CS1

Precision Coaxial Capacitance Standard

Includes 6 Capacitances
10pF to 1µF in decade steps
Others on request

Calibration Data
Comes with calibration data; three different accuracy levels available

Coaxial BNC Connection
Eliminates stray capacitances
Others through adapters or customized

Low Drift
Low temperature coefficients

Sealed Case
Avoids ingress of moisture by sealed case and special dissicant

ROHS
ROHS-compliant

Optional Versions
Optionally possible are versions with Banana (4mm) plugs or other capacitances; contact us

The CS1 is a cost efficient coxial capacitance standard intended for the verification and calibration of precision capacitance meters. It is intended for use in laboratory, research, metrology and educational applications where a precise yet economical capacitance standard is needed.

It is available in three basic versions, the CS1-S, the CS1-P and CS1-H, calibrated to different accuracy levels, each being ROHS compliant. The capacitors used are high accuracy, low drift COG or Thinfilm dielectric types. In the sealed case of the capacitance standard a special dissicant is used to achieve a very low internal humidity level, resulting in reduced humidity-driven drift rates.

Calibration is based on highly precise capacitance bridges, either an automatic digital bridge (for the CS1-S and CS1-P) or a high accuracy manual bridge (for the CS1-H) is used. Calibration data is shipped with every item, specifying C and D values for each capacitance.

Besides the standard versions, custom capacitances can be made available, as well as versions with other connectors or calibrated at other frequencies. Please contact us.

Parameter	Details
Capacitance	6 Decade Values, 10pF to 1µF
Operating Voltage	30V AC / 42V peak (SELV voltage)
Operating Temp.	18 – 28 °C
Connectors	2 BNC connectors per capacitance
Order Code	CS1-S-R: Standard accuracy, ROHS CS1-P-R: Enhanced accuracy, ROHS CS1-H-R: Highest accuracy, ROHS CS1-H-N; Highest accuracy, non-ROHS CS1-x: custom version, please contact us

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Typical Specifications at 23°C, K=2, unless otherwise specified:

Parameter	Condition	Specification
Ambient Conditions	Operation, per specification Operation, no damage Transport	18 – 28°C 10 – 40°C 10 – 40°C
Calibration Uncertainty *)1	CS1-S-R; capacitance CS1-P-R; capacitance CS1-H-R/N; capacitance CS1-x-R; dissipation factor	0.2 % max. 0.05% max. 0.02 % max. 0.0002 max.
Deviation from Nominal *)1 *)2	CS1-S-R CS1-P-R CS1-H-R	< 5 % max. < 1 % max. (10pF 5%) < 0.1% max. (10pF 1%)
Temperature Coefficient	Within operating limits	30 ppm/K max.
Aging Drift *)1 *)2	1 year drift	< 0.01 %
Calibration Frequency	All capacitances	1kHz
Working Voltage	All capacitances	30V AC / 42V peak max. (SELV voltages only !)
I/O Connectors	Per capacitance	BNC (2x); outer shield connected to case
Weight	Average	Appr. 0.7kg

Notes:
*)1: relative to national standards.
*)2: relative to time and temperature of calibration; for value see calibration report
Please note that all specifications are typical values related to 23°C, unless otherwise specified.
For specified values, ambient temperature gradient shall be < 1K/h
To calculate total worst case uncertainties, add calibration uncertainty, aging drift and temperature drift

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Description:

The CS1 capacitance standard consists of six precision decade capacitors from 10pF to 1μF with low temperature drift coefficients, mounted in a sealed metal enclosure. Each capacitor can be measured via two BNC connectors. This so-called three terminal connection (2x signal plus shield) allows to eliminate the effect of stray capacitances. It is also possible, by using appropriate adapters (not part of delivery), to use the standard also for other capacitances meters which require 4-terminal BNC connections such as e.g. Keysight LCR-meters, or with Banana plug connectors. For such applications, two pieces of BNC Tees or two BNC to Banana adapters would be used.

The sealed metal enclosure limits the effect of environmental electrical noise and enables a three-terminal measurement. In addition, the impact of humidity on the aging of the capacitances is reduced by using a special dissicant that keeps the internal humidity at a very low level. Enough dissicant is included to support long term operation over several years, even assuming ingress of certain amounts of air caused by air pressure changes (which can never be totally eleminated with a sealing gasket).

The CS1 standard is available in two basic versions, a ROHS-compliant version using precision Mica capacitors up to 10nF, and COG ceramic capacitors for 100nF and 1μF. The non-ROHS version uses hermetic glass Mica capacitors from 100pF to 100nF, and COG for 1μF. Calibration data (C and D) is available on a calibration tag at the bottom of the case.

In addition, each version is available with two different grades of accuracy, one economy version (CS1-S) based on calibration with a precision automatic digibridge with a basic measurement uncertainty of 0.02%, and a precision version (CS1-P) based on a Genrad/IET 1620 precison 6-digit manually operated bridge with a basic accuracy of 0.01%, resulting in the conservatively specified uncertainties as indicated in the specification section above.

Although the unit uses higher voltage capacitors, because of its intended use and construction, it is specified for use with SELV (Safety Extra Low Voltage) voltages up to 30V AC maximum only!

Operation Precautions:

This product is a precision device and special care should be taken when operating it to achieve optimum performance. Do not drop, handle carefully and ensure a temperature stabilized environment. Avoid any direct air drafts accross the item. Direct infrared radiation or other heat sources in close proximity to the unit should be avoided and will impact accurcy. Use short, shielded, cables and avoid EMI-generating devices in close proximity to limit electrical interference and achieve maximum accuracy. Avoid temperature extremes whenever possible. Do not exceed the specified operating and storage conditions, otherwise damage may occure. Do not open item in order to avoid ingress of humidity. Use only one capacitor at a time to avoid any crosstalk among adjacent capacitors, causing inaccuracies.

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