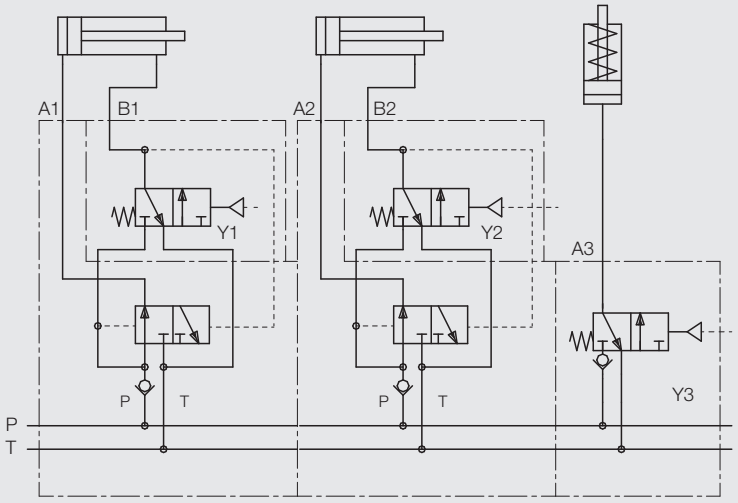
2 x 3/2 directional control poppet valve,
clamped without control air,
with hydraulically controlled intermediate plate

**Double acting via 4/2 directional function *1)
with machine tool interlock**

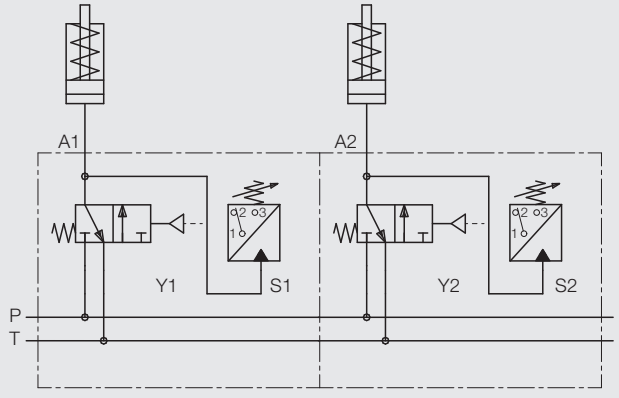


2 x 3/2 directional control poppet valve,
clamped without control air,
with hydraulically controlled intermediate plate
with 1 x piston pressure switch in the clamping outlet

**2 x double acting via 4/2 directional function *1)
and 1 x single acting**



**2 x single acting
with machine tool interlock**



*1) Note on the 4/2 directional function:
Due to the design, one of the two pressure outlets A or B is always under pressure, therefore not suitable for coupling purposes.

All valves shown with pneumatic control 4...15 bar.
Valves with 24 VDC solenoids as per data sheet C 2.360.
Valves manually operated as per data sheet C 2.320.
Valves with hydraulic control 16...50 bar on request.