

HACS-Z Series

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The HACS-Z provides a wide range of capacitance in increments as low as 1 pF and a total capacitance of up to 10,000 μF . With its high

- High accuracy: 0.05% or 0.1%
- Low zero capacitance <0.1 pF
- Programmable version available
- Trimmable capacitors for lower decades
- 3-Terminal shielded construction
- Excellent stability - 100 ppm/yr
- Special high voltage units up to 10 kV

SPECIFICATIONS

Capacitor Type: Air capacitors for 1 and 10 pF steps; stabilized sealed silvered-mica for 100 pF through 100 nF steps; hermetically sealed polystyrene capacitors for 1 μF steps; hermetically sealed metallized polycarbonate capacitors for 10 μF steps and over; polypropylene for 1000 μF steps. 1, 10, 100 and 1000 pF decades are trimmable from rear.

Accuracy:

A: $\pm(0.05\% + 0.5 \text{ pF})$; $\pm 0.5\%$ for 100 μF steps.

B: $\pm(0.1\% + 1.0 \text{ pF})$; $\pm 0.5\%$ for 100 μF steps.

at 1 kHz, 23°C, no zero subtraction, measured with a 3-terminal connection. (Calibration at other frequencies is available, and different frequencies may be selected for different decades.) SI traceable.

[If 1,000 μF steps are present, accuracy for 6 to 10 μF at 1 kHz is $\pm(0.1\% + 0.5 \text{ pF})$]

Range: 0 to 10,000 μF available, with minimum increments of 1 pF; see table on next page.

Dissipation Factor at 1 kHz:

<0.0017 for 1 pF, 10 pF, and 100 pF steps;

<0.0003 for 1 nF through 100 nF steps;

<0.0007 for 1 μF steps;

<0.007 for 10 μF steps.

Zero Capacitance:

$\leq 0.1 \text{ pF}$, measured with a 3-terminal connection, for units with highest decade steps $\leq 100 \text{ nF}$;

$\leq 2 \text{ pF}$, measured with a 3-terminal connection, for units with highest decade steps 1 μF .

Insulation Resistance: >50,000 M Ω .

DOUBLE SHIELDED CONSTRUCTION

The shielding is divided into two different parts: an inner shield that minimizes the low terminal-to-guard capacitance, and an outer shield (the case) that minimizes the detector input capacitance and noise.

When these two shields are connected together, the HACS-Z becomes an excellent 3-terminal capacitance substituter with low zero capacitance.

quality, tight tolerance capacitors, it is an ideal part of a test or calibration system.

- Excellent TC - begins at 20 ppm/°C



Six Decade HACS-Z Capacitance Substituter

Operating Frequency Range: 10 Hz or less to at least 1 MHz.
Stability:

A: $\pm(100 \text{ ppm} + 0.1 \text{ pF})$ per year for 0.1 μF steps and under;

$\pm 200 \text{ ppm}$ per year for 1 μF and 10 μF steps;

$\pm 500 \text{ ppm}$ per year for 100 μF and 1000 μF steps.

B: $\pm(200 \text{ ppm} + 0.1 \text{ pF})$ per year for all steps.

$\pm 500 \text{ ppm}$ per year for 1 μF and 10 μF steps;

$\pm 1000 \text{ ppm}$ per year for 100 μF and 1000 μF steps.

MAXIMUM VOLTAGE:

1 pF through 100 nF steps: 500 V peak max up to 10 kHz;

1 μF steps: 50 V peak max

10 μF and 100 μF steps: $(V_{dc} + V_{ac}) < 30 \text{ V}$ or $(V_{ac}) < 22 \text{ V}$, whichever applies first, where $V_{ac} = 1.8 \times 10^4 / f$, and f is freq. in Hz

Optional: up to 10 kV

Temperature Coefficient:

A: $\approx 20 \text{ ppm}/^\circ\text{C}$ for 0.1 μF steps and under;

-50 ppm/°C for 1 μF through 100 μF steps;

-150 ppm/°C for 1000 μF steps;

Operating Temperature Range: 10°C to 40°C.

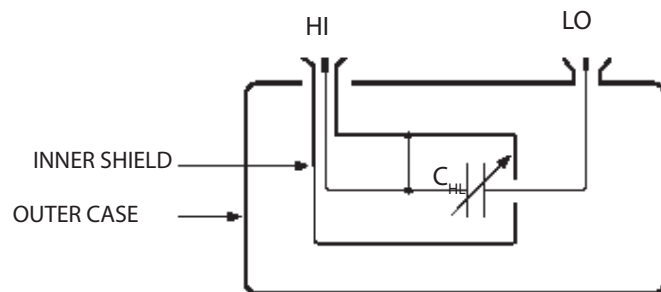
Operating Frequency Range: 10 Hz or less to at least 1 MHz.

Shielding: Double shielded construction.

Dimensions: 43.2 cm W x 14.2 cm H x 30.4 cm D (17" x 5.6" x 12"), for 6 decade version.

Weight: 5.9 kg (13 lb), for 6 decade version.

Connection to Substituter: BNC (standard) or 874 type coaxial connectors (optional) labeled HI and LO on front panel. Also available is an optional 36 pin connector providing individual BCD weighted



Double Shielded Construction



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ORDERING INFORMATION

STANDARD MODELS

Models*		Total Capacitance	No. of Decades	Resolution
Accuracy 0.05%	Accuracy 0.1%			
HACS-Z-A-3E-1pF	HACS-Z-B-3E-1pF	1,110 pF	3	1 pF
HACS-Z-A-3E-10pF	HACS-Z-B-3E-10pF	11,100 pF	3	10 pF
HACS-Z-A-3E-100pF	HACS-Z-B-3E-100pF	111,000 pF	3	100 pF
HACS-Z-A-3E-1nF	HACS-Z-B-3E-1nF	1.11 μF	3	1 nF
HACS-Z-A-3E-10nF	HACS-Z-B-3E-10nF	11.1 μF	3	10 nF
HACS-Z-A-3E-100nF	HACS-Z-B-3E-100nF	111 μF	3	100 nF
HACS-Z-A-3E-1μF	HACS-Z-B-3E-1μF	1,110 μF	3	1 μF
HACS-Z-A-3E-10μF	HACS-Z-B-3E-10μF	11,100 μF	3	10 μF
HACS-Z-A-4E-1pF	HACS-Z-B-4E-1pF	11,110 pF	4	1 pF
HACS-Z-A-4E-10pF	HACS-Z-B-4E-10pF	0.1111 μF	4	10 pF
HACS-Z-A-4E-100pF	HACS-Z-B-4E-100pF	1.111 μF	4	100 pF
HACS-Z-A-4E-1nF	HACS-Z-B-4E-1nF	11.11 μF	4	1 nF
HACS-Z-A-4E-10nF	HACS-Z-B-4E-10nF	111.1 μF	4	10 nF
HACS-Z-A-4E-100nF	HACS-Z-B-4E-100nF	1,111. μF	4	100 nF
HACS-Z-A-4E-1μF	HACS-Z-B-4E-1μF	11,110 μF	4	1 μF
HACS-Z-A-5E-1pF	HACS-Z-B-5E-1pF	0.111 11 μF	5	1 pF
HACS-Z-A-5E-10pF	HACS-Z-B-5E-10pF	1.111 1 μF	5	10 pF
HACS-Z-A-5E-100pF	HACS-Z-B-5E-100pF	11.111 μF	5	100 pF
HACS-Z-A-5E-1nF	HACS-Z-B-5E-1nF	111.11 μF	5	1 nF
HACS-Z-A-5E-10nF	HACS-Z-B-5E-10nF	1,111.1 μF	5	10 nF
HACS-Z-A-5E-100nF	HACS-Z-B-5E-100nF	11,111 μF	5	100 nF
HACS-Z-A-6E-1pF	HACS-Z-B-6E-1pF	1.111 11 μF	6	1 pF
HACS-Z-A-6E-10pF	HACS-Z-B-6E-10pF	11.111 1 μF	6	10 pF
HACS-Z-A-6E-100pF	HACS-Z-B-6E-100pF	111.111 μF	6	100 pF
HACS-Z-A-6E-1nF	HACS-Z-B-6E-1nF	1,111.11 μF	6	1 nF
HACS-Z-A-6E-10nF	HACS-Z-B-6E-10nF	11,111.1 μF	6	10 nF
HACS-Z-A-7E-1pF	HACS-Z-B-7E-1pF	11,111.11 μF	7	1 pF

*For 10 position switches, "0" - "9", in lieu of 11 position "0" - "10", delete E from model number.
Add suffix: BCD- for the BCD output option, RM- for rack mount option.

OPTIONAL MODELS

In order to satisfy any requirement for a HACS-Z Series capacitor, generate a part number from the chart below.

