

**Directional valve size NG 16  
WL 4.16**

Installation dimensions ISO 4401 / DIN 24340 A16  
electro-hydraulically pilot operated

## Description

A pilot valve operates the main control valve electrohydraulically. For operating the pilot valve, pressure-tight direct and alternating current magnets can be fitted switching in oil.

The control piston for the main control valve is operated by the flanged pilot valve directly subject to actuating pressure and switched to indexing position a or b.

The buncher space or spring chamber is formed by two flanged covers that can also be fitted with a stroke limiter. The control oil in- and outlet can be individually switched to internal or external.

The main control valve is available in the following control piston feedback models:

Pilot valve	Main control valve
1. Spring-centred central position	– Spring-centred central position
2. Spring-centred final position	– Without spring return
3. Without spring feedback	– Without spring return
4. With locking final position	– Without spring return

Actuating pressure is required with model 4 for fixing the final position of the main control valve.

## Statistics

### General statistics

Description	$\frac{4}{3}$ , $\frac{4}{2}$ , $\frac{3}{3}$ , $\frac{3}{2}$ and $\frac{2}{2}$ directional valves
Design	Slide damper
Method of fixing	Flange
Line connector	Connection panel R $\frac{3}{4}$ ", R1"
Dimensions	Page 9
Weight	Page 9
Fitting position	Optional, preferably horizontal
Direction of flow	See symbols
Environmental temperature	$\vartheta_{U \max} = + 50 \text{ }^\circ\text{C}$

### Hydraulic statistics

Operating pressure	
Connector P, A, B, T	$p_{\max.} = 315 \text{ bar}$ page 8
Connector X	$p_{\max.} = 315 \text{ bar}$
Connector Y	$p_{\max.} = 100 \text{ bar}$
Temperature of pressurizing medium	$\vartheta_{m \min.} = -20 \text{ }^\circ\text{C}$ $\vartheta_{m \max.} = +80 \text{ }^\circ\text{C}$
Viscosity	$v_{\min.} = 13 \text{ mm}^2/\text{s}$ (cSt) $v_{\max.} = 380 \text{ mm}^2/\text{s}$ (cSt)
Functions	Pages 4 and 5
$\Delta p$ -Q-characteristic curve	Pages 7 and 8
Hydraulic fluids	Hydraulic oils according to DIN 51524/25 Highly flammable liquids on request

### Operating mode

Hydraulically	
Electrohydraulically	Statistics on pages 6 and 8 WL 4.06 pilot valve

### Accessories

Stroke limiter	Page 6
Counterbalance valve	Page 7
Check valve	Page 7
Connection panels	Page 10

# Directional valve size WL 4.16 Installation dimensions ISO 4401 / DIN 24340 A16

Main control valve – the blanks marked with spaces are to be completed with the following codes:

1. Function

2. Pilot valve

3. Stroke limiter (spring-centred)

4. Control oil

<b>D</b>	with
<b>P</b>	without

<b>H0</b>	without
<b>H2</b>	only on side A works in indexing position b
<b>H3</b>	only on side B works in indexing position a
<b>H4</b>	both sides

	Inlet X	Outlet Y
<b>F</b>	internal	external
<b>V</b>	internal	external with counterbalance valve
<b>B</b>	internal	internal
<b>W</b>	internal	internal with counterbalance valve
<b>G</b>	external	external
<b>C</b>	external	internal

See explanation on page 7

**WL 4 . 16 XD2 . . .**

**Pilot valve NG 06**

**WL 4 . 16 XP2 . M .**

<b>3</b>	with
<b>6</b>	without

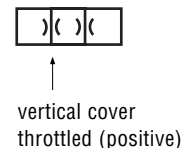
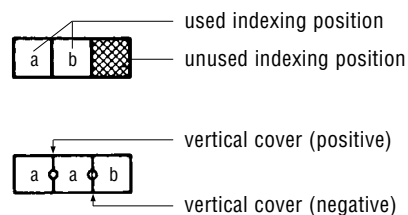
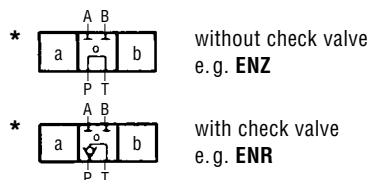
Page 6

Spring return

Spring return

Function	Symbol		Pilot valve	Function	Symbol		Pilot valve
<b>ENZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>	<b>SEZ</b> <b>(..R)*</b>		<b>3</b>	<b>0**</b>
		<b>6</b>	<b>0</b>			<b>6</b>	<b>6</b>
<b>HEZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>	<b>FZ</b> <b>(..R)*</b>		<b>6</b>	<b>0</b>
		<b>6</b>	<b>0</b>			<b>3</b>	<b>3</b>
		<b>6</b>	<b>1</b>			<b>3</b>	<b>31</b>
<b>SEZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>	<b>FDZ</b> <b>(..R)*</b>		<b>3</b>	<b>0**</b>
		<b>6</b>	<b>0</b>			<b>6</b>	<b>6</b>
		<b>3</b>	<b>3</b>			<b>6</b>	<b>0</b>
		<b>3</b>	<b>31</b>			<b>3</b>	<b>3</b>

Key to symbols:



# Directional valve size WL 4.16 Installation dimensions ISO 4401 / DIN 24340 A16

Main control valve – the blanks marked with spaces are to be completed with the following codes:

1. Function

2. Pilot valve

3. Stroke limiter (spring-centred)

4. Control oil

<b>D</b>	with
<b>P</b>	without

<b>H0</b>	without
<b>H2</b>	only on side A works in indexing position b
<b>H3</b>	only on side B works in indexing position a
<b>H4</b>	both sides

	Inlet X	Outlet Y
<b>F</b>	internal	external
<b>V</b>	internal	external with counterbalance valve
<b>B</b>	internal	internal
<b>W</b>	internal	internal with counterbalance valve
<b>G</b>	external	external
<b>C</b>	external	internal

See explanation on page 7

**WL 4 . 16 XD2 . . .**

**Pilot valve NG 06**

**WL 4 . 16 XP2 . M .**

Page 6

<b>3</b>	without
<b>6</b>	with

Function	Symbol	Stroke limiter	Pilot valve	Function	Symbol	Stroke limiter	Pilot valve
<b>FDZ</b> <b>(..R)*</b>		<b>3</b>	<b>31</b>	<b>EVZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>
		<b>3</b>	<b>0**</b>			<b>6</b>	<b>1</b>
<b>AFZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>	<b>FVZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>
		<b>6</b>	<b>0</b>			<b>6</b>	<b>1</b>
		<b>6</b>	<b>1</b>			<b>3</b>	<b>0**</b>
<b>SFZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>	<b>ANZ</b> <b>(..R)*</b>		<b>3</b>	<b>1**</b>
		<b>6</b>	<b>0</b>			<b>6</b>	<b>1</b>
<b>SFDZ</b> <b>(..R)*</b>		<b>6</b>	<b>6</b>				
		<b>6</b>	<b>0</b>				

\*\* With spring return 0: WL4 AP 06 P1 pilot valve..  
With spring return 1: WL4 BP 06 P1 pilot valve..

**Ordering example** **WL 4 ENZ 16 XD2 HOV6 + WL 4 SF06 P1 EG6 Z 23050 + MWL4 16 R2 A0**  
 main control valve                      pilot valve                      single connection panel

## Ordering code

Pilot valve – the points marked with spaces are to be completed with the following codes:

1. Magnet	2. Spring return for pilot valve: pages 4 and 5	3. Connector plug according to DIN 43650	4. Rated voltage
<b>EG</b> Alternating current-M		<b>Z</b> with	** <b>01200</b> 12 V Direct current
<b>E</b> Direct current-M		<b>Y</b> without	** <b>02400</b> 24 V Direct current
Explosion protection on request			** <b>23050</b> 230 V Alternating current 50 ... 60 Hz

\*\* preferably other voltages on request

**NG 06 WL 4 . 06 P1 . . . .** without response time adjustment  
 Plug-in nozzles are available for adjusting response times for channel P on the pilot valve. (on request)

## Basic functions

Function	Symbol
SF	
AP	
BP	

Other functions on request

## Electrical statistics

For direct and alternating current magnets

Permissible tolerance of rated voltage	DC: -10 ... +6 % AC: ±10 %
Max. operating cycles	15000 switches/h
Turn on time at $U_n$ and viscosity 20 mm <sup>2</sup> /s <sup>-1</sup>	DC: 30 ... 50 ms AC: 30 ... 40 ms
Turn off time with viscosity 20 mm <sup>2</sup> /s <sup>-1</sup>	DC: 10 ... 50 ms AC: 30 ... 70 ms
Max. permissible load factor	100 %
Durability of directional valves –	
Number of switching cycles	10 <sup>7</sup>
Protection class in accordance DIN 40 050	IP 65

## Stroke limiter

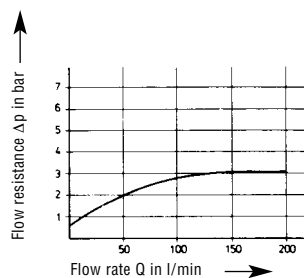
Code			
<b>H0</b>		Without stroke limiter	The stroke limiter is described as an adjustable stop in the valve's vertical cover for adjusting the control piston stroke. Stroke reduction means area reduction, i.e., throttle effect or flow regulation. An indexing position may also become completely blocked.  Other stroke limiters on request.
<b>H2</b>		One-sided stroke limiter on side A Works in indexing position b	
<b>H3</b>		One-sided stroke limiter on side B Works in indexing position a	
<b>H4</b>		Two-sided stroke limiter	

## Control oil in- and outlet

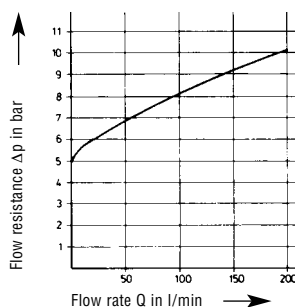
Code	Control oil	Simplified symbol	Detailed symbol	Diagram	Note
<b>F</b> (V)	X internal Y external				Not possible with functions <b>F</b> ENZ, SEZ, HEZ, EVZ; Function ANZ at $Q \leq 60$ l/min <b>V</b> Possible
<b>B</b> (W)	X internal Y internal				Not possible with functions <b>B</b> ENZ, SEZ, HEZ, EVZ; Function ANZ at $Q \leq 60$ l/min <b>W</b> Possible
<b>G</b>	X external Y external				Possible
<b>C</b>	X external Y internal				Possible
<b>M</b>	Remote controlled		Remote controlled		Possible

Note: With internal control oil in- and outlet, the connectors X and Y in the connection panel must be closed.

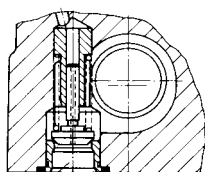
- with set screw M6 x 8 DIN 913 closed (SW 4)
  - Throttle screw according to drawing 4302803/4 screwed in (SW 4)
- Note:  
For control oil adjustment X and Y, first remove the screw plug M10 x 1 keg DIN 906 (SW 5)



The flow resistance is to be added to the flow value P-A; P-B; P-T ( $\Delta p$ -Q-characteristic curve page 8).



The flow resistance is to be added to the flow value P-A; P-B; P-T ( $\Delta p$ -Q-characteristic curve page 8).



A check- or counterbalance valve can also be installed. Conversion is not possible.

### Check valve in connector P

A check valve can be built into connector P in order to prevent volume displacement from the client to connector P when activating statically loaded clients.

Ordering code: 3301122/4

### Counterbalance valve in connector P

Counterbalance valves are used for valves with pressure-free circulation and internal withdrawal of control oil. The counterbalance valve also functions as a check valve in connector P.

Ordering code: 3301121/4

## Operating pressure / flow rate

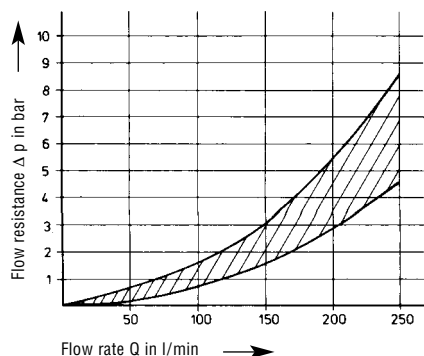
The breaking capacities stated refer to simultaneous valve flow, e.g., P-B and A-T.

Function	Q (Q <sub>max.</sub> ) [l/min] at		
	p = 150 bar	p = 210 bar	p = 315 bar
FZ, FDZ, SFZ, SFDZ AFZ, FVZ ①	250 (300)	250 (300)	250 (300)
ENZ, SEZ, ANZ, HEZ, EVZ ②	200 (230)	180	140

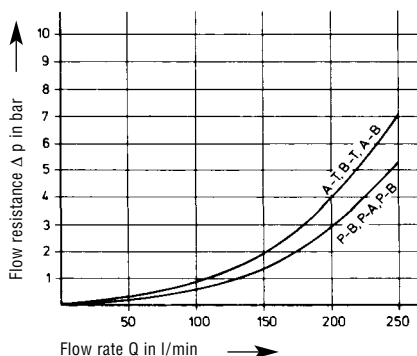
- ① The flow rate Q = 250 l/min is a recommended rate. This can be up to Q = 300 l/min taking account of higher flow resistance.
- ② In the case of pressure flow rate values above the values stated and the flow resistance of subordinate importance (see  $\Delta p$ -Q-characteristic curve), the pressure-centred recirculation is to be used (on request).

## $\Delta p$ -Q-characteristic curve

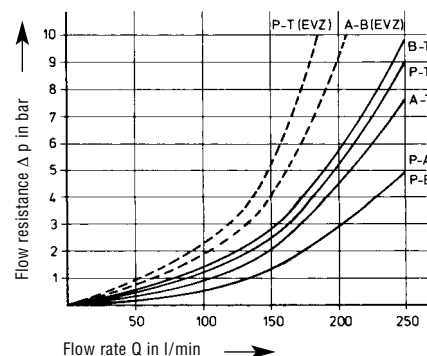
Viscosity  $\nu = 33 \text{ mm}^2/\text{s}$  (cSt)  
Characteristic curve  $\Delta p = f(Q)$



For all functions except SEZ, FZ, ENZ, EVZ



For functions SEZ, FZ



For functions ENZ, EVZ

## Control characteristics

Pilot pressure: main control valve

with spring return

$$p_{st} = 8,5 \dots 315 \text{ bar}$$

with spring return for functions  
ENZ, EVZ

$$p_{st} = 10,0 \dots 315 \text{ bar}$$

without spring return

$$p_{st} = 5,0 \text{ bar}$$

with servo cartridge for functions  
ENZ, SEZ, HEZ, EVZ, SEVZ

$$p_{st} = \Delta p\text{-Q-Characteristic curve (see above) + flow resistance P-T}$$

Pilot volume: main control valve

with spring load indexing positions o in a; o in b

$$V_{st} = 4,2 \text{ cm}^3$$

indexing position o in a; o in b for functions ENZ, EVZ

$$V_{st} = 4,9 \text{ cm}^3$$

without spring return indexing position a in b

$$V_{st} = 8,4 \text{ cm}^3$$

indexing position a in b for functions ENZ, EVZ

$$V_{st} = 9,8 \text{ cm}^3$$

Turn on times

(Pilot valve and main control valve)

(Alternating current)

with pilot valve NG 06

Main control valve

$p_{st}$  [bar] 50 100 200

With spring return

Indexing position o in a; o in b

$t_{an}$  [ms] 130 120 100

Without spring return

Indexing position a in b

$t_{an}$  [ms] 250 220 180

Turn on times are increased by 30 ms in case of direct current.

Turn off times

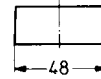
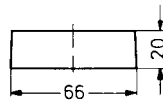
With spring return

$t_{ab}$  [ms] 100

# Directional valve size WL 4.16

## Dimensions (in mm)

Deflector plate for valve WL 4.16 XP2.M.  
included in delivery

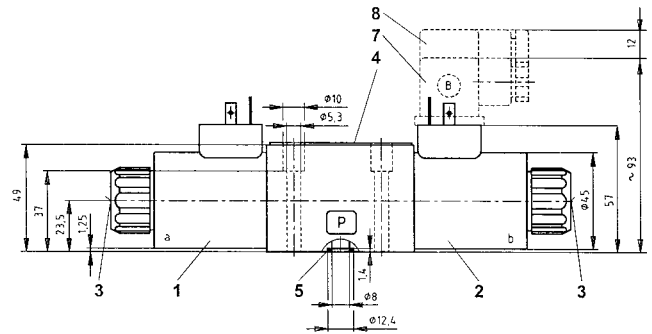
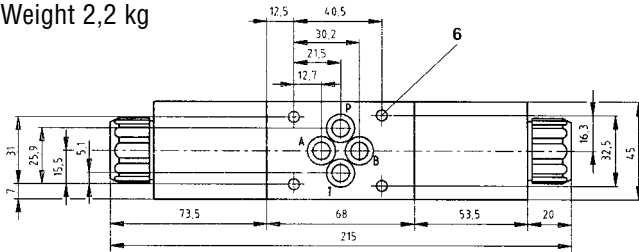


Weight 0,4 kg

## Pilot valve WL 4..06 P1.. installation dimensions ISO 4401 / DIN 24340 A6

Fitted with 2 magnets

Weight 2,2 kg



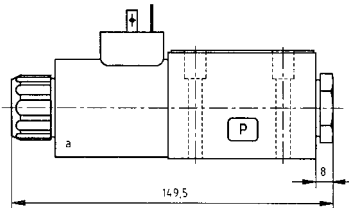
- 1 Actuating magnet a
- 2 Actuating magnet b
- 3 Emergency manual override

- 4 Name plate
- 5 Rectangular ring 9,25 x 1,68 x 1,68 mm included in delivery

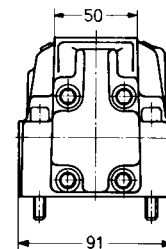
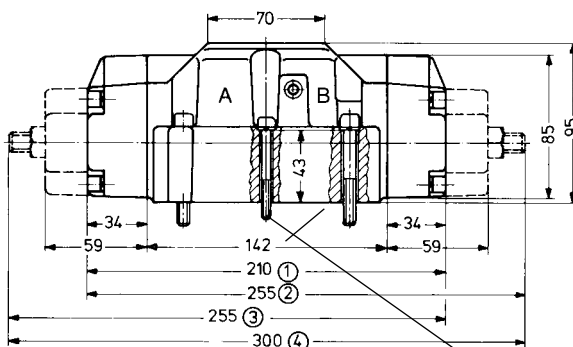
- 6 4 Valve fixing hole
- 7 DIN 43650 connector plug
- 8 Measurement A for removing the plug

Fitted with 1 magnet

Weight 1,6 kg

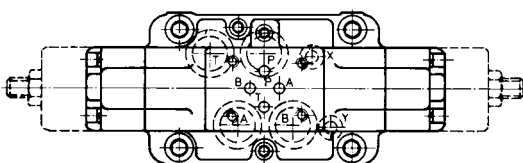


## Main control valve WL 4.16 Installation dimensions ISO 4401 / DIN 24340 A16



Weight

- ① H0 without stroke limiter 7,8 kg
- ② H3 with stroke limiter on side B 8,3 kg
- ③ H2 with stroke limiter on side A 8,3 kg
- ④ H4 with stroke limiters on both sides 8,8 kg



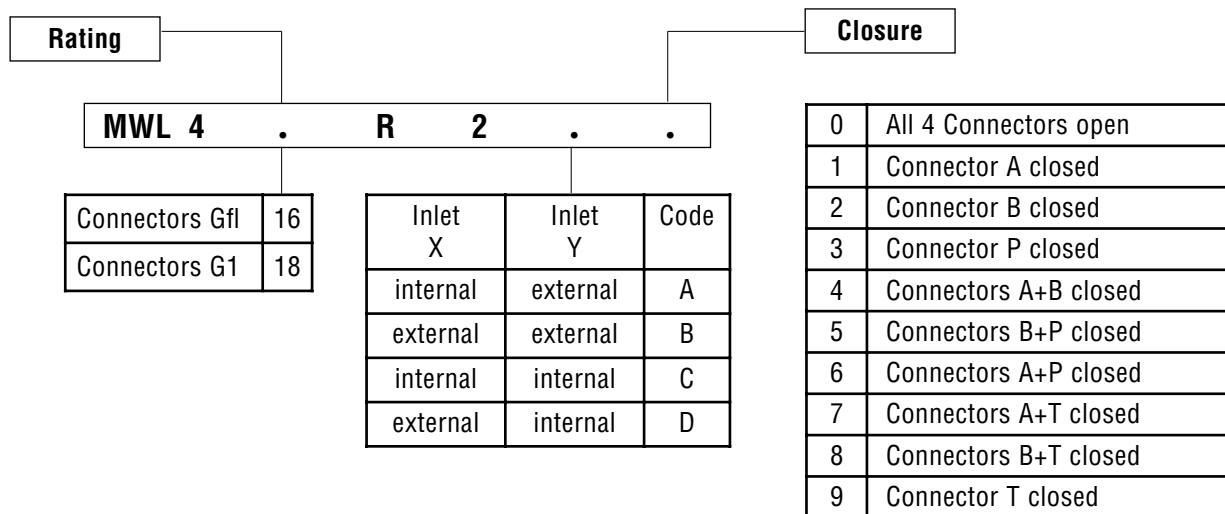
Valve fixing screws and spring rings are included in the delivery.

- 4 x M10 x 60 DIN 912-10.9
- 4 x spring rings 10 DIN 7980
- 2 x M6 x 55 DIN 912-10.9
- 2 x spring rings 6 DIN 7980

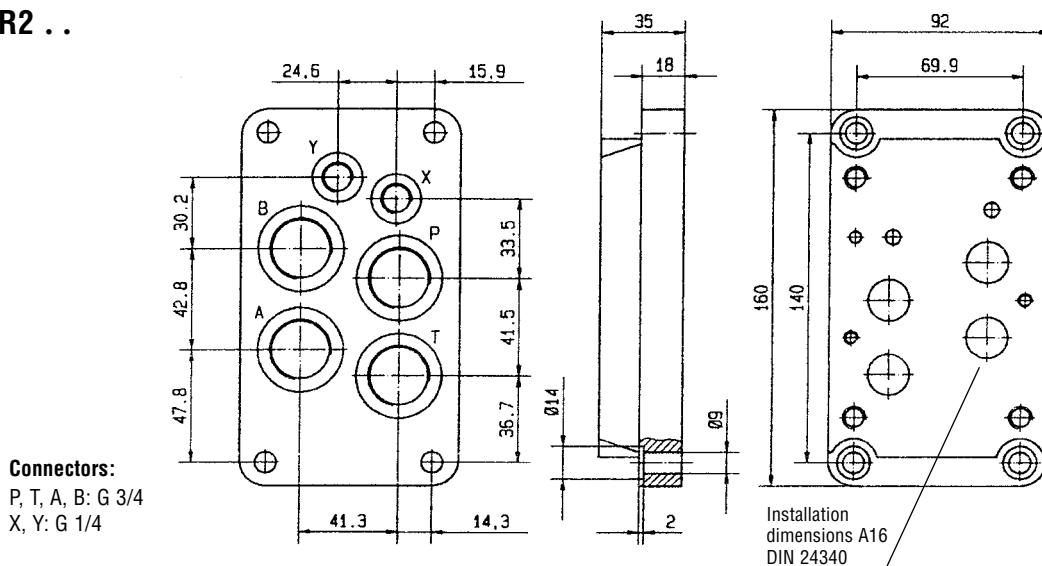


**Directional valve size WL 4.16** Installation dimensions ISO 4401 / DIN 24340 A16

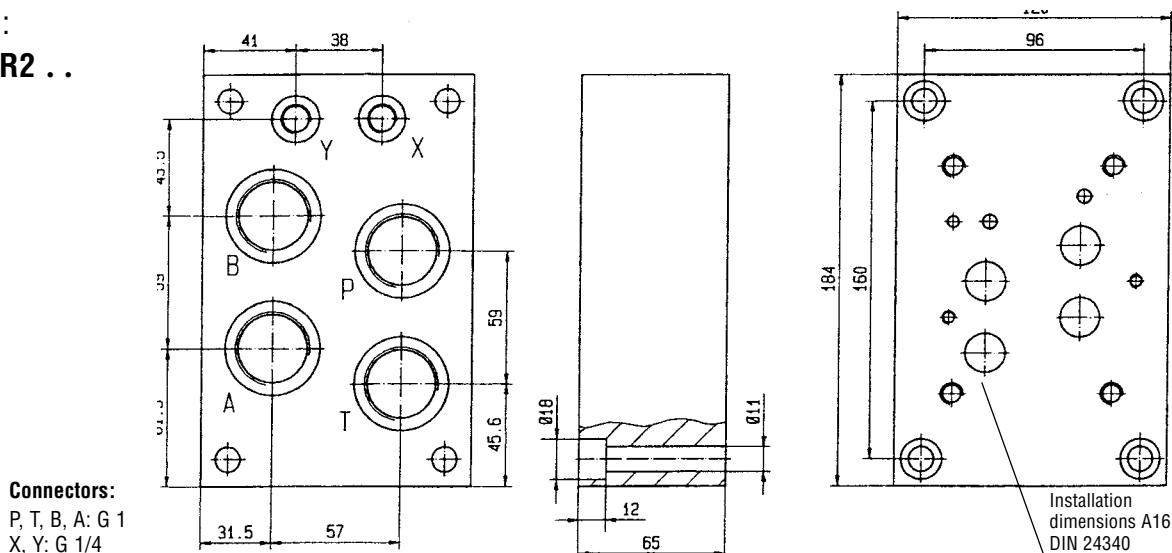
**Type code**



Ordering code:  
**MWL 4 16 R2 . .**



Ordering code:  
**MWL 4 18 R2 . .**



## Overview of our complete program

### Transfer pumps

Transfer pumps for lubricating oil supply equipment, low pressure filling and feed systems, dosing and mixing systems.

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Gear and turbine flow meters and electronics for volume and flow metering technology in hydraulics, processing and laquering technology.

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WL4.16/e/08.05