

CS1

Precision Coaxial Capacitance Standard

Includes 6 Capacitances

10pF to 1μF in decade steps
Others on request

Calibration Data

Comes with calibration data; two different accuracy levels available

Coaxial BNC Connection

Eliminates stray capacitances
Others through adapters or customization

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 coaxial 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 two versions, the CS1-P and CS1-H, built and calibrated to different accuracy levels, each being ROHS compliant. The capacitors used are high accuracy, low drift COG 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 highest precision capacitance bridges. Calibration data is shipped with every item, specifying C and D values for each capacitance.

Besides the standard versions, custom capacitance versions can be made available, e.g. with tighter tolerances from nominal, as well as versions with other connectors. 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-P-R: Enhanced accuracy, ROHS CS1-H-R: Highest accuracy, ROHS CS1-x: custom version, please contact us

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Datasheet

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 5 – 40°C 5 – 40°C
Calibration Uncertainty *)1	CS1-P-R; capacitance CS1-H-R; capacitance CS1-x-R; dissipation factor	0.1% max. 0.01% max. (10pF 0.05% max.) 0.0005 max.
Deviation from Nominal *)1 *)2	CS1-P-R CS1-H-R	1 % max. (10pF 5%) 0.5% max. (10pF 2%)
Temperature Coefficient	Within operating limits	30 ppm/K max.
Aging Drift *)2	1 year drift	0.025 % max. (10pF 0.05% max)
Calibration Frequency	All capacitances	1kHz
Working Voltage	All capacitances	30V AC / 42V peak max. (SELV voltages only !)
Capacitor Material		COG/NPO
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

Tighter Tolerances (Deviation from Nominal) are available on request.

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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-P-R; capacitance CS1-H-R; capacitance CS1-x-R; dissipation factor	0.05% max. 0.02 % max. 0.0002 max.
Deviation from Nominal *)1 *)2	CS1-P-R CS1-H-R	< 1 % max. (10pF 2,5%) < 0.1% max. (10pF 0.5%)
Temperature Coefficient	Within operating limits	30 ppm/K max.
Aging Drift *)1 *)2	1 year drift	< 0.02 %
Calibration Frequency	All capacitances	1 kHz
Working Voltage	All capacitances	30V AC / 42V peak max. (SELV voltages only !)
Capacitor Material		COG
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 1 μ F 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 with other capacitance 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 use of unshielded banana cables (with BNC to Banana adapters) is also possible (but is not recommended if highest accuracy is required).

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 eliminated with a sealing gasket).

The CS1 standard is based on low TC COG ceramic capacitors. Two version are available with two different grades of accuracy, one economy yet still low uncertainty version (CS1-P) based on calibration with a precision automatic digibridge with a basic measurement uncertainty of 0.02%, and a high precision version (CS1-H) based on a Andeen Hagerling highest precision 8 digit capacitance bridge.

Although the unit uses capacitors with higher voltage ratings, 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! The voltage used during calibration and through normal use is usually much lower.

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 accuracy. 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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