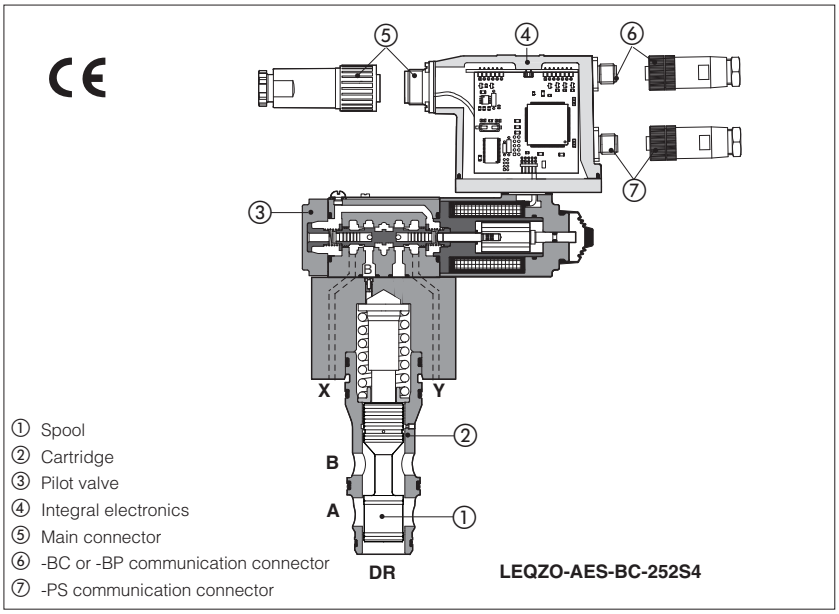
Proportional throttle cartridges type LEQZO-A*, 2-way

without position transducer, nominal sizes 16, 25 and 32



① Spool
② Cartridge
③ Pilot valve
④ Integral electronics
⑤ Main connector
⑥ -BC or -BP communication connector
⑦ -PS communication connector

1 MODEL CODE

LEQZO - AES - PS - 25 2 S 4 / * ** /*

Flow control valve

A = without position transducer
AE = as A plus integral electronics
AES = as A plus integral digital electronics

Communication interfaces (only for AES)
PS = Serial (1)
BC = CANopen
BP = PROFIBUS DP

Size:
16 **25** **32**

2 = 2 way

Spool type
L = linear
S = progressive

Spool size: **4** = see section 3

Options for -A execution, see section 5:
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 7:
I = current reference input (4÷20 mA)
Q = enable signal

Electronics options for -AES execution, see section 9:
Q = enable signal
Z = double power supply, enable fault and monitor (12 pin connector)

Series number

Syntethic fluids
WG = water-glycol
PE = phosphate ester

Notes
(1) Serial interface always present, also for -BC and -BP options

LEQZO-A* are 2-way proportional cartridge valves, designed for mounting in manifold blocks and provide not compensated flow control according to the electronic reference signal.
They operate in association with electronic drivers, see table 2 which supply the proportional valve with proper current to align valve regulation to the reference signal supplied to the electronic driver.
They are available in different executions:

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

The regulation is operated by means of a spool ① sliding into a cartridge ② piloted by the proportional pressure reducing valve type DHRZO ③.
The integral electronics ④ ensures factory presetting, fine functionality plus valve-to-valve interchangeability and simplified wiring and installation.
The electronic main connector ⑤ is fully interchangeable for -AE and -AES executions.
Standard 7 pin main connector is used for power supply, analog input reference and monitor signals.
12 pin connector is used for AEG version and for option /Z (AES).
Following communication interfaces ⑥, ⑦ are available for the digital -AES execution:

- standard -PS, Serial communication interface for configuration, monitoring and firmware updating through Atos PC software - always present.
- optional -BC, CANopen interface (only for -AES)
- optional -BP, PROFIBUS-DP interface (only for -AES)

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.

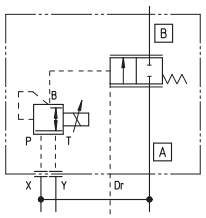
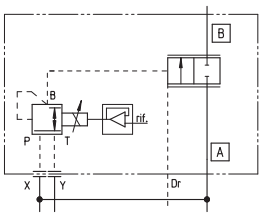
- Reduced response times
- Accurate flow regulation with good repeatibility
- Sizes: 16, 25 and 32.
- Max flow up to 350 l/min with differential pressure Δp = 5 bar, see section 3.
- Max pressure: 250 bar.

2 ELECTRONIC DRIVERS FOR LEQZO

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-RP-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 16

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

Hydraulic symbols		**LEQZO-A** 		**LEQZO-AE, LEQZO-AES** 			
Valve model		**LEQZO-A, LEQZO-AE, LEQZO-AES**					
Valve size		**16**		**25**		**32**	
Spool type and size		**S4**	**L4**	**S4**	**L4**	**S4**	**L4**
Max regulated flow at Δp = 5 bar at Δp = 10 bar	[l/min]	 140 200		 230 320		 350 490	
Max pressure (1)	[bar]	Ports A, B, X = 250		Y = 5		Dr = 5	
Response time 0 ÷ 100% step signal	[ms]	75					
Hysteresis	[% of max flow]	≤ 5%					
Repeatability	[% of max flow]	± 1%					

Notes:
• Above performance data refer to valves coupled with Atos electronic drivers, see section 2.
1) Minimum piloting pressure X port = 25 bar.

4 GENERAL NOTES

LEQZO 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.

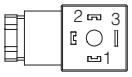
The electrical signals of the valve (e.g. monitor signals) must not be directly used to activate safety functions, like to switch-ON/OFF the machine's safety components, as prescribed by the European standards (Safety requirements of fluid technology systems and components-hydraulics, EN-982).

5 OPTIONS FOR -A EXECUTION

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

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

6 CONNECTIONS FOR -A EXECUTION

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

7 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÷+10VDC 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)

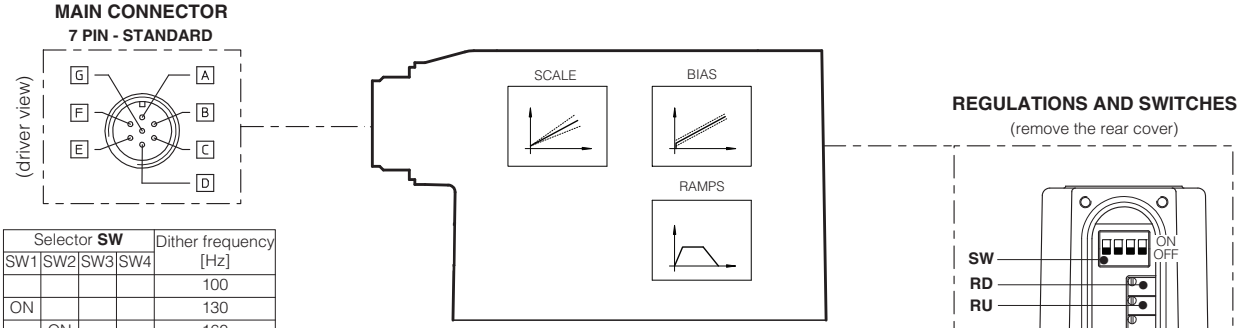
Following options are available to adapt standard execution to special application requirements:

7.1 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÷+10VDC.
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.

7.2 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.

7.3 Possible combined option: /IQ

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



Selector **SW**				Dither frequency
SW1	SW2	SW3	SW4	[Hz]
				100
ON				130
	ON			160
		ON		**200 (Standard)**
ON		ON		230
	ON	ON		270
ON	ON	ON		300
ON	ON		ON	380
ON		ON	ON	430
	ON	ON	ON	470
ON	ON	ON	ON	500

The dither frequency is factory pre-set at 200 Hz and its regulation may be adjusted after contact with Atos technical department

B1: positive bias adjust
S1: positive scale adjust
RU: ramp for increasing reference signal
RD: ramp for decreasing reference signal
SW: dither frequency selector (see table beside)

8.1 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) Default setting: 0÷+10 VDC (4 ÷ 20 mA for /I option)	Input - analog signal
E	INPUT -		
F	MONITOR	Monitor analog output: 0÷+5 VDC maximum range; 1 V = 1 A	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 reffered 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

9 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 (4÷20 mA with cable break detection, ±10 mA, ±20 mA or 0÷20 mA software selectable)

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

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

9.1 Option /Q

To enable the driver, supply 24Vdc on pin C referred to pin B: when the enable signal is set to zero the valve status is software selectable, by factory default the valve functioning is disabled (zero current to the solenoid) but the driver current output stage is still active. For the complete list of selectable status, see tab. G115.

9.2 Option /Z

It provides, on the 12 pin main connector, the following additional features:

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).

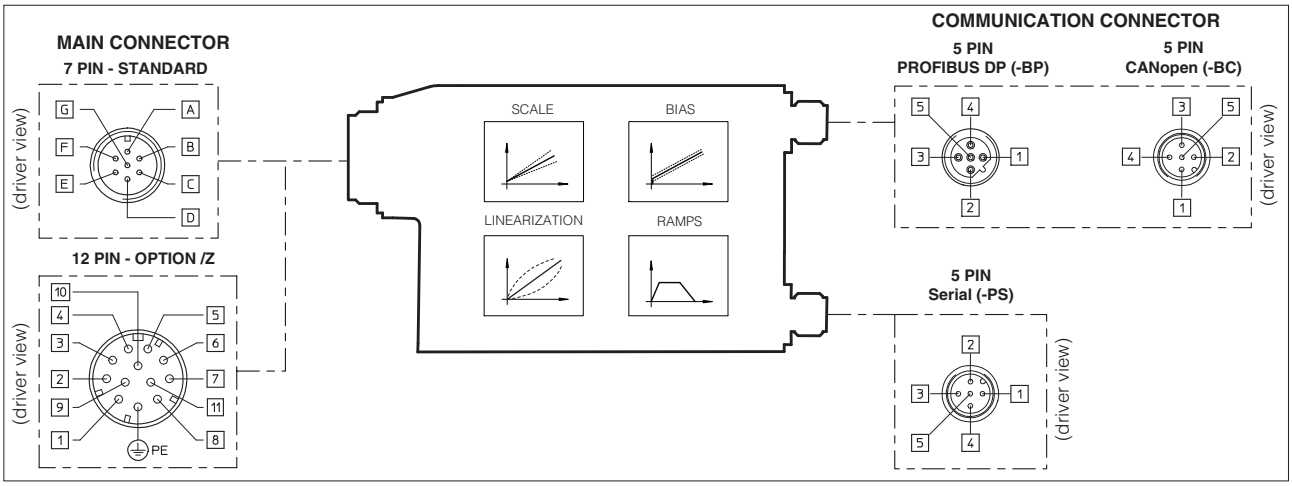
Enable Input Signal

To enable the driver, supply 24Vdc on pin C referred to pin B: when the enable signal is set to zero the valve status is software selectable, by factory default the valve functioning is disabled (zero current to the solenoid) but the driver current output stage is still active. For the complete list of selectable status, see tab. G115.

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.

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



10.1 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, ±20 mA maximum range software selectable Default setting: 0÷+10 VDC, differential input /Z option common mode INPUT+ referred to AGND	Input - analog signal
E	-	INPUT -		
C	5	AGND	Ground - signal zero for MONITOR signal (INPUT+ signal only for /Z option)	Gnd - analog signal
F	6	MONITOR	Monitor analog output: 0÷+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 24VDC power supply and when the valve is ready to operate. During this time the current to the valve coils is switched to zero.

10.2 ELECTRONIC CONNECTIONS - 5 PIN COMMUNICATION AND PRESSURE TRANSDUCER CONNECTORS

	-PS Serial		-BC CANopen		-BP PROFIBUS DP		/W pressure connector	
PIN	SIGNAL	TECHNICAL SPECIF.	SIGNAL	TECHNICAL SPECIF.	SIGNAL	TECHNICAL SPECIF.	SIGNAL	TECHNICAL SPECIF.
1	NC	do not connect	CAN_SHLD	Shield	+5V	for termination	VT	transducer power supply 24 VDC
2	NC	do not connect	NC	do not connect	LINE-A	Bus line (high)	TR	transducer signal 0÷10 VDC
3	RS_GND	Signal zero data line	CAN_GND	Signal zero data line	DGND	Data line and termination Signal zero	AGND	Signal zero for power supply and signal
4	RS_RX	Receiving data line	CAN_H	Bus line (high)	LINE-B	Bus line (low)	NC	do not connect
5	RS_TX	Transmitting data line	CAN_L	Bus line (low)	SHIELD	do not connect	NC	do not connect

11 SOFTWARE TOOLS

The driver configuration and parameters can be easily set with the Atos E-SW programming software, available in three different versions according to the driver's communication execution: **E-SW-PS** (Serial), **E-SW-BC** (CANopen) and **E-SW-BP** (PROFIBUS DP). Programming software E-SW-BC and E-SW-BP, for BC and BP drivers, can be also used to modify the valve's parameterization through the serial communication interface, without disconnecting the valve from the machine's bus line.

For a more detailed description of software interface, PC requirements, adapters, cables and terminators, please refer to technical table **G500**.

Programming software, must be ordered separately:

E-SW-* (mandatory - first supply) = Dvd including E-SW-* software installer and operator manuals; it allows the registration to Atos digital service

E-SW-*-N (optional - next supplies) = as above but not allowing the registration to Atos digital service

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.

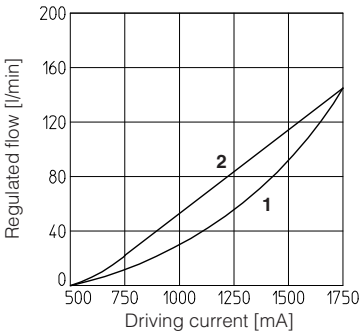
With the password you can also download, in your personal area, the latest releases of the Atos software, manuals, drivers and configuration files.

12 MAIN CHARACTERISTICS OF PROPORTIONAL THROTTLE CARTRIDGE

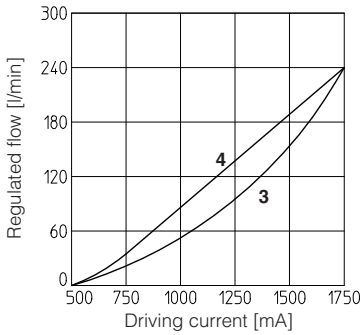
Assembly position	Any position
Subplate surface finishing	Roughness index, $\sqrt{}^{0.4}$ flatness ratio 0,01/100 (ISO 1101)
Ambient temperature	-20°C ÷ +70°C for -A execution; -20°C ÷ +60°C for -AE and -AES executions
Fluid	Hydraulic oil as per DIN 51524 ... 535 for other fluids see section 1
Recommended viscosity	15 ÷100 mm²/s at 40°C (ISO VG 15÷100)
Fluid contamination class	ISO 18/15 achieved with in line filters of 10 μm 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 ÷ 3.3 Ω for standard 12 VDC coil; 2 ÷ 2,2 Ω for 6 VDC coil; 13 ÷ 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; IP67 for -AE and AES executions
Duty factor	Continuous rating (ED=100%)

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

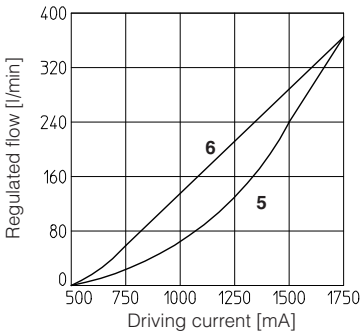
13.1 Regulation diagrams measured at Δp 5 bar



1 = LEQZO-A*-162S4
2 = LEQZO-A*- 162L4



3 = LEQZO-A*- 252S4
4 = LEQZO-A*- 252L4

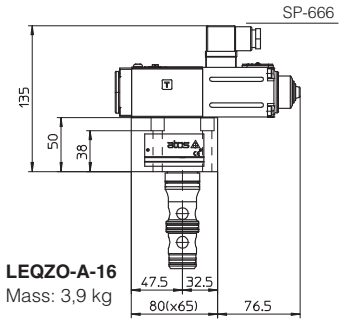


5 = LEQZO-A*- 322S4
6 = LEQZO-A*- 322L4

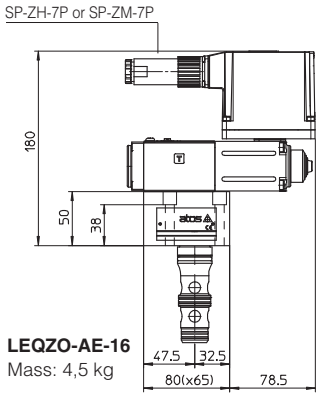
Notes: with 18 VDC coil the driving current is half of standard 12 VDC coil
For the valves with digital electronics, the regulation characteristic can be modified by setting the internal software parameters, see tab. G500.

14 DIMENSIONS [mm]

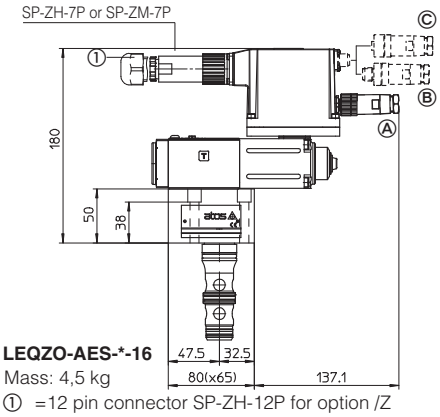
Fastening bolts:
N°4 M8x50 class 12.9
Tightening torque = 35 Nm



LEQZO-A-16
Mass: 3,9 kg

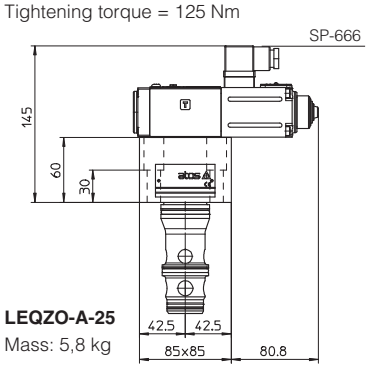


LEQZO-AE-16
Mass: 4,5 kg

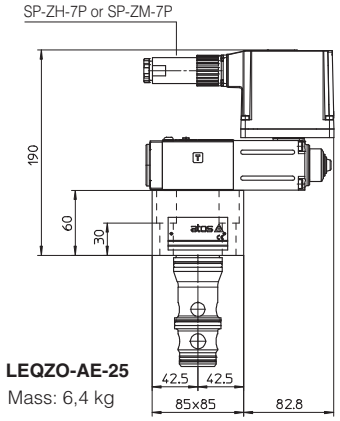


LEQZO-AES-*-16
Mass: 4,5 kg
① =12 pin connector SP-ZH-12P for option /Z

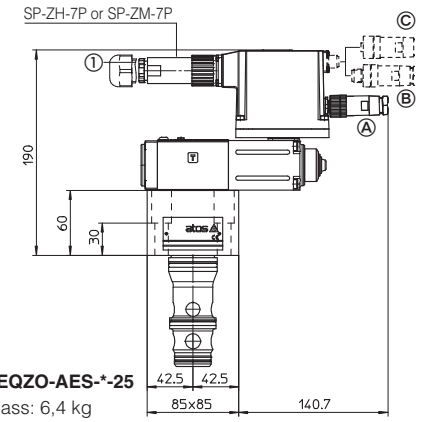
Fastening bolts:
N°4 M12x50 class 12.9
Tightening torque = 125 Nm



LEQZO-A-25
Mass: 5,8 kg

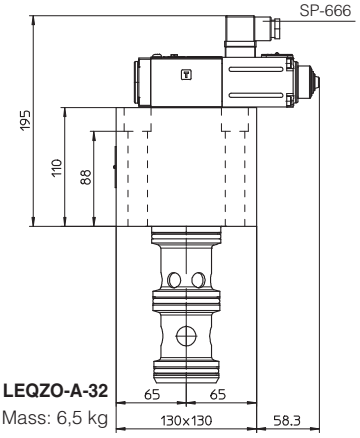


LEQZO-AE-25
Mass: 6,4 kg

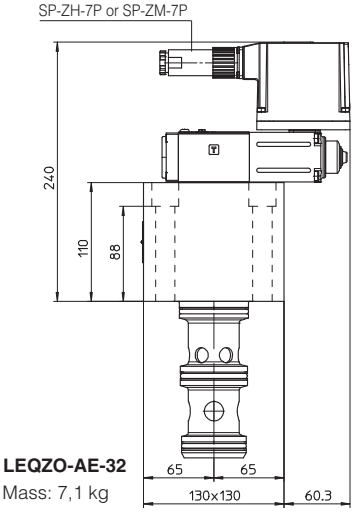


LEQZO-AES-*-25
Mass: 6,4 kg
① =12 pin connector SP-ZH-12P for option /Z

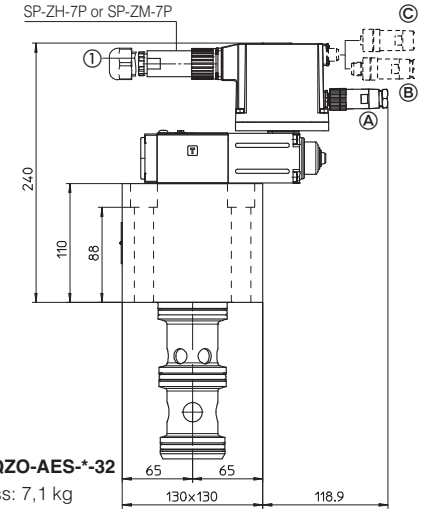
Fastening bolts:
N°4 M16x120 class 12.9
Tightening torque = 300 Nm



LEQZO-A-32
Mass: 6,5 kg



LEQZO-AE-32
Mass: 7,1 kg

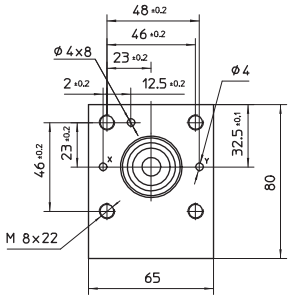


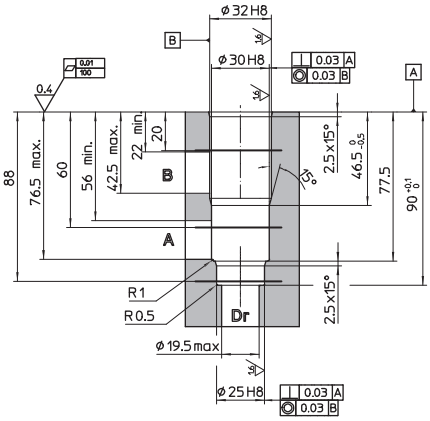
LEQZO-AES-*-32
Mass: 7,1 kg

Ⓐ -PS communication interface, SP-ZH-5P connector
Ⓑ -BP communication interface, SP-ZH-5P/BP connector
① Dotted line =12 pin connector SP-ZH-12P for option /Z
Ⓒ -BC communication interface, SP-ZH-5P connector

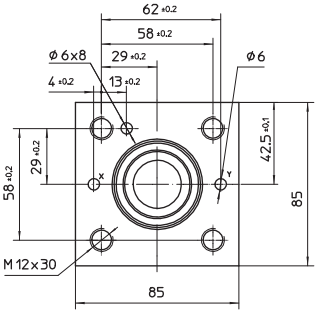
15 COVER INTERFACE AND CAVITY DIMENSIONS FOR LEQZO [mm]

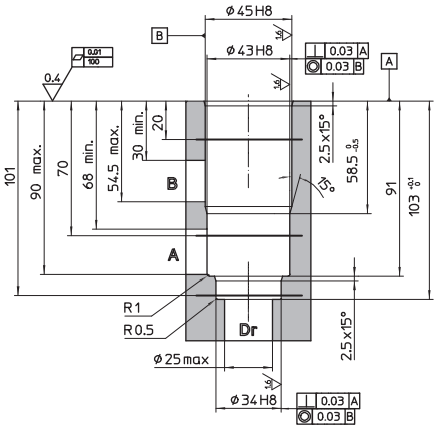
Size 16



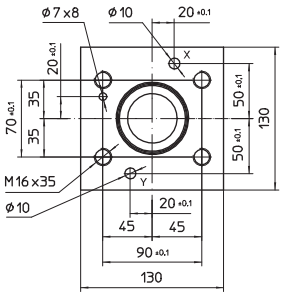


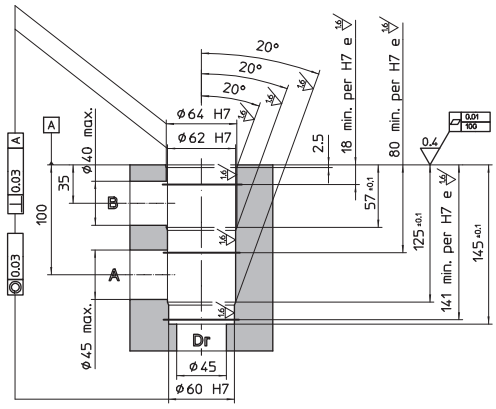
Size 25





Size 32





16 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	IP67	IP67	IP67
DATA SHEET	K500	G110, G115, K500			G115, K500	

connectors supplyed with the valve