

## CAL1, CAL2, CAL3 SERIES

### Calibration impulse generators



- Unique operating principle ensures excellent impulse properties
- Calibrated in our DAkkS-accredited laboratory which is certified according to ISO 17025:2018
- Optional features to suit a broad range of applications
- Enable reliable partial discharge measurements compliant to international standards, such as IEC 60270, CISPR 18-2, and NEMA 107
- Suitable for time domain reflectometry (TDR) in cables to determine the cable length and the location of joints
- Devices of the CAL2 series can be used for sensitivity verification on GIS according to CIGRÉ's technical brochure 654

### DESCRIPTION

Megger offers a broad range of calibration charge injectors suitable for the calibration of partial discharge (PD) measurements. The appropriate choice of a calibration instrument depends on the range of typical charge values of the PDs being measured.

Megger calibrators can be used for high frequency, ultra-high frequency, and RIV measurement setups. Hence, they are suitable for calibrating test setups for the following assets:

- Cables
- Transformers
- Rotating machines
- Gas-insulated switchgear

Additionally, the calibrators of the CAL1 series can also be used for time domain reflectometry in cables to determine the cable length and the location of joints.

### EASY TO USE

- Clear arrangement of the controls
- Large LC display for good readability
- Automatic synchronisation to line frequency by a photo diode
- Convenient connection of the calibrator with ready-to-use connection sets
- Up to 200 hours of operation due to long-life battery

### OPTIONS

- Suitable for 50 and 60 Hz, switchable
- Double pulse with adjustable time delay (for CAL1 series)
- Remote power input for supply by an external 12 to 24 V DC voltage
- Selection switch for single pulse or continuous pulses (allows the output of manually triggered single pulses)



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#### RANGES AND KEY FEATURES

| TYPE           | RANGE                                                                                             | INJECTION CAPACITOR (C <sub>i</sub> ) | IEC 60270 COMPLIANT | CONNECTOR | REMARKS/ APPLICATION                                         | INCLUDED CONNECTION SET |
|----------------|---------------------------------------------------------------------------------------------------|---------------------------------------|---------------------|-----------|--------------------------------------------------------------|-------------------------|
| CAL1A          | 1, 2, 5, 10, 20, 50, 100 pC                                                                       | <1 pF                                 | ●                   | BNC       | Cable and transformer tests                                  | CAL1-CS1                |
| CAL1B          | 100, 200, 500 pC, 1, 2, 5, 10 nC                                                                  | <100 pF                               | ●                   | BNC       | High level application, e.g., rotating machines              | CAL1-CS1                |
| CAL1C/100      | 1, 2, 5, 10, 20, 50, 100 pC* at 100 pF                                                            | V (50 Ω)                              | ●                   | BNC       | Incl. ext. capacitor 100 pF; cable tests                     | CAL1-CS4                |
| CAL1C/1000     | 1, 2, 5, 10, 20, 50, 100 pC* at 100 pF<br>10, 20, 50, 100, 200, 500, 1000 pC* at 1000 pF          | V (50 Ω)                              | ●                   | BNC       | Incl. switchable ext. capacitor 100/1000 pF; cable tests     | CAL1-CS4                |
| CAL1D          | 10, 20, 50, 100, 200, 500, 1000 pC                                                                | <10 pF                                | ●                   | BNC       | Laboratory use, transformer tests                            | CAL1-CS1                |
| CAL1E          | 0.5, 1, 2, 5, 10, 20, 50 nC                                                                       | <500 pF                               | ●                   | BNC       | See CAL1B                                                    | CAL1-CS1                |
| CAL1F          | 0.2, 0.5, 1, 2, 5, 10, 20 nC                                                                      | <200 pF                               | ●                   | BNC       |                                                              |                         |
| CAL1G          | 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2 nC                                                                | <20 pF                                | ●                   | BNC       | Transformer tests                                            | CAL1-CS1                |
| CAL1HV(+S)     | 0.5, 1, 2, 5, 10, 20, 50 pC* at **pF                                                              | V (50 Ω)                              | ●                   | BNC       | GIS, live injection via stray capacitance                    | CAL1-CS5                |
| CAL1J          | 10, 20, 50, 100, 200, 500, 1000 pC* at 100 pF, 100, 200, 500, 1000, 2000, 5000, 10000 pC* at 1 nF | V (50 Ω)                              | ●                   | BNC       | Incl. switchable ext. capacitor 100pF/1nF; transformer tests | CAL1-CS4                |
| CAL2B(/500***) | 2, 5, 10, 20, 30, 40, 50 V (into 50 Ω)                                                            | V (50 Ω)                              |                     | N         | GIS & UHF                                                    | CAL2-CS1                |
| CAL2C(/500)    | 1, 2, 5, 7, 10, 12, 15, 17, 20 V (into 50 Ω)                                                      | V (50 Ω)                              |                     | N         |                                                              |                         |
| CAL3A          | 600 kHz to 1.35 MHz, 10 μV to 10 mV                                                               | V (50 Ω)                              |                     | BNC       | RIV calibration; NEMA 107 compliant                          | CAL3-CS1                |
| CAL3B          | 400 kHz to 1.9 MHz, 10 μV to 10 mV                                                                | V (50 Ω)                              |                     | BNC       | RIV calibration; NEMA 107 compliant                          |                         |
| CAL3D          | 400 kHz to 1.9 MHz, 10 μV to 10 mV (into 300 Ω)                                                   | V (>20 KΩ)                            |                     | BNC       | RIV calibration; CISPR 18-2 compliant                        |                         |

\* with external high voltage capacitor, \*\* value to be specified by customer

\*\*\* It's not recommended to use the CAL2B/500 in combination with window sensors (WS) or external flange sensors (EFS1).

#### CONNECTION SETS

Every Megger calibrator comes with a set of clamps, plugs, adapters, and pre-assembled cables for the comfortable connection of the calibration impulse generator to the measurement setup. The ready-to-use sets include

everything for a quick and convenient connection of the device to the specific test setup. The basic cable set consists of two banana cables (1 m), two crocodile clips, and a BNC banana adapter.

| CONNECTION SET              | CAL1-CS1 | CAL1-CS2 | CAL1-CS3 | CAL1-CS4 | CAL1-CS5 | CAL2-CS1 | CAL2-CS3 | CAL3-CS1 | CAL3-CS2 |
|-----------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Basic cable set             | ●        | ●        | ●        | ●        | ●        |          | ●        | ●        | ●        |
| Banana cable, 4 m black     |          | ●        |          |          |          |          |          | ●        |          |
| Banana cable, 2.5 m black   |          |          | ●        |          |          |          |          |          |          |
| RG108 twinaxial cable, 10 m |          |          |          |          | ●        |          |          |          |          |
| T-joint (BNC)               |          |          |          | ●        |          |          |          | ●        | ●        |
| T-joint (N)                 |          |          |          |          |          | ●        |          |          |          |
| 50 Ω termination            |          |          |          | ●        |          | ●        |          | ●        |          |
| N-N adapter                 |          |          |          |          |          | ●        |          |          |          |
| N-BNC adapter               |          |          |          |          |          |          | ●        |          |          |

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### TECHNICAL DATA

|                        |                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------|
| Supply:                | 9 V lithium metal battery<br>(or equivalent)                                                          |
| Current consumption:   | 1 to 5 mA in operation                                                                                |
| Operation time:        | Lithium metal battery: Approx. 200 h<br>Alkaline battery: Approx. 90 h                                |
| Quiescent current:     | Negligible                                                                                            |
| Display:               | LCD, 3½ digits                                                                                        |
| Operation:             | Two buttons                                                                                           |
| Output impedance:      | CAL1x/CAL2x/CAL3A/CAL3B: 50 Ω<br>CAL3D: 30 kΩ                                                         |
| Output connector:      | CAL1x/CAL3x: BNC connector<br>CAL2x: N connector                                                      |
| Synchronisation:       | By photo diode to the power frequency light or internal quartz oscillator                             |
| Operation frequency:   | 50 Hz or 60 Hz                                                                                        |
| Operation temperature: | 10–40 °C (non-condensing)                                                                             |
| Width:                 | 65 mm (excl. wing nut of CAL1C)                                                                       |
| Depth:                 | 40 mm                                                                                                 |
| Height:                | 164 mm (CAL1x and CAL3x, incl. BNC connector)<br>170 mm (CAL2x, incl. N connector)                    |
| Weight:                | Approx. 450 g                                                                                         |
| Rise time:             | CAL1x: ≤ 35 ns<br>CAL2x: < 200 ps<br>CAL2x/500: Typ. 550 ps<br>CAL3x: Depending on selected frequency |

### ORDERING INFORMATION

| Product                               | Order no. |
|---------------------------------------|-----------|
| Calibration impulse generator CAL1A   | PX15000   |
| Calibration impulse generator CAL1B   | PX15001   |
| Calibration impulse generator CAL1C   | PX15002   |
| Calibration impulse generator CAL1D   | PX15003   |
| Calibration impulse generator CAL1E   | PX15004   |
| Calibration impulse generator CAL1F   | PX15005   |
| Calibration impulse generator CAL1G   | PX15006   |
| Calibration impulse generator CAL1H/V | PX15039   |
| Switching Unit for CAL1H/V            | PX15040   |
| Calibration impulse generator CAL1J   | PX15016   |
| UHF impulse generator CAL2B           | PX15009   |
| UHF impulse generator CAL2B/500       | PX15037   |
| UHF impulse generator CAL2C           | PX15010   |
| UHF impulse generator CAL2C/500       | PX15038   |
| RIV calibration unit CAL3A            | PX15012   |
| RIV calibration unit CAL3B            | PX15013   |
| RIV calibration unit CAL3D            | PX15020   |

| Accessories                      | Order no. |
|----------------------------------|-----------|
| Connection set CAL1-CS1 for CAL1 | PX15024   |
| Connection set CAL1-CS2 for CAL1 | PX15025   |
| Connection set CAL1-CS3 for CAL1 | PX15026   |
| Connection set CAL1-CS4 for CAL1 | PX15027   |
| Connection set CAL2-CS1 for CAL2 | PX15011   |
| Connection set CAL2-CS3 for CAL2 | PX15022   |
| Connection set CAL3-CS1 for CAL3 | PX15028   |
| Connection set CAL3-CS2 for CAL3 | PX15029   |

**One standard connection set included with every calibrator!**

| Options                                             | Order no. |
|-----------------------------------------------------|-----------|
| 50/60 Hz switchable                                 | PX15104   |
| Double pulse with adjustable time delay (for CAL1x) | PX15102   |
| Remote power input                                  | PX15107   |
| Selection switch for single pulse/continuous        | PX15101   |

### SALES OFFICE

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### CAL\_DS\_e1.03

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