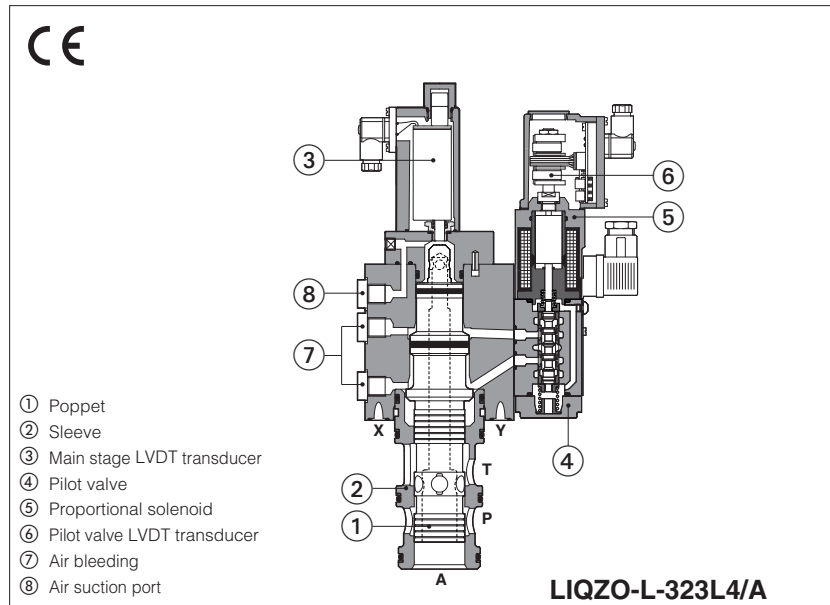


Servoproportional 3-way cartridges

piloted, with two LVDT transducers, sizes from 25 to 80



- ① Poppet
- ② Sleeve
- ③ Main stage LVDT transducer
- ④ Pilot valve
- ⑤ Proportional solenoid
- ⑥ Pilot valve LVDT transducer
- ⑦ Air bleeding
- ⑧ Air suction port

LIQZO-L, LIQZP-L

Servoproportional 3-way cartridge valves specifically designed for high speed closed loop controls.

The valves operate in association with digital off-board divers, see section 2.

The two LVDT transducers (pilot and main stage) grant very high regulation accuracy and response sensitivity.

The cartridge execution for blocks installation grants high flow capabilities and minimized pressure drops.

Spool regulation characteristics: L = linear

LIQZO: Size: 25 ÷ 40
 Max flow: 500 ÷ 1050 l/min
 Max pressure: 350 bar

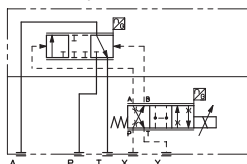
LIQZP: Size: 50 ÷ 80
 Max flow: 2000 ÷ 5000 l/min
 Max pressure: 420 bar

1 MODEL CODE

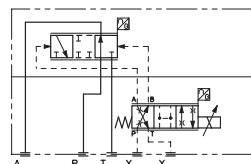
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------|-----------|-----------|-----------|----------|-----------|---|----------|---|----------|---|----------------|-----------|-----------|-----------|-------|-----|-----|-----|----------------|-----------|-----------|-----------|-------|-----|------|------|
| LIQZO | - | L | - | 25 | 3 | L4 | / | * | / | * | / | * | | | | | | | | | | | | | | | |
| <p>Servoproportional cartridge, piloted</p> <p>LIQZO = size 25 to 40, Pmax 350 bar LIQZP = size 50 to 80, Pmax 420 bar</p> <p>L = two LVDT transducers</p> <p>Valve size, see section 4 :</p> <table border="1"> <tr> <td>LIQZO =</td> <td>25</td> <td>32</td> <td>40</td> </tr> <tr> <td>l/min</td> <td>185</td> <td>330</td> <td>420</td> </tr> <tr> <td>LIQZP =</td> <td>50</td> <td>63</td> <td>80</td> </tr> <tr> <td>l/min</td> <td>780</td> <td>1250</td> <td>2100</td> </tr> </table> <p>Nominal flow (l/min) at Δp 5 bar</p> | | | | | | | | | | | | LIQZO = | 25 | 32 | 40 | l/min | 185 | 330 | 420 | LIQZP = | 50 | 63 | 80 | l/min | 780 | 1250 | 2100 |
| LIQZO = | 25 | 32 | 40 | | | | | | | | | | | | | | | | | | | | | | | | |
| l/min | 185 | 330 | 420 | | | | | | | | | | | | | | | | | | | | | | | | |
| LIQZP = | 50 | 63 | 80 | | | | | | | | | | | | | | | | | | | | | | | | |
| l/min | 780 | 1250 | 2100 | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Seals material, see section 6 :</p> <ul style="list-style-type: none"> - = NBR PE = FKM BT = HNBR | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Series number</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Configuration: 3 = 3 way

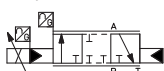
functional symbol: **Standard**



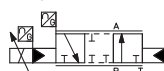
option **/A**



simplified symbol: **Standard**



option **/A**



Hydraulic options:

A = reversal hydraulic configuration of main spool:
 P-A in rest position

Spool type, regulating characteristics:

L4 = linear



2 OFF-BOARD ELECTRONIC DRIVERS

Please include in the driver order also the complete code of the connected proportional valve.

| | | | |
|---------------|----------------|----------------|----------------|
| Drivers model | E-BM-LID | E-BM-LEB | E-BM-LES |
| Type | digital | digital | digital |
| Format | DIN-rail panel | DIN-rail panel | DIN-rail panel |
| Tech table | GS235 | GS230 | GS240 |



WARNING

To avoid overheating and possible damage of the electronic driver, the valves must be never energized without hydraulic supply to the pilot stage. In case of prolonged pauses of the valve operation during the machine cycle, it is always advisable to disable the driver.

3 GENERAL CHARACTERISTICS

| | |
|--|---|
| Assembly position | Any position |
| Subplate surface finishing to ISO 4401 | Acceptable roughness index: Ra ≤ 0,8, recommended Ra 0,4 – Flatness ratio 0,01/100 |
| MTTFd valves according to EN ISO 13849 | 75 years, see technical table P007 |
| Ambient temperature range | Standard = -20°C ÷ +60°C /PE option = -20°C ÷ +60°C /BT option = -40°C ÷ +60°C |
| Storage temperature range | Standard = -20°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C |
| Surface protection | Zinc coating with black passivation |
| Corrosion resistance | Salt spray test (EN ISO 9227) > 200 h |
| Compliance | CE according to EMC directive 2014/30/EU (Immunity: EN 61000-6-2; Emission: EN 61000-6-3) RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006 |

4 HYDRAULIC CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C

| Size | 25 | 32 | 40 | 50 | 63 | 80 |
|--|--|-----|------|------|------|------|
| Nominal flow Δp P-A or A-T [l/min] | | | | | | |
| $\Delta p = 5$ bar | 185 | 330 | 420 | 780 | 1250 | 2100 |
| $\Delta p = 10$ bar | 260 | 470 | 590 | 1100 | 1750 | 3000 |
| Max permissible flow | 500 | 850 | 1050 | 2000 | 3100 | 5000 |
| Max pressure [bar] | LIQZO Ports P, A, T = 350 X = 350 Y ≤ 10 LIQZP Ports P, A, T = 420 X = 350 Y ≤ 10 | | | | | |
| Nominal flow of pilot valve at $\Delta p = 70$ bar [l/min] | 4 | 8 | 28 | 40 | 100 | 100 |
| Leakage of pilot valve at P = 100 bar [l/min] | 0,2 | 0,2 | 0,5 | 0,7 | 0,7 | 0,7 |
| Piloting pressure [bar] | min: 40% of system pressure max 350 recommended 140 ÷ 160 | | | | | |
| Piloting volume [cm ³] | 2,16 | 7,2 | 8,9 | 17,7 | 33,8 | 42,7 |
| Piloting flow (1) [l/min] | 6,5 | 20 | 25 | 43 | 68 | 76 |
| Response time 0 ÷ 100% step signal (2) [ms] | 21 | 22 | 22 | 25 | 30 | 34 |
| Hysteresis [% of the max regulation] | ≤ 0,1 | | | | | |
| Repeatability [% of the max regulation] | ± 0,1 | | | | | |
| Thermal drift | zero point displacement < 1% at $\Delta T = 40^\circ C$ | | | | | |

(1) With step reference input 0÷100%

(2) With pilot pressure = 140 bar, see detailed diagrams in section 7.2



WARNING

The loss of the pilot pressure causes the undefined position of the main spool.

The sudden interruption of the power supply during the valve operation causes the immediate main spool opening A → T or P → A (for option /A).

This could cause pressure surges in the hydraulic system or high decelerations which may lead to machine damages.

5 ELECTRICAL CHARACTERISTICS

| | |
|----------------------------------|---|
| Max power consumption | 30 W |
| Max. solenoid current | 2,6 A |
| Coil resistance R at 20°C | 3 ÷ 3,3 Ω |
| Insulation class | H (180°) Due to the occurring surface temperatures of the solenoid coils, the European standards ISO 13732-1 and EN982 must be taken into account |
| Protection degree to DIN EN60529 | IP65 with mating connectors |
| Duty factor | Continuous rating (ED=100%) |

6 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

| | | | |
|--------------------------------------|---|--|----------------------|
| Seals, recommended fluid temperature | NBR seals (standard) = -20°C ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C FKM seals (/PE option) = -20°C ÷ +80°C HNBR seals (/BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C | | |
| Recommended viscosity | 20 ÷ 100 mm ² /s - max allowed range 15 ÷ 380 mm ² /s | | |
| Max fluid contamination level | normal operation | ISO4406 class 18/16/13 | NAS1638 class 7 |
| | longer life | ISO4406 class 16/14/11 | NAS1638 class 5 |
| | | see also filter section at www.atos.com or KTF catalog | |
| Hydraulic fluid | Suitable seals type | Classification | Ref. Standard |
| Mineral oils | NBR, FKM, HNBR | HL, HLP, HLPD, HVLP, HVLPD | DIN 51524 |
| Flame resistant without water | FKM | HFDU, HFDR | ISO 12922 |
| Flame resistant with water | NBR, HNBR | HFC | |

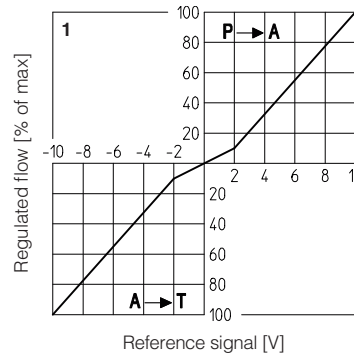
7 DIAGRAMS (based on mineral oil ISO VG 46 at 50 °C)

10.1 Regulation diagrams, see note

1 = LIQZO, LIQZP (all sizes)

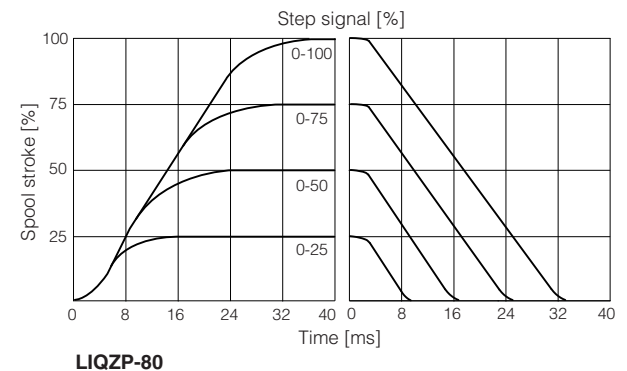
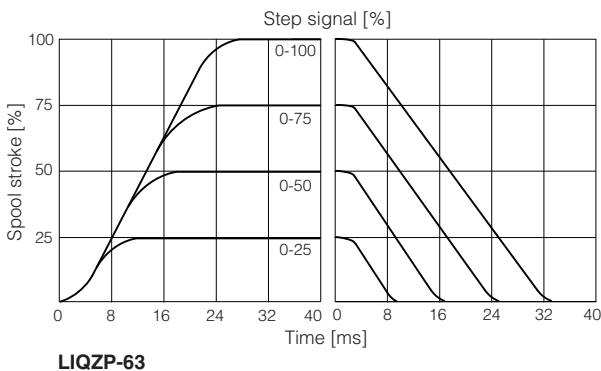
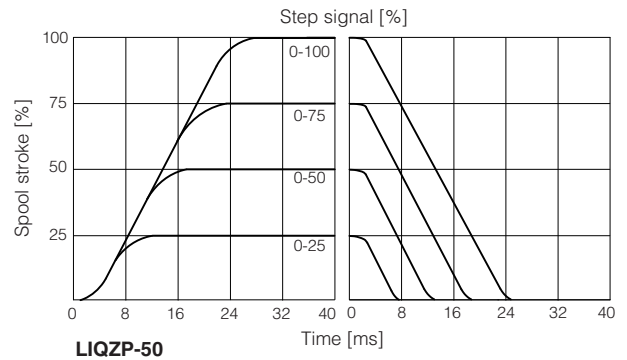
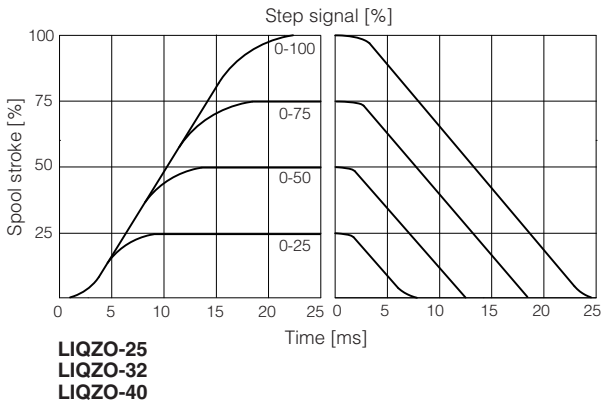
Hydraulic configuration vs. reference signal:

| | | |
|------------------------------------|----------|-----------|
| | standard | option /A |
| Reference signal 0 ÷ +10 V } P → A | | A → T |
| 12 ÷ 20 mA } P → A | | A → T |
| Reference signal 0 ÷ -10 V } A → T | | P → A |
| 4 ÷ 12 mA } A → T | | P → A |

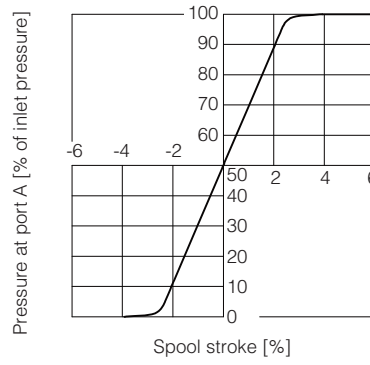
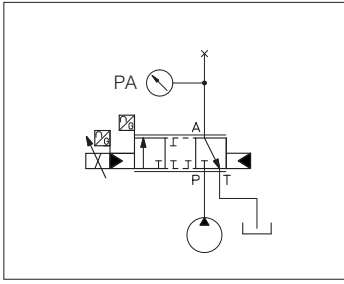


7.2 Response time

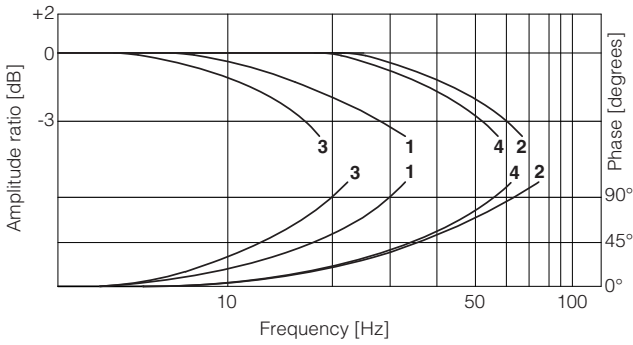
The response times in below diagrams are measured at different steps of the reference input signal. They have to be considered as average values. For the valves with digital electronics the dynamics performances can be optimized by setting the internal software parameters.



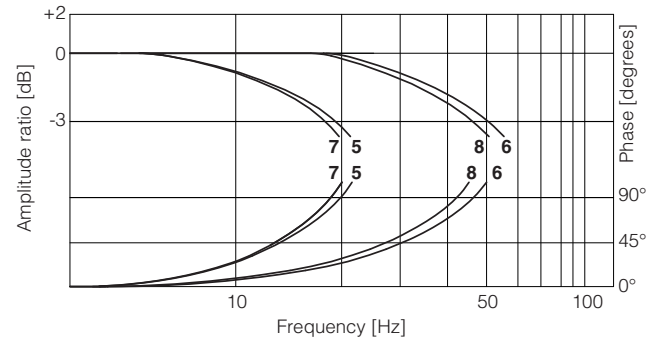
7.3 Pressure gain diagram



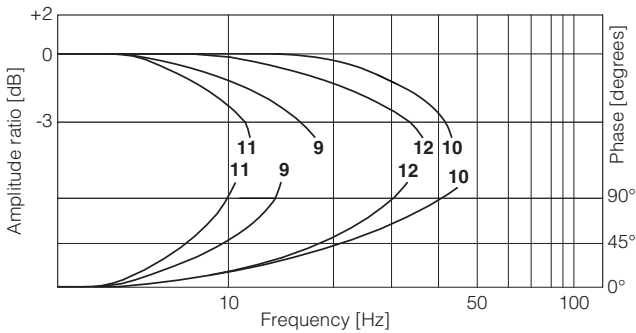
7.4 Bode diagrams



- 1 = LIQZO-L-253L4: ± 90%
- 2 = LIQZO-L-253L4: ± 5%
- 3 = LIQZO-L-323L4: ± 90%
- 4 = LIQZO-L-323L4: ± 5%



- 5 = LIQZO-L-403L4: ± 90%
- 6 = LIQZO-L-403L4: ± 5%
- 7 = LIQZP-L-503L4: ± 90%
- 8 = LIQZP-L-503L4: ± 5%



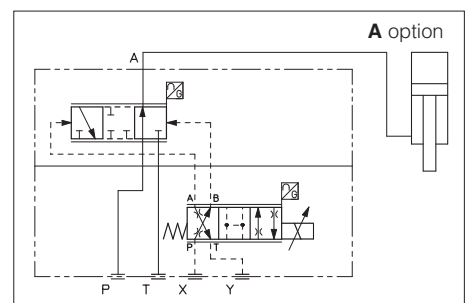
- 9 = LIQZP-L-633L4: ± 90%
- 10 = LIQZP-L-633L4: ± 5%
- 11 = LIQZP-L-803L4: ± 90%
- 12 = LIQZP-L-803L4: ± 5%

8 HYDRAULIC OPTIONS

A = The standard valve version provides the hydraulic configuration A-T of main spool in absence of electric power supply to the valve.

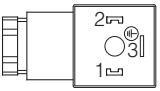
The option /A provides the reverse configuration P-A of main spool in absence of electric power supply to the valve.

This execution is particularly requested in vertical presses for safety reasons, because in case of electric power breakdown the P-A configuration of the main spool prevents the uncontrolled and dangerous downstroke of the press ram.

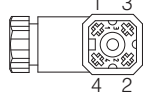


9 ELECTRICAL CONNECTION - connectors supplied with the valve

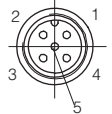
9.1 Solenoid connector

| PIN | SIGNAL | TECHNICAL SPECIFICATION | Connector code 666  |
|-----|--------|-------------------------|---|
| 1 | COIL | Power supply | |
| 2 | COIL | Power supply | |
| 3 | GND | Ground | |

9.2 LVDT transducer connector - for LIQZO

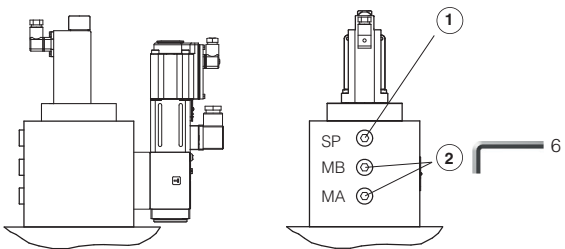
| PIN | SIGNAL | TECHNICAL SPECIFICATION | Connector code 345  |
|-----|--------|-------------------------|---|
| 1 | TR | Output signal | |
| 2 | VT- | Power supply -15Vdc | |
| 3 | VT+ | Power supply +15Vdc | |
| 4 | GND | Ground | |

9.3 LVDT transducer connector - for LIQZP

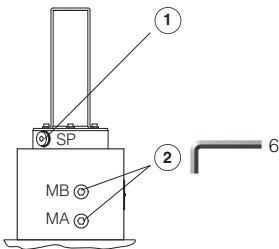
| PIN | SIGNAL | TECHNICAL SPECIFICATION | Connector code ZBE-08  |
|-----|--------|-------------------------|--|
| 1 | PROG | Do not connect | |
| 2 | VT+ | Power supply +15Vdc | |
| 3 | AGND | Ground | |
| 4 | TR | Output signal | |
| 5 | VT- | Power supply -15Vdc | |

10 AIR BLEEDING

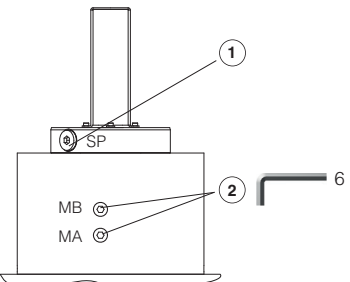
Size 25 to 40



Size 50



Sizes 63 to 80



1 Plugged port - do not open

2 Air bleeding:
N° 2 plugs G1/4"

At the machine commissioning it is advisable to bleed the air from piloting chambers, by loosening the 2 plugs shown in the picture. Operate the valve for few seconds at low pressure and then lock the plugs.

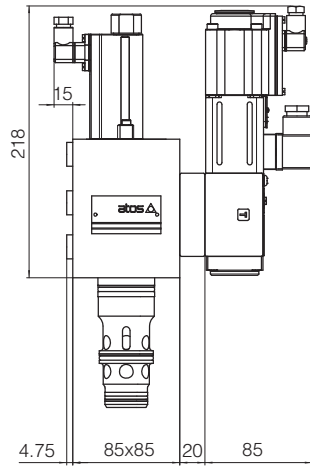
11 FASTENING BOLTS AND VALVE MASS

| Type | Size | Fastening bolts (1) | Mass [kg] |
|-------|------|--|-----------|
| LIQZO | 25 | 4 socket head screws M12x100 class 12.9 Tightening torque = 125 Nm | 8,8 |
| | 32 | 4 socket head screws M16x60 class 12.9 Tightening torque = 300 Nm | 11,2 |
| | 40 | 4 socket head screws M20x70 class 12.9 Tightening torque = 600 Nm | 17,3 |
| LIQZP | 50 | 4 socket head screws M20x80 class 12.9 Tightening torque = 600 Nm | 24,6 |
| | 63 | 4 socket head screws M30x120 class 12.9 Tightening torque = 2100 Nm | 44,6 |
| | 80 | 8 socket head screws M24x80 class 12.9 Tightening torque = 1000 Nm | 72,2 |

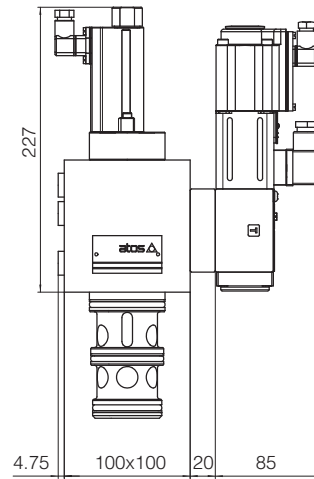
(1) Fastening bolts supplied with the valve

12 INSTALLATION DIMENSIONS [mm]

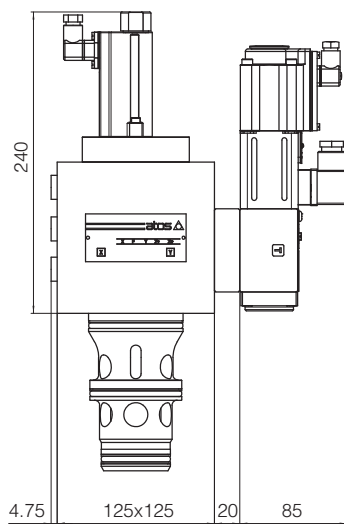
LIQZO-L-253



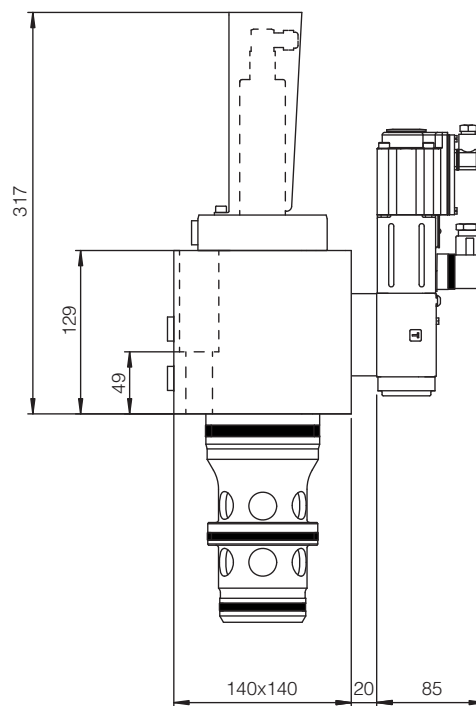
LIQZO-L-323



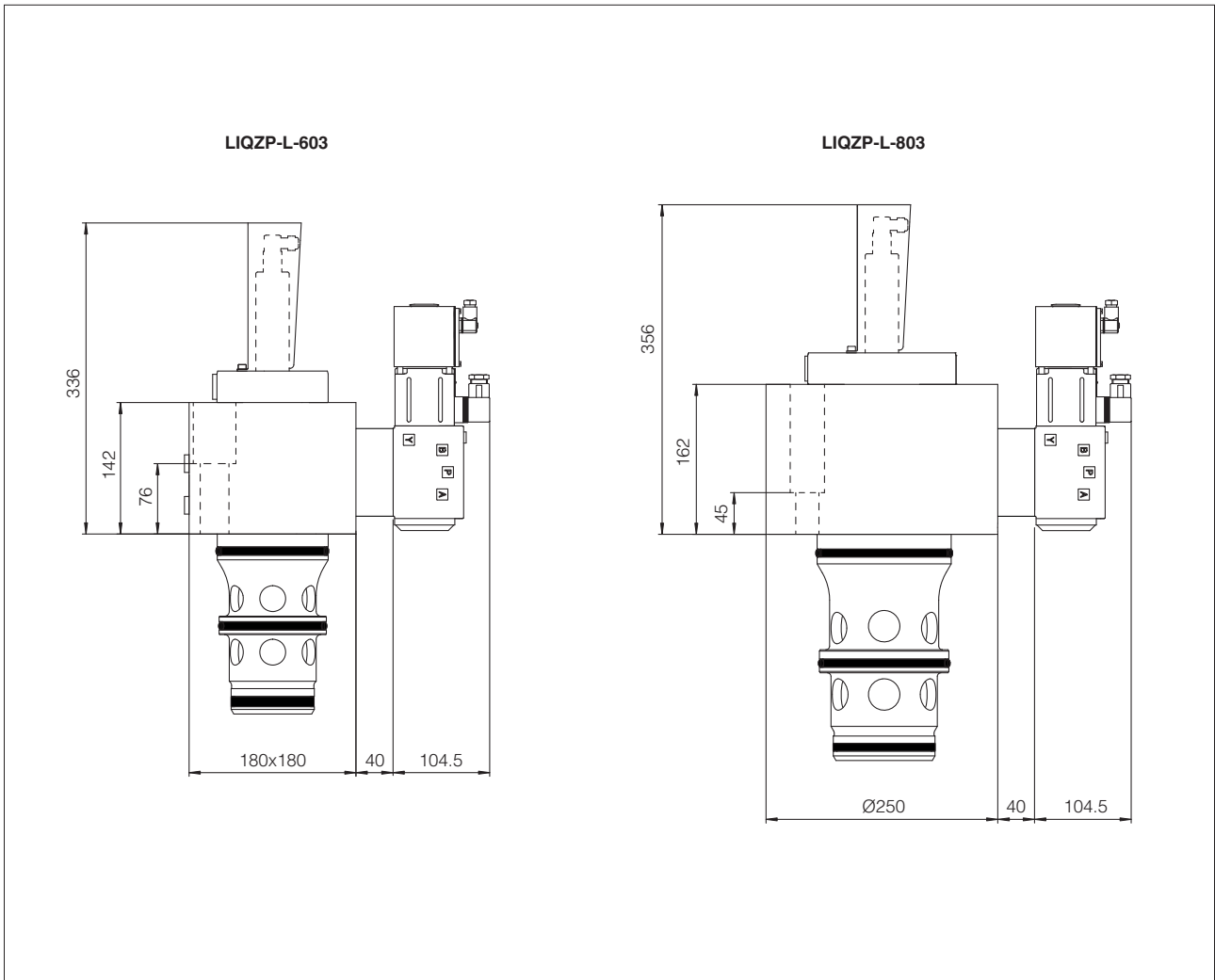
LIQZO-L-403



LIQZP-L-503



Note: for mounting surface and cavity dimensions, see table P006



Note: for mounting surface and cavity dimensions, see table P006

13 RELATED DOCUMENTATION

| | | | |
|--------------|---|--------------|---|
| FS001 | Basics for digital electrohydraulics | GS500 | Programming tools |
| FS900 | Operating and maintenance information for proportional valves | GS510 | Fieldbus |
| GS230 | E-BM-LEB digital driver | K800 | Electric and electronic connectors |
| GS235 | E-BM-LID digital driver | P006 | Mounting surfaces and cavities for cartridge valves |
| GS240 | E-BM-LES digital driver | | |