

# Calibrators



Power Diagnostix makes a range of calibration charge injectors suitable for use in calibrating partial discharge measurements. The appropriate choice of a calibration instrument depends on the range of typical charge values of the PDs being measured. Calibrators can also be used for time domain reflectometry in cables to determine cable length and location of joints.

## Conformity to International Standards

By end of 2003, Power Diagnostix received the accreditation as calibration laboratory within the German Calibration Service (Deutscher Kalibrierdienst, DKD). The audit was held by 'Physikalisch Technische Bundesanstalt' PTB, the German authority of standards. In January 2012, Power Diagnostix passed over to the newly introduced German accreditation authority DAkkS (DAkkS = **D**eutsche **A**kkreditungs**s**telle). Power Diagnostix' new accreditation is filed under D-K-15068-01-00.

New charge calibrators are shipped with the calibration certificate to ensure the traceability to international standards. However, Power Diagnostix still offers the cost-effective factory calibration, if the formal traceability is not required.

## Simple to Use

The calibrator is switched on with the pushbutton On/Off. Both amplitude (Range) and polarity (Pos/Neg) of the *single* charge pulse per cycle are displayed and can be adjusted by pressing of the two buttons. Each calibrator is also available supplying two pulses per cycle, as well as with double impulse output with adjustable interval.

The instrument automatically synchronizes to line frequency by a photo diode. In case of insufficient pick-up of power frequency light, the calibrator automatically selects the internal quartz oscillator (50Hz- and 60Hz-versions available).

CAL - Calibration Impulse Generators



CAL1A

### Available Calibrators

The standard calibration impulse generator CAL1A offers the charge range of 1/2/5/10/20/50/100 pC, while the CAL1B, mainly suitable for rotating machine testing, covers the range of 100/200/500pC/1/2/5/10nC.

Special signal sources are available for GIS measurements, such as the CAL2A: 0.5/1/2/5/10/20/50 pC,  $t_r \leq 300$  ps,  $f_{3dB} \geq 1$  GHz, or with voltage output, the CAL2B: 2/5/10/20/30/40/50 V,  $R_L = 50 \Omega$ ,  $t_r \leq 400$  ps,  $t_f = 100$  ns.

The Power Diagnostix line of calibration impulse generators is unique in that the charge pulse is generated by injecting a *variable* voltage step (correlated to an internal reference) via a *fixed* capacitor. This injection capacitor is relatively small, as the step voltage amounts up to 120 V for full range output. Therefore, the Power Diagnostix calibrators offer excellent impulse properties. Further, calculation of the correction factor is usually not necessary ( $C_i \ll C_s$ ).

Standard calibrators with their ranges and key features are listed in the following table.



CAL3A

Calibration Impulse Generator	Range	Injection Capacitor (C)	50Hz or 60Hz light sync	IEC60270 compliant	2 pulses / cycle option	BNC connection	Remarks
CAL1A	1, 2, 5, 10, 20, 50, 100pC	<1pF	✓	✓	✓	✓	Cable and transformer tests
CAL1B	100, 200, 500pC, 1, 2, 5, 10nC	<100pF	✓	✓	✓	✓	High level application, e.g. rotating machines
CAL1C	1, 2, 5, 10, 20, 50, 100pC* at 100pF	V (50Ω)	✓	✓	✓	✓	Incl. ext. capacitor 100pF; cable tests
CAL1D	10, 20, 50, 100, 200, 500, 1000pC	<10pF	✓	✓	✓	✓	Laboratory use, transformer tests
CAL1E	0.5, 1, 2, 5, 10, 20, 50nC	<500pF	✓	✓	✓	✓	See CAL1B
CAL1F	0.2, 0.5, 1, 2, 5, 10, 20nC	<200pF	✓	✓	✓	✓	
CAL1G	0.02, 0.05, 0.1, 0.2, 0.5, 1, 2nC	<20pF	✓	✓	✓	✓	Transformer tests
CAL1H/(V+S)	0.5, 1, 2, 5, 10, 20, 50pC* at **pF	V (50Ω)	✓	✓	✓	✓	GIS, live injection via stray capacitance
CAL1J	10, 20, 50, 100, 200, 500, 1000pC* at 100pF 100, 200, 500, 1000, 2000, 5000, 10000pC* at 1nF	V (50Ω)	✓	✓	✓	✓	Incl. ext. capacitor 100pF/1nF, switchable; transformer tests
CAL2A	0.5, 1, 2, 5, 10, 20, 50pC	<1pF	✓	✓	-	N	Incl. external capacitor 10pF; GIS & UHF
CAL2B(/500)	2, 5, 10, 20, 30, 40, 50V (into 50Ω)	V (50Ω)	✓	-	-	N	
CAL2C(/500)	1, 2, 5, 7, 10, 12, 15, 17, 20V (into 50Ω)	V (50Ω)	✓	-	-	N	
CAL2D(/500)	5, 7.5, 10, 15, 20, 30, 40V (into 50Ω)	V (50Ω)	✓	-	-	N	
CAL3A	600kHz to 1.35MHz, 10μV to 10mV	V (50Ω)	✓			✓	RIV calibration; NEMA 107 compliant
CAL3B	400kHz to 1.9MHz, 10μV to 10mV	V (50Ω)	✓			✓	RIV calibration; NEMA 107 compliant
CAL3D	400kHz to 1.9MHz, 10μV to 10mV (into 300Ω)	V (>20KΩ)	✓			✓	RIV calibration; CISPR 18-2 compliant

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

Power Diagnostix calibrators enjoy all the advantages of 20 years' experience in calibration services. The broad range of easy-to-use and robust units for many different applications ensures reliable PD measurements compliant to international standards, such as IEC 60270 and CISPR 18-2.

