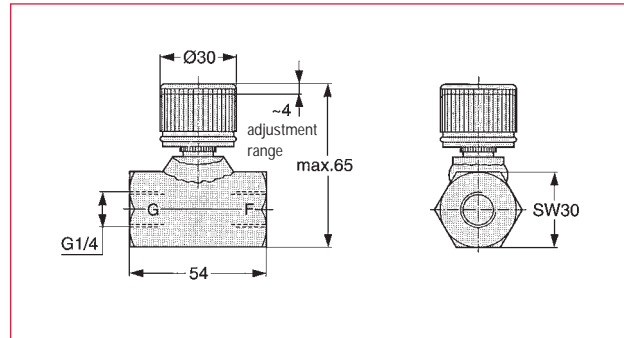
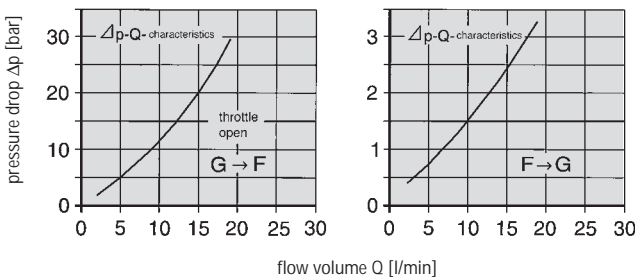
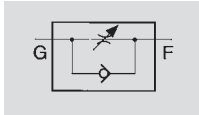


Hydraulic throttle valve with reverse free flow

Max. operating pressure 500 bar

Hydraulic throttle valves are used as restrictor valves in hydraulic systems. Their flow resistance is changed by adjusting the diameter of the restrictor; this regulates the flow volume. In the opposite flow direction, the flow is not restricted.

Symbol



Order no.	Design	Mounting position	Max. operating pressure [bar]	Max. flow Q [l/min]	Flow direction throttled	Flow direction free	Temperature range oil and surroundings	Weight ~ [kg]
70981-D	cone flow control valve with by-pass back pressure valve	optional	500	ca. 15	G R F	F R G	-40°...+80°C	0,37

Hydraulic opening valve, direct control

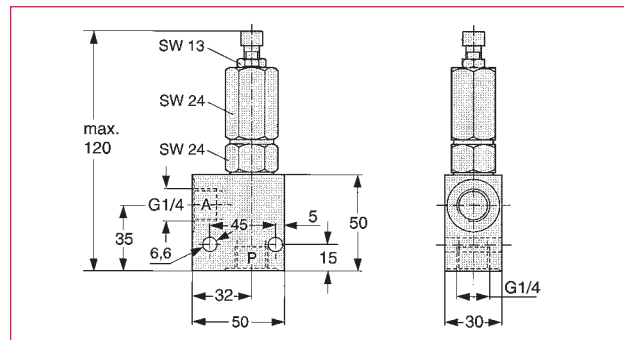
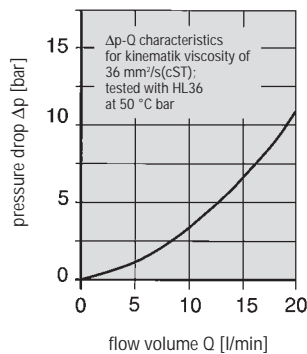
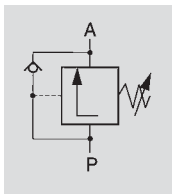
Max. operating pressure 350 bar

The use of hydraulic opening valves is recommended in applications where 2 or more hydraulic cylinders have to be operated in sequence or where workpieces have first to be positioned and then clamped.

Function

Hydraulic opening valves are mounted into the feed line of hydraulic cylinders which have to be actuated with a delay. Opening valves only open when the pre-set pressure is achieved or exceeded.

Symbol



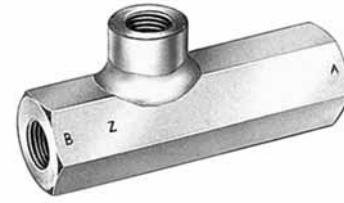
Order no.	Design	Mounting position	Max. operating pressure [bar]	Setting range [bar]	Perm. temperature range	Weight ~ [kg]
70982-D1	sliding piston valve	optional	350	ab 20...250	-20°C...+70°C	0,7

Hydraulic valves

Back pressure valve with hydraulic release

Max. operating pressure 700 bar

Back pressure valves serve to avoid pressure drop in pressurised cylinders as a result of leakage in the directional control slide valve. Furthermore, back pressure valves are used where hydraulic cylinders must be blocked for safety reasons in case of control valve failure.

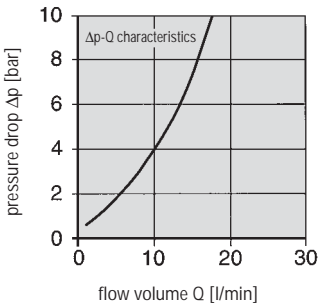
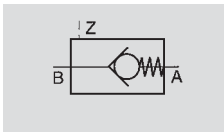


Function

Flow direction A → B blocked, B → A open.

The flow direction A → B (blocked) can be released by hydraulic pressure to Z.

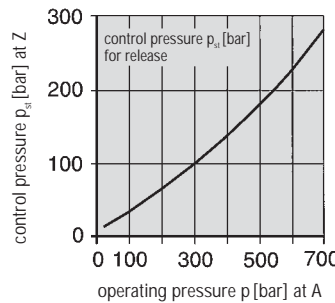
Symbol



applies to:
 low direction B → A
 and released
 flow direction A → B
 opening pressure
 B → A 0.2 ... 0.3 bar
 oil viscosity during
 the test 60 mm²/s(cSt)

Application example

optional damping of the control conduit by a hydraulic choke coil



control pressure p_{st} [bar] for release

$$p_{st} = p_B + \Delta p + k$$

p_B [bar] = pressure on side B
 Δp [bar] = flow resistance
 A → B according to Δp -Q-characteristics
 $k = 10$

Order no.	Design	Mounting position	Max. operating pressure [bar]	Max. flow volume Q [l/min]	Temperature range oil and surroundings	Weight ~ [kg]
70983-D	spring loaded, hermetically sealed ball seat valve	optional, mounted into the tube conduct	700	ca. 15	-40° ... +80°C	0,32

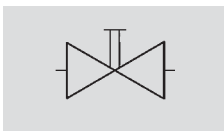
Hydraulic high pressure shut-off valve

Max. operating pressure 500 bar

Hydraulic high pressure shut-off valves are used for blocking hydraulic lines, e.g. in case one or more cylinders in a hydraulic clamping circuit must be temporarily shut-off.



Symbol



Order no.	Max. operating pressure [bar]	housing	Material			Actuation and function	Weight ~ [kg]
			ball and shaft	ball seal	shaft seal		
70984-D	500	steel	steel chromed	polyamide	perbunan	hand lever can be mounted in four positions up to (90°), optional flow direction, maintenance free operation	0,4

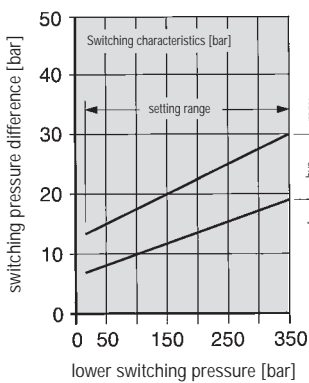
Pressure switch, electro-hydraulic

Max. operating pressure 630 bar with variable switching pressure adjustment
Setting range 20 to 350 bar

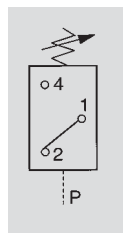
Electro-hydraulic pressure switches are used for monitoring pressure in a clamping system.

When pressure is applied, it activates a microswitch. This micro-switch is designed for millions of switching processes.

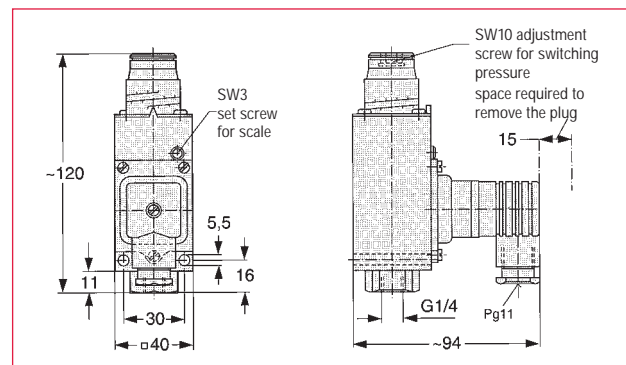
Depending on the type of connection, the electro-hydraulic pressure switch is used to switch on, off or over in case of increasing or dropping pressure. Turn the adjustment screw to achieve the required switching pressure (which can be seen on the scale).



Symbol



switching precision: <math>< \pm 1\%</math> of the adjustment pressure



Order no.	Design	Mounting position	Max. operating pressure [bar]	Adjustment range [bar]	Max. switching frequency [1/min]	Temperature range	Protection	Permitted current load		Weight [kg]
								up to 250V-	up to 50V=	
70985-D1	piston pressure switch	optional	630	20...350	120	-20°...+70°C	IP 65	5A	1A	0,6

Hydraulic gauge with glycerine filling

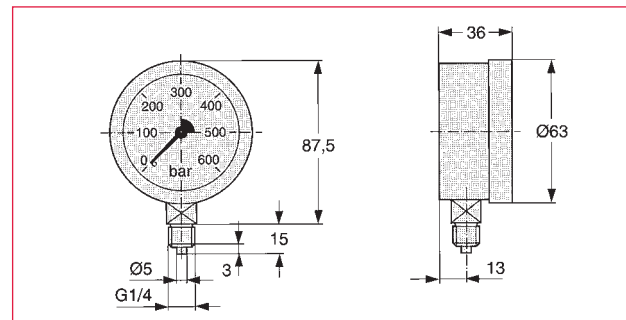
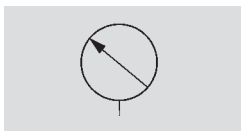
Max. operating pressure 600 bar

The gauge complies with the Calibration Regulations and with the international technical recommendations.

See p. 25.8 for the appropriate gauge screw connection.



Symbol



Order no.	Operating pressure [bar]	Weight [kg]
70925-214	0-600	0,25

Hydraulic quick connectors

The following hydraulic quick connectors are used for easy and quick separation and connection of filled hydraulic hoses.

Max. operating pressure 350 bar

Technical characteristics:

- minimal pressure drop due to unobstructed flow
- minimal loss of oil when connecting or disconnecting

Technical data:	
flow diameter	Ø3 mm
flow volume Q max.	7 l/min
operating pressure, max.	350 bar
bursting pressure	1300 bar
temperature range	-40°C...+110°C
Weight	
connector socket	0,12 kg
connector plug	0,04 kg

At least one side of the lines must be flexible. For easy separation and connection, the flexible line should be located on the connector plug.

connector socket

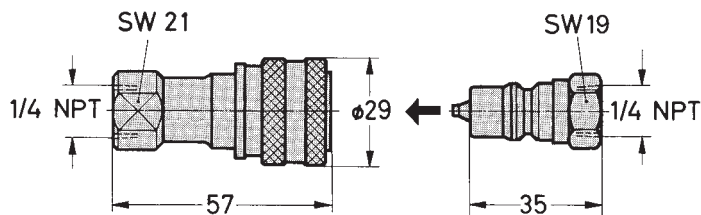


order no. 70969

connector plug



order no. 70968



Max. operating pressure 1000 bar

Technical characteristics:

- minimal pressure drop due to unobstructed flow
- drip free connection or disconnection
- dust caps supplied as standard

Technical data:	
flow diameter	Ø3mm
flow volume Q max.	7 l/min.
max. operating pressure connected	1000 bar
max. operating pressure disconnected	500 bar
bursting pressure connected	3000 bar
bursting pressure disconnected	2000 bar
temperature range	-40°C...+110°C
Weight	
connector socket	0,25 kg
connector plug	0,1 kg
adaptor	0,02 kg

connector socket

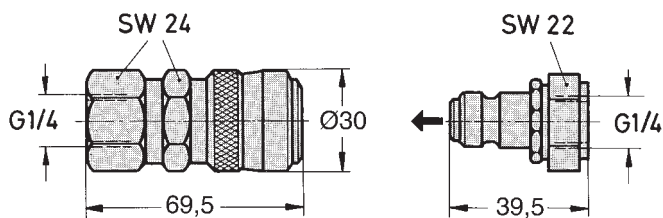


order no. 1150A3-2B

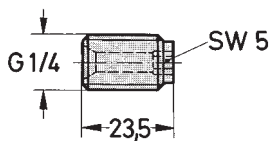
connector plug



order no. 1155A3-2B



adaptor



order no. 1184-2B

The adaptor is necessary to fit the connection to a G 1/4 internal thread

copper ring, order no. 70200-02, separate order

Hydraulic high pressure hoses

Max. operating pressure 400 bar to 500 bar

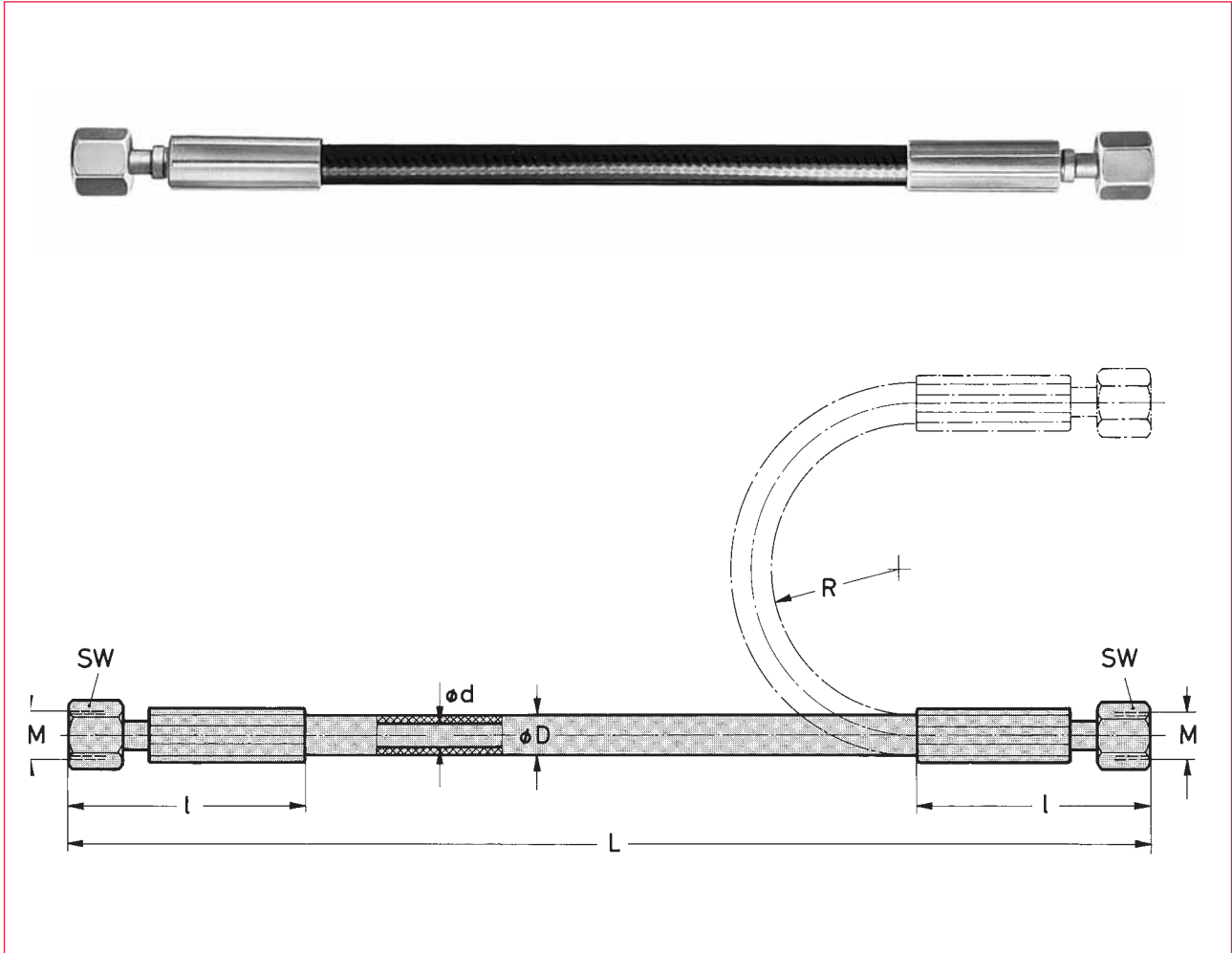
The maximal operating pressure (dynamic) is based on a safety factor of 4.

- The high pressure hoses are pre-assembled for 8L- or 8S screw connections (pages 5.7–5.9).
- The hydraulic high pressure hoses are resistant to mineral oil based hydraulic oils.

Technical characteristics

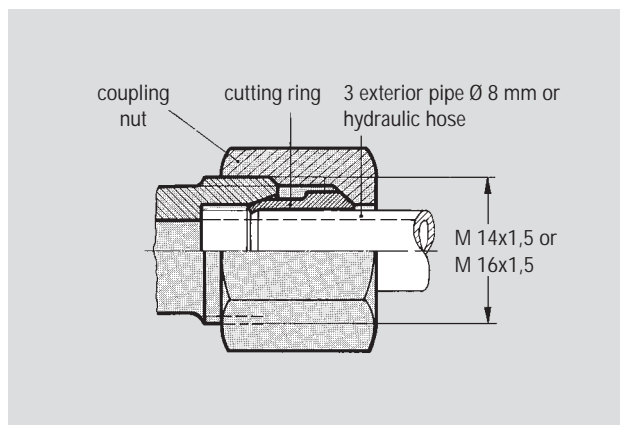
- Version up to 400 bar provided with a double steel braiding, version up to 500 bar provided with a fourfold steel spiral

Special lengths on request.



Order no.	Nominal width NW	Max. operating pressure [kg]	Internal ϕd	External ϕD	Connector thread M	-l	-L	SW	Bend radius R min.	Weight ~ [kg]
6-301-300	6	400	6,4	15	M14x1,5	50	300	17	100	0,20
6-301-600	6	400	6,4	15	M14x1,5	50	600	17	100	0,32
6-301-900	6	400	6,4	15	M14x1,5	50	900	17	100	0,42
6-301-1200	6	400	6,4	15	M14x1,5	50	1200	17	100	0,52
6-301-1500	6	400	6,4	15	M14x1,5	50	1500	17	100	0,63
6-301-300 S	6	500	6,4	18	M16x1,5	59	300	19	150	0,28
6-301-600 S	6	500	6,4	18	M16x1,5	59	600	19	150	0,40
6-301-900 S	6	500	6,4	18	M16x1,5	59	900	19	150	0,54
6-301-1200 S	6	500	6,4	18	M16x1,5	59	1200	19	150	0,65
6-301-1500 S	6	500	6,4	18	M16x1,5	59	1500	19	150	0,75

Hydraulic accessories



Screw connections

For pipe, exterior diameter 8 and hydraulic hoses

Screw connection, standard application

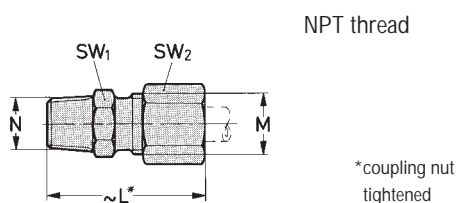
(coupling nut M14x1,5 or M16x1,5 and cutting ring are removable).

The permitted operating pressure is:

L-screw connections R1/8 max. 200 bar (e.g. D8L-R1/8)

L-screw connections R1/4 max. 250 bar (e.g. D8L-R1/4)

S-screw connections max. 630 bar (e.g. D8S-R1/4)

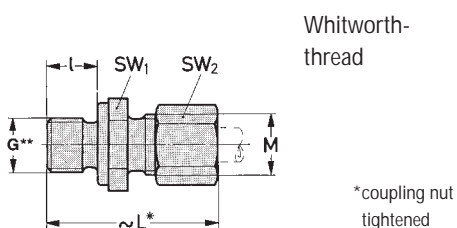


NPT thread

*coupling nut tightened

Straight screw connection

Order no.	-L*	M	N	SW1	SW2	Weight ~ [kg]
D8L-1/8NPT	31,5	M14x1,5	1/8NPT	14	17	0,034
D8L-1/4NPT	36,5	M14x1,5	1/4NPT	14	17	0,038
D8S-1/4NPT	42,5	M16x1,5	1/4NPT	17	19	0,063

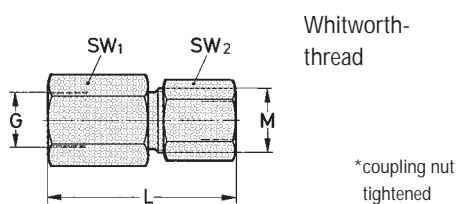


Whitworth-thread

*coupling nut tightened

Straight screw connection

Order no.	I	-L*	M	G	SW1	SW2	Weight ~ [kg]
D8L-R1/8	8	31	M14x1,5	G1/8	17	17	0,036
D8L-R1/4	12	36,5	M14x1,5	G1/4	19	17	0,045
D8S-R1/8	8	39	M16x1,5	G1/8	17	19	0,055
D8S-R1/4	12	42	M16x1,5	G1/4	19	19	0,063

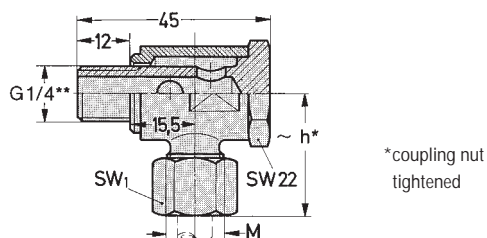


Whitworth-thread

*coupling nut tightened

Straight screw connection

Order no.	-L*	M	G	SW1	SW2	Weight ~ [kg]
GA18-LR	39	M14x1,5	G1/4	19	17	0,045
GA18-SR 1	41	M16x1,5	G1/4	19	19	0,055

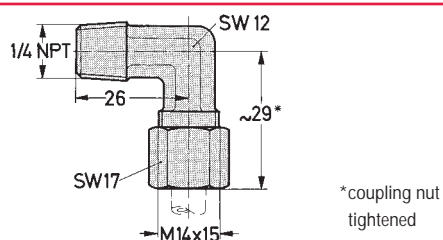


*coupling nut tightened

L-screw connection, adjustable

Order no.	-h*	M	SW1	Weight ~ [kg]
DSVK-8LR	28,8	M14x1,5	17	0,09
DSVK-8SR ¹⁾	30,5	M16x1,5	19	0,09

¹⁾ permitted operating pressure max. 400 bar

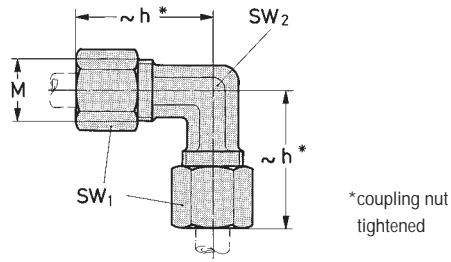


*coupling nut tightened

L-screw connection

Order no. G8L-1/4NPT	Weight 0,047 kg
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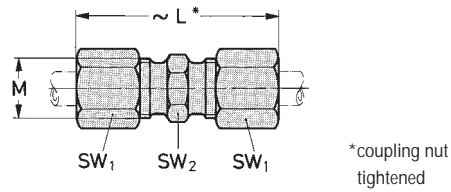
Screw connections



Screw connection, standard applications

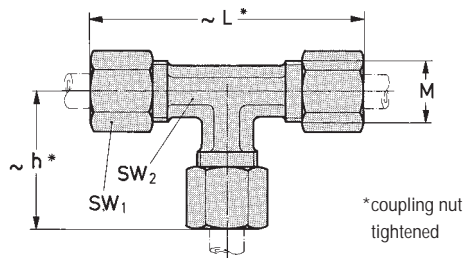
L-screw connection

Order no.	-h*	M	SW1	SW2	Weight ~ [kg]
K8L	29	M14x1,5	17	12	0,06
K8S	31,5	M16x1,5	19	19	0,06



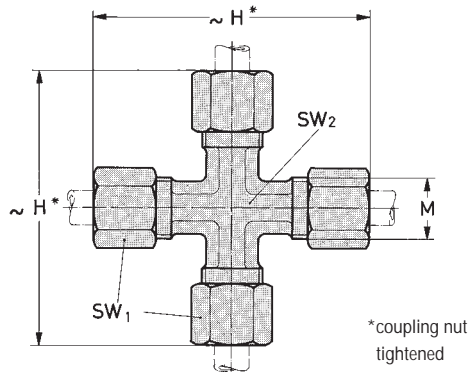
straight screw connection

Order no.	-L*	M	SW1	SW2	Weight ~ [kg]
E8L	40	M14x1,5	17	14	0,05
E8S	47	M16x1,5	19	17	0,05



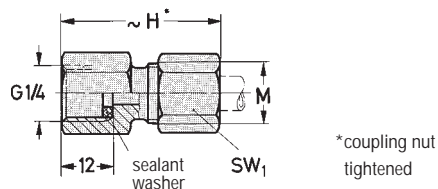
T-screw connection

Order no.	-h*	-L*	M	SW1	SW2	Weight ~ [kg]
Q8L	29	57	M14x1,5	17	12	0,09
Q8S	31,5	63	M16x1,5	19	14	0,09



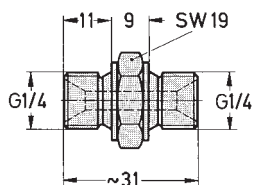
Cross screw connection

Order no.	-H*	M	SW1	SW2	Weight ~ [kg]
KV8L	57	M14x1,5	17	12	0,12
KV8S	63	M16x1,5	19	14	0,12



Gauge screw connection

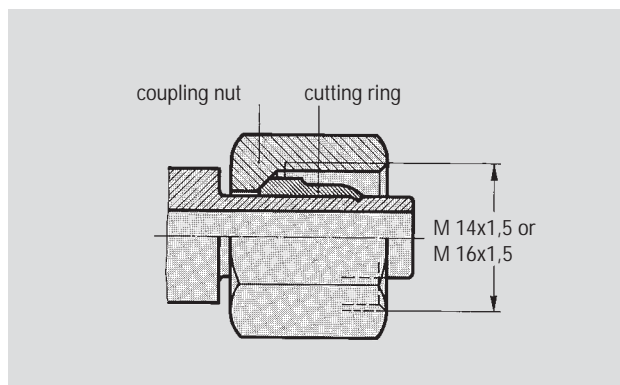
Order no.	-H*	M	SW1	Weight ~ [kg]
MV8L	34	M14x1,5	17	0,05
MV8S	36	M16x1,5	19	0,05



Twin nipple

Order no. R-1/4-1/4	Weight 0,04 kg
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Hydraulic accessories



Screw connections

Screw connections, pre-assembled

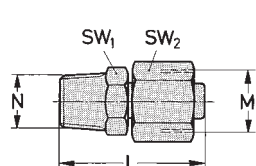
(the coupling nut M14x1,5 or M16x1,5 and the cutting ring are pre-assembled).

The permitted operating pressure is:

L-screw connections R1/8 max. 200 bar (e.g. D8L-R1/8)

L-screw connections R1/4 max. 250 bar (e.g. D8L-R1/4)

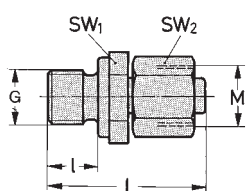
S-screw connections max. 630 bar (e.g. D8S-R1/4)



NPT thread

Straight screw connection, pre-assembled

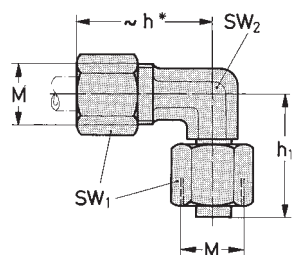
Order no..	L	M	N	SW1	SW2	Weight ~ [kg]
DC8L-1/4NPT	34	M14x1,5	1/4NPT	14	17	0,035
DC8S-1/4NPT	40	M16x1,5	1/4NPT	14	19	0,05



Whitworth-thread

Straight screw connection, pre-assembled

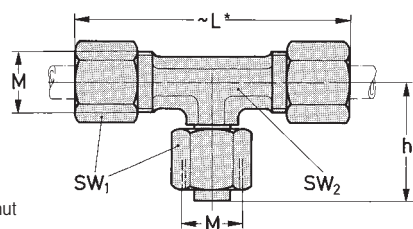
Order no.	I	L	M	G	SW1	SW2	Weight ~ [kg]
DC8L-R1/8	8	35	M14x1,5	G1/8	14	17	0,038
DC8L-R1/4	12	37	M14x1,5	G1/4	19	17	0,045
DC8S-R1/4	12	42	M16x1,5	G1/4	19	19	0,055



*coupling nut tightened

L screw connection, pre-assembled

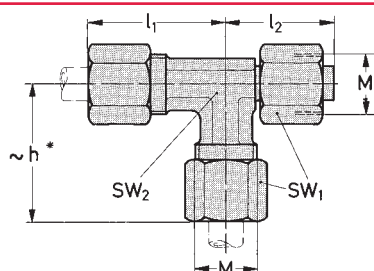
Order no.	-h*	h1	M	SW1	SW2	Weight ~ [kg]
KE8L	29	27	M14x1,5	17	12	0,06
KE8S	31,5	30	M16x1,5	19	14	0,06



*coupling nut tightened

T screw connection, pre-assembled

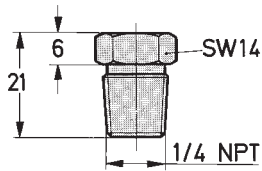
Order no.	h	-L*	M	SW1	SW2	Weight ~ [kg]
QE8L	27	57	M14x1,5	17	12	0,08
QE8S	30	63	M16x1,5	19	14	0,08



*coupling nut tightened

T screw connection, pre-assembled

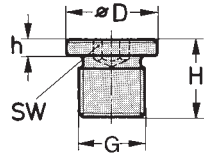
Order no.	-h*	l1	l2	M	SW1	SW2	Weight ~ [kg]
LE8L	29	29	27	M14x1,5	17	12	0,08
LE8S	31,5	31,5	30	M16x1,5	19	14	0,08



Blanking plug

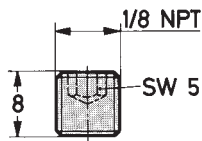
Order no. 70956

Weight 0,023 kg



Blanking plug

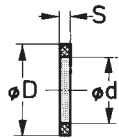
Order no.	ØD	h	H	G	SW	Weight ~ [kg]
70215-09	14	3	11,5	G1/8	5	0,007
70230-09	18	3	15	G1/4	6	0,014



Blanking plug

Order no. 702158

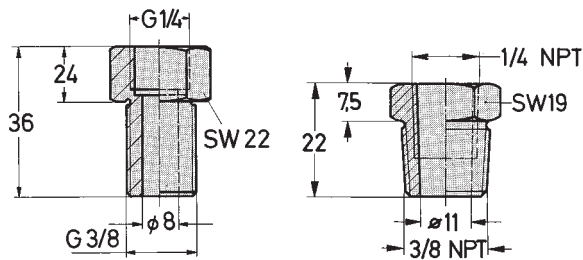
Weight 0,004 kg



for screw-in connection with whitworth thread

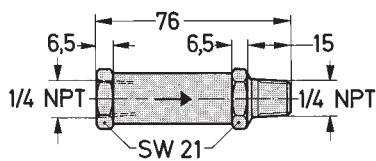
Copper seal ring

Order no.	Ød	ØD	s	for	Weight ~ [kg]
70200-01	10	15	1,5	G1/8	0,002
70200-02	13	18	1,5	G1/4	0,002



Reducing nipple

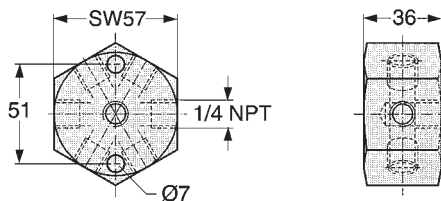
Order no.	Order no. whitworth thread	Weight ~ [kg]
GWR-3/8-1/4	pipe thread	0,003
PTRS-1/4NPT	NPT thread	0,002



Back pressure valve

Order no. 70923

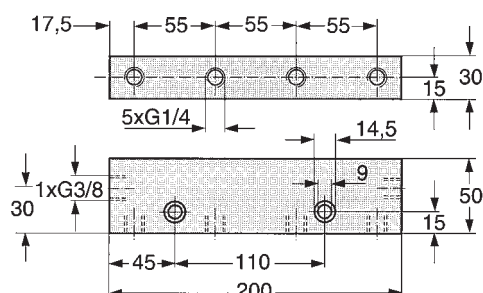
Weight 0,125 kg



Manifold

Order no. 70901

Weight 0,42 kg



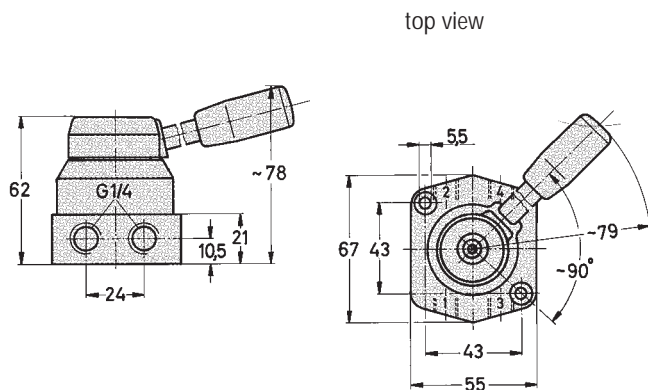
1 reducing nipple GWR-3/8-1/4 included

Manifold, in time

Order no. 794J06001-1

Weight 2,1 kg

Pneumatic accessories

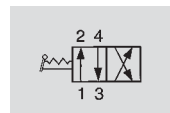


4/2-way manual control valve, G1/4 connection

order no. 800414

weight 0,4 kg

Symbol

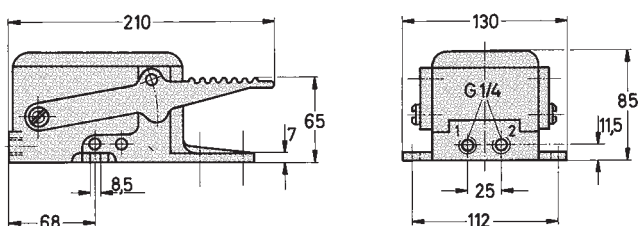
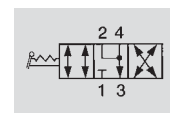


4/3-way manual control valve, G1/4 connection

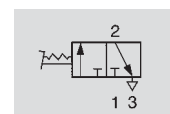
order no. 800415

weight 0,4 kg

Symbol



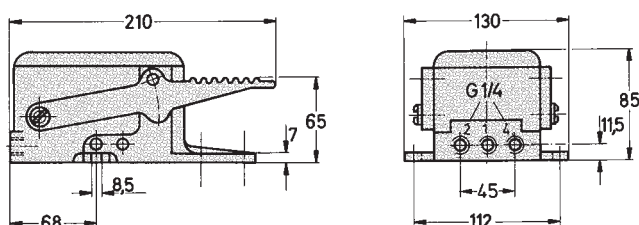
Symbol



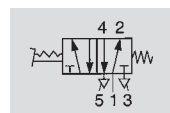
3/2-way foot control valve, G1/4 connection (with locking notch)

order no. FP-3-1/4-B

weight 1,76 kg



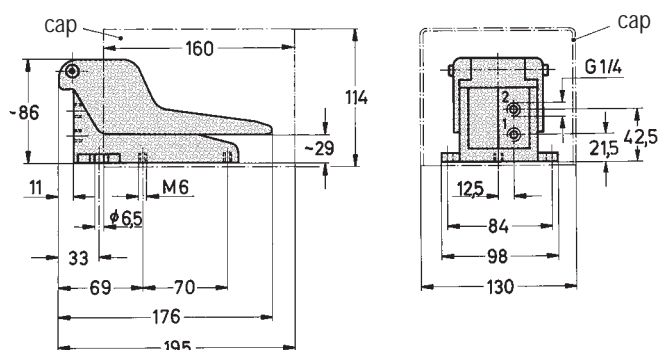
Symbol



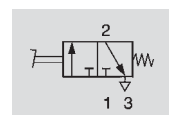
5/2-way foot control valve, G1/4 connection (with locking notch)

order no. FP-5-1/4-B

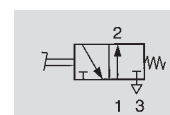
weight 1,95 kg



Symbol



F-3-1/4-B
F-3-1/4-H



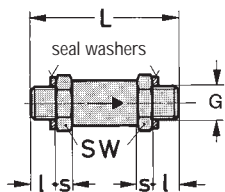
FO-3-1/4-B
FO-3-1/4-H

F-design: flow blocked in zero position

FO-design: flow open in zero position

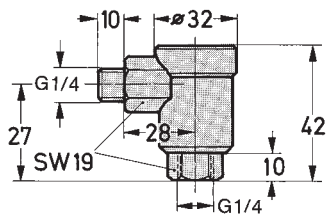
3/2-way foot control valve, G1/4 connection

Order no.	Order no.	Cover	Weight ~ [kg]
F-3-1/4-B	FO-3-1/4-B	with	1,2
F-3-1/4-H	FO-3-1/4-H	without	1,8



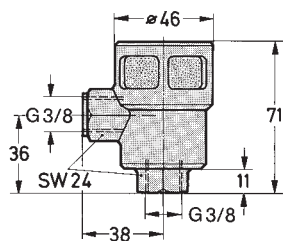
Back pressure valve

Order no.	l	L	G	s	SW	Weight ~ [kg]
H-1/4-A	8	50	G1/8	6	22	0,1
H-3/8-A	11	54	G3/8	7	22	0,11



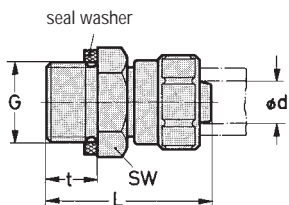
Quick vent valve with sound dampener, G1/4

Order no. SEU-1/4	Weight 0,11 kg
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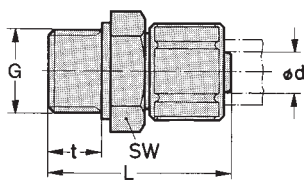
Quick vent valve with sound dampener, G3/8

Order no. SEU-3/8	Weight 0,175 kg
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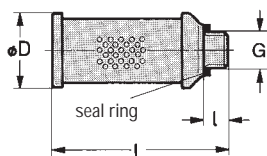
Pneumatic fitting

Order no.	L	G	SW	T	For plastic tube, inner Ø d	Weight ~ [kg]
CK-1/8-PK6	25	G1/8	13	7	6	0,006
CK-1/4-PK6	27	G1/4	17	9	6	0,009
CK-1/4-PK9	30	G1/4	17	9	9	0,015
CK-3/8-PK6	29	G3/8	19	10	6	0,013
CK-3/8-PK9	32	G3/8	19	10	9	0,016



Pneumatic fitting (plastic)

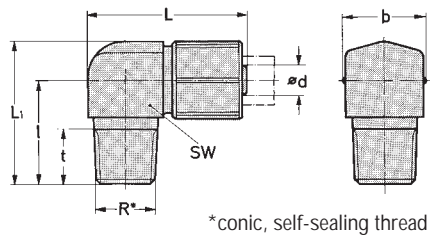
Order no.	L	G	SW	T	For plastic tube, inner Ø d	Weight ~ [kg]
CK-1/8-6KU	25,5	G1/8	13	6,5	6	0,004
CK-1/4-6KU	28,5	G1/4	17	8,5	6	0,005



Sound dampener

Order no.	ØD	l	L	G	Weight ~ [kg]
U-1/4	19	10	58	G1/4	0,01
U-3/8	35	11	82	G3/8	0,038

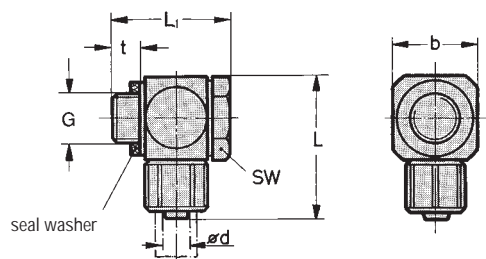
Pneumatic accessories



*conic, self-sealing thread

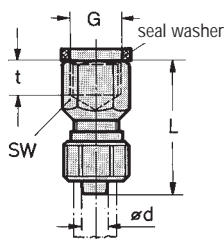
L-pneumatic fittings (plastic)

Order no.	b	L	L1	I	R*	SW	t	For plastic tube, inner $\varnothing d$	Weight ~ [kg]
GCK-1/8-6KU	14	29	24,5	17,5	R1/8	14	8	6	0,005
GCK-1/4-6KU	14	32,5	27,5	20,5	R1/4	14	11	6	0,009



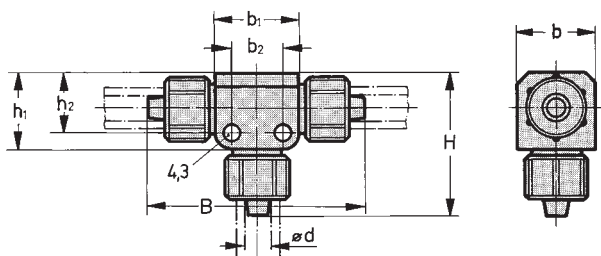
L-pneumatic fitting, swivel

Order no.	b	L	L1	G	SW	t	For plastic tube, inner $\varnothing d$	Weight ~ [kg]
LCK-1/4-PK6	19	34	28,5	G1/4	17	8	6	0,016
LCK-3/8-PK9	25	42	36,5	G3/8	22	12	9	0,043



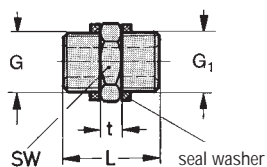
Pneumatic fitting

Order no.	L	G	SW	t	For plastic tube, inner $\varnothing d$	Weight ~ [kg]
ACK-1/4-PK6	33	G1/4	17	12	6	0,011
ACK-3/8-PK9	38	G3/8	19	18	9	0,016



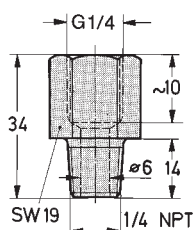
T-fitting (plastic)

Order no.	B	b	b1	b2	H	h1	h2	For plastic tube, inner $\varnothing d$	Weight ~ [kg]
FCK-3-PK6	52	18	20	12	34	18	14	6	0,014
FCK-3-PK9	64	22	21	13	46	22	22	9	0,028



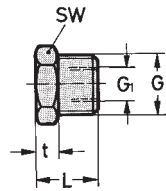
Twin nipple

Order no.	L	G	G1	t	SW	Weight ~ [kg]
E-1/4-1/4	23	G1/4	G1/4	5	17	0,008
E-1/4-3/8	25	G1/4	G3/8	5	19	0,010
E-3/8-3/8	27	G3/8	G3/8	5	19	0,010



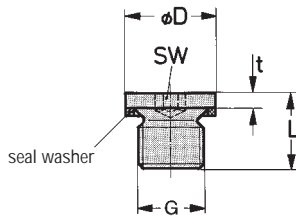
Connector

Order no. R1/4-1/4NPT	Weight 0,043 kg
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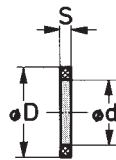
Reducing nipple

Order no.	L	G	G1	t	SW	Weight ~ [kg]
D-1/8I-1/4A	11	G1/4	G1/8	4	17	0,008
D-1/4I-3/8A	15	G3/8	G1/4	4	19	0,014
D-3/8I-1/2A	18	G1/2	G3/8	6	24	0,025



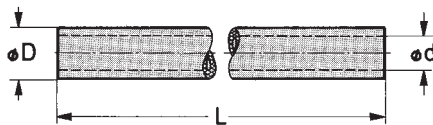
Blanking plug

Order no.	ØD	L	G	SW	t	Weight ~ [kg]
B-1/4	18	15	G1/4	6	3	0,015
B-3/8	22	15	G3/8	8	3	0,023



Plastic seal

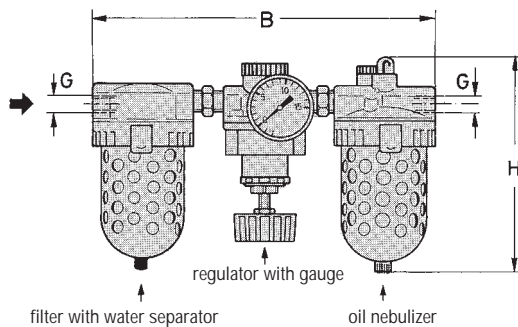
Order no.	Ød	ØD	s	For	Weight ~ [kg]
0-1/4	13	18	2	G1/4	0,001
0-3/8	17	22	2	G3/8	0,001



Plastic tube

Order no.	Ød	ØD	L	For fitting	Weight ~ [kg]
PK-6	6	8,5	per meter	G1/8, G1/4, G3/8	0,025
PU-6*	5,9	8,3		G1/8, G1/4, G3/8	0,033
PL-9	9	11,5		G3/8, G1/4	0,05

* flexible version



standard accessories: angle for wall fastening

Maintenance unit

information: The flow volume is based on 6 bar output pressure and a pressure drop of 0,5 bar. Adjustment range of the pressure regulator: 0,35-8,5 bar

All units have polycarbonate containers which can be used up to a pressure of 14 bar

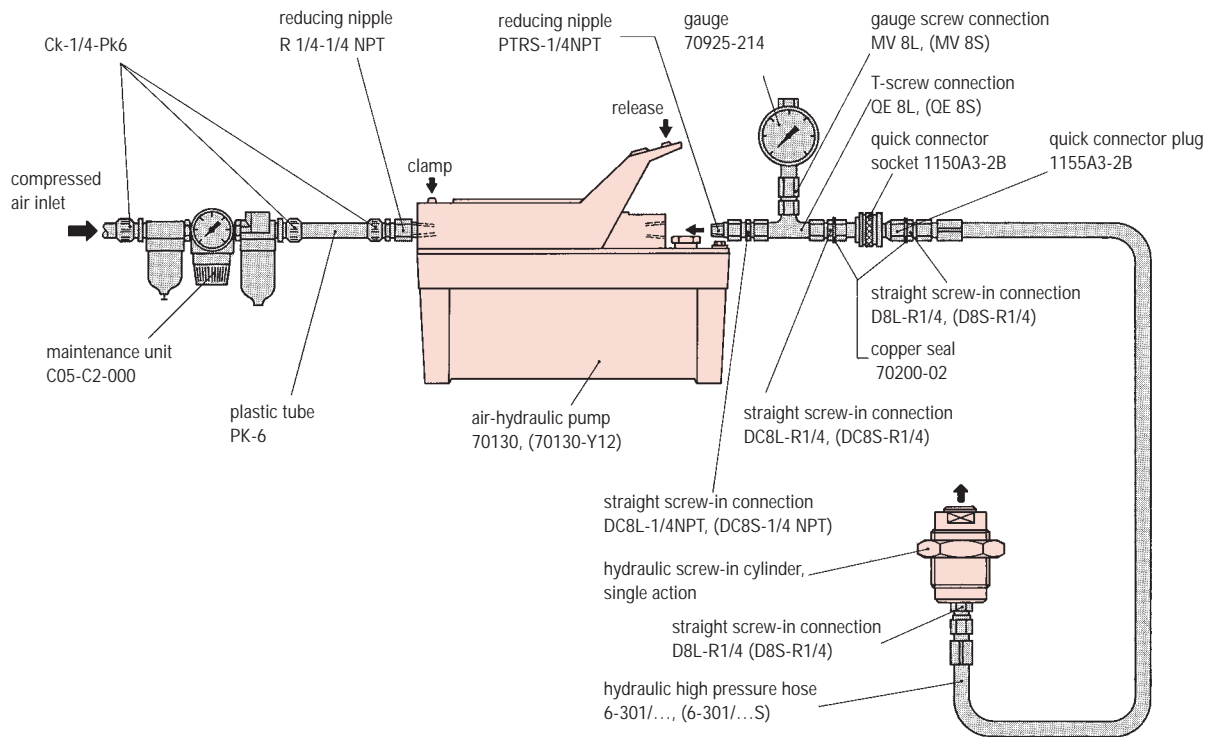
Recommended oil: light spindle oil of approx. 13-21 cSt (2-3°E) at 50°C.

Maintenance unit

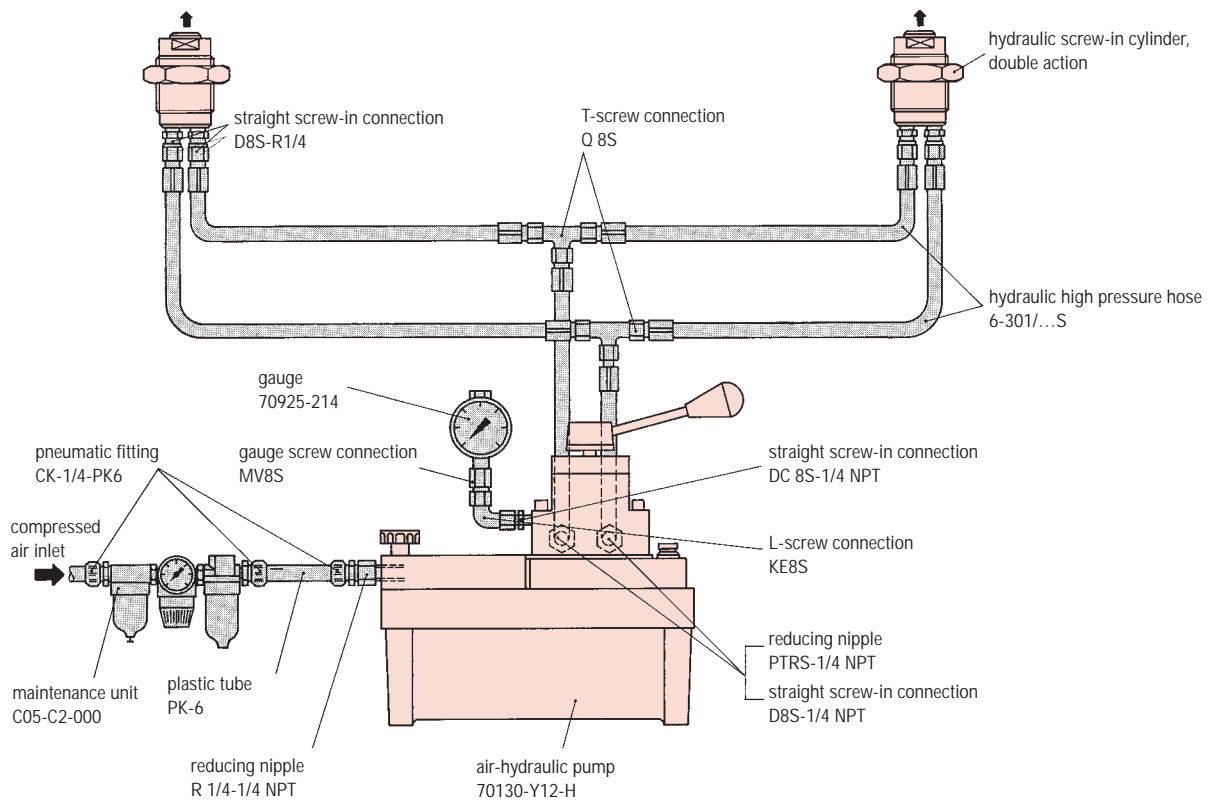
Order no.	B	H	G 2x	Flow volume [Nm³/h]	Weight ~ [kg]
C05-C2-000	145	116	G1/4	40	0,67
C16-C3-000	228	180	G3/8	75	2,2

Connection examples

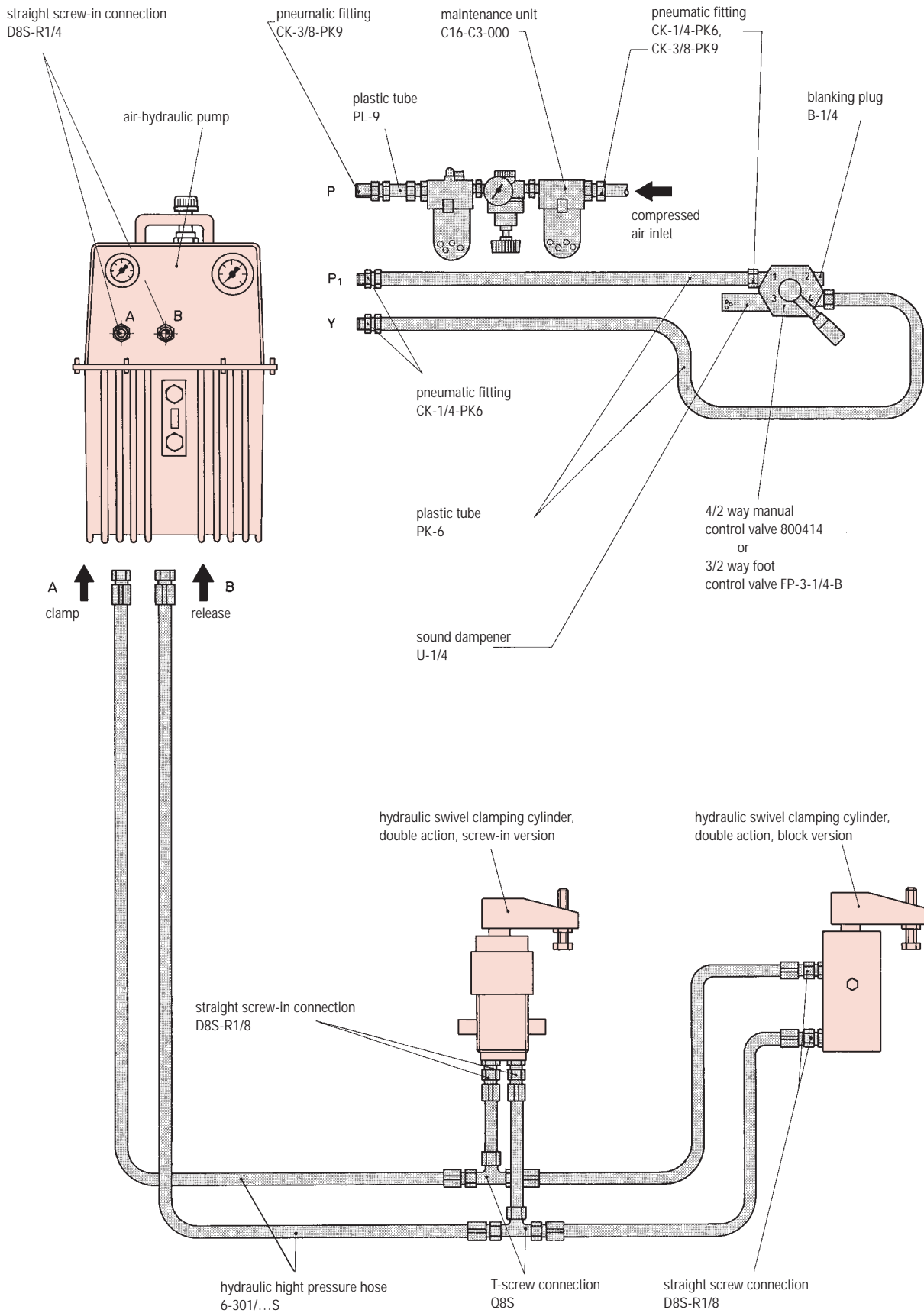
1. Connection example, single action

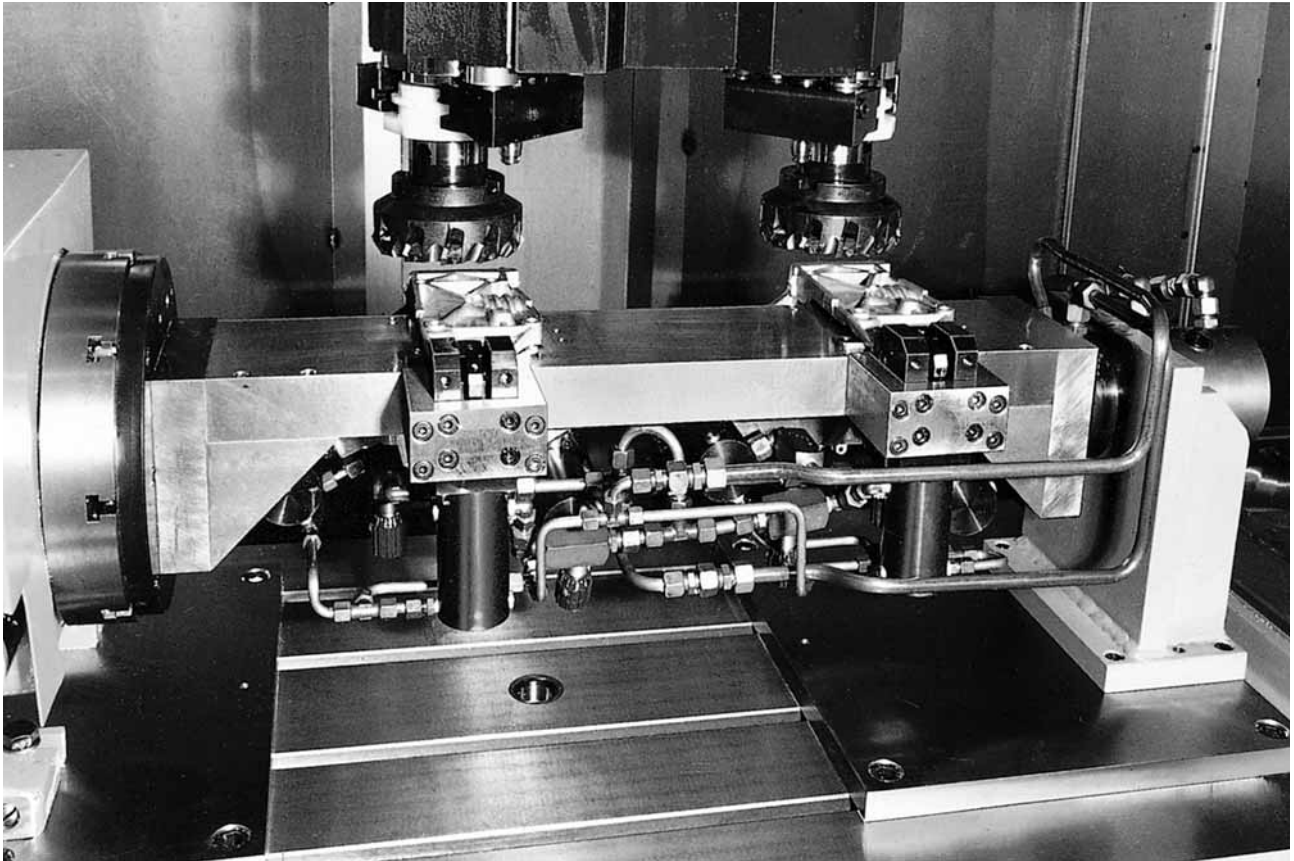


2. Connection example, double action

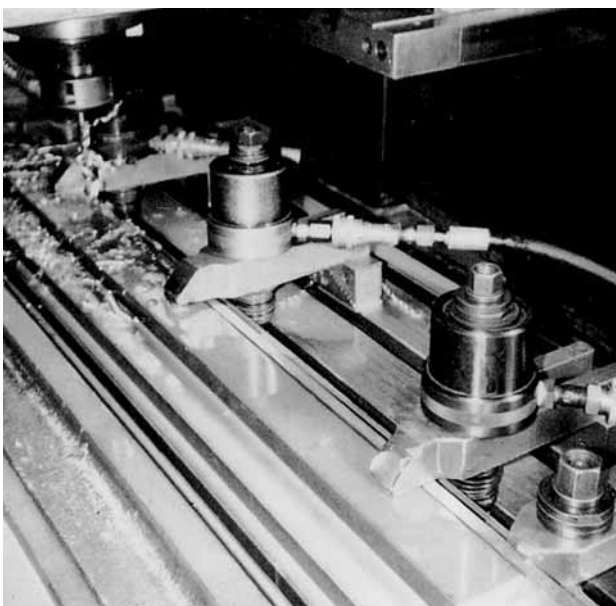


3. Connection example, double action





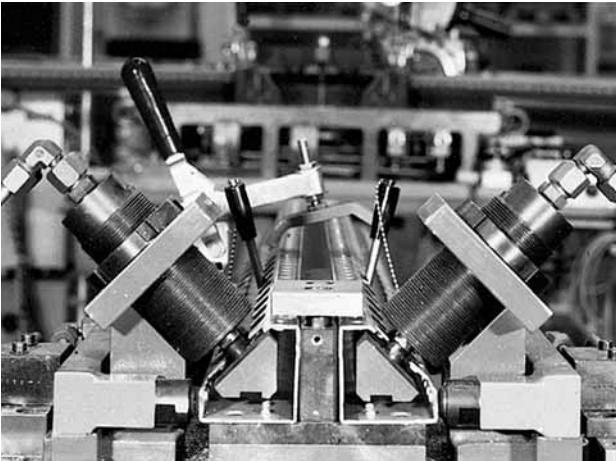
Hydraulic power clamp, double action (page 24.6) on a milling fixture



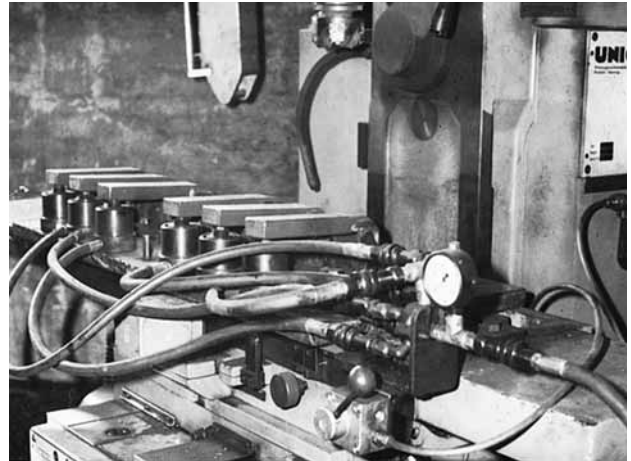
Hydraulic hollow piston cylinder, single action
(see catalogue pages 23.13 and 23.14) for clamping on a
drilling jig.



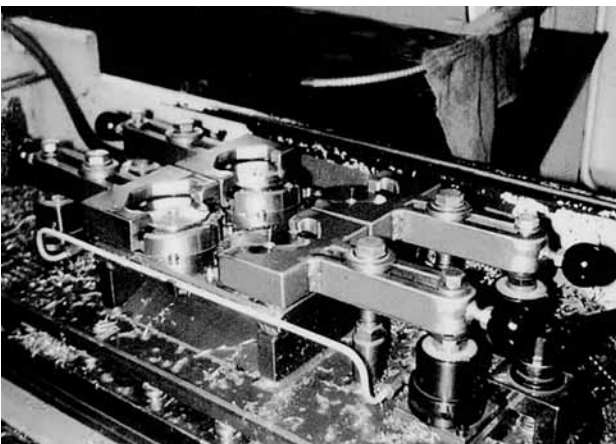
Hydraulic swivel clamp, double action
(see catalogue pages 24.1 to 24.4) for clamping cast parts on a
milling fixture



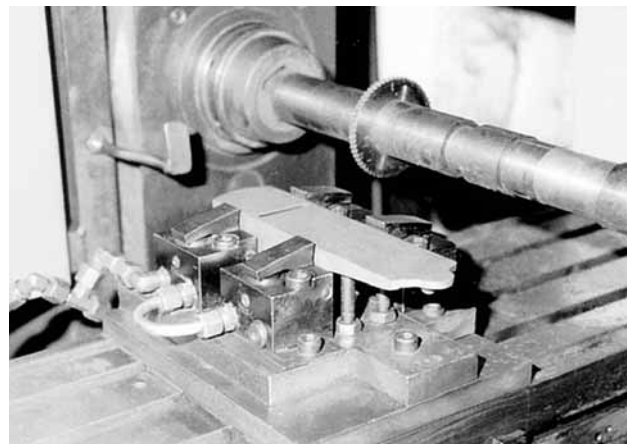
Hydraulic screw-in cylinder, double action
 (see catalogue pages 23.1 and 23.2) for clamping profiles fixed on a milling machine.



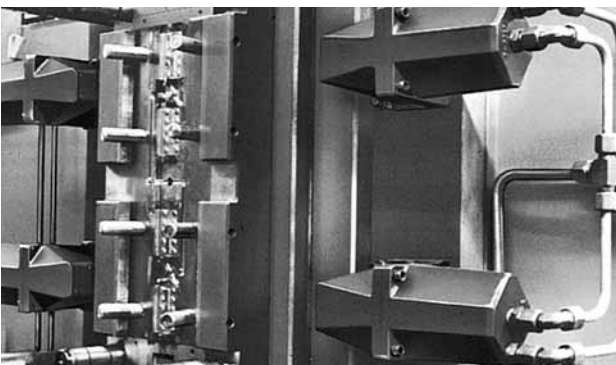
Hydraulic hollow piston cylinder, single action
 (see catalogue pages 23.13 and 23.14) as a clamping device on a milling machine.



Hydraulic hollow piston cylinder, single action
 (see catalogue pages 23.13 to 23.14) for clamping on a milling jig.



Hydraulic Edge clamp, single action
 (page 24.7 to 24.8) for clamping on a milling machine.



Hydraulic retraction clamp, double action
 (catalogue page 24.5) for clamping a mould tool to an injection mould machine.