ELR-3BN

Type B residual current monitoring and protection relay

WARNING!

- Carefully read the manual before the installation or use.
- This device is to be installed by qualified personnel, complying to current standards, to avoid damages.
- Before any maintenance operation on the device, remove supply inputs.
- The manufacturer cannot be held responsible for electrical safety in case of improper use of the equipment.
- Products illustrated herein are subject to alteration and changes without prior notice.

Description

- Earth leakage relay **type B**
- Measuring in true effective value (TRMS)
- Third harmonic filtering (settable)
- Modular DIN-rail housing, 3 modules
- External residual current transfomer **CTB-2** series
- Visualization instant leakage values, AC component value and DC component value
- Backlighted LCD display (green, yellow, red)
- Green power LED indicator (ON)
- Yellow prealarm LED indicator (ALARM)
- Red relay tripped LED indicator (TRIP)
- TEST and RESET by front button or remote contact
- 2 output relays
- Fail safe function for each relays (settable)
- Log tripped residual current
- RS-485 communication Modbus RTU protocol (optional)

Display and LED functions

Thanks to LCD display, the user can view very quickly the measurements (instant leakage values, AC and DC components, filter TRMS, MAX values, THD, harmonics), the Log trip events, the alarms and can access to all settings.

- Green: detected current lower than threshold
- Yellow: detected current higher than ALARM threshold but lower than TRIP threshold
- Red:
    - detected current higher than TRIP threshold and relay activation
    - current leakage read off scale
    - TEST, causes tripping of the relay
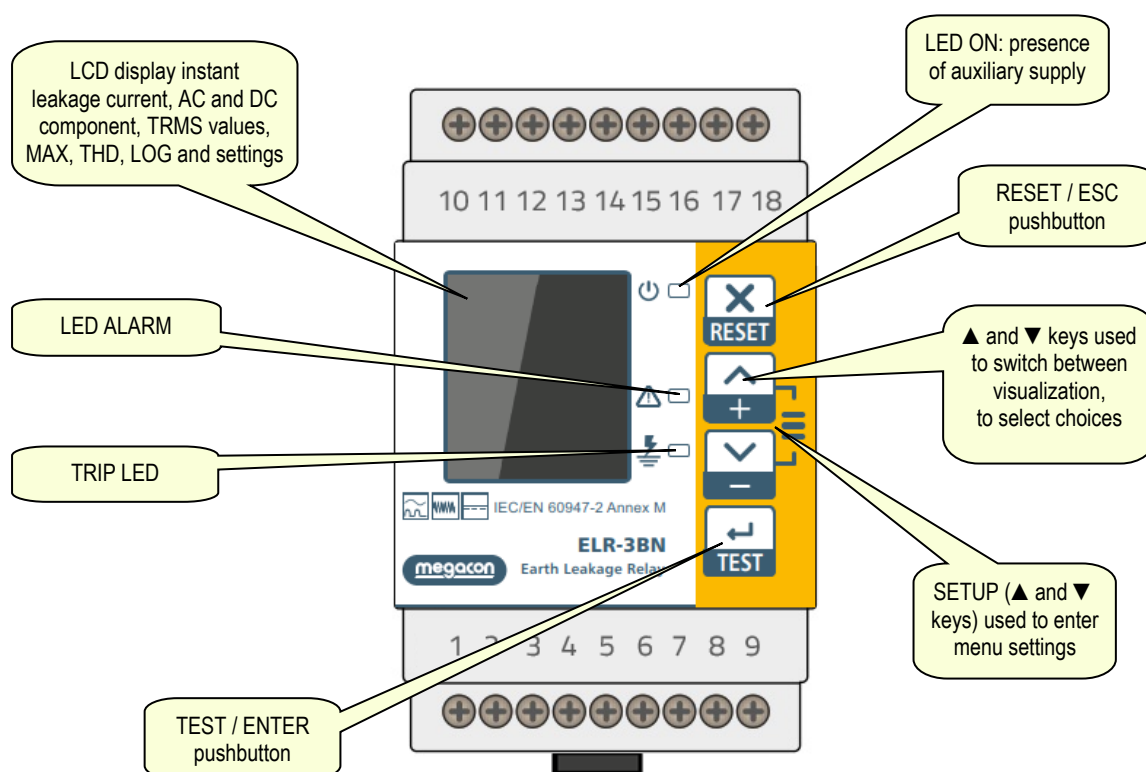   - open residual current transformer circuit (or not right connected)

Front keyboard

RESET/ESC key – To reset the relay after tripping, used to exit from settings menu.
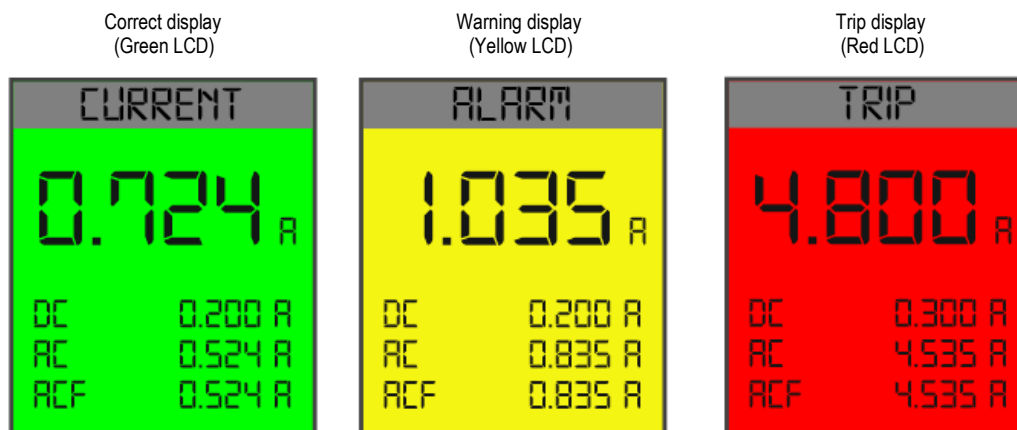**TEST/ENTER** key – Causes tripping of the relays, to confirm a choice.
SETUP keys – Used to enter into settings menu.
▲ and ▼ keys – Used to switch between visualization modes, to select among possible choices and to modify settings (increment/decrement).

Display indications

Correct display (Green LCD)	Warning display (Yellow LCD)	Trip display (Red LCD)

Cause of the trip	Display message
Test	Red display / TRIP LED
Current leakage	Red display / TRIP LED

Others display messages	
Alarm	Yellow display / ALARM LED
Current leakage over scale	OVR / Red display
Poor toroidal connection	OPEN / Red display

Parameters table

Below are listed all the programming parameters. For each parameter are indicated the possible setting range, the factory default, as well as a description of the function of the parameter.

Press ▲ and ▼ keys to select the required parameter. The selected parameter is highlited with ► . Press **TEST** key to activated the selected parameter.

Menu

TRIP	Unit of measure	Default	Range
Reset	-	MAN	AUTO-MAN-RECLOSE
Threshold mA	mA	30	30…10000
Time	ms	20	20…10000
Hysteresis	%	90	50…90
Failsafe	-	NO	YES-NO
Filter AC	-	NO	NO 3rd arm. 21st arm. 60479-2 62423
Recovery num.	-	3	1…10
Recovery time	s	10	5…600
Recovery reset	s	60	10…600

Reset - If set to AUTO, the reset of TRIP will be automatic.
If set to MAN, manual reset through the RESET key on the front. If set to RECLOSE, activates the reclosing sequence according to the associated menu items.
Threshold mA - Select the tripping fault current to earth.
Time - Select the tripping delay time.
Hysteresis - Tripping fault current threshold hysteresis.
Failsafe - If set to YES, positive safety activated on TRIP relay, in this condition the relay is normally energised; therefore switches from normally open to normally closed.
Filter AC:
NO - If set to NO, the harmonic blocking filter is disabled.
3ª arm. - Activate the third harmonic filter.
21ª arm. - Activate the twenty-first harmonic filter.
IEC 60479-2 - Attenuates harmonic components in installations, according to EN 60479-2 standard.
IEC 62423 - Attenuates harmonic components in installations, according to EN 62423 standard.

Note: the following menus are used, only if Reset in RECLOSE mode.
Recovery num. - Possibility of setting *n* automatic resets.
Recovery time - After fault, the time between one reclosing attempt and the next.
Recovery reset - After successful reset, it defines the time, without trip, after which the number of attempts is reset to one.

ALARM	Unit of measure	Default	Range
Reset	-	AUTO	AUTO-MAN
Threshold mA	mA	30	30…10000
Time	ms	20	20…10000
Hysteresis	%	90	50…90
Failsafe	-	NO	YES-NO
Source	-	TOT	TOT-DC-AC

Reset - If set to AUTO, the reset of ALARM will be automatic. If set to MAN, manual reset through the RESET key on the front.
Alarm threshold - Select the ALARM threshold which of the current value.
Time - Select the alarm delay time.
Hysteresis - Tripping fault current threshold hysteresis.
Failsafe - If set to YES, positive safety activated on ALARM relay, in this condition the relay is normally energised; therefore switches from normally open to normally closed.
Source - Measure that generates the alarm:
TOT = RMS value - $\sqrt{(AC\ component^2 + DC\ component^2)}$
DC = DC component
AC = AC component

MEASURE	Unit of measure	Default	Range
Frequency	-	50Hz	50-60Hz
AVG level	-	Medium	NO Low Medium High
Coupling	-	NO	YES-NO

AVG level - Selection of average reading calculation method. Allows showing measurements with slow variations.
Coupling - For better reading accuracy of the DC components, it's recommended to open the monitored lines and start the above procedure.

RS485	Unit of measure	Default	Range
Node	-	01	01-247
Baudrate	bps	38400	4800-115200
Stop bits	-	1	1-2
Data format	-	8 bit - n	8 bit, no parity 8 bit, odd 8 bit, even
Response time	ms	10	5-100

Node - Serial address (node number) for the communication protocol.
Baudrate - Serial communication speed.
Bit di stop - Number of stop bits.
Formato dati - Data format and parity.
Tempo di risposta - Defines the delay time in the Modbus response.

UTILITY	Unit of measure	Default	Range
Language	-	ENG	ENG-ITA
TRIP memory	-	NO	YES-NO
LCD standby	min	NO	NO-15min

TRIP memory - If set YES, the TRIP condition reappears when turned on, if the device was turned off without TRIP reset.

DATE and TIME
The ELR-3BN manages the time and date, that is used for the storage of events.

COMMAND	Description
Parameters to default	All setup parameters are resetted to factory default value
Reset MAX & LOG	Clears the event list and max values
Reset MAX	Clears the max values
Reset LOG	Clears the event list

The commands menu allows executing some occasional operations like resetting, log events clearing. Once the required command has been selected, press **TEST** to execute it. To cancel the command execution press **RESET** key.

PASSWORD menu

The password is used to enable or lock to setting menu and command menu (RESET). For new devices (factory default), the password management is disabled and the access is free. If instead the password has been enabled and defined (0-9999), then to get access, it's necessary to enter the password first, specifyng the number code.

PASSWORD	Unit of measure	Default	Range
Value	-	0	0-9999

If set to 0, password management is disabled.

Terminals connection
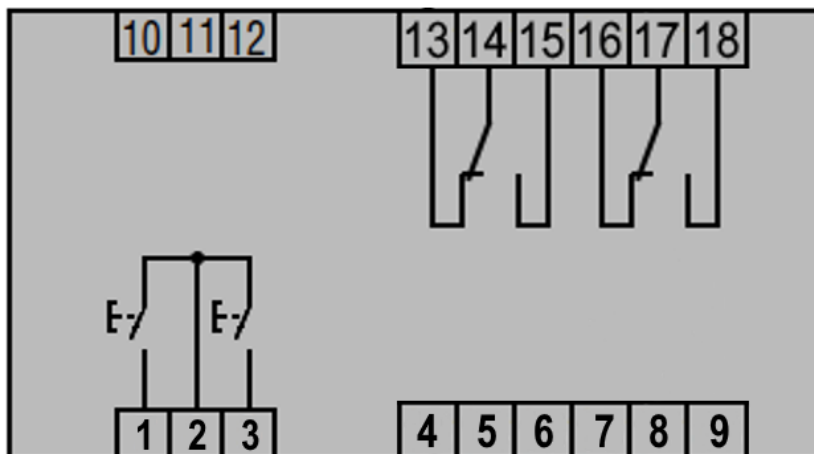
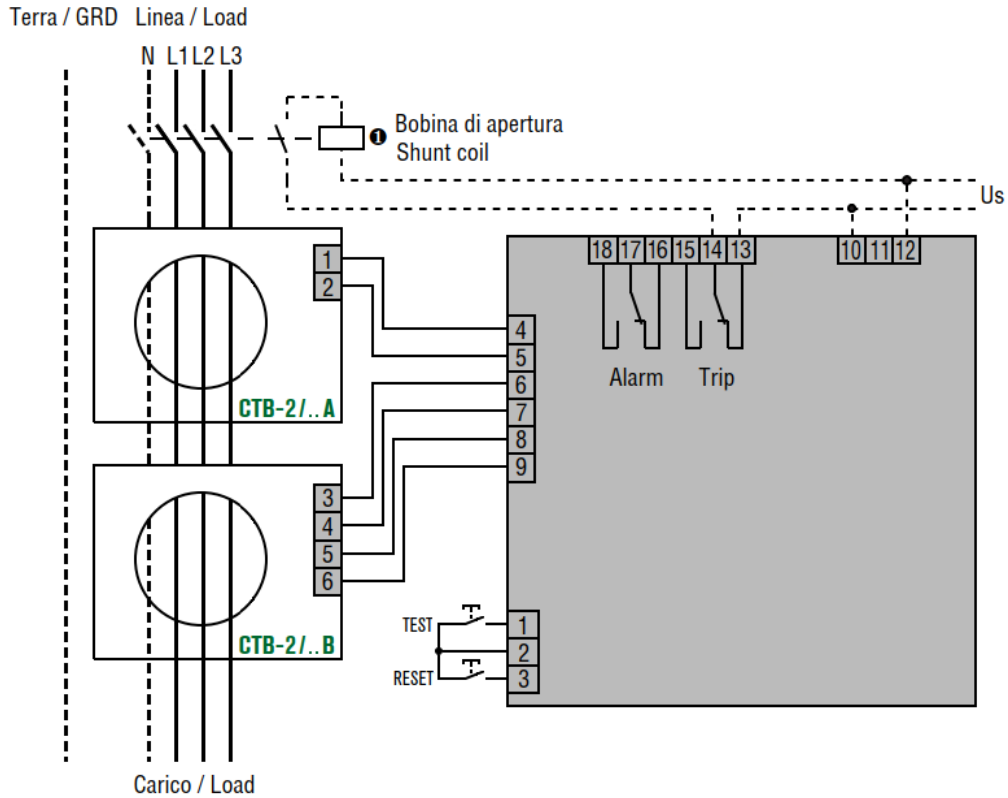| N°	Description
1	External TEST
2	Digital input (COMMON)
3	External RESET
4…9	Inputs toroidal current transformer
10	Auxiliary supply (neutral or phase)
11	Not used
12	Auxiliary supply (neutral or phase)
13	Output relay TRIP (NC)
14	Output relay TRIP (COMMON)
15	Output relay TRIP (NO)
16	Output relay ALARM (NC)
17	Output relay ALARM (COMMON)
18	Output relay ALARM (NO)

Toroidal current transformer type according to current

Current	Toroidal trasformer
30mA	CTB-2/22A,CTB-2/22B, CTB-2/35, CTB-2/60
>= 100mA	CTB-2/80, CTB-2/110
>= 500mA	CTB-2/210

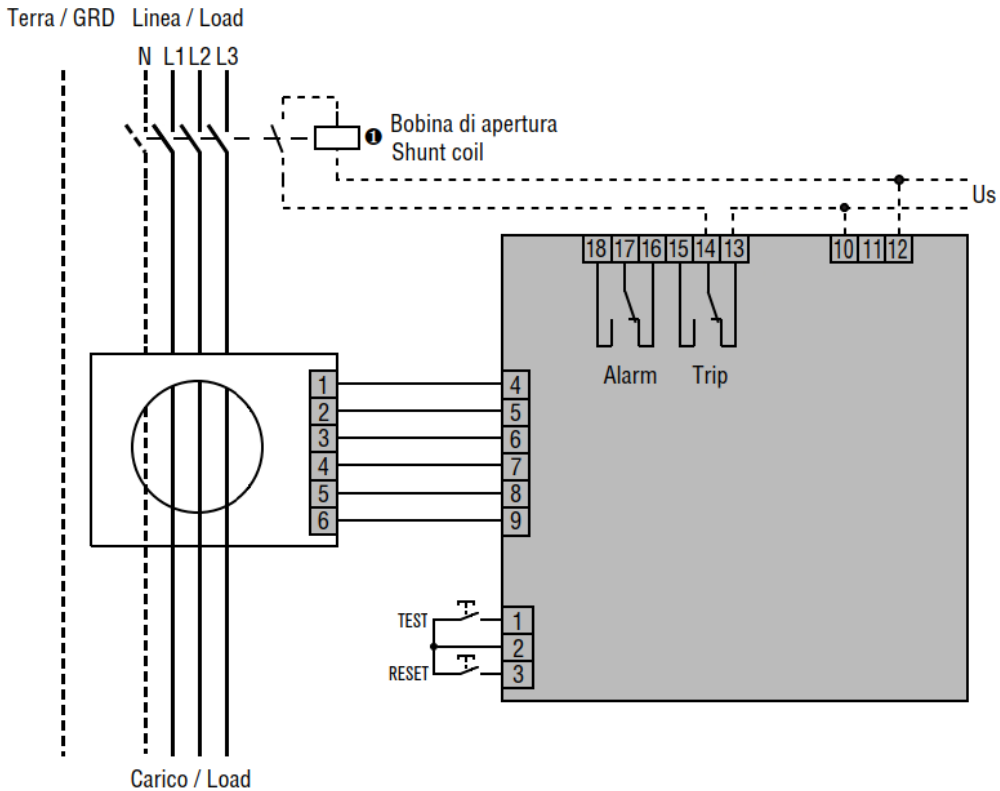**Note:** Versions of CT with special sensitivity level are available.

Wiring connection example with:

Type	Code	Useful section
CTB-2/22A	3CTB200AME	Ø 22 mm
CTB-2/22B	3CTB200AME	Ø 22 mm

Terra / GRD   Linea / Load
N L1 L2 L3

Bobina di apertura
Shunt coil

CTB-2/..A

CTB-2/..B

Us

Alarm   Trip

TEST
RESET

Carico / Load

Wiring connection example with:

Type	Code	Useful section
CTB-2/35	3CTB201ME	Ø 35 mm
CTB-2/60	3CTB202ME	Ø 60 mm
CTB-2/80	3CTB203ME	Ø 80 mm
CTB-2/110	3CTB204ME	Ø 110 mm
CTB-2/210	3CTB206ME	Ø 210 mm

Terra / GRD   Linea / Load
N L1 L2 L3

Bobina di apertura
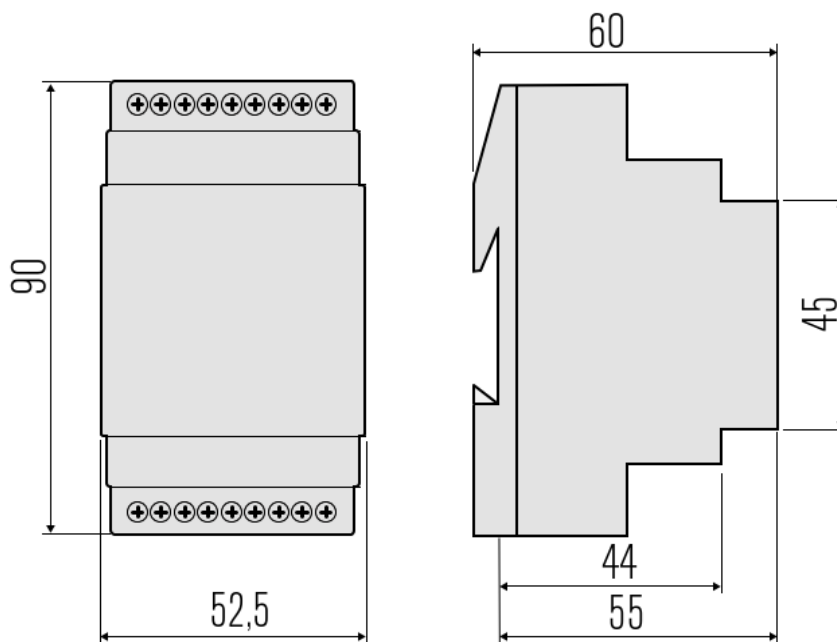Shunt coil

Us

Alarm   Trip

TEST
RESET

Carico / Load

❶ The coil connection can vary depending on the connected type of device (contactor, breaker with shunt trip release or breaker with undervoltage trip release).

RS485 connection (optional)
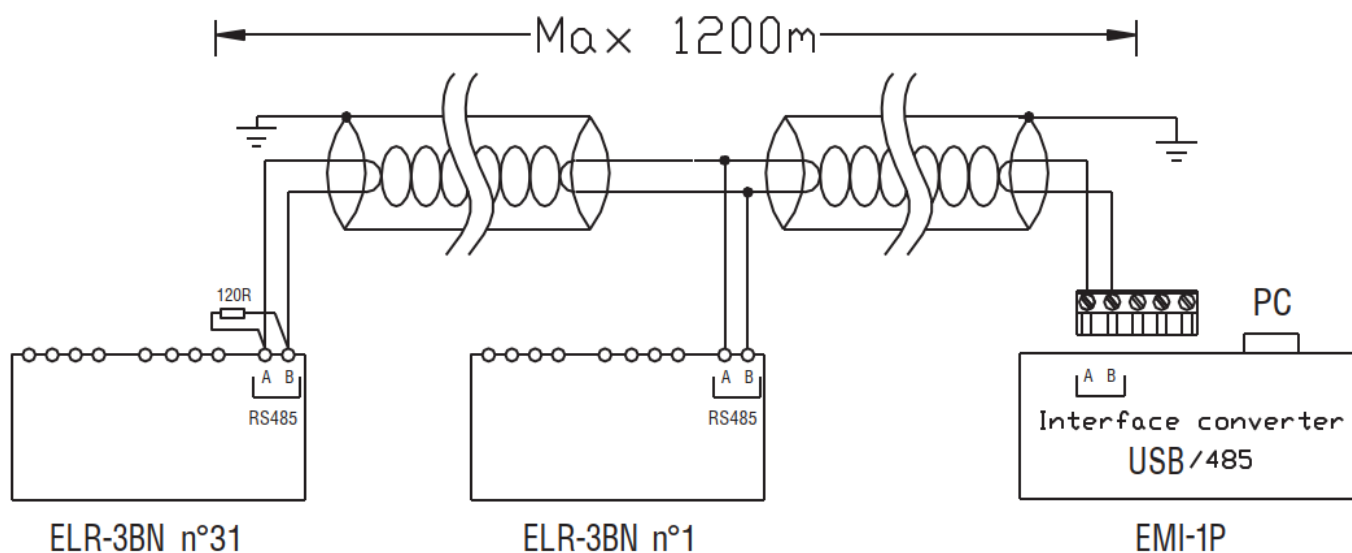
Mechanical dimensions (mm)

Front panel adapter accessory

The 72x72mm front adapter accessory is used to install the device on a panel. All connections must remain inside the electrical board.
The front adapter accessory has a frame, two tabs and three screws.

Technical characteristics

Control circuit	
Toroidal transformer	External, CTB-2 series
Tripping type	Type B
Tripping set-point (I∆)	0,03÷10A
Tripping time (t)	0,02÷10s
Resetting	Manual by pushbutton on front or remote
Auxiliary supply	
Auxiliary voltage	85÷250 VAC | 120÷350 VDC 24÷48 VAC/DC (optional)
Rated frequency	50/60Hz
Max power consumption	4VA
Output relay	
Number of outputs	2
State	Configurable normally de-energised or energised
Rated operating voltage	250 VAC
Rated current	5A
Mechanical life	$10 \cdot 10^6$ cycles
Digital inputs	
Number of inputs	2 (TEST and RESET)
Input type	Free contact
Display	
Type	LCD
RS485 serial interface (optional)	
Protocol	Modbus-RTU
Baud-rate	Programmable 4800 – 115200 bps
Connections	
Type of terminal	Screw (fixed)
Number of terminals	18
Conductor cross section	0,127 - 2,082 mm^2
Tightening torque	0.5 - 0.6 Nm
Length of cable to strip	7mm
Ambient operating conditions	
Operating temperature	-10÷60°C
Storage temperature	-20÷80°C
Relative humidity	5÷95%
Housing	
Version	3 module DIN
Degree of protection	IP20 terminals IP40 on front
Weight	200g
Certifications and compliance	
Reference standards	2014/35/UE,2014/30/UE,2015/863/UE EN 61326-1:2013-01 EN 61326-2-1:2013-01 EN 61326-2-2:2013-01 EN 61326-2-3:2013-01 EN 61326-2-4:2013-01 EN 61326-2-5:2013-01 EN 60947-2:2017-10 (Annex M) EN 61543/A2:2006-02 CEI EN 61543/A11 CEI EN 61543/A12

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