Table 1-1. Specifications (sheet 1 of 8).

## SPECIFICATIONS

Parameters Measured: C, L, R, |Z|, D, Q, ESR, G, X, B, θ. Δ (deviation) and Δ% (percent deviation) for C, L, R, |Z|.

Measurement Circuit Modes: Auto, Series and Parallel.

Parameter Combinations:

|  |  |
|---|---|
| Series circuit mode | C-D or Q or ESR<br>L-D or Q or ESR<br>R-X or L<br>\|Z\|-θ |
| Parallel circuit mode | C-D or Q or G<br>L-D or Q or G<br>R-B or C<br>\|Z\|-θ |

Display: Normal mode: 4-1/2 digit, maximum display 19999.
High resolution mode: 5-1/2 digit, maximum display 199999.
(Number of significant digits displayed changes depending on measurement frequency, test signal level and measurement range).

Measurement Terminals: Four terminal pair configuration (high and low terminals for current and potential terminals) with guard terminal.

Range Modes: Auto and Manual (up-down).

Measurement Frequencies: 10kHz, 20kHz, 40kHz, 100kHz, 200kHz, 400kHz, 1MHz, 2MHz, 4MHz and 10MHz ±0.01%.

Test Signal Level: 1mV to 1Vrms, continuously variable in 3 ranges.
Test voltage and current can be monitored at front panel display.

Deviation Measurement: When REF VALUE STORE button is pressed, the existing measured value is stored as a reference value. Next, pressing Δ or Δ% button offsets displayed value to zero. Deviation is displayed as the difference between the referenced value and subsequent result.
(Deviation spread in counts is -199999 to 199999 or from -199.99% to 199.99%).

Offset Adjustment: Stray capacitance, residual inductance, resistance and conductance of test fixture or test leads can be compensated for as follows:

C: up to 20pF
L: up to 2000nH
R: up to 0.5Ω
G: up to 5µS

Self Test: Performs cyclic operation of internal function tests and displays diagnostic code sets (when any abnormality is detected).

DC Bias: Two external DC bias input connectors on rear panel, maximum ±35V and ±200Vdc.

Bias input characteristics:
100Ω±10%, 0.1A max (for max ±35V input).
150kΩ±10%, 1.3mA max (for max ±200V input).

DC Bias Monitor: Bias voltage monitor output (for both internal and external biases), BNC connector, output impedance 30kΩ.

Trigger: Internal, external or manual.

### GENERAL

Operating Temperature and Humidity: 0°C to 55°C at 95% RH (to 40°C).

Power Requirements: 100/120/220V ±10%, 240V +5% - 10%, 48 - 66Hz.

Power Consumption: 165VA max with any option.

Dimensions:

425.5(W) x 188 (H) x 574 (D) mm (16-3/4" x 7-3/8" x 22-5/8")

Weight: Approximately 18kg (Std).

Table 1-1.  Specifications (sheet 2 of 8).

Range and Accuracy:

Accuracies apply under the following measurement conditions for all test parameters:

1) Warm-up time:  at least 30 minutes.

2) Test signal level setting:

MULTIPLIER: X 1 or X 0.1
OSC LEVEL:  Fully clockwise

3) CABLE LENGTH switch setting:

"0" position.

4) ZERO offset adjustment appropriately completed.

5) Environmental temperature:

23°C ±5°C
(At 0°C to 55°C, error doubles).

6) Significant display readout should be more than 20 counts.

7) Measurement ranges in normal mode except those specifically noted.

Accuracy in table is ±(% of rdg + error counts + residual counts) except for D and θ:

D accuracy:

±(% of rdg + D error value + count)

θ accuracy:

±degrees

Error count applies to significant display readouts (neglects less significant digit data).

## ACCURACY COEFFICIENTS
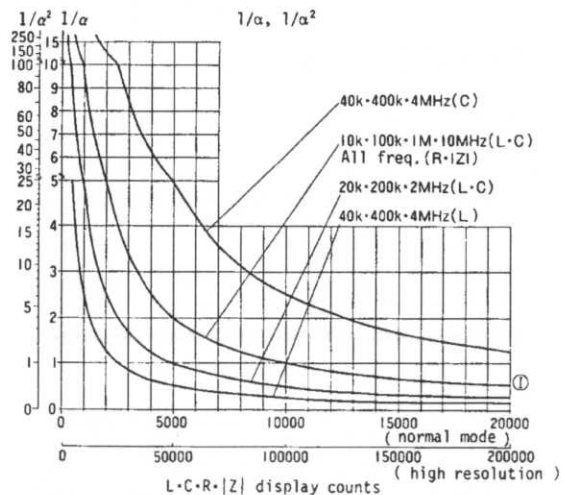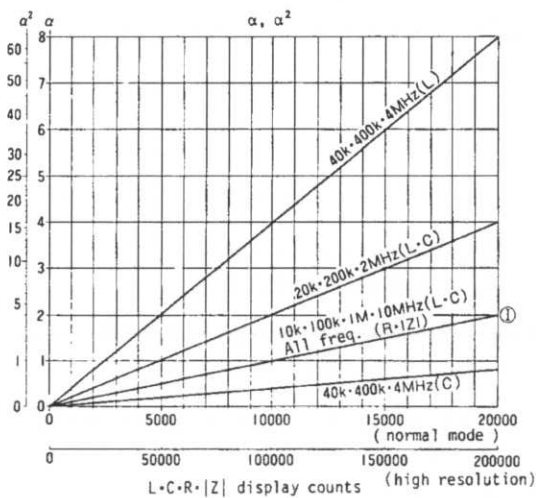


Horizontal axis scales represent display counts in DISPLAY A and vertical axis scales represent accuracy coefficients $\alpha$, $\alpha^2$, $1/\alpha$ and $1/\alpha^2$.
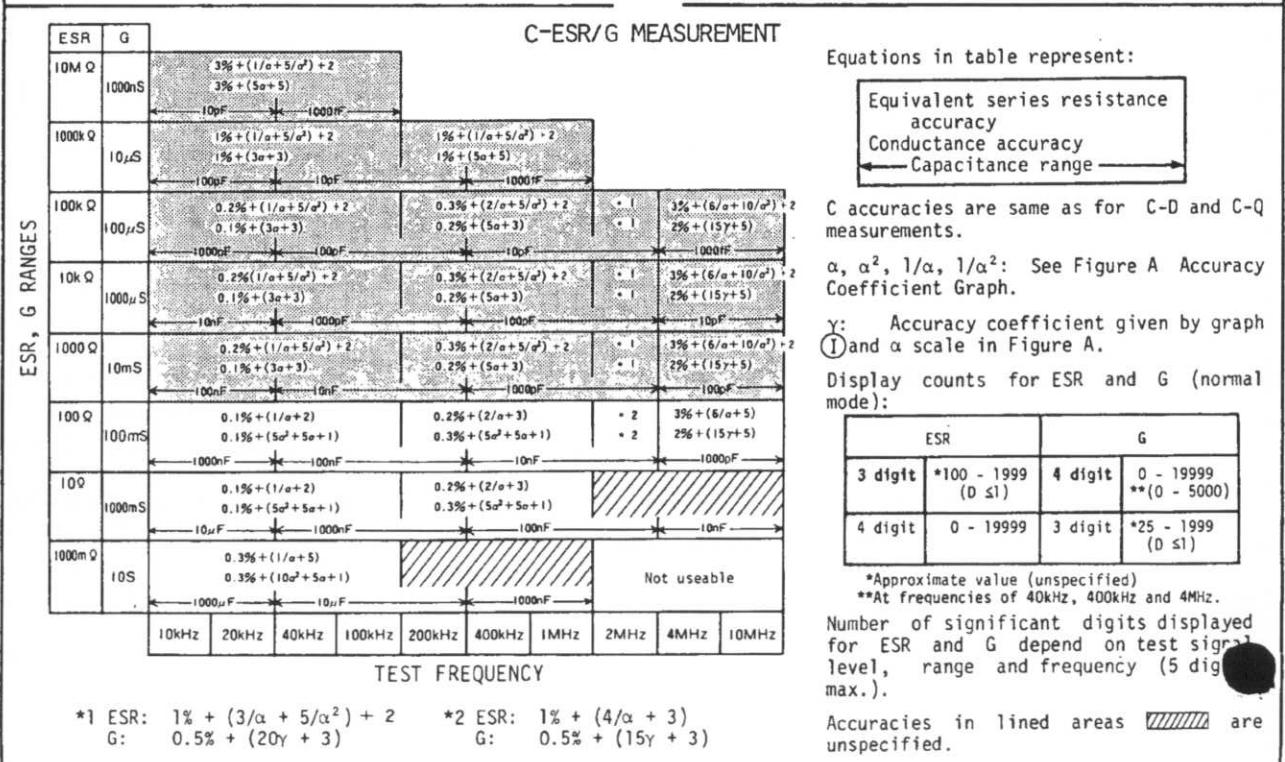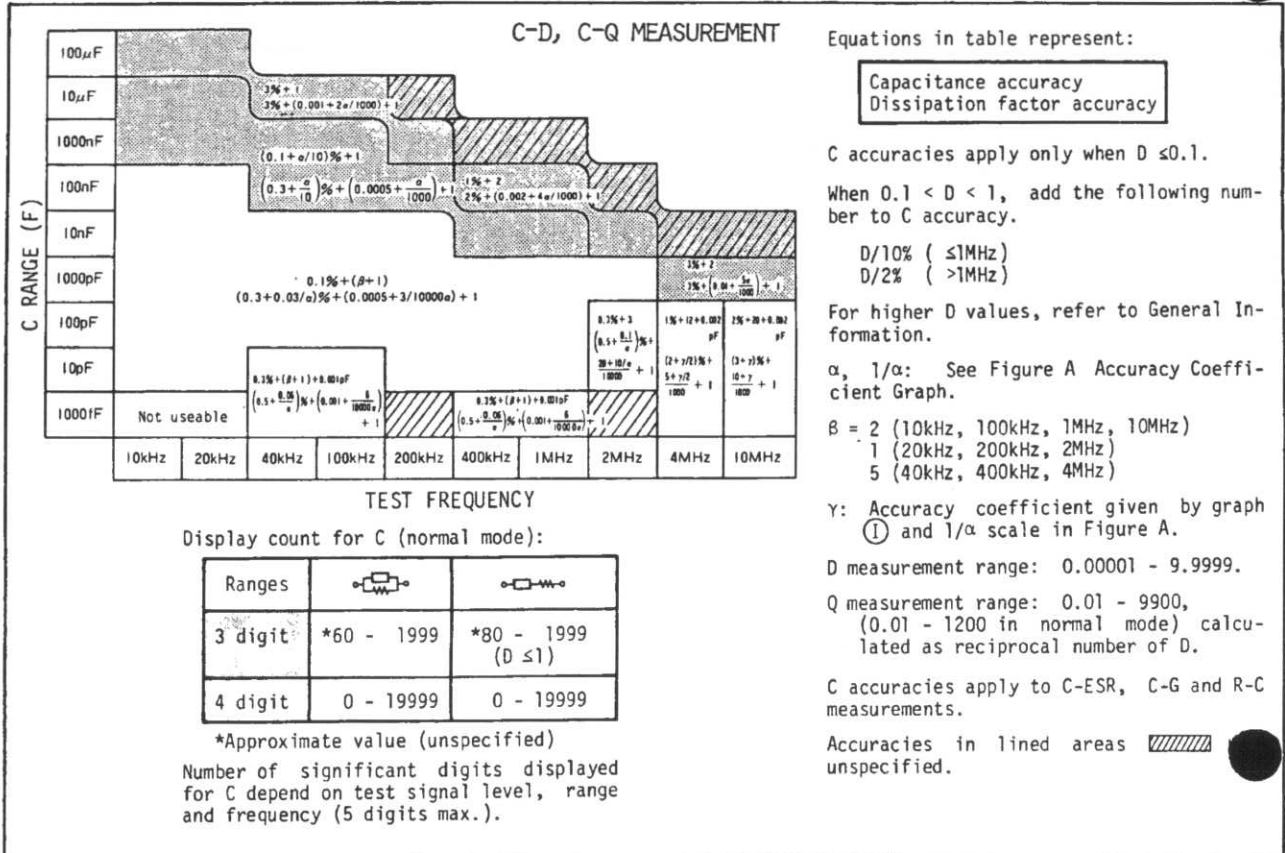
Table 1-1. Specifications (sheet 3 of 8).

## C-D, C-Q MEASUREMENT

| C RANGE (F) | 10kHz | 20kHz | 40kHz | 100kHz | 200kHz | 400kHz | 1MHz | 2MHz | 4MHz | 10MHz |
|---|---|---|---|---|---|---|---|---|---|---|
| 100μF | | | | | | | | | | |
| 10μF | | 3% + 1 / 3% + (0.001 + 2α/1000) + 1 | | | | | | | | |
| 1000nF | | | (0.1 + α/10)% + 1 | | | | | | | |
| 100nF | | | | (0.3 + α/10)% + (0.0005 + α/1000) + 1 | | 1% + 2 / 2% + (0.002 + 4α/1000) + 1 | | | | |
| 10nF | | | | | | | | | | |
| 1000pF | | | 0.1% + (β+1) / (0.3 + 0.03/α)% + (0.0005 + 3/10000α) + 1 | | | | | | 1% + 2 / 1% + (0.01 + 5α/1000) + 1 | |
| 100pF | | | | | | | 0.3% + 3 (0.5 + 8.1/α)% + 20 + 10/α /1000 | 1% + 12 + 0.002 pF / (2 + γ/2)% + 5 + γ/2 /1000 + 1 | 2% + 20 + 0.3α2 pF / (3 + γ)% + 10 + γ /1000 + 1 | |
| 10pF | | | 0.3% + (β+1) + 0.001pF (0.5 + 0.06/α)% + (0.001 + α/1000α) + 1 | | | 0.3% + (β+1) + 0.001pF (0.5 + 0.06/α)% + (0.001 + 6/1000α) + 1 | | | | |
| 1000fF | Not useable | | | | | | | | | |

TEST FREQUENCY

Display count for C (normal mode):

| Ranges | ⊸▭▭⊸ | ⊸▭⏚▭⊸ |
|---|---|---|
| 3 digit | *60 – 1999 | *80 – 1999 (D ≤1) |
| 4 digit | 0 – 19999 | 0 – 19999 |

*Approximate value (unspecified)

Number of significant digits displayed for C depend on test signal level, range and frequency (5 digits max.).

**Equations in table represent:**

> Capacitance accuracy
> Dissipation factor accuracy

C accuracies apply only when D ≤0.1.

When 0.1 < D < 1, add the following number to C accuracy.

D/10% ( ≤1MHz)
D/2% ( >1MHz)

For higher D values, refer to General Information.

α, 1/α: See Figure A Accuracy Coefficient Graph.

β = 2 (10kHz, 100kHz, 1MHz, 10MHz)
    1 (20kHz, 200kHz, 2MHz)
    5 (40kHz, 400kHz, 4MHz)

γ: Accuracy coefficient given by graph ① and 1/α scale in Figure A.

D measurement range: 0.00001 – 9.9999.

Q measurement range: 0.01 – 9900, (0.01 – 1200 in normal mode) calculated as reciprocal number of D.

C accuracies apply to C-ESR, C-G and R-C measurements.

Accuracies in lined areas ▨▨▨ unspecified.

## C-ESR/G MEASUREMENT

| ESR | G | 10kHz | 20kHz | 40kHz | 100kHz | 200kHz | 400kHz | 1MHz | 2MHz | 4MHz | 10MHz |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10MΩ | 1000nS | 3% + (1/α + 5/α²) + 2 / 3% + (5α + 5) ⟵10pF — 1000fF⟶ | | | | | | | | | |
| 1000kΩ | 10μS | 1% + (1/α + 5/α²) + 2 / 1% + (3α + 3) ⟵100pF — 10pF⟶ | | | 1% + (1/α + 5/α²) + 2 / 1% + (5α + 3) ⟵ 1000fF ⟶ | | | | | | |
| 100kΩ | 100μS | 0.2% + (1/α + 5/α²) + 2 / 0.1% + (3α + 3) ⟵1000pF — 100pF⟶ | | | 0.3% + (2/α + 5/α²) + 2 / 0.2% + (5α + 3) ⟵ 10pF ⟶ | | | *1 | 3% + (6/α + 10/α²) + 2 / 2% + (15γ + 5) ⟵1000fF⟶ | | |
| 10kΩ | 1000μS | 0.2% + (1/α + 5/α²) + 2 / 0.1% + (3α + 3) ⟵1nF — 1000pF⟶ | | | 0.3% + (2/α + 5/α²) + 2 / 0.2% + (5α + 3) ⟵ 100pF ⟶ | | | | 3% + (6/α + 10/α²) + 2 / 2% + (15γ + 5) ⟵10pF⟶ | | |
| 1000Ω | 10mS | 0.2% + (1/α + 5/α²) + 2 / 0.1% + (3α + 3) ⟵100nF — 10nF⟶ | | | 0.3% + (2/α + 5/α²) + 2 / 0.2% + (5α + 3) ⟵ 1000pF ⟶ | | | | 3% + (6/α + 10/α²) + 2 / 2% + (15γ + 5) ⟵100pF⟶ | | |
| 100Ω | 100mS | 0.1% + (1/α + 2) / 0.1% + (5α² + 5α + 1) ⟵1000nF — 100nF⟶ | | | 0.2% + (2/α + 3) / 0.3% + (5α² + 5α + 1) ⟵ 10nF ⟶ | | | *2 | 3% + (6/α + 5) / 2% + (15γ + 5) ⟵1000pF⟶ | | |
| 10Ω | 1000mS | 0.1% + (1/α + 2) / 0.1% + (5α² + 5α + 1) ⟵10μF — 1000nF⟶ | | | 0.2% + (2/α + 3) / 0.3% + (5α² + 5α + 1) ⟵ 100nF ⟶ | | | | | | |
| 1000mΩ | 10S | 0.3% + (1/α + 5) / 0.3% + (10α² + 5α + 1) ⟵1000μF — 10μF⟶ | | | | | | | Not useable | | |

TEST FREQUENCY

*1 ESR: 1% + (3/α + 5/α²) + 2  
    G:    0.5% + (20γ + 3)

*2 ESR: 1% + (4/α + 3)  
    G:    0.5% + (15γ + 3)

**Equations in table represent:**

> Equivalent series resistance accuracy
> Conductance accuracy
> ⟵—— Capacitance range ——⟶

C accuracies are same as for C-D and C-Q measurements.

α, α², 1/α, 1/α²: See Figure A Accuracy Coefficient Graph.

γ: Accuracy coefficient given by graph ① and α scale in Figure A.

Display counts for ESR and G (normal mode):

| | ESR | | G | |
|---|---|---|---|---|
| 3 digit | *100 – 1999 (D ≤1) | 4 digit | 0 – 19999 **(0 – 5000) | |
| 4 digit | 0 – 19999 | 3 digit | *25 – 1999 (D ≤1) | |

*Approximate value (unspecified)
**At frequencies of 40kHz, 400kHz and 4MHz.

Number of significant digits displayed for ESR and G depend on test signal level, range and frequency (5 digits max.).

Accuracies in lined areas ▨▨▨ are unspecified.

## Table 1-1. Specifications (sheet 4 of 8).

### L-D, L-Q MEASUREMENT

L RANGE (H) vs TEST FREQUENCY

Frequency columns: 10kHz, 20kHz, 40kHz, 100kHz, 200kHz, 400kHz, 1MHz, 2MHz, 4MHz, 10MHz

Range rows: 100H, 10H, 1000mH, 100mH, 10mH, 1000µH, 100µH, 10µH, 1000nH, 100nH

Equations appearing in chart regions:

$$3\% + 1$$
$$3\% + \left(0.001 + \frac{\alpha}{1000}\right)\% + 1$$

$$(0.1 + 0.2\alpha)\% + 1$$
$$\left(0.3 + \frac{\alpha}{10}\right)\% + \left(0.001 + \frac{\alpha}{1000}\right)\% + 1$$

$$(0.2 + 0.3\alpha)\% + 1$$
$$\left(0.5 + \frac{\alpha}{5}\right)\% + \left(0.001 + \frac{2\alpha}{1000}\right)\% + 1$$

$$0.1\% + 3$$
$$\left(0.3 + \frac{0.03}{\alpha}\right)\% + \left(0.001 + \frac{3}{10000\alpha}\right)\% + 1$$

$$1\% + 2$$
$$(1 + 0.5\gamma)\% + 0.01 + 1$$

$$2\% + 3$$
$$(2 + \gamma)\% + 0.02 + 1$$

$$0.3\% + 3$$
$$\left(0.5 + \frac{0.05}{\alpha}\right)\% + \left(0.001 + \frac{5}{10000\alpha}\right)\% + 1$$

$$0.2\% + 3$$
$$\left(0.5 + \frac{0.05}{\alpha}\right)\% + \frac{20 + 5/\alpha}{10000} + 1$$

$$1\% + 5$$
$$\left(2 + \frac{\alpha}{\alpha}\right)\% +$$

$$3\% + 3$$
$$(3 + \gamma)\% + 0.02 + 1$$

$$0.5\% + 5$$
$$\left(1 + \frac{0.05}{\alpha}\right)\% + \frac{30 - 5/\alpha}{10000} + 1$$

$$\frac{5 + 5/\alpha}{1000}$$

$$2\% + 1$$
$$\left(1 + \frac{\alpha}{\alpha}\right)\% + \frac{10 + 10/\alpha}{1000} + 1$$

Not useable (lower left)
Not useable (lower right)

TEST FREQUENCY

Number of significant digits displayed for L depend on test signal level, range and frequency (5 digits max.).

L accuracies apply to L-ESR, L-G and R-L measurements.

Accuracies in lined areas ▨ are unspecified.

Equations in table represent:

> Inductance accuracy
> Dissipation factor accuracy

L accuracies only apply when D ≤0.1.

When 0.1 < D < 1, add the following number to L accuracy:

D/10% (≤ 1MHz)
D/2% (> 1MHz)

For higher D values, refer to General Information.

α, 1/α: See Figure A Accuracy Coefficient Graph.

γ: Accuracy coefficient given by graph ① and α scale in Figure A.

D measurement range: 0.00001 - 9.9999

Q measurement range: 0.01 - 9900, (0.01 - 1200 in normal mode) calculated as reciprocal number of D.

Display count for L (normal mode):

| Range | ○─▭▭─○ | ○─▭▭─○ |
|-------|--------|--------|
| 3 digit | *60 - 1999 | *800 - 1999 (D ≤1) |
| 4 digit | 0 - 19999 | 0 - 19999 |

*Approximate value (unspecified).

### L-ESR/G MEASUREMENT

ESR, G RANGES vs TEST FREQUENCY

ESR rows: 10MΩ, 1000kΩ, 100kΩ, 10kΩ, 1000Ω, 100Ω, 10Ω, 1000mΩ
G rows: 1000nS, 10µS, 100µS, 1000µS, 10mS, 100mS, 1000mS, 10S

Frequency columns: 10kHz, 20kHz, 40kHz, 100kHz, 200kHz, 400kHz, 1MHz, 2MHz, 4MHz, 10MHz

Inductance range markers: 100H, 10H, 1000mH, 100mH, 10mH, 1000µH, 100µH, 10µH, 1000nH, 100nH

Equations appearing in chart regions:

$$1\% + (10\alpha^2 + 3\alpha) - 2$$
$$1\% + (2/\alpha + 3)$$

$$0.2\% + (10\alpha^2 + 3\alpha) + 2$$
$$0.1\% + (2/\alpha + 3)$$

$$0.3\% + (10\alpha^2 + 6\alpha) + 2$$
$$0.2\% + (2/\alpha + 3)$$

$$0.2\% + (10\alpha^2 + 3\alpha) + 2$$
$$0.1\% + (2/\alpha + 3)$$

$$0.3\% + (10\alpha^2 + 6\alpha) + 2$$
$$0.2\% + (2/\alpha + 3)$$

$$3\% + (40\alpha^2 + 20\alpha) + 1$$
$$2\% + (10/\alpha + 5)$$

$$0.2\% + (10\alpha^2 - 3\alpha) + 2$$
$$0.1\% + (2/\alpha + 3)$$

$$0.3\% + (10\alpha^2 + 6\alpha) + 2$$
$$0.2\% + (2/\alpha + 3)$$

$$3\% + (40\alpha^2 + 20\alpha) + 1$$
$$2\% + (10/\alpha + 5)$$

$$0.1\% + (3\alpha + 2)$$
$$0.1\% + (2/\alpha^2 + 2/\alpha + 1)$$

$$0.2\% + (6\alpha + 3)$$
$$0.3\% + (2/\alpha^2 + 2/\alpha + 1)$$

$$2\% + (20\gamma + 7)$$
$$2\% + (5/\alpha^2 + 6/\alpha + 2)$$

$$0.1\% + (\alpha + 2)$$
$$0.1\% + (2/\alpha^2 + 2/\alpha + 1)$$

$$0.2\% + (6\alpha + 3)$$
$$0.3\% + (2/\alpha^2 + 2/\alpha + 1)$$

$$2\% + (20\gamma + 7)$$
$$2\% + (5/\alpha^2 + 6/\alpha + 2)$$

$$0.3\% + (5\alpha + 3)$$
$$0.3\% + (2/\alpha^2 + 2/\alpha + 1)$$

$$0.5\% + (6\alpha + 5)$$
$$0.5\% + (5/\alpha^2 + 2/\alpha + 1)$$

Not useable

TEST FREQUENCY
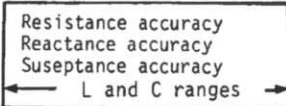
*1  ESR: $1\% + (20\alpha^2 + 20\gamma) + 2$
    G:   $0.5\% + (5/\alpha + 3)$

*2  ESR: $0.5\% + (6\alpha + 5)$
    G:   $0.5\% + (2/\alpha^2 + 3/\alpha + 2)$

Equations in table represent:

> Equivalent series resistance accuracy
> Conductance accuracy
> ──── Inductance range ────

Inductance accuracies are same as for L-D, L-Q measurements.

α, α², 1/α, 1/α²: See Figure A Accuracy Coefficient Graph.

γ: Accuracy coefficient given by graph ① and α scale in Figure A.

Display counts for ESR and G (normal mode).

| | ESR | | G | |
|---|-----|---|---|---|
| 3 digit | *50 - 1999 (D ≤1) | 4 digit | 0 - 19999 **(0 - 10000) |
| 4 digit | 0 - 19999 | 3 digit | *25 - 1999 (D ≤1) |

*Approximate value (unspecified)
**At frequencies of 40kHz, 400kHz and 4MHz.

Number of significant digits displayed for ESR and G depend on test signal level, range and frequency (5 digits max.).

Accuracies in lined areas ▨ are unspecified.

Table 1-1. Specifications (sheet 5 of 8).

## R-X/B & R-L/C MEASUREMENTS



Equations in table represent:

> Resistance accuracy
> Reactance accuracy
> Suseptance accuracy
> ◄— L and C ranges —►

R accuracies apply only when Q ≤0.1 (D ≥10). For higher Q values, refer to General Information.

$\alpha$, $\alpha^2$, $1/\alpha$, $1/\alpha^2$: See Figure A Accuracy Coefficient Graph.

$\delta$: $\dfrac{X\ rdg}{10000}$ (normal mode)

$\dfrac{X\ rdg}{100000}$ (high resolution mode)

(X rdg = reactance reading in counts).

C accuracies are same as for C-D, C-Q measurements.

L accuracies are same as for L-D, L-Q measurements.

Display counts for R, X, B, L and C (normal mode):

|  | 3 digit | 4 digit |
|---|---|---|
| Rs X | *36 - 1999 | 0 - 19999 |
| Rp | *50 - 1999 (Q ≤1) | 0 - 19999 |
| L | *56 - 1999 | 0 - 19999 (D ≤2) |

|  | 4 digit | 3 digit |
|---|---|---|
| B | 0 - 19999 | *36 - 1999 |
| C | 0 - 1999 (3 digit) | *56 - 1999 **(140 - 1999) |

*Approximate value (unspecified).
**At frequencies of 40kHz, 400kHz, and 4MHz.

Subscripts s and p signify series and parallel modes, respectively.

Number of significant digits displayed for R, X and B depend on test signal level, range and frequency (5 digits max.).

Accuracies in lined areas ▨▨▨ are unspecified.

*1 X: 1% + $(20\alpha^2 + 20\alpha + 1)$
  B: 0.5% + $(3/\alpha^2 + 3/\alpha + 1)$

*2 X: 1% + $(20\alpha^2 + 20\alpha + 1)$
  B: 0.5% + $(2/\alpha + 3)$

*3 X: 0.5% + $(10\alpha + 5)$
  B: 0.5% + $(2/\alpha + 3)$

Table 1-1.  Specifications (sheet 6 of 8).

## |Z| – θ MEASUREMENT

| |Z| RANGE | | TEST FREQUENCY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10MΩ | 5% + 1 / 0.1° + 0.1°α | | | | | | | | | | |
| 1000kΩ | | 3% + 1 / 0.05° + 0.1°α | | | | | | | | | |
| 100kΩ | | | | | | | | | | | |
| 10kΩ | (0.1 + 0.2α)% + 1 / 0.05° + 0.05°α | | | (0.2 + 0.2α)% + 1 / 0.05° + 0.05°α | | | 1% + 2 / 0.1° + 0.1°α | 3% + 3 / 0.4° + 0.4°α | | | |
| 1000Ω | | | | | | | | | | | |
| 100Ω | 0.1% + 3 / 0.05° + 0.05°/α | | | 0.2% + 3 / 0.05° + 0.05°/α | | | | 2% + 7 / 0.4° + 0.4°/α | | | |
| 10Ω | | | | | | | | | | | |
| 1000mΩ | 0.3% + 5 / 0.1° + 0.1°/α | | | 0.5% + 5 / 0.1° + 0.1°/α | | | Not useable | | | | |
| | 10kHz | 20kHz | 40kHz | 100kHz | 200kHz | 400kHz | 1MHz | 2MHz | 4MHz | 10MHz | |

Equations in table represent:

> Impedance accuracy
> Phase angle accuracy

α, 1/α:  See  Figure A  Accuracy Coefficient Graph.

θ measurement range:

   -180.000° - +180.000°

Display counts for |Z| and θ (normal mode):

| Ranges | |Z| | θ |
|---|---|---|
| | *36 - 1999 | 0 - 18000 |
| | 0 - 19999 | 0 - 18000 |

   *Approximate value (unspecified).

Number of significant digits displayed for |Z| and θ depend on test signal level, range and frequency (5 digits max.).

Accuracies in lined areas ▨ are unspecified.

## OPTIONS

Option 001:    Internal dc bias source remotely controllable from 0V to ±35V in 1mV (minimum) steps.

   Bias control range and accuracy:

| Range | step | Accuracy |
|---|---|---|
| ±(.000 - .999)V | 1mV | ±(0.5% of rdg + 2mV) |
| ±(1.00 - 9.00)V | 10mV | ±(0.5% of rdg + 4mV) |
| ±(10.0 - 35.0)V | 0.1V | ±(0.5% of rdg + 20mV) |

   *Accuracies apply when DC BIAS switch is set to: INT 35V/100V (≤.1μF) position.  In INT 35V/100V (≤2F) position,  ±(2% of setting + 20mV) on all ranges.

Bias output characteristics:

   220Ω ±10%, 40mA max. (C≤0.1μF)
   1050Ω ±10%, 10mA max. (C≤200μF)

Control:    Remote control by HP 16023B DC Bias Controller or by HP-IB controller.

Control input:   24 pin connector input for 16023B or HP-IB connector.  Mating connector: HP part number 1251-0292, AMPHENOL 57-40240.

Option 002:    Internal dc bias source remotely controllable from 0V to ±99.9V in 0.1V (minimum) steps.

   Bias control range:   ±(00.0V - 99.9V), 0.1V steps.

   Accuracy:   ±(2% of setting + 40mV)

   Bias output characteristics:

      50kΩ ±10%, 2mA max.

   Control:  same as Option 001.

   Control input:  same as Option 001.

Option 003:    Provides continuous memorization of control settings powered by stand-by battery.  Memorizes the following data and control settings:

   1)  Front panel pushbutton control settings (except SELF TEST function).

   2)  Offset control values for test fixture or leads.

Table 1-1. Specifications (sheet 7 of 8).

3) Reference value of deviation measurement.

These memories are maintained if the instrument loses power. Memorized control settings are restored by turning the instrument on or by pressing front panel keys.

Option 004: 10 spot test signal frequencies selectable in a 1-3-5-10 step sequence instead of standard test signal frequencies. Option frequencies are: 10kHz, 30kHz, 50kHz, 100kHz, 300kHz, 500kHz, 1MHz, 3MHz, 5MHz and 10MHz ±0.01%.

Option 101: HP-IB Compatible (data output and remote control per IEEE-STD-488-1975).

Remotely controllable functions:

1) Display A functions (L, C, R, $|Z|$-$\theta$).

2) Deviation functions ($\Delta$, $\Delta$%, RECALL, STORE).

3) LCRZ Range.

4) Display B functions (D, Q, ESR, G, X, B, L, C).

5) Circuit mode.

6) High resolution.

7) Self test.

8) Trigger.

9) Test signal frequency.

10) Test signal level check functions.

11) Test signal level multiplier.

12) Zero offset.

13) DC bias voltage (options 001 and 002 only).

Data output: L or C with D, Q, ESR or G; R with X, B, L or C; $|Z|$ with $\theta$; $\Delta$ or $\Delta$%; reference value in deviation measurement; test signal voltage and current; front panel control settings status (circuit mode, test frequency, Display A and Display B functions).

Internal function allowable subsets: SH1, AH1, T5, L4, SR1, RL1, DC1 and DT1.

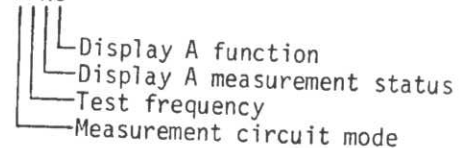Data output format: Either of two formats may be selected (switchable on internal circuit board):

Format A.

PFNC N.NNNNNE NN,ND N.NNNNNE NN (CR)(LF)

Format B.

PFNC N.NNNNNE NN,
ND N.NNNNNE NN (CR)(LF)

PFNC
└─ Display A function
└─ Display A measurement status
└─ Test frequency
└─ Measurement circuit mode

ND
└─ Display B function
└─ Display B measurement status
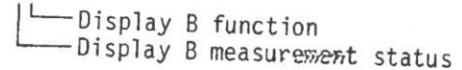
Option 102: HP-IB Compatible (data output and remote control per IEEE-STD-488-1975). Opto-isolator coupled interfacing. Data input/output format is same as Option 101.

Option 907: Front handle kit, for front handle installation.

Option 908: Rack flange kit, for mounting in IEC standard rack.

Option 909: Rack flange & handle kit, for rack mounting and front handle installation.

Option 910: Extra manual.

Special frequency option: One or two test frequencies can be installed in addition to standard (or Option 004) 10-spot test frequencies.

Available frequency range:

10kHz - 10.7MHz.

Frequency accuracy: 0.1%.

Table 1-1. Specifications (sheet 8 of 8).

Table 1-2. General Information (sheet 1 of 2).

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### ACCESSORIES

Accessories supplied: 16047A Test Fixture, direct coupled, 4-terminal pair configuration. Three kinds of contact electrode modules are included for components with either axial, radial or radial short leads. Useable on all 4275A ranges.

Accessories available:

16047B: Test Fixture, cable connection type, 4-terminal pair, useable with dc biases up to 200 volts. Protective cover provided as safeguard against high potential hazards. Three kinds of contact electrode modules are furnished (same as for 16047A). Useable on all ranges at frequencies below 2MHz.

16047C: Test Fixture, direct coupled, 2-terminal. Useable on all 4275A ranges (especially for high frequency measurements requiring high accuracy).

16048A: Test Leads with BNC connectors, 4-terminal pair, 1m long.

16048B: Test Leads with miniature rf connectors for system applications, 4-terminal pair, 1m long.

16048C: Test Clip Cable with special alligator clips, 4 terminal. Useable for low frequency measurements below 100kHz (C>1000pF, L>100µH).

16034B: Test Fixture, tweezer type, 3 terminal. Useable in high impedance measurements (>50Ω), lead-less components on all 4275A frequency ranges.

16023B: Bias Controller. For setting internal dc bias voltage of 4275A (option 001 or 002) in three digits (set into control switch).

Bias voltage control range:

±0.000V to ±99.9V.

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### GENERAL INFORMATION

Measurement accuracy:

Accuracy at Multiplier X 0.01, Osc Level max:

C-D, C-Q: Multiplies values of accuracy equation terms that include $\alpha$ by 10.

C-ESR, C-G: Same as accuracy specifications.

L-D, L-Q: Multiplies values of accuracy equation terms that include $\alpha$ by 10.

L-ESR, L-G: Same as accuracy specifications.

R-X, R-B, R-L, R-C: Multiplies values of % error terms that include $\alpha$, $\gamma$ or $\delta$ in accuracy equation by 10.

$|Z|-\theta$:

$|Z|$: Multiplies values in accuracy equation terms that include $\alpha$ by 10.

$\theta$: Multiplies specified accuracy by 2.

Accuracy at OSC LEVEL setting other than max. position:

Multiplies specified accuracy by coefficient given in figure below:



$$\left(1 + \frac{0.1}{\text{dial setting}}\right)$$

OSC LEVEL dial setting

C and L accuracies at D > 1: Multiplies specified accuracy by $(1 + D^2)$.

R accuracy at Q > 0.1 (D < 10): Multiplies specified accuracy by $(1 + Q^2)$