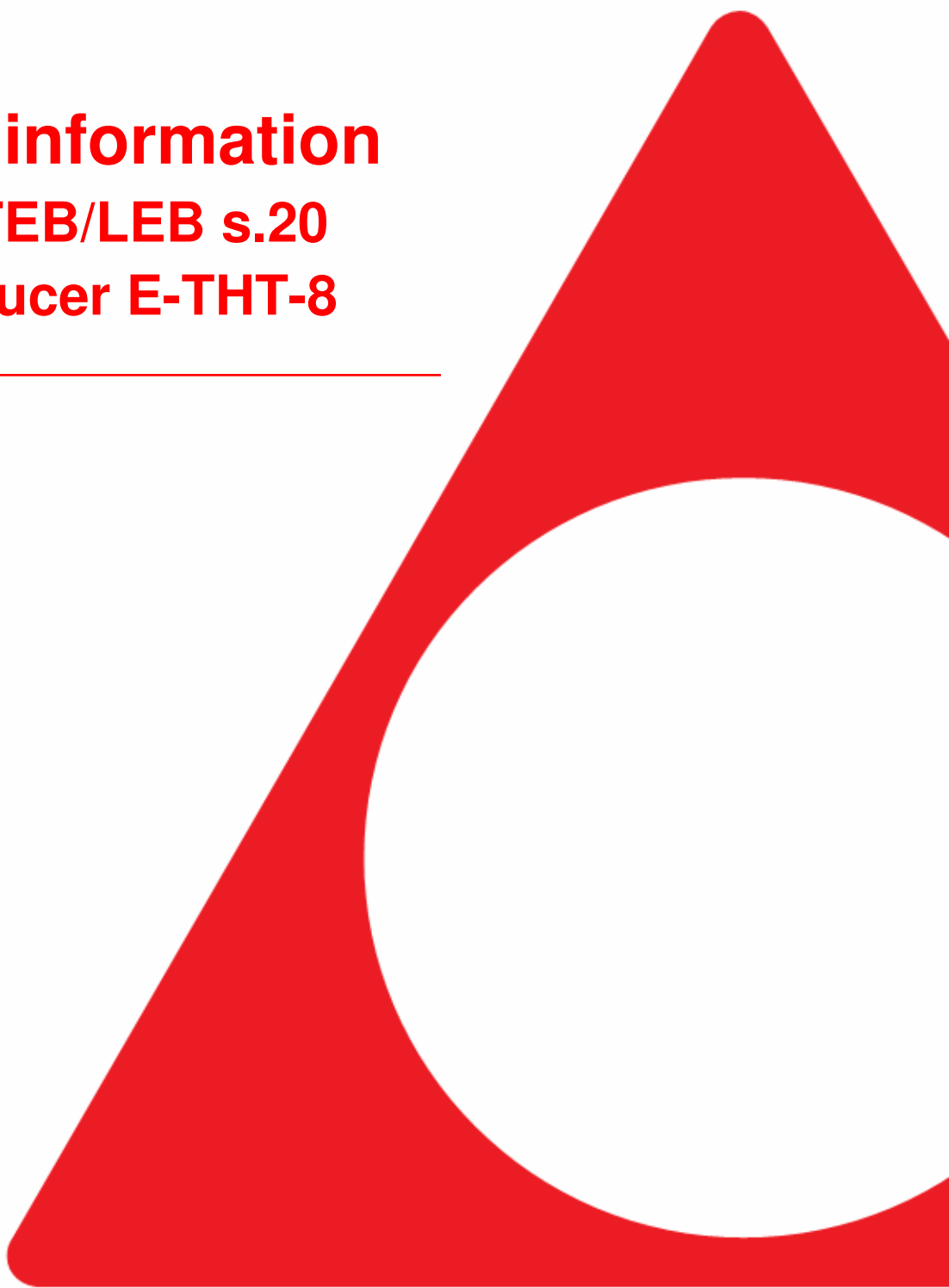


Technical information

Driver E-RI-TEB/LEB s.20

LVDT transducer E-THT-8



SUMMARY

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1 GENERALITIES

High performance and servoproportional directionals have been updated to offer further improved performances and reliability.

The upgrades are related to two main valve components:

1. Driver **E-RI-TEB/LEB s20**: new series of on-board electronics.
2. Transducer **E-THT-8**: new main stage transducer for DPZO, DPZE-TID, LIQZO size 16, 25, 32, 40.

2 TECHNICAL DESCRIPTION

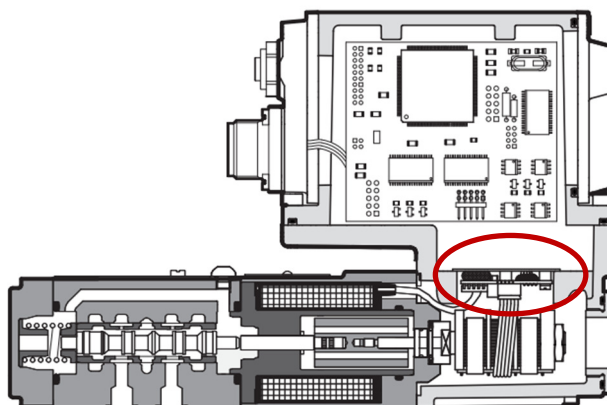
2.1 Driver E-RI-TEB/LEB s20

The new driver E-RI-TEB/LEB s20 confirms the previous version performances providing additional features:

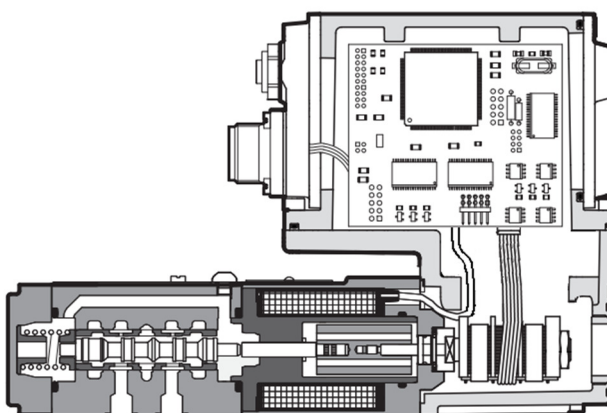
- Higher reliability thanks to LVDT conditioning board integration.
- IO-Link execution implementation.

2.1.1 LVDT conditioning board integration

In the S11 version of E-RI-TEB/LEB the LVDT conditioning board (encircled in red) of NG6, NG10 proportional valves (also when used as a pilot valve) is a dedicated board placed above the transducer.



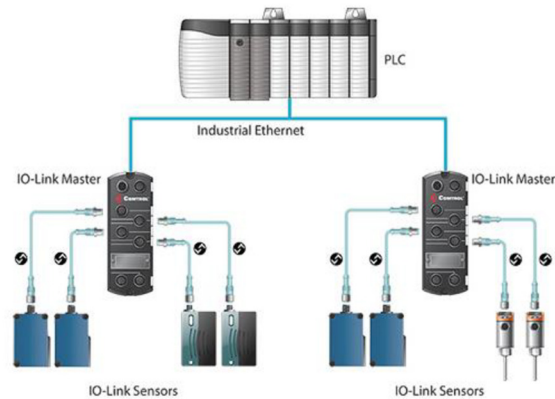
In the new driver series, the transducer's conditioning board will be integrated in the E-RI-TEB/LEB electronic. Thanks to the integration, the number of components and internal connections decreased, thus increasing reliability.



2.1.2 IO-Link execution

An IO-Link based system consists of:

- IO-Link master
- IO-Link devices (sensors, actuators, RFID readers, I/O modules)
- Unshielded cables up to 20m long



The IO-Link master is the link between the IO-Link devices on the machine and the higher level bus.

Typically the master is a "power strip" installed directly on the machine that communicates via bus with the PLC and via IO-Link with the individual devices, putting them in communication with each other.

IO-Link is NOT a fieldbus as it provides a point-to-point connection between master and devices: each device is connected to a port of the master via a dedicated cable and M12 connectors.

If this technology will start to take on to lead the complete digitalization of machines in an Industry 4.0 perspective, it will become more and more likely to be faced with machines equipped with IO-Link masters and cabling.

Hence the demand for valves with IO-Link could arise for 2 reasons:

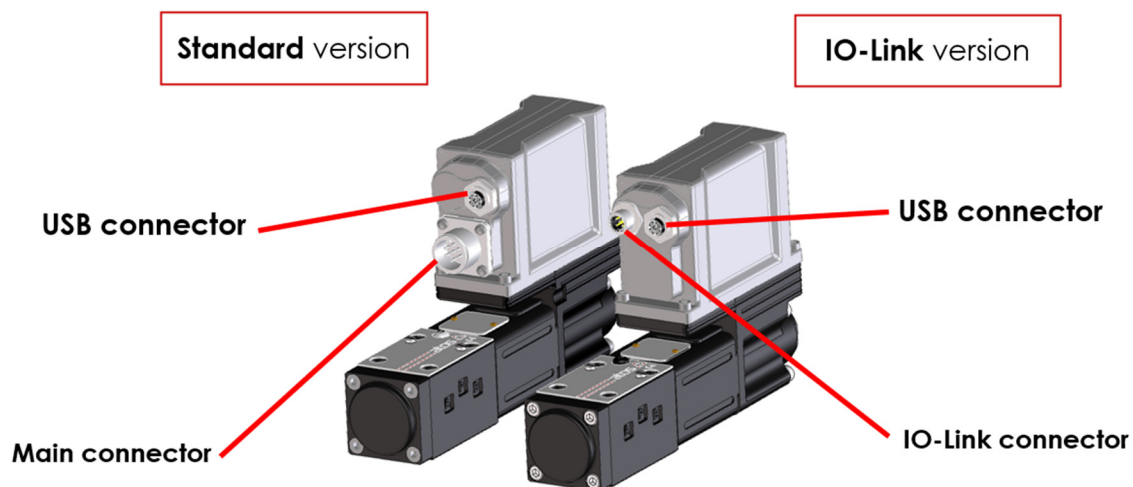
- As a replacement for analog interface valves to achieve similar benefits to fieldbus valves
- As a replacement for fieldbus valves for a matter of costs, especially if as an alternative to industrial ethernet

Note: compared to fieldbus, the IO-Link is less performing in terms of data exchange speed;

it passes from a cycle time that can drop below 1ms, especially for industrial ethernets, to a few ms also depending on the number of connected devices.

In TEB IO-Link (IL) valves the classic 7/12 pole connector is replaced by an M12 connector through which the driver receives power supplies and digital signal. On the front panel there will therefore be 2 M12 connectors (IO-Link and USB). The operator cannot go wrong in connecting the cables having different polarity connectors / keys.

As with the rest of the range, it will then be possible to connect in parallel with the USB to configure the valve, download the calibration, monitor the device, update the FW,...



2.2 Main stage transducer for DPZ*, LIQZ*

The obsolescence of electronic component induces the development of the new main stage transducer for DPZO, DPZE-TID, LIQZO size 16, 25, 32, 40.

Atos seized the opportunity to improve its component in a general way. The new version will provide the following features:

- Higher mechanical resistance.
- Maximum pressure up to 420 bar for LIQZO.
- Thermal drift reduced by 50%.
- Valve-to-valve repeatability improved by 50%.
- Improved linearity (Only for LIQZO size 25-32-40)

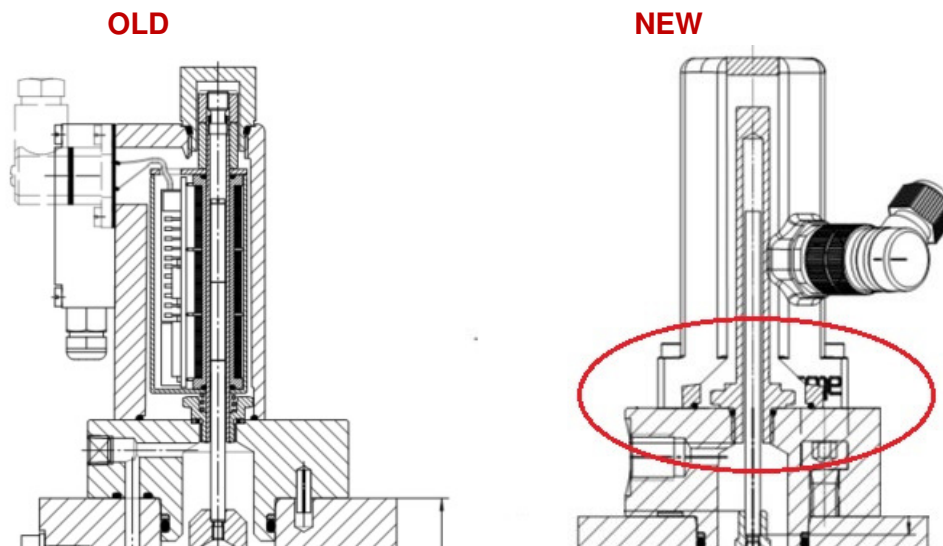
2.2.1 Higher mechanical resistance

Thanks to design optimization, the new transducer has increased mechanical resistance: the connection to valve housing and internal transducer components have been modified to withstand higher pressures.

The optimal design was obtained through FEM calculation, allowing to increase section in the most stressed points, or by changing the production process.

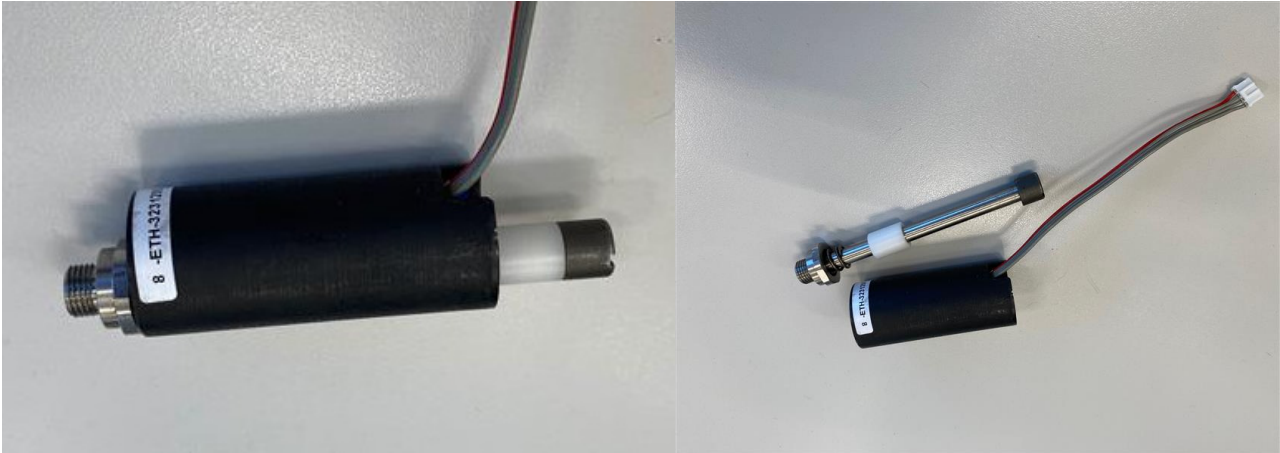
Only for LIQZ* cartridge, the new design allows to increase max pressure limit up to 420 bar.

DPZ* valves' limit is not increased as for cartridges, however at 350 bar can guarantee higher reliability due to higher safety coefficient.



- OLD DESIGN

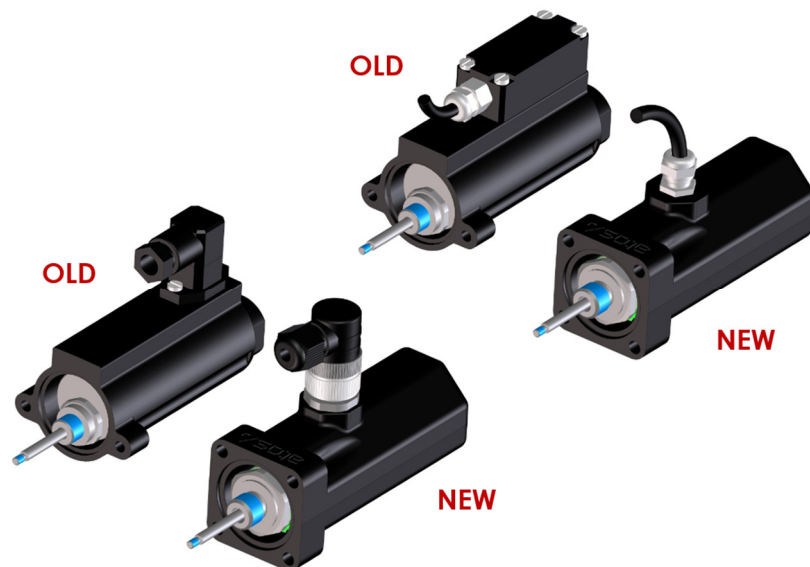
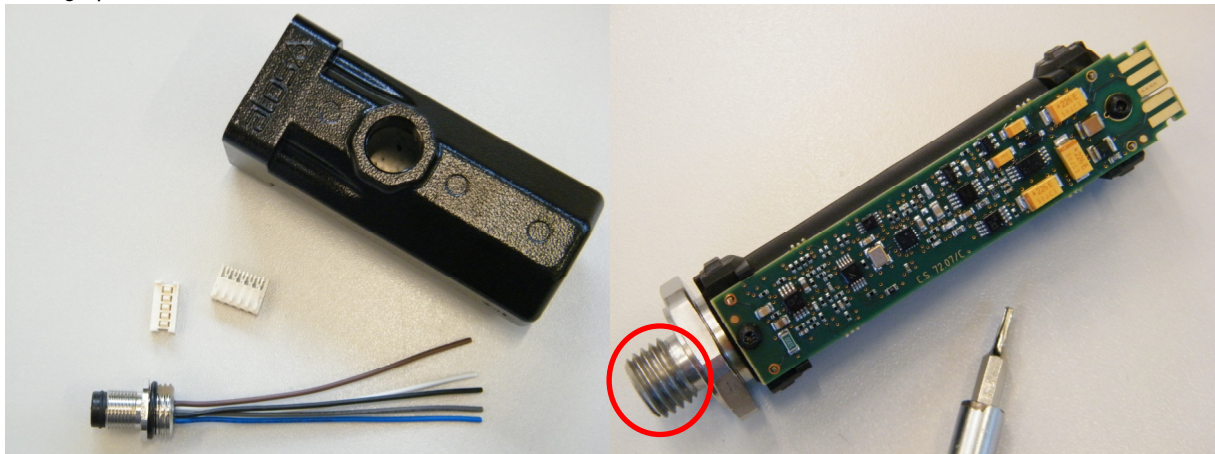
Below you can find the internal part of the old transducer with the solenoid tube.



- NEW DESIGN

Here, instead, you can see the internal aspect of the new transducer: on the left the external case is shown, while on the right the internal parts with the solenoid tube is visible.

It is important to remark that the solenoid tube (highlighted in red) will be screw-in with Loctite to ensure the correct fixing also at high pressure.



2.2.2 Thermal drift

New design optimization allows to improve thermal drift.

It has been tested in our R&D department that at $T=40^{\circ}\text{C}$, thermal drift has been decreased from 1% to 0.5% (decrease of 50%)

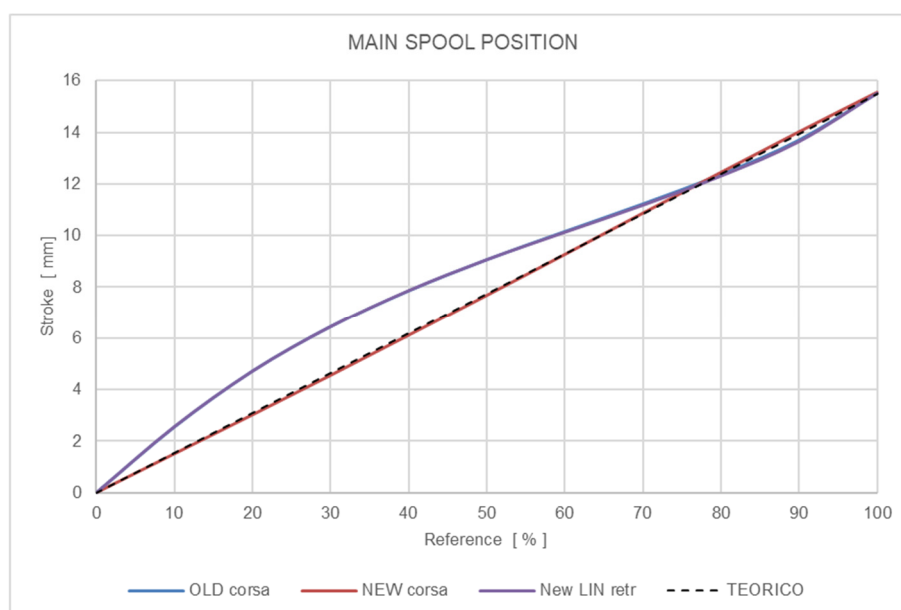
2.2.3 Valve-to-valve repeatability

New design optimization provides an improved valve-to-valve repeatability.

It has been tested in our R&D department that the error on valve's repeatability has been decreased from 10% to 5% (decrease of 50%)

2.2.4 Improved linearity

The new transducer has shown a better linearity between the stroke and the reference. The improved linearity has not relevant effect on DPZ* and LIQZO size16, but, only for LIQZO size 25, 32 and 40, due to higher stroke of transducer, the linearity improves also valve response.



In this plot it is possible to see the linearity difference between previous transducer (OLD corsa) and the new one (NEW corsa).

As it is possible to understand from the graph, at given reference the stroke is different, therefore the velocity of the valve will change accordingly.

This implies a different valve behaviour, that is a better behaviour in general. However, some old specific application could require the previous valve behaviour.

In case the specific application requires the previous valve behaviour, the option /N have been developed for new valves. The option /N reproduce the old valve response thanks to a specific linearization on valve's feedback. In this way, the /N linearity (New LIN retr) will become exactly the same of the previous transducer (OLD corsa is superposed to New LIN retr).

The slash /N is a software selectable option that is also available with an addition of standard cost (like /I option).

2.3 Transducer parameters management

The new transducer is characterized by a **different electrical scale** with respect the old 8-ETH, which forced us to generate new settings for all pilot operated valves.

The ADX file will be recognizable by the progressive "D" (e.g. DL16SD, LQ12SD etc..) and will have no other differences except for the operating range of the main stage transducer.

On the practical side, we managed the entry into production of the new transducer in this way:

Driver On Board – RI:

When a different ADX file is uploaded, the parameters that will be written in the memory of the driver depend on the level at which the user is working.

Up to **level 3**, the transducer parameters are not uploaded, while at **level 7**, the related scale of the transducer will instead be written.

Therefore, all the Service Centers that work at level 7 must remember to **download the correct calibration version** based on the transducer present on the valve.

Valve with "old" transducer → **DP17SA_OH07SA_----_--_EB_---**

Valve with "new" transducer → **DP17SD_OH07SA_----_--_EB_---**

Driver Off Board – BM :

According if the valve has the old or new transducer, the off-board driver must have the correct parameterization uploaded.

The same logic explained for on board drivers remains valid.

Note: if a new driver must be purchased, the valve complete code (with also serial number) must be indicated during the order.

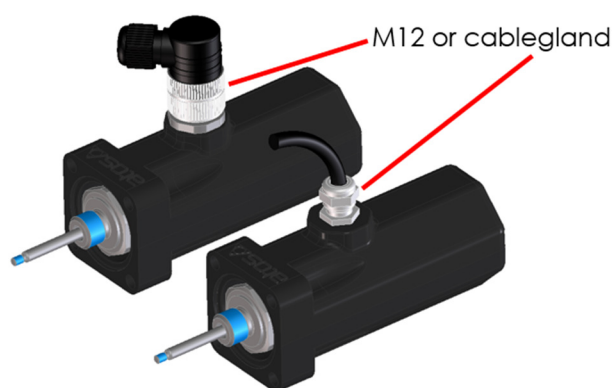
2.3.1 Additional notes

Cablegland:

- DPZO with On-board driver
- LIQZO size 16-25-32-40 with On-board driver

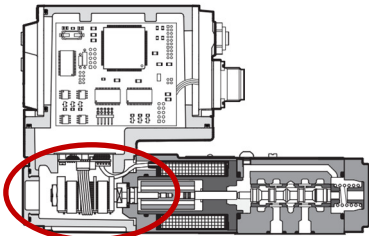
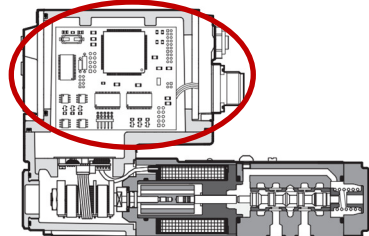
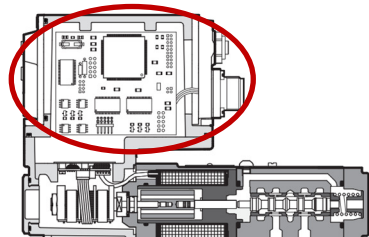
M12:

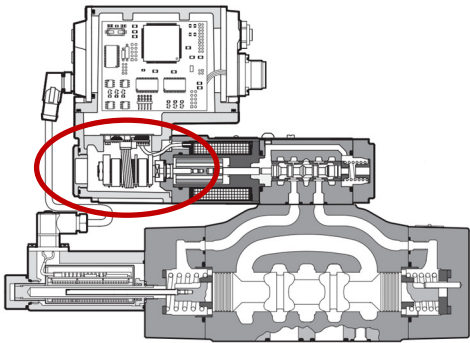
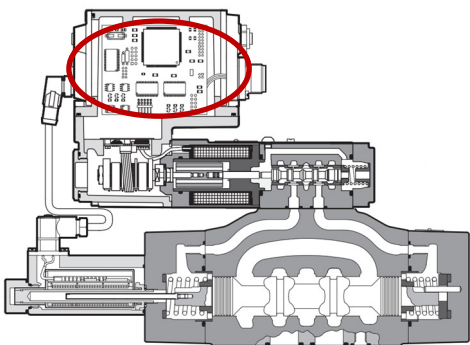
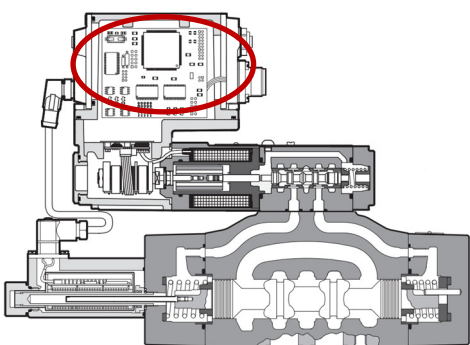
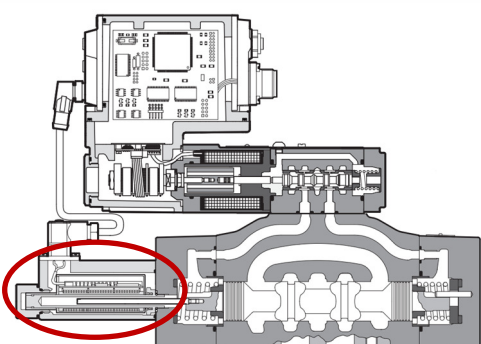
- DPZO with Off-board driver
- DPZE-TID
- LIQZ* size 16-25-32-40 with Off-board driver

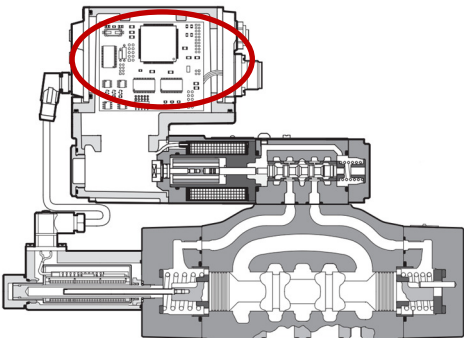
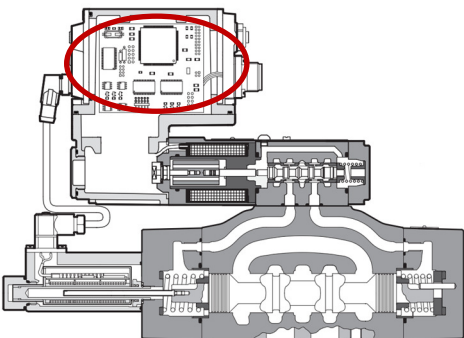
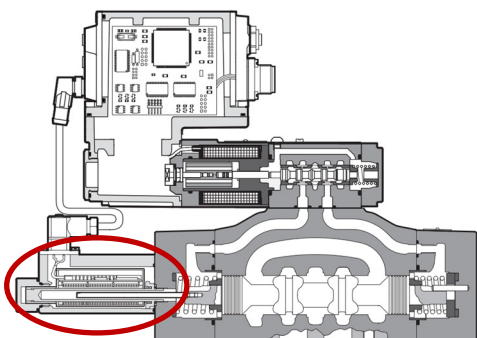


3 SPARE PARTS management

In case of spare parts requests for previous version components you can follow this procedure:

NG6 & NG10 direct operated and pilot valves		
TYPE OF FAILURE		SPARE PART MANAGEMENT
Failure of E-THT-4 s49 transducer		Provide current ESP-THT-4 s49 spare part because the transducer is yet used for TES/LES/TEZ execution.
Failure of E-RI-TEB s11 driver		Provide old E-RI-TEB s11 spare part
Failure of E-RI-TES/Z-RI-TEZ s4* driver		Provide current ESP-RI-TES, ESP-RI-TEZ s4* spare part

Pilot operated valves with 2 transducers		
TYPE OF FAILURE		SPARE PART MANAGEMENT
Failure of E-THT-4 s49 transducer		Provide current ESP-THT-4 s49 spare part because the transducer is yet used for TES/LES/TEZ execution.
Failure of E-RI-LEB s11 driver		Provide old E-RI-TEB s11 spare part
Failure of E-RI-LES/Z-RI-LEZ s4* driver		Provide current ESP-RI-LES, ESP-RI-LEZ s4* spare part.
Failure of 8-ETH main stage transducer		Provide old ESP-8-ETH spare part because providing E-THT-8 should require the administration and modification of too much valve's codes.

Pilot operated valves with 1 transducer		
TYPE OF FAILURE		SPARE PART MANAGEMENT
Failure of E-RI-TEB s11 driver		Provide new ESP-RI-TEB s20 spare part because it is compatible with 8-ETH.
Failure of E-RI-TES s4*		Provide current ESP-RI-TES s4* spare part.
Failure of 8-ETH main stage transducer		Provide old ESP-8-ETH spare part because providing E-THT-8 should require the administration and modification of too much valve's codes.



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