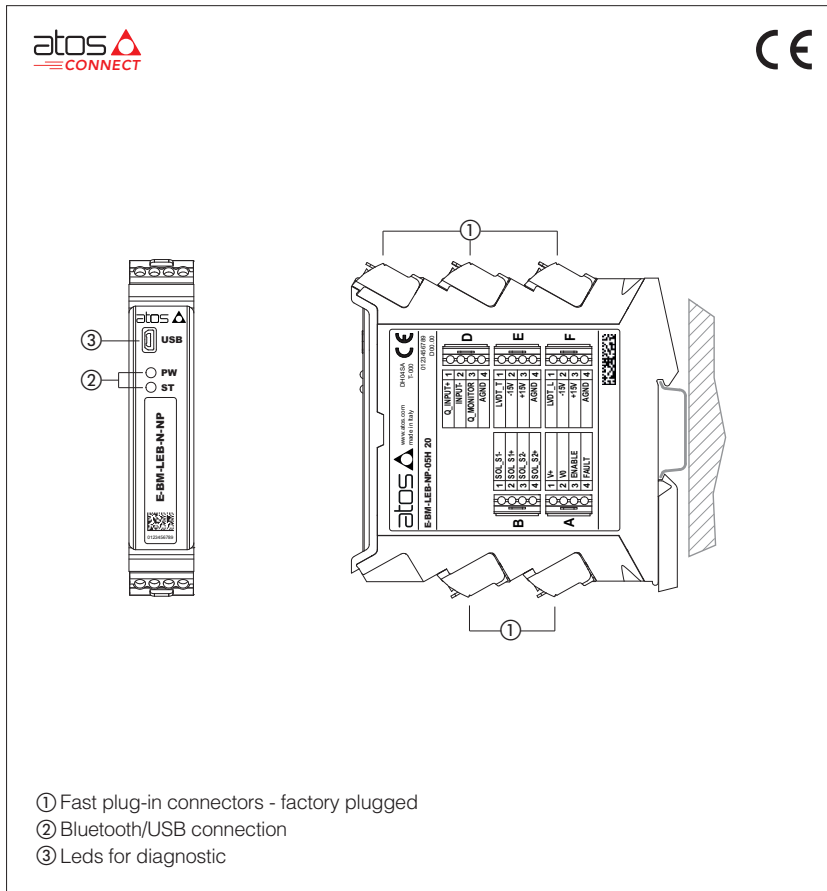


Digital E-BM-TEB/LEB drivers

DIN-rail format, for proportional valves with one or two LVDT transducers



E-BM-TEB/LEB

Digital drivers control in closed loop the position of the spool or poppet of direct and pilot operated proportional valves, according to the electronic reference input signal.

TEB execution controls direct operated directional/flow valves with one LVDT transducer.

LEB execution controls pilot operated directional valves with two LVDT transducers.

Bluetooth/USB connection is always present for valve settings via mobile App and Atos PC software.

General Features:

- 5 fast plug-in connectors
- Mini USB connector for Bluetooth/USB connection - always present
- 2 leds for diagnostics (see 8.1)
- Electrical protection against reverse polarity of power supply
- Ambient temperature range: $-20 \div +60 \text{ }^\circ\text{C}$
- Plastic box with IP20 protection degree and standard DIN-rail mounting
- CE mark according to EMC directive

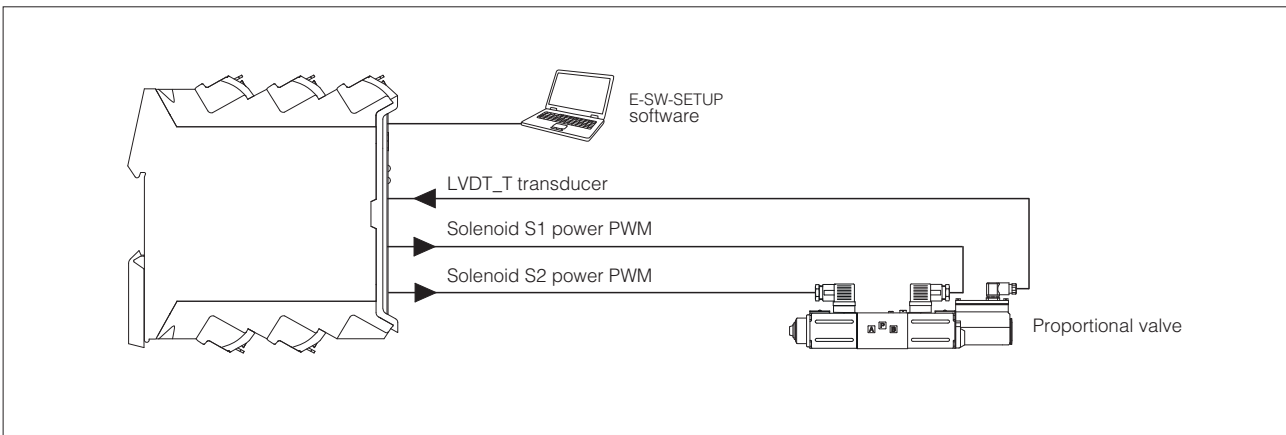
Software Features:

- Intuitive graphic interface
- Setting of valve's functional parameters: bias, scale, ramps, dither
- Linearization function for hydraulic regulation
- Setting of PID gains
- Selection of analog IN / OUT range
- Complete diagnostic of driver status
- Internal oscilloscope function
- In field firmware update through USB

1 MODEL CODE

| | | | | | | | | | | | | | | | |
|---|---|------------|---|----------|---|-----------|---|------------|---|---|---|---|---|---|---|
| E-BM | - | TEB | - | N | - | NP | - | 01H | * | / | * | / | * | / | * |
| Off-board electronic driver in DIN rail format TEB = digital basic driver, for valves with one LVDT transducer LEB = digital basic driver, for valves with two LVDT transducers Alternated P/Q control: N = none Fieldbus interface: NP = Not Present | | | | | | | | | Set code (see section 9) Series number Options , see section 10: A = max current limitation for Ex-proof valves C = current feedback $4 \div 20 \text{ mA}$ for LVDT transducers only in combination with option A I = current reference input and monitor $4 \div 20 \text{ mA}$ - = omit for direct valves and for pilot operated valves with two LVDT transducers P = for pilot operated valves with one LVDT transducer (only for TEB) | | | | | | |
| | | | | | | | | | 01H = for single solenoid proportional valves 05H = for double solenoid proportional valves (only for TEB) | | | | | | |

2 BLOCK DIAGRAM EXAMPLE



3 VALVES RANGE

| Valves | Directional | | | Flow | Directional | Cartridge |
|-----------------------|--------------------------------------|----------------------------------|------------------------|----------------------------------|-------------------------------|--------------------------------|
| Industrial Tech table | DHZO-T, DKZOR-T F165, F168 | DLHZO-T, DLKZOR-T F180 | DPZO-T F172 | QVHZO-T, QVKZOR-T F412 | DPZO-L F175, F178 | LIQZP-L F330, F340 |
| Ex-proof Tech table | DHZA-T, DKZA-T FX120 | DLHZA-T, DLKZA-T FX140 | DPZA-T FX220 | QVHZA-T, QVKZA-T FX420 | DPZA-L FX232, FX237 | LIQZA-L FX350, FX370 |
| Driver model | E-BM-TEB | | | | E-BM-LEB | |

4 GENERAL NOTES

Atos digital proportionals valves are CE marked according to the applicable directives (e.g. Immunity and Emission EMC Directive). Installation, wirings and start-up procedures must be performed according to the general prescriptions shown in tech table **FS900** and in the user manuals included in the Z-SW-* programming software.

5 VALVE SETTINGS AND PROGRAMMING TOOLS - see tech. table **GS500**

5.1 Atos CONNECT mobile App

Free downloadable App for smartphones and tablets which allows quick access to valve main functional parameters and basic diagnostic information via Bluetooth, thus avoiding physical cable connection and significantly reducing commissioning time. Atos CONNECT supports Atos digital valve drivers equipped with E-A-BTH adapter or with built-in Bluetooth. It does not support valves with p/Q control or axis controls.



5.2 E-SW-SETUP PC software

Free downloadable software for PC allows to set all valve functional parameters and to access complete diagnostic information of digital drivers via Bluetooth/USB service port. Atos E-SW-SETUP PC software supports all Atos digital valve drivers and it is available at www.atos.com in MyAtos area.

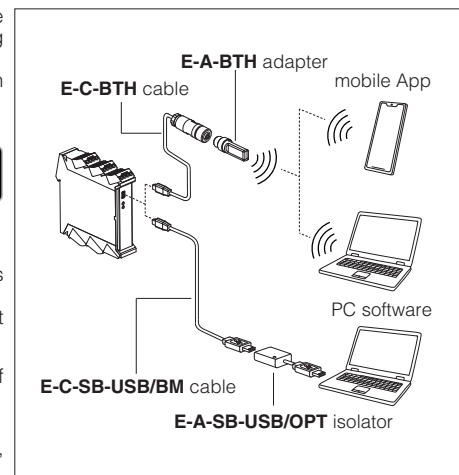


WARNING: drivers USB port is not isolated! For E-C-SB-USB/BM cable, the use of E-A-SB-USB/OPT isolator adapter is highly recommended for PC protection



WARNING: for the list of countries where the Bluetooth adapter has been approved, see tech. table **GS500**

Bluetooth or USB connection



6 FIELDBUS - see tech. table **GS510**

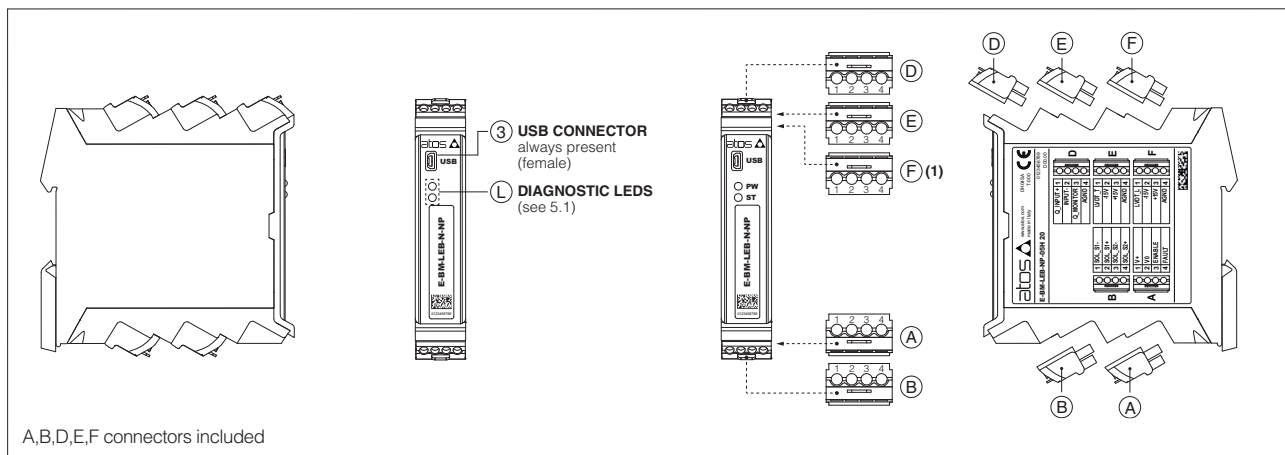
Fieldbus allows valve direct communication with machine control unit for digital reference, valve diagnostics and settings. These execution allow to operate the valves through fieldbus or analog signals available on the main connector.

7 MAIN CHARACTERISTICS

| | |
|-------------------------------|--|
| Power supply (see 7.1) | Nominal : +24 Vdc Rectified and filtered : $V_{RMS} = 20 \div 32 V_{MAX}$ (ripple max 10 % VPP) |
| Max power consumption | 50 W |
| Current supplied to solenoids | $I_{MAX} = 3.0$ A for standard driver $I_{MAX} = 2.5$ A for ex-proof driver (IA option) |
| Analog input signal (see 7.2) | Voltage: range ± 10 Vdc (24 V_{MAX} tolerant) Input impedance: $R_i > 50$ k Ω Current: range ± 20 mA Input impedance: $R_i = 500$ Ω |
| Monitor output (see 7.3) | Output range: voltage ± 10 Vdc @ max 5 mA current ± 20 mA @ max 500 Ω load resistance |
| Enable input (see 7.4) | Range: 0 \div 5 Vdc (OFF state), 9 \div 24 Vdc (ON state), 5 \div 9 Vdc (not accepted); Input impedance: $R_i > 10$ k Ω |
| Fault output (see 7.5) | Output range: 0 \div 24 Vdc (ON state > [power supply - 2 V] ; OFF state < 1 V) @ max 50 mA; external negative voltage not allowed (e.g. due to inductive loads) |
| Alarms | Solenoid not connected/short circuit, cable break with current reference signal, over/under temperature, valve spool transducer malfunctions, alarms history storage function |
| Format | Plastic box ; IP20 protection degree ; L 35 - H 7,5 mm DIN-rail mounting as per EN60715 |
| Operating temperature | -20 \div +60 $^{\circ}$ C (storage -25 \div +85 $^{\circ}$ C) |
| Mass | Approx. 300 g |
| Additional characteristics | 2 leds for diagnostic; protection against reverse polarity of power supply |
| 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 $^{\circ}$ 1907/2006 |
| Communication interface | USB Atos ASCII coding |
| Communication physical layer | USB 2.0 + USB OTG not insulated |
| Recommended wiring cable | LiYCY shielded cables: 0,5 mm 2 max 50 m for logic - 1,5 mm 2 max 50 m for power supply Note: for transducers wiring cable please consult the transducers datasheet |
| Max conductor size (see 11) | 2,5 mm 2 |

Note: a maximum time of 400 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.

8 CONNECTIONS AND LEDS



(1) F connector is available only for LEB

8.1 Diagnostic LEDs (L)

Two leds show driver operative conditions for immediate basic diagnostics. Please refer to the driver user manual for detailed information.

| LEDS | DESCRIPTION | |
|------|--|--|
| PW | OFF = Power supply OFF ON = Power supply ON | |
| ST | OFF = Fault present ON = No fault | |

8.2 Connectors - 4 pin

| CONNECTOR | PIN | SIGNALS | TECHNICAL SPECIFICATIONS | NOTES |
|-------------------------|-----|------------------|--|--|
| A | A1 | V+ | Power supply 24 Vdc | Input - power supply |
| | A2 | V0 | Power supply 0 Vdc | Gnd - power supply |
| | A3 | ENABLE | Enable (24 Vdc) or disable (0 Vdc) the controller, referred to V0 | Input - on/off signal |
| | A4 | FAULT | Fault (0 Vdc) or normal working (24 Vdc), referred to V0 | Output - on/off signal |
| B | B1 | SOL_S1- | Negative current to solenoid S1 | Output - power PWM |
| | B2 | SOL_S1+ | Positive current to solenoid S1 | Output - power PWM |
| | B3 | SOL_S2- | Negative current to solenoid S2 | Output - power PWM |
| | B4 | SOL_S2+ | Positive current to solenoid S2 | Output - power PWM |
| D | D1 | Q_INPUT+ | Flow reference input signal: ± 10 Vdc / ± 20 mA maximum range Default are ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Input - analog signal Software selectable |
| | D2 | INPUT- | Negative reference input signal for Q_INPUT+ | Input - analog signal |
| | D3 | Q_MONITOR | Flow monitor output signal: ± 10 Vdc / ± 20 mA maximum range, referred to AGND Default are ± 10 Vdc for standard and $4 \div 20$ mA for /I option | Output - analog signal Software selectable |
| | D4 | AGND | Common gnd for monitor output | Common gnd |
| E | E1 | LVDT_T | Direct valve or pilot valve position transducer signal | Input - analog signal |
| | E2 | -15V | Direct valve or pilot valve stage position transducer power supply -15V | Output power supply |
| | E3 | +15V | Direct valve or pilot valve tage position transducer power supply +15V | Output power supply |
| | E4 | AGND | Common gnd for transducer power | Common gnd |
| F ⁽¹⁾ | F1 | LVDT_L | Main stage valve position transducer signal | Input - analog signal |
| | F2 | -15V | Main stage valve position transducer power supply -15V | Output power supply |
| | F3 | +15V | Main stage valve position transducer power supply +15V | Output power supply |
| | F4 | AGND | Common gnd for transducer power | Common gnd |

(1) F connector is available only for LEB

8.3 Communication connector ③

| ③ USB connector - Mini USB type B always present | | |
|--|----------------|-----------------------------|
| PIN | SIGNAL | TECHNICAL SPECIFICATION (1) |
| 1 | +5V_USB | Power supply |
| 2 | D- | Data line - |
| 3 | D+ | Data line + |
| 4 | ID | Identification |
| 5 | GND_USB | Signal zero data line |

9 SET CODE

The basic calibration of electronic driver is factory preset, according to the proportional valve to be coupled. These pre-calibrations are identified by the set code at the end of driver's model code (see section 1). For correct set code selection, please include in the driver order also the complete code of the coupled proportional valve. For further information about set code, please contact Atos technical office.

10 POWER SUPPLY AND SIGNALS SPECIFICATIONS

Generic electrical output signals of the valve (e.g. fault or 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, ISO 4413).

10.1 Power supply (V+ and V0)

The power supply (pin A1 and A2) must be appropriately stabilized or rectified and filtered: apply at least a 10000 μ F/40 V capacitance to single phase rectifiers or a 4700 μ F/40 V capacitance to three phase rectifiers.

 A safety fuse is required in series to each power supply: 2,5 A time lag fuse.

10.2 Flow reference input signal (Q_INPUT+)

The driver is designed to receive an analog reference input signal (pin D1) for the valve's spool position.

Reference input signal is factory preset according to selected valve code, defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option.

Input signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 Vdc or ± 20 mA.

10.3 Flow monitor output signal (Q_MONITOR)

The driver generates an analog output signal (pin D3) proportional to the actual spool position; the monitor output signal can be software set to show other signals available in the driver (e.g. analog reference, valve spool position).

Monitor output signal is factory preset according to selected valve code, defaults are ± 10 Vdc for standard and $4 \div 20$ mA for /I option.

Output signal can be reconfigured via software selecting between voltage and current, within a maximum range of ± 10 Vdc or ± 20 mA.

10.4 Enable input signal (ENABLE)

To enable the driver, supply 24 Vdc on pin A3; Enable input signal allows to enable/disable the current supply to the solenoid, without removing the electrical power supply to the driver; it is used to activate the communication and the other driver functions when the valve must be disabled for safety reasons. This condition **does not comply** with norms IEC 61508 and ISO 13849.

10.5 Fault output signal (FAULT)

Fault output signal (pin A4) indicates fault conditions of the driver (solenoid short circuits/not connected, reference or transducer signal cable broken, maximum error exceeded, etc.). Fault presence corresponds to 0 Vdc, normal working corresponds to 24 Vdc.

Fault status is not affected by the status of the Enable input signal.

10.6 Main stage and direct or pilot position transducer input signals (LVDT_L and LVDT_T)

Main stage (LVDT_L pin F1) and direct or pilot (LVDT_T pin E1) position transducer integrated to the valve have to be directly connected to the driver using ± 15 Vdc supply output available at pin F2, F3 and pin E2, E3.

Note: transducer input signals working range is ± 10 Vdc for standard or $4 \div 20$ mA for /C option and **cannot** be reconfigured via software (input signals setting depends to the driver set code).

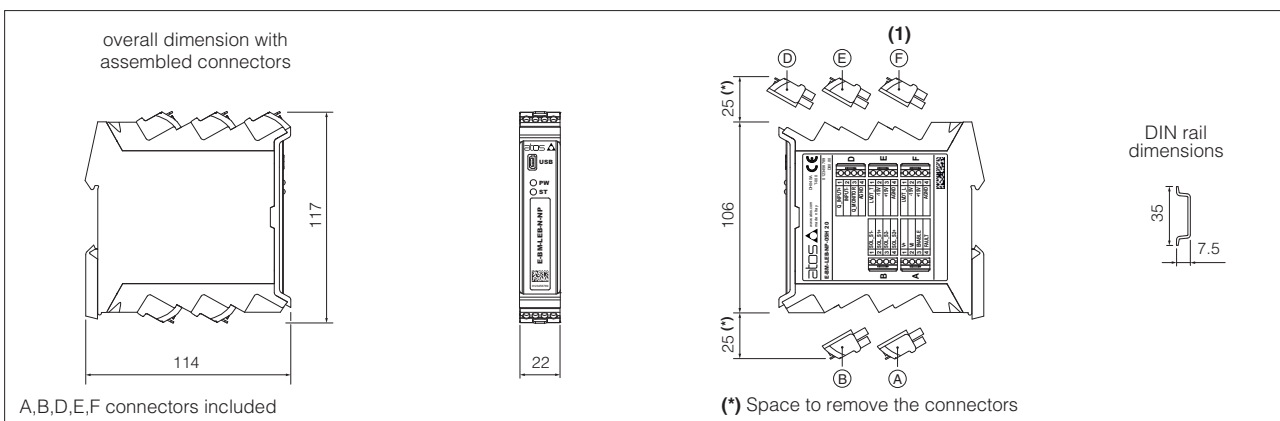
10.7 Possible combined options: /AC, /AI, /ACI

11 MAIN SOFTWARE PARAMETER SETTINGS

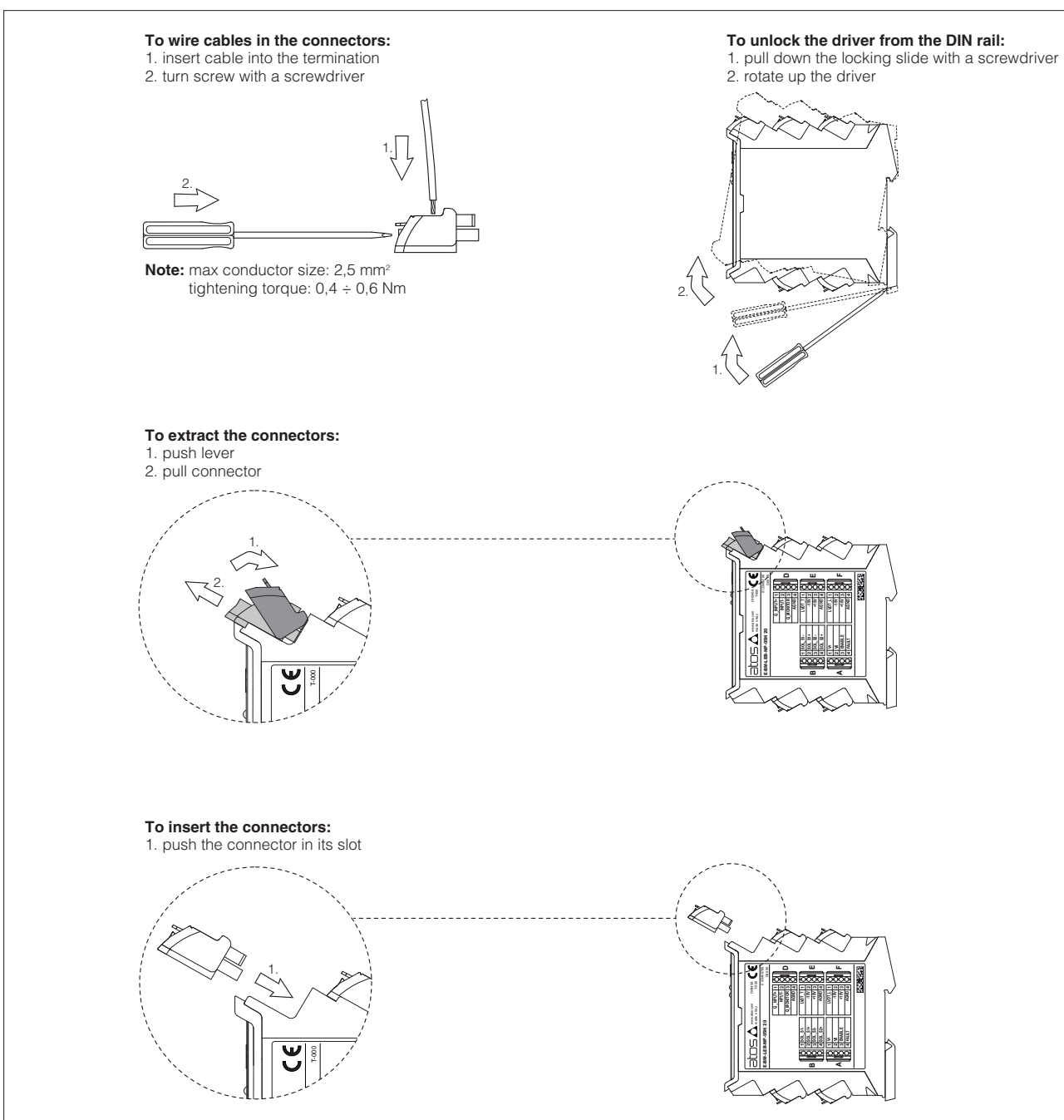
For detailed descriptions of settings, wirings and installation procedures, please refer to the user manual included in the E-SW-SETUP programming software:

E-MAN-BM-LEB - user manual for **E-BM-TEB** and **E-BM-LEB** digital drivers

12 OVERALL DIMENSIONS [mm]



13 INSTALLATION



Note: all connectors are supplied with a mechanical coding. This feature ensures a unique insertion of each connector in the own slot. (e.g. connector A can not be inserted into connector slot of B,D,E,F)