QUICKSTART FULL
for digital proportionals with LVDT transducer - fieldbus and optional p/Q control

QF300-5 - 01/25

DIRECT OPERATED PROPORTIONAL DIRECTIONAL AND FLOW VALVES

Valve model:

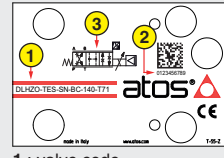|		
DHZO-TES	DKZOR-TES	QVHZO-TES
DLHZO-TES	DLKZOR-TES	QVKZOR-TES

Driver models:
E-RI-TES-N for directional and flow valves without alternated p/Q control **SN**
E-RI-TES-S for directional valves with alternated p/Q control **SP, SF, SL**

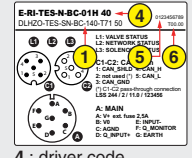## IDENTIFICATION

Valve identification plates and label

Valve name plate : **N**

1 : valve code
2 : valve matrix code
3 : hydraulic symbol

Driver label : **L**

E-RI-TES-N-BC-01H 40
DLHZO-TES-SN-BC-140-T71 50

4 : driver code
5 : driver serial number
6 : factory firmware version

INSTALLATION TOOLS ACCORDING TO VALVE MODEL - not included

Fastening bolts	Wrenches	Main connectors		Fieldbus connectors		Transducers cables	
		SN	**SN,SP,SF,SL**	**BC,BP**	**EH,EW,EI,EP**	**SP,SL**	**SF**
socket head screws	or / for fastening bolts and air bleeding	7 pin metallic	12 pin metallic	5 pin metallic	4 pin metallic	5 pin plastic	5 pin plastic
see STEP 1 and STEP 3		see STEP 2.1		see STEP 2.2		see STEP 2.3	

PROGRAMMING TOOLS - not included

PC software	mobile App	Bluetooth	OR	USB connection KIT	
		Adapter		Cable	Isolator
E-SW-SETUP	Atos CONNECT	E-A-BTH		E-C-SB-USB/M12	E-A-SB-USB/OPT

NOTE: Atos CONNECT supports Atos digital valve drivers equipped with E-A-BTH or with built-in Bluetooth, see STEP 5

PC SOFTWARE

E-SW-SETUP	supports	**NP** (USB)	**IL** (IO-Link)	**PS** (Serial)	**IR** (Infrared)
		BC (CANopen)	**BP** (PROFIBUS DP)	**EH** (EtherCAT)	
		EW (POWERLINK)	**EI** (EtherNet/IP)	**EP** (PROFINET RT/IRT)	
	supports	valves with **SP, SF, SL** alternated p/Q control			

REMARK Atos PC software is designed for Windows based operative systems - Windows 10 or later

PC SOFTWARE DOWNLOAD

Download PC software at www.atos.com accessing to "**MyAtos -> Download area** electronics"

Free registration by filling the form at www.atos.com/en-it/login

E-SW-SETUP is free and available in Download area

RELATED DOCUMENTATION - www.atos.com

FS900	Operating and maintenance information - tech. table	STARTUP BLUETOOTH	Bluetooth adapter startup guide
FS500	Digital proportional valves with p/Q - tech. table	E-MAN-RI-LES	TES/LES - driver operating manual
FS165	DHZO, DKZOR positive spool overlap - tech. table	E-MAN-RI-LES-S	TES/LES - driver with S option operating manual
FS168	DHZO, DKZOR zero spool overlap - tech. table	E-MAN-S-BC	CANopen protocol programming manual
FS180	DLHZO, DLKZOR servoproportional - tech. table	E-MAN-S-BP	PROFIBUS DP protocol programming manual
FS412	QVHZO, QVKZOR flow controls - tech. table	E-MAN-S-EH	EtherCAT protocol programming manual
P005	Mounting surface - tech. table	E-MAN-S-EW	POWERLINK protocol programming manual
GS500	Programming tools - tech. table	E-MAN-S-EI	EtherNet/IP protocol programming manual
GS510	Fieldbus - tech. table	E-MAN-S-EP	PROFINET protocol programming manual
K800	Electric and electronic connectors - tech. table		

ATTENTION !

The purpose of this quickstart guide is show a logical sequence of basic operations. This guide does not cover all details or variants of Atos valves. All operations described in this document should be performed only by qualified personnel.
Operations and images could be subject to change without notice. For further information please refer to related documentation.

CONTACT US

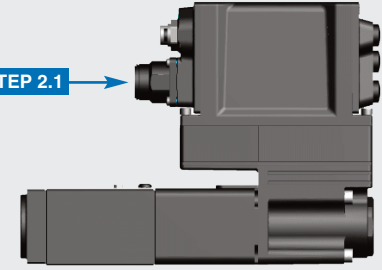Atos spa - Italy - 21018 Sesto Calende   www.atos.com   support@atos.com

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PRODUCTS OVERVIEW
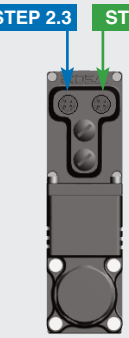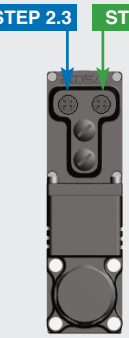
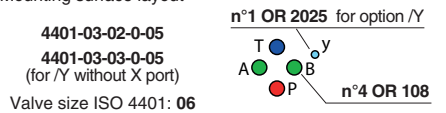| INSTALLATION			PROGRAMMING	
STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
MECHANICAL	ELECTRICAL	HYDRAULICS	PC SOFTWARE	MOBILE APP

STEP 1   MECHANICAL

In case of first commissioning, before the valve installation the whole system must be correctly flushed to grant the required cleanliness level
During the flushing operation use on-off or by-pass valves in place of the proportional valve
• remove protection pad **P1** located on the valve bottom face only immediately before installation (do not remove connectors caps)
• check the presence and correct positioning of the seals on valve ports
• verify that valve mounting surface is clean and free from damages or burrs
• verify the correct valve orientation according to the pattern of the relevant mounting interface
• lock the fastening bolts respecting below sequence and tightening torque according to valve model
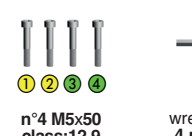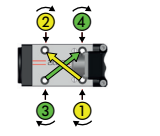
DHZO-TES / DLHZO-TES

Mounting surface layout
4401-03-02-0-05
4401-03-03-0-05 (for /Y without X port)
Valve size ISO 4401: **06**
n°1 OR 2025 for option /Y
n°4 OR 108
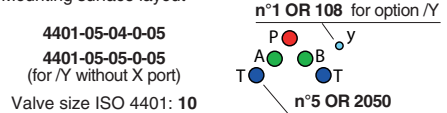
Fastening bolts socket head screws
Tightening torque: **8 Nm**
n°4 M5×50 class:12.9   wrench 4 mm
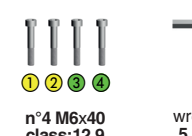
DKZOR-TES / DLKZOR-TES

Mounting surface layout
4401-05-04-0-05
4401-05-05-0-05 (for /Y without X port)
Valve size ISO 4401: **10**
n°1 OR 108 for option /Y
n°5 OR 2050
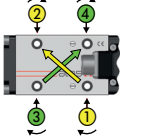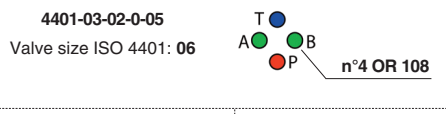
Fastening bolts socket head screws
Tightening torque: **15 Nm**
n°4 M6×40 class:12.9   wrench 5 mm

QVHZO-TES
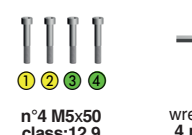
Mounting surface layout
4401-03-02-0-05
Valve size ISO 4401: **06**
n°4 OR 108
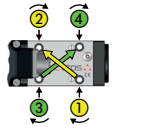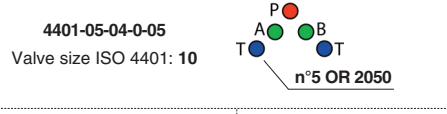
Fastening bolts socket head screws
Tightening torque: **8 Nm**
n°4 M5×50 class:12.9   wrench 4 mm

QVKZOR-TES

Mounting surface layout
4401-05-04-0-05
Valve size ISO 4401: **10**
n°5 OR 2050
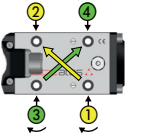
Fastening bolts socket head screws
Tightening torque: **15 Nm**
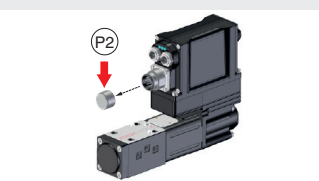n°4 M6×40 class:12.9   wrench 5 mm

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STEP 2   ELECTRICAL

This section considers the different valves options, illustrating the multiple variants of the available electrical connections. The electrical connections have to be wired according to the selected valve code
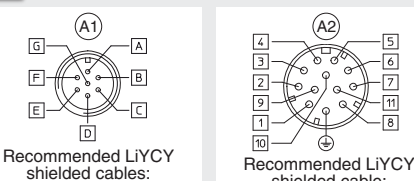
⚠ **WARNING:** for electrical connections of safety proportional valves please refer to technical tables:
FY100 safety proportionals **/U** with double power supply - **FY200** safety proportionals **/K** with on-off signals

2.1   MAIN CONNECTOR

1 Remove main connector cap P2

⚠ **WARNING:** remove power supply before any electrical or wiring operations
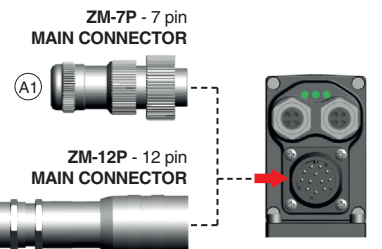
3 Connect the valve to the system

2 Select main connector according to valve code and proceed with wirings operations

Recommended LiYCY shielded cables:
7 x 0,75 mm² max 20 m
7 x 1 mm² max 40 m

Recommended LiYCY shielded cable:
12 x 0,75 mm² max 20 m

ZM-7P - 7 pin MAIN CONNECTOR
ZM-12P - 12 pin MAIN CONNECTOR

NOTE: the use of above metallic connectors is strongly recommended in order to fulfill EMC requirements

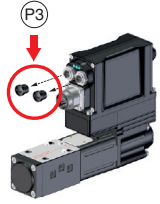⚠ **WARNING:** a safety fuse is required in series to driver power supply - 2,5 A time lag fuse

SN   standard

A	V+	(power supply 24Vdc)
B	V0	(power supply 0Vdc)
C	AGND	
D	Q_INPUT+	(±10Vdc / 4 ÷ 20mA)
E	INPUT-	
F	Q_MONITOR	(±10Vdc / 4 ÷ 20mA)
G	EARTH	

SN   /Q option

A	V+	(power supply 24Vdc)
B	V0	(power supply 0Vdc)
C	ENABLE	(input 24Vdc)
D	Q_INPUT+	(±10Vdc / 4 ÷ 20mA)
E	INPUT-	
F	Q_MONITOR	(±10Vdc / 4 ÷ 20mA)
G	EARTH	

SN   /F option

A	V+	(power supply 24Vdc)
B	V0	(power supply 0Vdc)
C	AGND	
D	Q_INPUT+	(±10Vdc / 4 ÷ 20mA)
E	INPUT-	
F	FAULT	(output 24Vdc)
G	EARTH	

SN   /Z option

1	V+	(power supply 24Vdc)
2	V0	(power supply 0Vdc)
3	ENABLE	(input 24Vdc)
4	Q_INPUT+	
5	INPUT-	
6	Q_MONITOR	(±10Vdc / 4 ÷ 20mA)
7	NC	
8	NC	
9	VL+	(power supply 24Vdc)
10	VL0	(power supply 0Vdc)
11	FAULT	(output 24Vdc)
PE	EARTH	
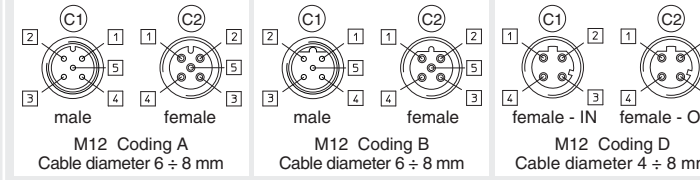
SP, SF, SL   standard

1	V+	(power supply 24Vdc)
2	V0	(power supply 0Vdc)
3	ENABLE	(input 24Vdc)
4	Q_INPUT+	
5	INPUT-	(±10Vdc / 4 ÷ 20mA)
6	Q_MONITOR	(±10Vdc / 4 ÷ 20mA)
7	F_INPUT+	(±10Vdc / 4 ÷ 20mA)
8	F_MONITOR	(±10Vdc / 4 ÷ 20mA)
9	D_IN0	(multiple PID selection - NP)
	VL+	(power supply 24Vdc - fieldbus)
10	D_IN1	(multiple PID selection - NP)
	VL0	(power supply 0Vdc - fieldbus)
11	FAULT	(output 24Vdc)
PE	EARTH	

2.2   FIELDBUS CONNECTORS - only for BC, BP, EH, EW, EI, EP

1 Remove fieldbus connectors caps P3

2 Select fieldbus connectors according to valve code and proceed with wirings operations

M12 Coding A Cable diameter 6 ÷ 8 mm (male / female)
M12 Coding B Cable diameter 6 ÷ 8 mm (male / female)
M12 Coding D Cable diameter 4 ÷ 8 mm (female - IN / female - OUT)
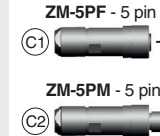
BC

1	CAN_SHLD	Shield
2	not used	
3	CAN_GND	Signal zero data line
4	CAN_H	Bus line (high)
5	CAN_L	Bus line (low)

BP
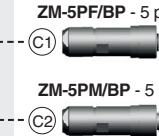
1	+5V	Termination supply signal
2	LINE-A	Bus line (high)
3	DGND	Data line - termination signal zero
4	LINE-B	Bus line (low)
5	SHIELD	

EH - EW - EI - EP

1	TX+	Transmitter
2	RX+	Receiver
3	TX-	Transmitter
4	RX-	Receiver
housing	SHIELD	

3 Connect the valve to the fieldbus network. For information about fieldbus terminators see GS500.
The use of above metallic connectors is strongly recommended in order to fulfill EMC requirements.
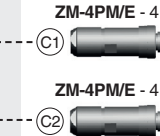
BC
ZM-5PF - 5 pin
ZM-5PM - 5 pin

BP
ZM-5PF/BP - 5 pin
ZM-5PM/BP - 5 pin
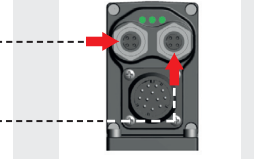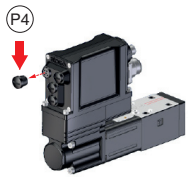
EH, EW, EI, EP
ZM-4PM/E - 4 pin
ZM-4PM/E - 4 pin
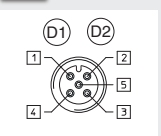
2.3   REMOTE TRANSDUCERS CONNECTOR - only for SP, SF, SL

1 Remove transducer connector cap P4

2 Select transducer(s) connection and proceed with wirings operations
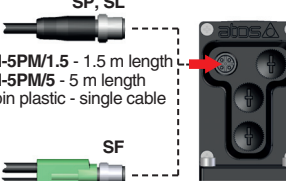
SP, SL - Single Transducer

1	VF+ 24V	(power supply 24Vdc)
2	TR1	(0 ÷ 10Vdc / 4 ÷ 20mA)
3	AGND	
4	NC	
5	NC	

Recommended cable:
D1 3 x 0,25 mm²
D2 5 x 0,25 mm²

SF - Double Transducers

1	VF+ 24V	(power supply 24Vdc)
2	TR1	(0 ÷ 10Vdc / 4 ÷ 20mA)
3	AGND	
4	TR2	(0 ÷ 10Vdc / 4 ÷ 20mA)
5	NC	

3 Connect the valve to the transducer(s)

SP, SL
ZH-5PM/1.5 - 1.5 m length
ZH-5PM/5 - 5 m length
5 pin plastic - single cable

SF
ZH-5PM-2/2 - 2 m length
4 pin - plastic - double cable

ELECTRICAL WIRING EXAMPLES

MAIN CONNECTOR - VOLTAGE

REFERENCE INPUT - DIFFERENTIAL MODE

cabinet side	main connector pin-out				valve internal circuit
±10 Vpc	std	/F	/Q	/Z	NP	field	
Ref. F ⊕	not present				7	F_INPUT+ 50K
Ref. Q ⊖	D	4			4	Q_INPUT+ 50K
Ref. F, Q	E	5			5	INPUT- 50K
	SN				SP, SF, SL	Rsh = 500 ohm

REFERENCE INPUT - COMMON MODE

cabinet side	main connector pin-out				valve internal circuit
±10 Vpc	std	/F	/Q	/Z	NP	field	
Ref. F ⊕	not present				7	F_INPUT+ 50K
Ref. Q ⊕	D	4			4	Q_INPUT+ 50K
Ref. F, Q	E	5			5	INPUT- 50K
⊥ (0 V)	C	B	10	2	10	AGND / V0 / VL0
	SN				SP, SF, SL	

MONITOR OUTPUT

cabinet side	main connector pin-out			valve internal circuit
±10 Vpc	std	/Q	/Z	NP	field	
Mon. F	not present			8	F_MONITOR
Mon. Q	F	6		6	Q_MONITOR
⊥ (0 V)	C	B	10	2	10	AGND / V0 / VL0
	SN			SP, SF, SL	

REMOTE TRANSDUCER - only for **SP, SL**

transducer side	transducer connector pin-out	valve internal circuit
	std	/C	
power supply ⊕	V+	1	V+
⊖	V0	3	NC	AGND
signal	TR	2	TR1
	0÷10Vpc	4÷20mA	Rsh = 500 ohm (/C option)

MAIN CONNECTOR - CURRENT

REFERENCE INPUT - DIFFERENTIAL MODE

cabinet side	main connector pin-out				valve internal circuit
4÷20 mA	std	/F	/Q	/Z	NP	field	
Ref. F ⊕	not present				7	F_INPUT+ 50K
Ref. Q ⊕	D	4			4	Q_INPUT+ 50K
Ref. F, Q	E	5			5	INPUT- 50K
	SN				SP, SF, SL	Rsh = 500 ohm

REFERENCE INPUT - COMMON MODE

cabinet side	main connector pin-out				valve internal circuit
4÷20 mA	std	/F	/Q	/Z	NP	field	
Ref. F ⊕	not present				7	F_INPUT+ 50K
Ref. Q ⊕	D	4			4	Q_INPUT+ 50K
	E	5			5	INPUT- 50K
⊥ (0 V)	C	B	10	2	10	AGND / V0 / VL0
	SN				SP, SF, SL	Rsh = 500 ohm

MONITOR OUTPUT

cabinet side	main connector pin-out			valve internal circuit
4÷20 mA	std	/Q	/Z	NP	field	
Mon. F	not present			8	F_MONITOR
Mon. Q	F	6		6	Q_MONITOR
⊥ (0 V)	C	B	10	2	10	AGND / V0 / VL0
Rmax = 500 ohm	SN			SP, SF, SL	

REMOTE TRANSDUCERS - only for **SF**

transducers side	transducer connector pin-out	valve internal circuit
	std	/C	
power supply ⊕	V+	1	VF +24V
⊖	V0	3	NC	AGND
1st signal	TR	2	TR1
2nd signal	TR	4	TR2
	0÷10Vpc	4÷20mA	Rsh = 500 ohm (/C option)

STEP 3 — HYDRAULICS

Air bleeding - only **DHZO**, **DLHZO**, **DKZOR** and **DLKZOR**:
- release 2 or 3 turns the air bleed screw **V**
- cycle the valve at low pressure until the oil leaking from the **V** port is exempted from air bubbles
- lock the air bleed screw **V**

Wrenches types

		Tightening torque
DHZO DLHZO	3 mm	4 Nm
DKZOR DLKZOR	4 mm or 13 mm	8 Nm

NOTE: to facilitate bleeding operations, apply a light backpressure (1 or 2 bar) by adding a check valve on T line for standard valves or on Y line for valves with /Y option

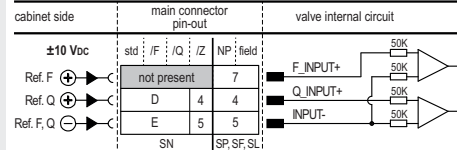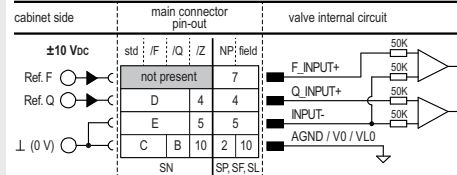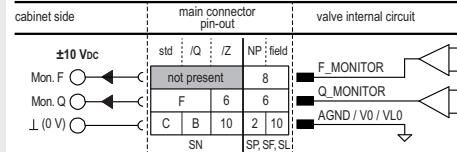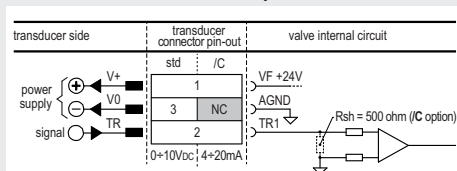Consult tech table **FS900** for general guidelines about component's commissioning

HINT ! - Wizard objects dictionary - only for BC, BP, EH, EW, EI, EP

Press **CTRL** + **H** on the PC keyboard to open the context help form

Move arrow on parameter (e.g. **Unit**) to display the objects dictionary information to access the parameter via fieldbus

If present **List**, press ➡ to display values accepted by the parameter
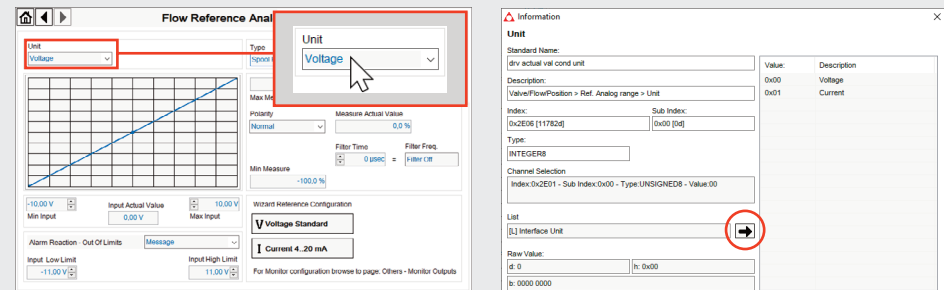
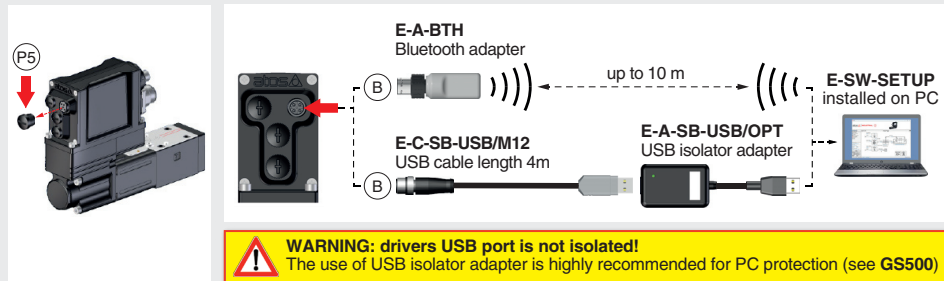**NOTE:** alternatively right click on any parameter

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STEP 4 — PC SOFTWARE

REMARK proportional valves with on-board electronics are factory preset with default parameters, only few programming operations are mandatory for:
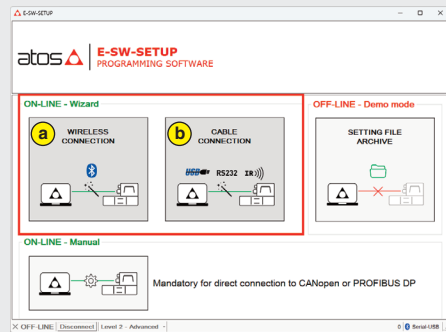- **BC, BP, EH, EW, EI, EP** setup the network parameters and the source of reference signals
- **SP, SF, SL** setup the feedback's scale for remote transducers and the pressure/force PID parameters

Valve programming can be performed through E-SW-SETUP software or via fieldbus (not for **NP**)

4.1 CONNECTION

1 In order to access valve parameterization:
- Install E-SW-SETUP software on PC
- Insert main connector to the valve and power on with **24Vpc**

2 Remove USB plastic protection cap **P5** and connect valve to the PC as shown below via Bluetooth (adapter only) or USB (cable and isolator adapter)

E-A-BTH Bluetooth adapter — up to 10 m — **E-SW-SETUP** installed on PC

E-C-SB-USB/M12 USB cable length 4m

E-A-SB-USB/OPT USB isolator adapter

WARNING: drivers USB port is not isolated!
The use of USB isolator adapter is highly recommended for PC protection (see **GS500**)

3 Launch the PC software using E-SW-SETUP icon:
- **PC software does NOT detect valid connection** communication is not established, please follow wizard procedure **4**
- **PC software detects valid connection** communication automatically established - valve is **ON-LINE** see **5**

4 In **ON-LINE - Wizard** press button:
- **a : WIRELESS CONNECTION** Wizard procedure for connection via Bluetooth
- **b : CABLE CONNECTION** Wizard procedure for connection via USB cable

5 Communication established, valve is **ON-LINE** and it is possible change parameters

NOTE: for **BC, BP, EH, EW, EI, EP** please also refer to the following parameter settings:
- see step 4.2 to change the network setup
- see step 4.3 to change the reference signals setup

NOTE: for more info about E-A-BTH Bluetooth adapter, please refer to STARTUP BLUETOOTH guide

REMARK: once removed the E-A-BTH Bluetooth adapter or E-C-SB-USB/M12 USB cable, screw the plastic protection cap **P5** applying the correct tightening torque, in order to preserve valve's IP protection characteristics

Tightening torque **0,6 Nm**
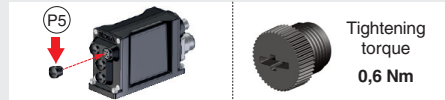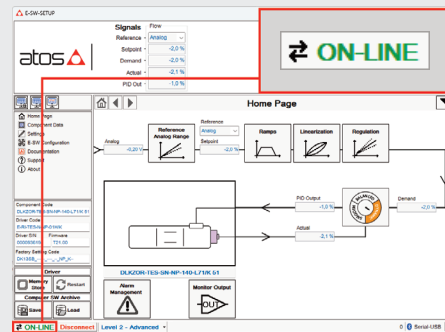
4.2 FIELDBUS - Network Management - only for BC, BP, EH, EW, EI, EP

Node, Station Alias, IP Address, Baudrate, etc... can be set through:
1) **Machine central unit (master)** - please refer to E-MAN-S-** fieldbus protocol programming manual
2) **E-SW-SETUP software**
- browse to **Network Management - Configuration** to change below default settings:

BC CANopen — Configuration file: **EDS**
Configuration — CANopen Node: 1 — Speed: 50 Kbit/sec — CANopen Hardware Filter: Filter Active

BP PROFIBUS DP — Configuration file: **GSD**
Defaults: Telegram 3 for **SN**, Telegram 5 for **SP, SF, SL**
Configuration — Profibus Node: 125 — Telegram Selection: Telegram 5

EH EtherCAT — Configuration file: **XML**
Configuration — Station Alias: 0
Station Alias is assigned automatically by fieldbus master

EW POWERLINK — Configuration file: **XDD**
Configuration — Node ID: 125

EI EtherNet/IP — Configuration file: **EDS**
IP Address, Subnet Mask and Default Gateway are assigned by fieldbus master, IPconfig or BOOTP/DHCP utility
Configuration — IP Address: 0 . 0 . 0 . 0 — Subnet Mask: 0 . 0 . 0 . 0 — Default Gateway: 0 . 0 . 0 . 0

EP PROFINET — Configuration file: **GSDML**
IP Address, Subnet Mask, Default Gateway and Station Name are assigned automatically by fieldbus master (e.g. Discovery and Configuration Protocol)
Configuration — IP Address: 0 . 0 . 0 . 0 — Subnet Mask: 0 . 0 . 0 . 0 — Default Gateway: 0 . 0 . 0 . 0
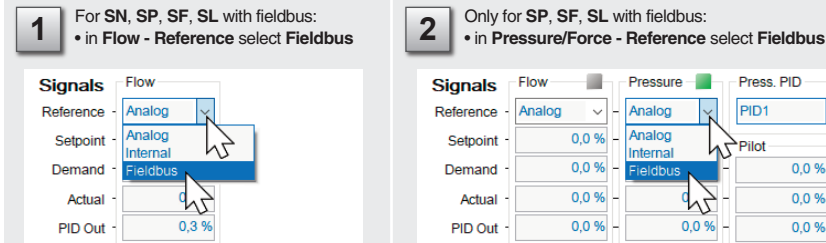
- press **Memory Store** button and press **Save User Set** button to save new setting into the driver (see 4.6)
- network configuration settings will be applied at next driver power on or pressing the **Restart** button

NOTE: configuration files are available in MyAtos area - **www.atos.com**

4.3 REFERENCES - only for BC, BP, EH, EW, EI, EP

The source of reference signals for valves with fieldbus:
- is preset as **Analog** by factory default
- can be managed through machine control unit by setting the source from **Analog** to **Fieldbus**

1 For **SN, SP, SF, SL** with fieldbus:
- in **Flow - Reference** select **Fieldbus**

2 Only for **SP, SF, SL** with fieldbus:
- in **Pressure/Force - Reference** select **Fieldbus**

4.4 p/Q SETUP - only for SP, SF, SL

The scaling procedure of the remote transducers feedbacks and pressure/force PID tuning are mandatory! Please refer to E-MAN-RI-LES-S operating manual.

WARNING: the system may be damaged and/or perform uncontrolled movements, due to vibrations and/or undesired transitions between controls **p** and **Q** or not executing at all the pressure/force limitation, if the operations listed in this paragraph are not performed.

4.5 SMART TUNING - E-SW-SETUP

Smart tuning allows to adjust the valve dynamic response in order to match different performance requirements.

The valve is provided with 3 factory setting for the spool control:

dynamic fast response time and high sensitivity for best dynamic performances (default factory setting)

balanced average response time and sensitivity suitable for major applications

smooth attenuated response time and sensitivity to improve control stability in critical applications or in environments with electrical disturbances

1 = dynamic
2 = balanced
3 = smooth
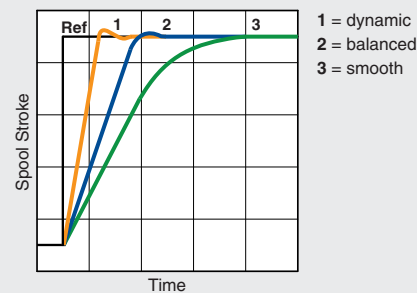
4.6 STORE

Parameters modifications will be stored into driver permanent memory:
- press **Memory Store** button to access **Driver - Memory Save** window
- press **Save User Set** button to store **Valve Parameters**

WARNING: during valve parameters storing operations, the driver automatically shuts down the solenoid power supply for a short time. Do not perform any storing commands while the system is working.

4.7 BACK UP

Parameter modifications will be saved into PC memory:
- press **Save** button to access **Computer SW Archive - Setting Files** page, **Setting File Name** pop-up appears
- input a valid name into **Description** field and press **Ok** button

STEP 5 — MOBILE APP

ATOS CONNECT for smartphones and tablets is a free downloadable app which allows quick access to valve main functional parameters and configuration via Bluetooth, thus avoiding physical cable connection and significantly reducing commissioning times.

ATOS CONNECT app requirements:
- iOS 14 / Android 9
- Bluetooth Low Energy (BLE), version 4.2 or higher
- Atos digital valves/drivers equipped with E-A-BTH Bluetooth adapter or with built-in Bluetooth

Download on the App Store — GET IT ON Google Play — EXPLORE IT ON AppGallery

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TROUBLESHOOTING

Valve vibration or noise
- presence of air in the solenoid; perform air bleeding procedure – see STEP 3

The valve does not follow the reference signal
- valve is powered off, verify presence of 24 Vdc power supply
- valve is disabled, verify presence of 24 Vdc on enable pin - only for /Q and /Z options
- flow/pressure values exceeding the valve's performance limits, verify that hydraulic operating conditions are in compliance with the valve's characteristics
- spool sticking, contact Atos service center

PC software parameters modifications are lost when valve is switched off
- parameter store operation was not performed, check store procedure – see STEP 4, section 4.6

PC software parameters modifications have no effect on the valve
- valve is OFF LINE, check connection procedure – see STEP 4, section 4.1

After the modifications of PC software parameters the valve does not work properly
- restore valve factory parameters using 'Load Factory Set' button, located in 'Driver - Memory Save' window:
  - during restore, the current to the solenoid(s) will be temporarily switched off!
  - factory parameters will be applied at next driver restart or after power off-on sequence!