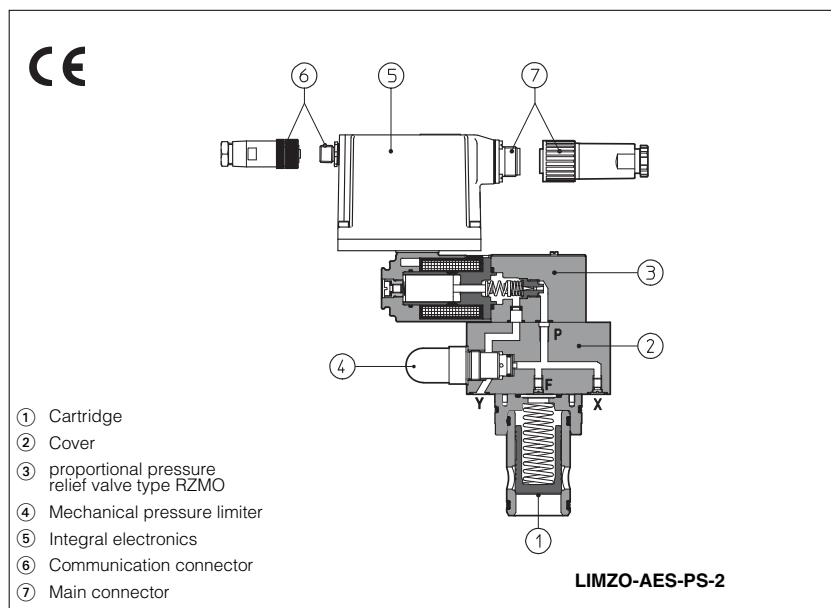


Proportional pressure control cartridges type **LI*ZO-A***

compensator, relief, reducing, without integral pressure transducer, ISO 7368 sizes from 16 to 80



1 MODEL CODE FOR COVERS

LIMZO - AES - PS - 3 / 210 / * ** / *									
Proportional cartridge valves LICZO = pressure compensator LIMZO = pressure relief LIRZO = pressure reducing									
A = without integral transducer AE = as A plus integral electronics AES = as A plus integral digital electronics									
Communication interfaces (only for AES) PS = Serial BC = CANopen BP = PROFIBUS DP									
Size: 1 = 16; 2 = 25; 3 = 32; 4 = 40; 5 = 50 (not for LIRZO) 6 = 63; (only for LIMZO) 8 = 80; (only for LIMZO-A, -AE, -AES)									
Pressure range: 50 = 50 bar 100 = 100 bar 210 = 210 bar 315 = 315 bar									
Syntetic fluids WG = water-glycol PE = phosphate ester									
Series number									
Hydraulic options: P = with integral mechanical pressure limiter (standard for size 1, 2 and 3)									
Options for -A execution, see section 7: 6 = with 6 V_{dc} coil instead of standard 12V_{dc} coil 18 = with 18 V_{dc} coil instead of standard 12V_{dc} coil									
Electronics options for -AE execution, see section 9: I = current reference (4÷20 mA) Q = enable signal									
Electronics options for -AES execution, see section 11: I = current reference 4÷20 mA Z = double power supply, enable fault and monitor signals (12 pin connector)									

2 MODEL CODE FOR CARTRIDGES

SC LI - 32 31 2 ** / *									
Cartridge according to ISO 7368									
Size: the same of relative cover									
Syntetic fluids WG = water-glycol PE = phosphate ester									
Series number									
Spring cracking pressure: 2 = 1,5 bar for poppet 31 3 = 3 bar; 6 = 6 bar for poppet 31 and 36 4 = 4 bar; 7 = 7 bar for poppet 37									

4 ELECTRONIC DRIVERS FOR LI*ZO

Valve model	-A						-AE	-AES
Drivers model	E-MI-AC-01F	E-MI-AS-IR	E-BM-AC-01F	E-BM-AS-PS	E-ME-AC-01F	E-EP-AC-01F	E-RI-AE	E-RI-AES
Data sheet	G010	G020	G025	G030	G035	G100	G110	G115

Note: for power supply and communication connector see section 19

LICZO, LIMZO and LIRZO are 2-way proportional cartridges without integral pressure transducer which provide respectively pressure compensation, relief and reducing controls according to the electronic reference signals.

They operate in association with electronic drivers, see table 4 which supply the proportional valve with proper current to align valve regulation to the reference signal supplied to the electronic driver.

These valves are composed by a 2-way cartridge 1 housed into a standard ISO/DIN cavity and by a closing cover 2 with a piloting proportional pressure relief valve 3 type RZMO, see tab. F007.

They are available in different executions:

- -A, without integral pressure transducer.
- -AE, -AES, as -A plus analogue (AE) or digital (AES) integral electronics 5.

The integral electronics 5 ensures factory presetting, fine functionality plus valve-to-valve interchangeability and simplified wiring and installation.

The electronic main connector 7 is fully interchangeable for -AE and -AES executions. Standard 7 pin connector is used for power supply, analog input reference and monitor signals.

12 pin connector is used for option /Z (AES).

Following communication interfaces 6 are available for the digital -AES execution:

- -PS, RS232 serial communication interface. The valve reference signal is provided with analogue commands.
- -BC, CANbus interface
- -BP, PROFIBUS-DP interface

The valves with -BC and -BP interfaces can be integrated into a fieldbus communication network and thus digitally operated by the machine control unit.

The coils are fully plastic encapsulated (insulation class H), and the valves have antivibration, antishock and weather-proof features.

Size: 16, 25, 32, 40, 50, 63, 80.

Max flow: up to 3000 l/min.

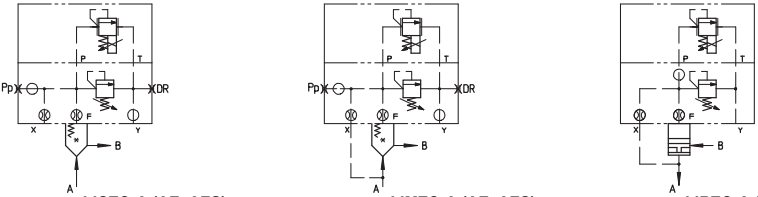
Max pressure: 315 bar.

3 TYPICAL FUNCTIONS OF CARTRIDGES

Type	Functional sketch (hydraulic symbol)	Typical section	Area ratio (1)
31			1:1
36			1:1
37			1:1

(1) It is the ratio of the area A to the area on which the pilot pressure is applied.

5 HYDRAULIC CHARACTERISTICS (based on mineral oil ISO VG 46 at 50 °C)

Hydraulic symbols																
	LICZO-A (AE, AES)					LIMZO-A (AE, AES)							LIRZO-A (AE, AES)			
Valve model	LICZO-A, -AE, -AES					LIMZO-A, -AE, -AES							LIRZO-A, -AE, -AES			
Valve size	16	25	32	40	50	16	25	32	40	50	63	80	16	25	32	40
Max flow [l/min]	200	400	750	1000	2000	200	400	750	1000	2000	3000	4500	160	300	550	800
Min regulated pres. at port A [bar]	9	8,5	8	13	15	7	7	7	10,5	12	12	(1)	7			
Max regulated pres. at port A [bar]	50; 100; 210; 315					50; 100; 210; 315							50; 100; 210; 315			
Response time 0-100% step signal (depending on installation) -see section 9.4 [ms]	100-400					100-450							100-350			
Hysteresis [% of regulated max pres.]	≤ 2					≤ 1,5							≤ 2			
Linearity [% of regulated max pres.]	≤ 3					≤ 3							≤ 3			
Repeatability [% of regulated max pres.]	≤ 2					≤ 2							≤ 2			

(1) consult our technical office

Above performance data refer to valves coupled with Atos electronic drivers, see section 2.

6 GENERAL NOTES

LI*ZO proportional valves are CE marked according to the applicable Directives (e.g. Immunity/Emission EMC Directive and Low Voltage Directive).

Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in table F003 and in the installation notes supplied with relevant components.

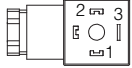
The electrical signals of the valve (e.g. monitor signals) must not be directly used to activate safety functions, like to switch-ON/OFF the machine's safety components, as prescribed by the European standards (Safety requirements of fluid technology systems and components-hydraulics, EN-982).

7 OPTIONS FOR -A EXECUTION

7.1 Option /6 6 Vdc coil instead of standard 12 Vdc, to be used in case of power supply 12 Vdc

7.2 Option /18 18 Vdc coil instead of standard 12 Vdc, to be used with electronic drivers not supplied by Atos

8 CONNECTIONS FOR -A EXECUTION

SOLENOID POWER SUPPLY CONNECTOR		
PIN	Signal description	
1	SUPPLY	
2	SUPPLY	
3	GND	

9 ANALOG INTEGRAL DRIVERS -AE - OPTIONS

Standard driver execution provides on the 7 pin main connector:

Power supply - 24Vdc must be appropriately stabilized or rectified and filtered; a 2,5 A safety fuse is required in series to the driver power supply. Apply at least a 10000 µF/40 V capacitance to single phase rectifiers or a 4700 µF/40 V capacitance to three phase rectifiers

Reference input signal - analog differential input with 0÷+10 Vdc nominal range (pin D,E), proportional to desired coil current

Monitor output signal - analog output signal proportional to the actual valve's coil current (1V monitor = 1A coil current)

Following options are available to adapt standard execution to special application requirements:

9.1 Option /I

It provides the 4÷20 mA current reference signal instead of the standard 0÷+10 Vdc. Monitor output signal is still the standard 0÷+10 Vdc

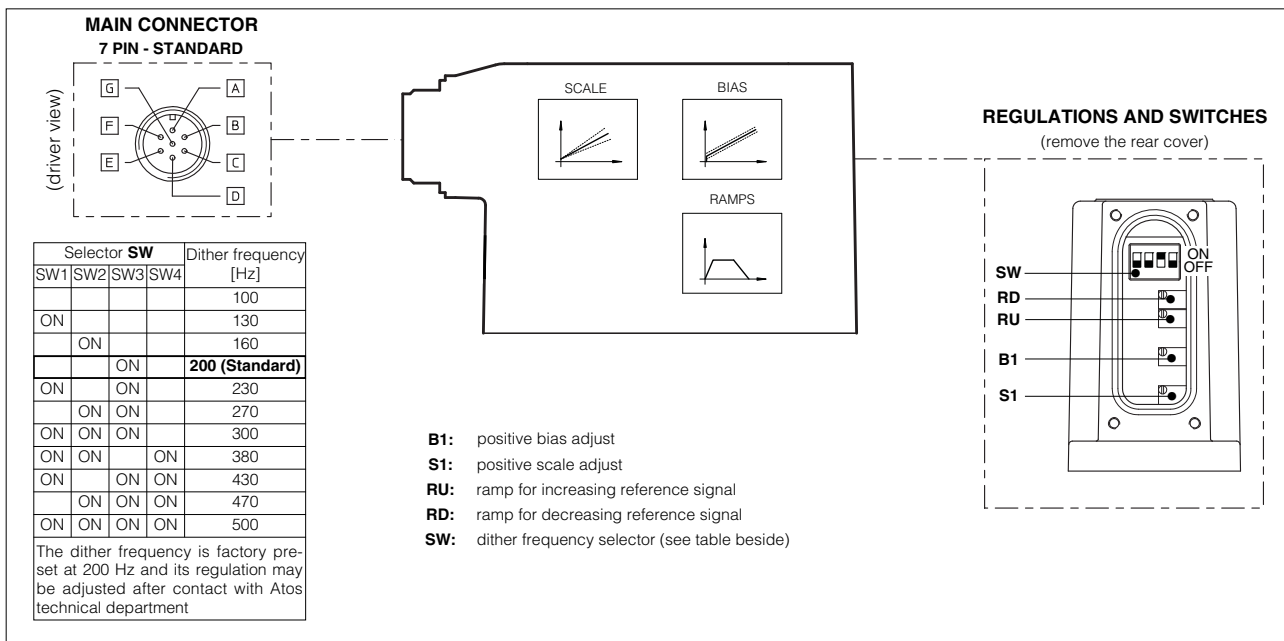
It is normally used in case of long distance between the machine control unit and the valve or where the reference signal can be affected by electrical noise; the valve functioning is disabled in case of reference signal cable breakage.

9.2 Option /Q

It provides the possibility to enable or disable the valve functioning without cutting the power supply (the valve functioning is disabled but the driver current output stage is still active). To enable the driver supply a 24Vdc on the enable input signal.

9.3 Possible combined option: /IQ

10 ANALOG INTEGRAL DRIVERS -AE - MAIN FUNCTIONS AND ELECTRONIC CONNECTIONS



10.1 ELECTRONIC CONNECTIONS - 7 PIN MAIN CONNECTORS

PIN	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
A	V+	Power supply 24 Vdc for solenoid power stage and driver logic	Input - power supply
B	V0	Power supply 0 Vdc for solenoid power stage and driver logic	Gnd - power supply
C ⁽¹⁾	AGND	Ground - signal zero for MONITOR signal	Gnd - analog signal
	ENABLE	Enable (24 Vdc) or disable (0 Vdc) the driver (for /Q option)	Input - on/off signal
D	INPUT+	Reference analog differential input: 0÷+10 Vdc maximum range (4 ÷ 20 mA for /I option)	Input - analog signal
E	INPUT -	Normal working range 0÷+10 Vdc (4 ÷ 20 mA for /I option)	
F	MONITOR	Monitor analog output: 0÷+10 Vdc maximum range	Output - analog signal
G	EARTH	Internally connected to the driver housing	

Note: (1) with /Q option ENABLE signal replaces AGND on pin C; MONITOR signal is referred to pin B.

A minimum time of 60ms to 160ms have be considered between the driver energizing with the 24 Vdc power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero

11 DIGITAL INTEGRAL DRIVERS -AES - OPTIONS

Standard driver execution provides on the 7 pin main connector:

Power supply - 24Vdc must be appropriately stabilized or rectified and filtered; a 2,5 A safety fuse is required in series to each driver power supply. Apply at least a 10000 µF/40 V capacitance to single phase rectifiers or a 4700 µF/40 V capacitance to three phase rectifiers.

Reference input signal - analog differential input with 0÷+10 Vdc nominal range (pin D,E), proportional to desired coil current

Monitor output signal - analog output signal proportional to the actual valve's coil current (1V monitor = 1A coil current)

Following options are available to adapt standard execution to special application requirements:

11.1 Option /I

It provides 4÷20 mA current reference signal instead of the standard 0÷+10 Vdc. Monitor output signal is still the standard 0÷+10 Vdc

It is normally used in case of long distance between the machine control unit and the valve or where the reference signal can be affected by electrical noise; the valve functioning is disabled in case of reference signal cable breakage.

11.2 Option /Z

It provides on a 12 pin main connector the above standard features plus:

Logic power supply

Option /Z provides separate power supply for the solenoid (pin 1, 2) and for the digital electronic circuits (pin 9, 10).

Cutting solenoid power supply allows to interrupt the valve functioning but keeping energized the digital electronics thus avoiding fault conditions of the machine fieldbus controller. This condition allows to realize safety systems in compliance with European Norms EN13849-1 (ex EN954-1).

Enable Input Signal

To enable the driver, supply a 24Vdc on pin 3 referred to pin 2: when the Enable signal is set to zero the valve functioning is disabled (zero current to the solenoid) but the driver current output stage is still active. This condition does not comply with European Norms EN13849-1 (ex EN954-1).

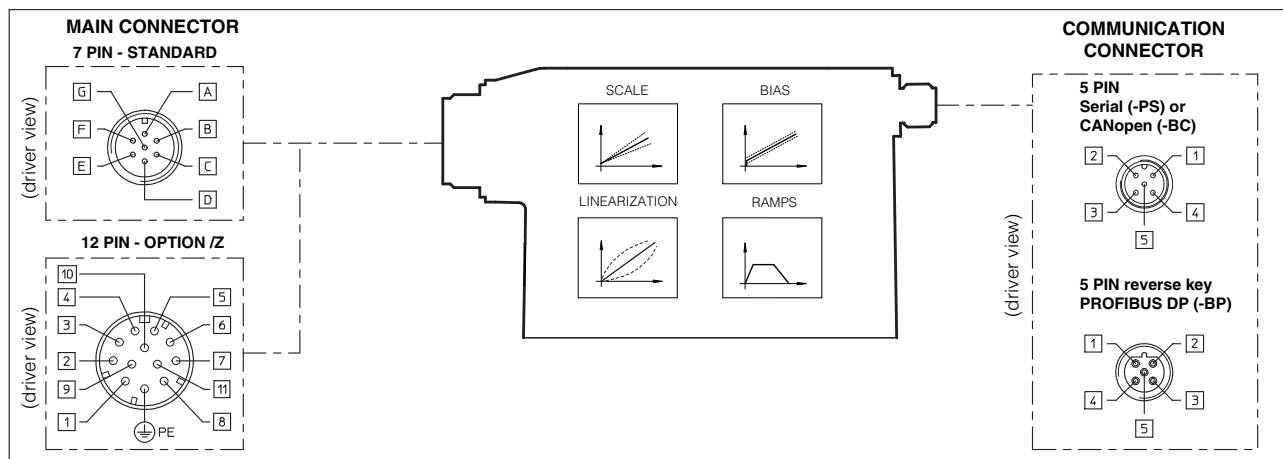
Fault Output Signal

Fault output signal indicates fault conditions of the driver (solenoid short circuits/not connected, reference signal cable broken for 4÷20mA input, etc.).

Fault presence corresponds to 0 Vdc, normal working corresponds to 24Vdc (pin 11 referred to pin 2): Fault status is not affected by the Enable input signal.

11.3 Possible combined option: /IZ

12 DIGITAL INTEGRAL DRIVERS -AES - MAIN FUNCTIONS AND ELECTRONIC CONNECTIONS



12.1 ELECTRONIC CONNECTIONS - 7 & 12 PIN MAIN CONNECTORS

Standard 7pin	/Z option 12pin	SIGNAL	TECHNICAL SPECIFICATIONS	NOTES
A	1	V+	Power supply 24 Vdc for solenoid power stage (and for driver logic on 7 pin connection)	Input - power supply
B	2	V0	Power supply 0 Vdc for solenoid power stage (and for driver logic on 7 pin connection)	Gnd - power supply
-	3	ENABLE	Enable (24 Vdc) or disable (0 Vdc) the driver	Input - on/off signal
D	4	INPUT+	Reference analog input: ± 10 Vdc maximum range (4 $\div$ 20 mA for /I option) Normal working range 0 $\div$ +10 Vdc (4 $\div$ 20 mA for /I option)	Input - analog signal
E	-	INPUT -	standard: differential input; /Z option: common mode INPUT+ referred to AGND	
C	5	AGND	Ground - signal zero for MONITOR signal signal zero for INPUT+ signal (only for /Z option)	Gnd - analog signal
F	6	MONITOR	Monitor analog output: ± 10 Vdc maximum range	Output - analog signal
-	7	NC	do not connect	
-	8	NC	do not connect	
-	9	VL+	Power supply 24 Vdc for driver logic	Input - power supply
-	10	VL0	Power supply 0 Vdc for driver logic	Gnd - power supply
-	11	FAULT	Fault (0 Vdc) or normal working (24 Vdc)	Output - on/off signal
G	PE	EARTH	Internally connected to the driver housing	

Note: A minimum time of 270 to 340 ms have be considered between the driver energizing with the 24 VDC power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

12.2 ELECTRONIC CONNECTIONS - 5 PIN COMMUNICATION CONNECTORS

	-PS Serial		-BC CANopen		-BP PROFIBUS DP	
PIN	SIGNAL	TECHNICAL SPECIFICATION	SIGNAL	TECHNICAL SPECIFICATION	SIGNAL	TECHNICAL SPECIFICATION
1	NC	do not connect	CAN_SHLD	Shield	+5V	for termination
2	NC	do not connect	NC	do not connect	LINE-A	Bus line (high)
3	RS_GND	Signal zero data line	CAN_GND	Signal zero data line	DGND	data line and termination Signal zero
4	RS_RX	Valves receiving data line	CAN_H	Bus line (high)	LINE-B	Bus line (low)
5	RS_TX	Valves transmitting data line	CAN_L	Bus line (low)	SHIELD	

13 SOFTWARE TOOLS

The functional parameters of digital valves, as the bias, scale ramp and linearization of the regulation characteristic, can be easily set and optimized with the Atos E-SW programming software, available in three different versions according to the driver's communication interfacing: E-SW-PS (Serial), E-SW-BC (CANopen) and E-SW-BP (PROFIBUS DP).

A proper connection is required between the PC and the electronic driver communication port: for a more detailed description of software interface, PC requirements, adapters, cables and terminators, please **see table G500**.

Proportional valves with fieldbus communication interface (-BC and -BP) can be directly managed by the machine control unit; it is required to implement in the machine control the standard communication as described in the user manuals supplied with the relevant programming software. For detailed description of available fieldbus feature, **see table G510**.

On first supply of the E-SW software, it is required to apply for the registration in the Atos download area: www.download.atos.com

Once the registration is completed, the password will be sent by email.

The software remains active for 10 days from the installation date and then it stops until the user inputs his password.

With the password you can also download, in your personal area, the latest releases of the Atos software, manuals, drivers and configuration files.

14 MAIN CHARACTERISTICS OF PROPORTIONAL PRESSURE CARTRIDGES TYPE LI*ZO

Assembly position	Any position
Subplate surface finishing	Roughness index, $\sqrt{Ra}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	-20°C $\div$ +70°C for -A execution; -20°C $\div$ +60°C for -AE and -AES;
Fluid	Hydraulic oil as per DIN 51524 ... 535 for other fluids see section [I]
Recommended viscosity	15 $\div$ 100 mm ² /s at 40°C (ISO VG 15 $\div$ 100)
Fluid contamination class	ISO 18/15 achieved with in line filters of 10 μ m and $\beta_{10} \geq 75$ (recommended)
Fluid temperature	-20°C +60°C (standard and /WG seals) -20°C +80°C (/PE seals)
Coil resistance R at 20°C	3 $\div$ 3,3 Ω for standard 12 Vdc coil; 2 $\div$ 2,2 Ω for 6 Vdc coil; 13 $\div$ 13,4 Ω for 18 Vdc coil
Max solenoid current	2,6 A for standard 12 Vdc coil; 3,25 A for 6 Vdc coil; 1,5 A for 18 Vdc coil
Max power	40 Watt
Protection degree (CEI EN-60529)	IP65 for -A execution; IP65+67 for -AE, execution, depending to the connector type see section [I9]
Relative duty factor	Continuous rating (ED=100%)

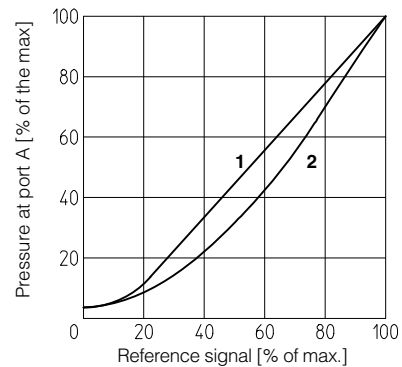
15 DIAGRAMS OF LICZO/LIMZO (based on mineral oil ISO VG 46 at 50 °C)

15.1 Regulation diagrams

- 1 = LIMZO-A, LIMZO-AE, LIMZO-AES
2 = LICZO-A, LICZO-AE, LICZO-AES

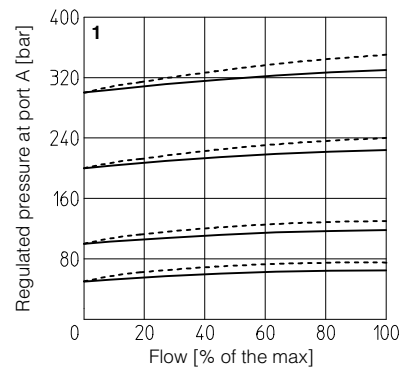
Note:

The presence of counter pressure at port T can affect the effective pressure regulation.



15.2 Pressure/flow diagrams

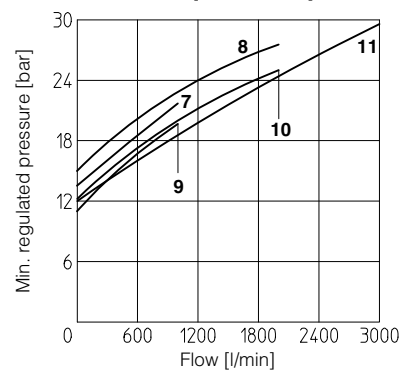
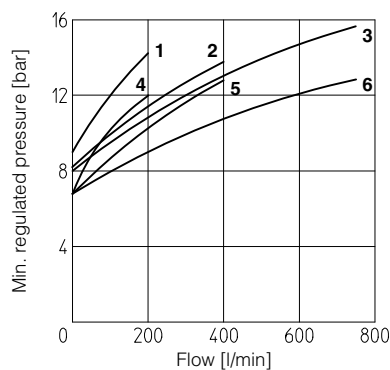
- 1 = LICZO-A, LICZO-AE, LICZO-AES
LIMZO-A, LIMZO-AE, LIMZO-AES



15.3 Min. pressure/flow diagrams with reference signal "null"

- 1 = LIMZO-*-1
2 = LIMZO-*-2
3 = LIMZO-*-3
4 = LICZO-*-1
5 = LICZO-*-2
6 = LICZO-*-3
7 = LICZO-*-4
8 = LICZO-*-5
9 = LIMZO-*-4
10 = LIMZO-*-5
11 = LIMZO-*-6

Note: for LIMZO-*-8 consult our technical office



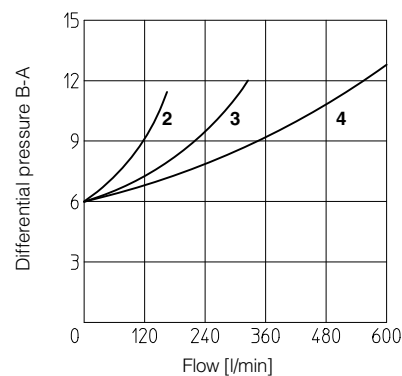
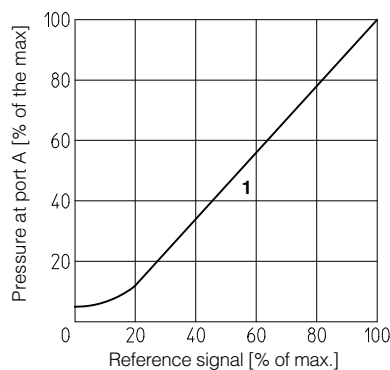
16 DIAGRAMS OF LIRZO (based on mineral oil ISO VG 46 at 50 °C)

16.1 Regulation diagrams

- 1 = LIRZO-A, LIRZO-AE, LIRZO-AES

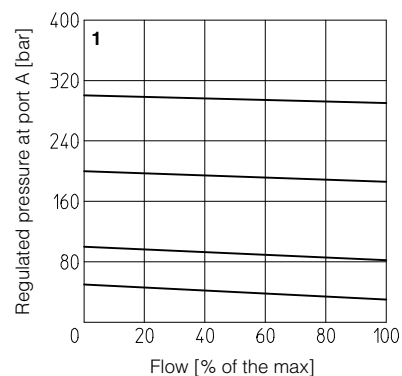
16.2 Min. pressure/flow diagrams with reference signal "null"

- 2 = LIRZO-*-1
3 = LIRZO-*-2
4 = LIRZO-*-3
5 = LIRZO-*-4



16.3 Pressure/flow diagrams

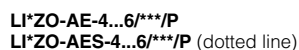
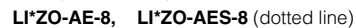
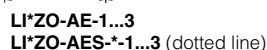
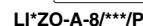
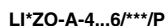
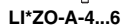
- 1 = LIRZO-A, LIRZO-AE, LIRZO-AES



16.4 Dynamic response

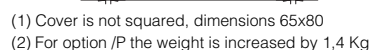
The response times in section 3 have to be considered as average values.

The pressure variation in consequence of a modification of the reference input signal to the valve is affected by the stiffness of the hydraulic circuit: greater is the stiffness of the circuit, faster is the dynamic response.

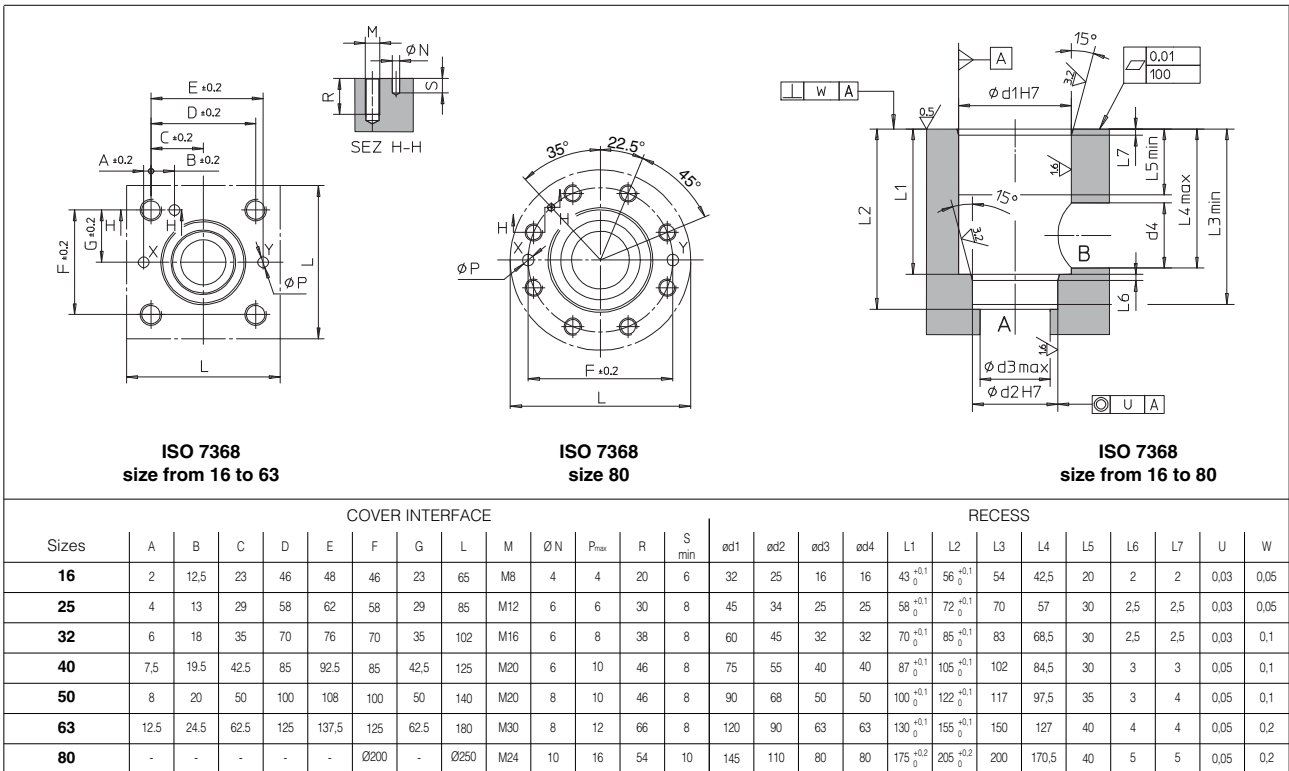


- ① SP-ZH-7P or SP-ZM-7P
- ② SP-ZH-5P/BP (for -BP)
SP-ZH-5P (for -PS and -BC)
- ③ SP-ZH-12P (option/Z)

Sizes	A	Ø B	C	D	E	Port Pp-Dr	Seal	Fastening bolts class 12.9	Tightening torque Nm	Mass (Kg) -A -AE, - AES
16	65 ⁽¹⁾	3	4	40	45,25	-	2 OR 108	n° 4 M8x45	35	3,5 4,1
25	85	5	6	40	42,5	-	2 OR 108	n° 4 M12x45	125	4 4,6
32	100	5	6	50	50	-	2 OR 2043	n° 4 M16x55	300	5,3 5,9
40	125	5	6	60	62,5	G 1/4	2 OR 2050	n° 4 M20x70	600	8,9 ⁽²⁾ 9,5 ⁽²⁾
50	140	6	4	70	70	G 1/4	2 OR 2050	n° 4 M20x80	600	12,4 ⁽²⁾ 13 ⁽²⁾
63	180	6	4	80	90	G 3/8	2 OR2056	n° 4 M30x90	2100	21,6 ⁽²⁾ 22,2 ⁽²⁾
80	Ø250	8	6	80	125	G 3/8	2 OR123	n° 8 M24x90	1000	33 ⁽²⁾ 33,6 ⁽²⁾



18 COVER INTERFACE AND RECESS DIMENSIONS [mm]



19 MODEL CODES OF POWER SUPPLY AND COMMUNICATION CONNECTORS (to be ordered separately)

VALVE VERSION	-A	-AE, -AES		-AES/Z	-Serial (-PS) or CANopen (-BC)	PROFIBUS DP (-BP)
CONNECTOR CODE	SP-666	SP-ZH-7P	SP-ZM-7P	SP-ZH-12P	SP-ZH-5P	SP-ZH-5P/BP
PROTECTION DEGREE	IP65	IP67	IP67	IP65	IP67	IP67
DATA SHEET	K500	G110, G115, K500			G115, K500	

connectors supplied with the valve