

DC SPECIFICATIONS

CONDITIONS: 1 PLC or 5 PLC.

For <1PLC, add appropriate "ppm of range" adder from "RMS Noise" table.
Includes rear panel Analog Backplane connector and transducer conversion. Refer to DC Notes for additional card uncertainties.

Accuracy: +/- (ppm of reading + ppm of range)
(ppm = parts per million) (e.g., 10ppm = 0.001%)

| Function | Range ¹ | Resolution | Test Current or Burden Voltage | Input Resistance or Open Circuit Voltage ² | 24 Hour ³ 23°C ± 1° | 90 Day 23°C ± 5° | 1 Year 23°C ± 5° | Temperature Coefficient 0° -18°C & 28° - 50°C |
|--|----------------------------|------------|--------------------------------|---|--------------------------------|------------------|------------------|---|
| Voltage ⁴ | 100.00000 mV ¹⁹ | 0.01µV | | >10G Ω or 10M Ω ± 1% | 10 + 9 | 25 + 9 | 30 + 9 | (1 + 5)/°C |
| | 1.0000000 V ¹⁹ | 0.1µV | | >10G Ω or 10M Ω ± 1% | 7 + 2 | 25 + 2 | 30 + 2 | (1 + 1)/°C |
| | 10.000000 V | 1µV | | >10G Ω or 10M Ω ± 1% | 7 + 2 | 20 + 2 | 25 + 2 | (1 + 1)/°C |
| | 100.00000 V | 10µV | | 10M Ω ± 1% | 15 + 6 | 35 + 6 | 40 + 6 | (5 + 1)/°C |
| | 300.0000 V | 100µV | | 10M Ω ± 1% | 20 + 6 | 35 + 6 | 40 + 6 | (5 + 1)/°C |
| Resistance ^{4, 5, 6, 7} | 1.0000000 Ω | 0.1µΩ | 10mA | 8.2V | 15 + 80 | 40 + 80 | 60 + 80 | (8 + 1)/°C |
| | 10.000000 Ω | 1µΩ | 10mA | 8.2V | 15 + 9 | 40 + 9 | 60 + 9 | (8 + 1)/°C |
| | 100.00000 Ω | 10µΩ | 1mA | 13.9V | 15 + 9 | 40 + 9 | 60 + 9 | (8 + 1)/°C |
| | 1.0000000 kΩ | 100µΩ | 1mA | 13.9V | 20 + 4 | 40 + 4 | 60 + 4 | (8 + 1)/°C |
| | 10.000000 kΩ | 1m Ω | 100µA | 9.1V | 15 + 4 | 40 + 4 | 60 + 4 | (8 + 1)/°C |
| | 100.00000 kΩ | 10m Ω | 10µA | 14.7V | 20 + 4 | 45 + 5 | 65 + 5 | (8 + 1)/°C |
| | 1.0000000 MΩ | 100m Ω | 10µA | 14.7V | 25 + 4 | 50 + 5 | 70 + 5 | (8 + 1)/°C |
| | 10.000000 MΩ | 1 Ω | 0.64µA // 10MΩ | 6.4V | 150 + 6 | 200 + 10 | 400 + 10 | (70 + 1)/°C |
| | 100.00000 MΩ | 10 Ω | 0.64µA // 10MΩ | 6.4V | 800 + 30 | 2000 + 30 | 2000 + 30 | (385 + 1)/°C |
| Dry Circuit Resistance ^{6, 8} | 1.0000000 Ω | 1µΩ | 10mA | 27mV | 25 + 80 | 50 + 80 | 70 + 80 | (8 + 1)/°C |
| | 10.000000 Ω | 10µΩ | 1mA | 20mV | 25 + 80 | 50 + 80 | 70 + 80 | (8 + 1)/°C |
| | 100.00000 Ω | 100µΩ | 100µA | 20mV | 25 + 80 | 90 + 80 | 140 + 80 | (8 + 1)/°C |
| | 1.0000000 kΩ | 1mΩ | 10µA | 20mV | 25 + 80 | 180 + 80 | 400 + 80 | (8 + 1)/°C |
| | 2.0000000 kΩ | 10m Ω | 5µA | 20mV | 25 + 80 | 320 + 80 | 800 + 80 | (8 + 1)/°C |
| Continuity (2W) | 1.000 kΩ | 100mΩ | 1mA | 13.9V | 40 + 100 | 100 + 100 | 100 + 100 | (8 + 1)/°C |
| Current ⁹ | 10.000000 µA | 1pA | <61mV | | 40 + 50 | 300 + 50 | 500 + 50 | (35 + 9)/°C |
| | 100.00000 µA | 10pA | <105mV | | 50 + 9 | 300 + 30 | 500 + 30 | (50 + 5)/°C |
| | 1.0000000 mA | 100pA | <130mV | | 50 + 9 | 300 + 30 | 500 + 30 | (50 + 5)/°C |
| | 10.000000 mA | 1nA | <150mV | | 50 + 9 | 300 + 30 | 500 + 30 | (50 + 5)/°C |
| | 100.00000 mA | 10nA | <0.4V | | 50 + 9 | 300 + 30 | 500 + 30 | (50 + 5)/°C |
| | 1.0000000 A | 100nA | <0.6V | | 200 + 60 | 500 + 60 | 800 + 60 | (50 + 10)/°C |
| 3.000000 A | 1µA | <1.8V | | 1000 + 75 | 1200 + 75 | 1200 + 75 | (50 + 10)/°C | |

Temperature

(Displayed in °C, °F, or K. Exclusive of probe errors.)

Accuracy for all thermocouple types and the 100 Ω platinum, D100, and F100 RTD types based on ITS-90. Accuracy for the PT385 and PT3916 RTD types based on IPTS-68.

Thermocouples

| Type | Range | Resolution | 90 Day / 1 Year 23°C ± 5° | | 90 Day / 1 Year 23°C ± 5° | | Temperature Coefficient 0° - 18°C & 28° - 50°C |
|------|------------------|------------|------------------------------|---------------------------|---------------------------|-----------------|--|
| | | | Simulated Reference Junction | 3720, 3721, or 3724 Cards | 3720, 3721, or 3724 Cards | Range | |
| J | -150 to +760 °C | 0.001°C | 0.2°C | 1.0°C | | -200 to -150 °C | 0.03°C/°C |
| K | -150 to +1372°C | 0.001°C | 0.2°C | 1.0°C | | -200 to -150°C | 0.03°C/°C |
| N | -100 to +1300 °C | 0.001°C | 0.2°C | 1.0°C | | -200 to -100 °C | 0.03°C/°C |
| T | -100 to +400°C | 0.001°C | 0.2°C | 1.0°C | | -200 to -100°C | 0.03°C/°C |
| E | -150 to +1000°C | 0.001°C | 0.2°C | 1.0°C | | -200 to -150°C | 0.03°C/°C |
| R | +400 to +1768°C | 0.1°C | 0.6°C | 1.8°C | | 0 to +400°C | 0.03°C/°C |
| S | +400 to +1768°C | 0.1°C | 0.6°C | 1.8°C | | 0 to +400°C | 0.03°C/°C |
| B | +1100 to +1820°C | 0.1°C | 0.6°C | 1.8°C | | +350 to +1100°C | 0.03°C/°C |

4-Wire RTD or 3-Wire RTD: (100Ω platinum [PT100], D100, F100, PT385, PT3916, or USER 0Ω to 10kΩ. Selectable Offset compensation On or Off).

For 3-Wire RTD, dmm.connect=dmm.CONNECT_FOUR_WIRE, ≤ 0.1Ω lead resistance mis-matching in Input HI and LO. Add 0.25°C/ 0.1Ω of lead resistance mis-match.

| | | | | | | | |
|------------|----------------|---------|--------|--|--|--|------------|
| 4-Wire RTD | -200 to +630°C | 0.001°C | 0.06°C | | | | 0.003°C/°C |
| 3-Wire RTD | -200 to +630°C | 0.001°C | 0.75°C | | | | 0.003°C/°C |

Thermistor:(2.2kΩ, 5kΩ, and 10kΩ). Not recommended with Model 3724 card. See Model 3724 manual for "Measurement Considerations".

| | | | | | | | |
|--|---------------|---------|--------|--|--|--|------------|
| | -80 to +150°C | 0.001°C | 0.08°C | | | | 0.002°C/°C |
|--|---------------|---------|--------|--|--|--|------------|

IPLC and 5PLC RMS Noise are included in DC Specifications.

| DC Speeds vs. RMS Noise | | | | RMS Noise ¹⁶ PPM of Range | | | | | Measurements into Buffer ¹³ | | Measurement to PC ¹³ | | |
|---------------------------------------|----------------------|---------------|--------|---|---------|-----------|------|------|---|-----------------|---------------------------------|--------------|--------------|
| Single Channel, 60Hz (50Hz) Operation | | | | RMS Noise calculator Add 2.5 x "RMS Noise" to "ppm of range" (e.g. 10V @ 0.006plc) "ppm of range" = 2.5 x 7.0ppm + 2ppm | | | | | (Rdg/s) | | (ms / Rdg) ZeroOff | | |
| Function | NPLC | Aperture (ms) | Digits | 100mV | 1V | 10V | 100V | 300V | Azero On | Azero Off | Enet | GPIB | USB |
| DCV | 5 ¹⁴ | 83.3 (100) | 7-½ | 1.0 | 0.07 | 0.05 | 0.7 | 0.2 | 9.5 (8) | 12 (10) | 86.3 (104) | 86.1 (102.8) | 86.3 (103.1) |
| | 1 ¹⁴ | 16.7 (20) | 7-½ | 0.9 | 0.12 | 0.1 | 0.8 | 0.35 | 42 (33) | 59.8 (49.5) | 19.4 (22.7) | 19.5 (22.8) | 19.9 (23.2) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 6-½ | 2.5 | 0.32 | 0.3 | 2.5 | 1.0 | 50 (40) | 60 (50) | 19.4 (22.7) | 19.5 (22.8) | 19.9 (23.2) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 6-½ | 3.5 | 1.7 | 0.7 | 3.5 | 1.5 | 120 (100) | 295 (235) | 7.6 (8.3) | 6.2 (6.8) | 6.4 (7.0) |
| | 0.06 ¹⁵ | 1.0 (1.2) | 5-½ | 12 | 3.0 | 1.5 | 8.0 | 3.5 | 205 (165) | 935 (750) | 1.40 (1.80) | 1.50 (1.80) | 1.60 (2.30) |
| | 0.006 ¹⁵ | 0.100 (0.120) | 4-½ | 55 | 15 | 7.0 | 70 | 35 | 218 (215) | 6,200 (5,500) | 0.55 (0.57) | 0.65 (0.67) | 0.75 (0.77) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 325 | 95 | 95 | 900 | 410 | 270 (270) | 14,600 (14,250) | 0.50 (0.5) | 0.60 (0.60) | 0.70 (0.70) |
| | | | | 10-100Ω | 1KΩ | 10KΩ | | | | | | | |
| 2WΩ (≤10kΩ) | 5 ¹⁴ | 83.3 (100) | 7-½ | 2.0 | 0.5 | 0.4 | — | — | 9.5 (8) | 12 (10) | 87.0 (105) | 86.1 (103) | 86.5 (104) |
| | 1 ¹⁴ | 16.7 (20) | 7-½ | 3.5 | 0.8 | 0.6 | — | — | 42 (33) | 59.8 (49.5) | 21.0 (24.3) | 19.5 (22.8) | 19.9 (23.2) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 6-½ | 6.5 | 1.7 | 1.5 | — | — | 50 (40) | 60 (50) | 21.0 (24.3) | 19.5 (22.8) | 19.9 (23.2) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 6-½ | 8.0 | 4.5 | 5.5 | — | — | 120 (100) | 295 (235) | 7.6 (8.3) | 6.2 (6.8) | 6.4 (7.0) |
| | 0.06 ¹⁵ | 1.0 (1.2) | 5-½ | 15 | 6 | 6.5 | — | — | 205 (165) | 935 (750) | 1.40 (1.80) | 1.50 (1.80) | 1.60 (2.30) |
| | 0.006 ¹⁵ | 0.100 (0.120) | 4-½ | 60 | 15 | 15 | — | — | 218 (215) | 6,200 (5,500) | 0.55 (0.57) | 0.65 (0.67) | 0.75 (0.77) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 190 | 190 | 190 | — | — | 270 (270) | 14,100 (13,700) | 0.50 (0.5) | 0.60 (0.60) | 0.70 (0.70) |
| | | | | 10μA | 100μA | 1mA-100mA | 1A | 3A | | | | | |
| DCI | 5 ¹⁴ | 83.3 (100) | 7-½ | 3.5 | 1.6 | 1.6 | 2.9 | 2.0 | 9.5 (8) | 12 (10) | 88 (103) | 86.1 (102.8) | 86.3 (103.1) |
| | 1 ¹⁴ | 16.7 (20) | 6-½ | 3.5 | 1.1 | 1.1 | 2.2 | 1.8 | 42 (33) | 59.8 (49.5) | 21.0 (22.7) | 19.5 (22.8) | 19.8 (23.1) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 5-½ | 50 | 5.0 | 3.0 | 4.0 | 8.0 | 50 (40) | 60 (50) | 19.4 (22.7) | 19.5 (22.8) | 19.8 (23.1) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 4-½ | 100 | 35 | 12 | 4.0 | 8.0 | 120 (100) | 295 (235) | 7.6 (8.3) | 6.2 (6.8) | 6.4 (7.0) |
| | 0.06 ¹⁵ | 1.0 (1.2) | 4-½ | 350 | 35 | 20 | 8.0 | 20 | 205 (165) | 935 (750) | 1.40 (1.80) | 1.50 (1.80) | 1.60 (2.30) |
| | 0.006 ¹⁵ | 0.100 (0.120) | 4-½ | 400 | 200 | 40 | 50 | 100 | 218 (215) | 6,200 (5,500) | 0.55 (0.57) | 0.65 (0.67) | 0.75 (0.77) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 2500 | 450 | 250 | 325 | 750 | 270 (270) | 14,100 (13,700) | 0.50 (0.5) | 0.60 (0.60) | 0.70 (0.70) |
| | | | | 1Ω | 10-100Ω | 1KΩ | 10KΩ | | | | | | |
| 4WΩ | 5 ¹⁴ | 83.3 (100) | 7-½ | 5.5 | 0.8 | 0.5 | 0.5 | — | 5 (4) | 5.9 (4.7) | 173 (206) | 173 (206) | 173 (206) |
| | 1 ¹⁴ | 16.7 (20) | 7-½ | 15 | 1.4 | 0.5 | 0.7 | — | 23.5 (18.5) | 29 (23) | 39 (46) | 39 (46) | 39 (46) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 5-½ | 100 | 30 | 10 | 50 | — | 26.5 (21) | 30 (24) | 39 (46) | 39 (46) | 39 (46) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 5-½ | 300 | 50 | 10 | 63 | — | 80 (60) | 120 (95) | 12.3 (14.5) | 11.3 (13.3) | 11.7 (13.7) |
| | 0.06 ¹⁵ | 1.0 (1.2) | 4-½ | 500 | 50 | 15 | 70 | — | 140 (110) | 285 (225) | 6.2 (7.2) | 6.3 (7.3) | 6.5 (7.6) |
| | 0.006 ¹⁵ | 0.100 (0.120) | 4-½ | 750 | 75 | 30 | 100 | — | 200 (195) | 580 (565) | 4.2 (4.4) | 4.3 (4.5) | 4.6 (4.8) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 3500 | 450 | 250 | 250 | — | 210 (205) | 650 (645) | 4.2 (4.4) | 4.3 (4.5) | 4.6 (4.8) |
| | | | | 1Ω | 10-100Ω | 1KΩ | 10KΩ | | | | | | |
| 4WΩ OCOMP | 5 ¹⁴ | 83.3 (100) | 7-½ | 5.5 | 0.8 | 0.5 | 0.5 | — | 2.5 (2.0) | 2.9 (2.3) | 343 (427) | 341 (425) | 342 (426) |
| | 1 ¹⁴ | 16.7 (20) | 7-½ | 16 | 1.5 | 0.7 | 1.5 | — | 12.7(10) | 14 (11.2) | 77 (95) | 74 (92) | 75 (93) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 6-½ | 45 | 4.5 | 2.1 | 3.5 | — | 14 (11.2) | 15 (12) | 70 (86.5) | 70 (86.5) | 70 (86.5) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 5-½ | 500 | 50 | 13 | 30 | — | 46.5 (37) | 56 (44) | 22.7 (25) | 20.5 (23) | 21.1 (24) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 4500 | 650 | 400 | 400 | — | 129 (125) | 215 (210) | 6.7 (6.7) | 6.8 (6.8) | 7 (7) |
| | | | | 1-10Ω | 100Ω | 1KΩ | 2KΩ | | | | | | |
| Dry-CktΩ OCOMP | 5 ¹⁴ | 83.3 (100) | 6-½ | 8.0 | 10 | 10 | 8.0 | — | 2.5 (2.0) | 2.9 (2.3) | 347 (430) | 345 (428) | 346 (429) |
| | 1 ¹⁴ | 16.7 (20) | 5-½ | 17 | 22 | 25 | 28 | — | 12 (9.5) | 13 (10) | 80 (99) | 77 (95) | 78 (97) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 4-½ | 50 | 50 | 50 | 50 | — | 14 (11.2) | 15 (12) | 70 (86.5) | 70 (86.5) | 70 (86.5) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 3-½ | 500 | 1000 | 1000 | 1500 | — | 35 (30) | 45 (36) | 27 (33) | 25 (31) | 26 (32) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 2-½ | 8500 | 8500 | 8500 | 8500 | — | 84 (84) | 115 (110) | 10.7 (10.7) | 10.7 (10.7) | 11 (11) |

| 1 PLC and 5 PLC Noise are included in RTD Specifications. | | | | | | | | | | |
|---|----------------------|---------------|--------|---------------------------------|--------|--|-----------|---------------------------------|-------------|-------------|
| RTD Speeds vs. Noise | | | | Add °C to Reading ¹⁶ | | Measurements into Buffer ¹³ | | Measurement to PC ¹³ | | |
| Single Channel, 60Hz (50Hz) Operation | | | | | | (Rdg/s) | | (ms / Rdg) AzeroOff | | |
| Function | NPLC | Aperture (ms) | Digits | 4-Wire | 3-Wire | Azero On | Azero Off | Enet | GPIB | USB |
| OCOMP OFF | 5 ¹⁴ | 83.3 (100) | 7-½ | 0 | 0 | 5 (4) | 5.9 (4.7) | 173 (206) | 173 (206) | 173 (206) |
| | 1 ¹⁴ | 16.7 (20) | 7-½ | 0 | 0 | 23.5 (18.5) | 29 (23) | 39 (46) | 39 (46) | 39 (46) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 5-½ | 0.01 | 0.01 | 26.5 (21) | 30 (24) | 39 (46) | 39 (46) | 39 (46) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 5-½ | 0.18 | 0.18 | 80 (60) | 120 (95) | 12.3 (14.5) | 11.3 (13.3) | 11.7 (13.7) |
| | 0.06 ¹⁵ | 1.0 (1.2) | 4-½ | 0.24 | 0.24 | 140 (110) | 285 (225) | 6.2 (7.2) | 6.3 (7.3) | 6.5 (7.6) |
| OCOMP ON | 5 ¹⁴ | 83.3 (100) | 7-½ | 0 | 0 | 2.5 (2.0) | 2.9 (2.3) | 343 (427) | 341 (425) | 342 (426) |
| | 1 ¹⁴ | 16.7 (20) | 7-½ | 0 | 0 | 12.7(10) | 14 (11.2) | 77 (95) | 74 (92) | 75 (93) |
| | 0.2 ^{12,14} | 3.33 (4.0) | 6-½ | 0.02 | 0.02 | 14 (11.2) | 15 (12) | 70 (86.5) | 70 (86.5) | 70 (86.5) |
| | 0.2 ¹⁴ | 3.33 (4.0) | 5-½ | 0.38 | 0.38 | 46.0 (37) | 56 (44) | 22.7 (25) | 20.5 (23) | 21.1 (24) |
| | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 4.67 | 4.67 | 128 (125) | 215 (210) | 6.7 (6.7) | 6.8 (6.8) | 7 (7) |

System Performance ^{13, 14}

3-1/2 Digit Mode, azero off, and nPLC=0.0005. Time includes function change from either DCV or 2WΩ to listed function.

| Function | Function Change (msec) | Range Change (msec) | Auto-range (msec) |
|-----------------------------------|------------------------|---------------------|-------------------|
| DCV or 2WΩ (<10KΩ) | 10 | 10 | 10 |
| 4WΩ (<10k) | 20 | 20 | 20 |
| DCI | 10 | 10 | 10 |
| Frequency or Period ¹⁷ | 110 | 10 | — |
| ACV or ACI ¹⁷ | 20 | 85 | 300 |

| Buffer Transfer Speed | Enet | GPIB | USB |
|--|--------|--------|--------|
| Average for 1000 readings | 2450/s | 2000/s | 1800/s |
| Average for 1000 readings with timestamp | 2300/s | 1800/s | 1600/s |

| Card | Command | Single Command Execution time (ms) | | |
|--------------------------------------|---|------------------------------------|------|------|
| | | Enet | GPIB | USB |
| 3720, 3721, 3722, 3730 | channel.close (ch_list) or channel.open (ch_list) | 5.7 | 5.8 | 6.1 |
| 3723, 3724, 3731, 3732 ¹⁸ | channel.close (ch_list) or channel.open (ch_list) | 2.3 | 2.4 | 2.7 |
| 3740 | channel.close (ch_list 1-28) or channel.open (ch_list 1-28) | 10.7 | 10.8 | 11.1 |
| | channel.close (ch_list 29-32) or channel.open (ch_list 29-32) | 22.7 | 22.8 | 23.1 |

| AC Speeds | | | | Measurements into Buffer ¹³ | | | Measurement to PC ¹³ | | |
|---------------------------------------|--------------------|----------------------|---------------|--|-----------------------------|-----------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Single Channel, 60Hz (50Hz) Operation | | | | (Rdg/s) | | | (ms / Rdg) | | |
| Function | Detector Bandwidth | NPLC | Aperture (ms) | Digits | Azero On | Azero Off | Enet | GPIB | USB |
| ACI / ACV | 3 | n/a | n/a | 6-½ | 0.45 (0.45) | n/a | 2150 (2150) | 2150 (2150) | 2150 (2150) |
| | 30 | n/a | n/a | 6-½ | 2.5 (2.5) | n/a | 400 (400) | 400 (400) | 400 (400) |
| | 300 | 1.0 ¹⁴ | 16.67 (20) | 6-½ | 42 (33) | 59.5 (50) | 19.4 (22.7) | 19.5 (22.8) | 19.8 (23.1) |
| | 300 | 0.2 ¹⁴ | 3.33 (4.0) | 6-½ | 120 (100) | 295 (235) | 7.6 (8.3) | 6.2 (6.8) | 6.4 (7.0) |
| | 300 | 0.06 ¹⁵ | 1.0 (1.2) | 5-½ | 170 (165) | 935 (750) | 1.40 (1.80) | 1.50 (1.80) | 1.60 (2.30) |
| | 300 | 0.006 ¹⁵ | 0.100 (0.120) | 4-½ | 218 (215) | 6,200 (5,500) | 0.55 (0.57) | 0.65 (0.67) | 0.75 (0.77) |
| | 300 | 0.0005 ¹⁵ | 0.0083 (0.01) | 3-½ | 218 (215) | 14,600 (14,250) | 0.50 (0.5) | 0.60 (0.60) | 0.70 (0.70) |
| Frequency / Period | n/a | | 10 → 273 | n/a | 2x input period + Gate time | n/a | 2x input period + Gate time + 2.7ms | 2x input period + Gate time + 2.8ms | 2x input period + Gate time + 3.1ms |

DC Notes

DC Measurement Characteristics

DC Volts:

A-D LINEARITY: 1.0 ppm of reading + 2.0 ppm of range.

INPUT IMPEDANCE:

100mV – 10V Ranges: Selectable >10GΩ// <400pF or 10MΩ ±1%.

100V – 300V ranges: 10MΩ ±1%.

Input Bias Current: <50pA at 23°C with dmm.autozero=dmm.OFF or dmm.inputdivider=dmm.ON.

Common Mode Current: <500nA peak-to-peak for ≤1MHz.

Autozero OFF Error: For DCV ±1°C and ≤10minutes,

Add ±(8ppm of reading + 5μV).

Input Protection: 300V all ranges.

Common Mode Voltage: 300V DC or 300Vrms (425V peak for AC waveforms) between any terminal and chassis.

Resistance:

MAX 4WΩ LEAD RESISTANCE: 5Ω per lead for 1Ω range, 10% of range per lead for 10Ω → 1kΩ ranges; 1kΩ per lead for all other ranges.

For Dry Circuit.

MAX 4WΩ LEAD RESISTANCE: 0.5Ω per lead for 1Ω range; 10% of range per lead for 10Ω → 100Ω ranges; 50Ω per lead for 1kΩ → 2kΩ range.

INPUT IMPEDANCE:

1Ω – 10Ω Ranges: 99kΩ ±1% // <1μF.

100Ω – 2KΩ Ranges: 10MΩ ±1% // <0.015μF.

OFFSET COMPENSATION: Selectable on 4WΩ 1Ω → 10kΩ ranges.

OPEN LEAD DETECTOR: Selectable per channel. 1.5uA, ±20% sink current per DMM SHI and SLO lead. Default on.

CONTINUITY THRESHOLD: Adjustable 1 to 1000Ω.

Autozero OFF Error: For 2WΩ ±1°C and ≤10 minutes,

Add ±(8ppm of reading + 0.5mΩ for 10Ω and 5mΩ for all other ranges).

INPUT PROTECTION: 300V all ranges.

DC Current:

Autozero OFF Error: For ±1°C and ≤10 minutes,

Add ±(8 ppm of reading + range error). Refer to table below.

| Range | 3A | 1A | 100mA | 10mA | 1mA | 100μA | 10μA |
|---|--------|--------|-------|--------|--------|--------|--------|
| Shunt Resistance guaranteed by design | 0.05Ω | 0.05Ω | 1Ω | 10Ω | 100Ω | 1kΩ | 6kΩ |
| Burden Voltage | <1.75V | <0.55V | <0.4V | <150mV | <130mV | <105mV | <61mV |
| Burden Voltage with 3721 card | <2.35V | <1.15V | <0.4V | <150mV | <130mV | <105mV | <61mV |
| Autozero OFF "of range" error | 100μA | 100μA | 5μA | 0.5μA | 50nA | 5nA | 0.85nA |
| For each additional amp after ±1.5A input, add the following to ppm of range. | — | 120 | 60 | 60 | 60 | 60 | 95 |

INPUT PROTECTION: 3A, 250V fuse.

Thermocouples:

CONVERSION: ITS-90.

REFERENCE JUNCTION: Internal, External, or Simulated (Fixed).

OPEN LEAD DETECTOR: Selectable per channel. Open >1.15k ±50Ω. Default on.

COMMON MODE ISOLATION: 300V DC or 300Vrms (425V peak for AC waveforms), >10GΩ and <350pF any terminal to chassis.

End DC

DC Notes

- 20% overrange on DC functions except 1% on 300V and 3.33% on 3A.
- ±5% (Measured with 10MΩ input Resistance DMM, >10GΩ DMM on 10MΩ and 100MΩ ranges). Refer to table for other 2W/4W configurations. For Dry Circuit, +20%, <1mV with dmm.offsetcompensation=ON for 100Ω → 2kΩ ranges.

| Range | 2W | Ocomp Off | | Ocomp On | |
|------------|-------|-----------|-------------|----------|-------------|
| | | 4W | 4W - Kelvin | 4W | 4W - Kelvin |
| 1, 10Ω | 8.2V | 8.2V | 8.2V | 12.1V | 12.1V |
| 100, 1kΩ | 13.9V | 14.1V | 13.9V | 15.0V | 12.7V |
| 10kΩ | 9.1V | 9.1V | 9.1V | 0.0V | 0.0V |
| 100k, 1MΩ | 12.7V | 14.7V | 12.7V | — | — |
| 10M, 100MΩ | 6.4V | 6.4V | 6.4V | — | — |

- Relative to calibration accuracy.
- Add the following additional uncertainty with -ST Accessory:

| Cards | "ppm of range" | | | "ppm of reading + ppm of range" | | | |
|----------------------------|----------------|-----|-----|---------------------------------|----------|---------|----------|
| | 100mV | 1V | 10V | 100kΩ | 1MΩ | 10MΩ | 100MΩ |
| 3720, 3721, 3722, and 3730 | 45 | 4.5 | - | 8 + 5 | 8 + 0.5 | - | - |
| 3723 | 60 | 6.0 | - | 8 + 6 | 8 + 0.5 | - | - |
| 3724 | 45 | 4.5 | - | 8 + 5 | 80 + 0.5 | 250 + 1 | 5000 + 1 |
| 3731 | 800 | 80 | 8 | 8 + 80 | 40 + 8 | 0 + 25 | 0 + 15 |
| 3732 (Quad 4x28) | 200 | 20 | 2 | 8 + 20 | 40 + 2 | 0 + 7 | 0 + 4 |

- Specifications are for 4-wire Ω, 1Ω → 1kΩ with offset compensation on. For the Model 3700 plug-in cards, LSYNC and offset compensation on. 1Ω range is 4-wire only. The Model 3724 card, 1kΩ → 100MΩ and 3731 card, 100Ω → 100MΩ ranges only.

For 2-wire Ω specifications, add the following to "ppm of range" uncertainty:

| DMM Connect Relays | Rel Enable | Rear Panel Connector or 3700 Card | 3724 Card | 3731 Card |
|--------------------|------------|-----------------------------------|-----------|-----------|
| CONNECT_ALL | ON | 100mΩ | 500mΩ | 900mΩ |
| CONNECT_ALL | OFF | 1.5Ω | 64Ω | 2.3Ω |
| CONNECT_TWO_WIRE | ON | 700mΩ | 1.2Ω | 1.5Ω |
| CONNECT_TWO_WIRE | OFF | 1.5Ω | 64Ω | 2.3Ω |

- Test current with dmm.offsetcompensation=OFF, (± 5%).
- Add the following to "ppm of reading" uncertainty when using 3700 plug in cards in Operating Environment ≥50%RH.

| Card | 10kΩ | 100kΩ | 1MΩ | 10MΩ | 100MΩ |
|---|-------|---------|-------|------|-------|
| 3720, 3721, 3724, 3730, 3731, 3732 (Quad 4x28) with MTC D-Shell connector | 1ppm | 10 ppm | 0.01% | 0.1% | 1% |
| 3720, 3721, 3724, 3730, 3731, 3732 (Quad 4x28) with -ST screw terminal module | 10ppm | 100 ppm | 0.1% | 1% | 10% |
| 3722 and 3723 | 10ppm | 100 ppm | 0.1% | 1% | 10% |

3700 plug in cards Operating Environment: Specified for 0°C to 50°C, ≤70%RH at 35°C.

- Dry-Circuit Ω is 4-wire only. Specifications with offset compensation and LSYNC on.

| Card | Ranges |
|----------------------|------------|
| 3720, 3721, and 3730 | 1Ω → 2kΩ |
| 3722, 3723, and 3732 | 10Ω → 2kΩ |
| 3724 | 1kΩ → 2kΩ |
| 3731 | 100Ω → 2kΩ |

- Includes Analog Backplane 15-pin rear panel connector. For 3721, refer to DC Current table for additional uncertainties.

- For LSYNC On, line frequency +/-0.1%.

| | nPLC | 5 | 1 | ≤0.2 | ≤0.01 |
|-----------|------|------------|------------|------|-------|
| LSYNC On | NMRR | 110 dB | 90dB | 45dB | — |
| LSYNC Off | NMRR | 60dB, ±2dB | 60dB, ±2dB | — | — |

- For 1kohm unbalance in LO lead. AC CMRR is 70dB.

| nPLC | 5 | 1 | 0.2 ¹² | ≤0.2 |
|------|--------|-------|-------------------|------|
| CMRR | 140 dB | 140dB | 120dB | 80dB |

- For LSYNC On.
- Reading rates are for 60Hz (50Hz) operation using factory defaults operating conditions dmm.reset("all"), Autorange off, dmm.autodelay=dmm.OFF, dmm.opendetector=dmm.OFF, format.data=format.SREAL. Rates listed below.

| Function | Range |
|--------------------------------|---------------------|
| DCV | 10V |
| 2WΩ or 4WΩ | 1KΩ |
| DCI | 1mA |
| Dry-Circuit Ω | 10Ω |
| Dry-Circuit Ω, Offset Comp OFF | 2KΩ, 60 rdg/s max |
| Dry-Circuit Ω, Offset Comp ON | 2KΩ, 29.5 rdg/s max |
| ACI | 1mA |
| ACV | 1V |
| T/C | Use DCV rates |
| Thermistor | Use 2WΩ rates |

Speeds are typical and include measurement and data transfer out the Enet, GPIB or USB.

- DMM configured for single reading, dmm.measurecount=1 and print(dmm.measure()). May require additional settling delays for full accuracy depending on measurement configuration.
- DMM configured for multi-sample readings and single buffer transfer, dmm.measurecount=1000, buf=dmm.makebuffer(1000), dmm.measure(buf), and printbuffer(1, 1000, buf).
- dmm.autozero=dmm.ON. RMS Noise using low thermal short for DCV, 2WΩ, 4WΩ, and Dry-Circuit Ω. For DCI, dmm.connect=dmm.CONNECT_NONE or 0. For RTD, Noise using low thermal 190Ω precision resistor. Includes Model 3721 card accuracies. RMS Noise values are typical.
- For DCV or 2W to Frequency or Period, dmm.nplc=0.2 and dmm.aperture=0.01 sec. For ACI or ACV, dmm.detectorbandwidth=300. For ACI or ACV with dmm.autodelay=dmm.ON, best speed is 65ms.
- Speeds are within same Mux bank. Add an additional 8msec when changing banks or slots.
- When properly zeroed using REL function.

AC

| Function | Range ¹ | Resolution | Calibration Cycle | Accuracy: ± (% of reading + % of range) 23°C ± 5° | | | | | |
|--------------------------------------|-------------------------|------------|---|---|--------------------|--------------------|--------------------|---------------------|-----------------|
| | | | | 3 Hz – 5Hz | 5Hz – 10Hz | 10Hz – 20kHz | 20kHz – 50kHz | 50kHz – 100kHz | 100kHz – 300kHz |
| Voltage ² | 100.0000mV | 0.1µV | 90 Day | 1.0 + 0.03 | 0.30 + 0.03 | 0.05 + 0.03 | 0.11 + 0.05 | 0.6 + 0.08 | 4.0 + 0.5 |
| | 1.000000V | 1µV | (100mV – 100V) | | | | | | |
| | 10.00000V | 10µV | 1 Year | 1.0 + 0.03 | 0.30 + 0.03 | 0.06 + 0.03 | 0.12 + 0.05 | 0.6 + 0.08 | 4.0 + 0.5 |
| | 100.0000V | 100µV | (100mV – 100V) | | | | | | |
| | 300.0000V | 1mV | 90 Day | 1.0 + 0.05 | 0.30 + 0.05 | 0.05 + 0.05 | 0.11 + 0.08 | 0.6 + 0.11 | 4.0 + 0.8 |
| | 300.0000V | 1mV | 1 Year | 1.0 + 0.05 | 0.30 + 0.05 | 0.06 + 0.05 | 0.12 + 0.08 | 0.6 + 0.11 | 4.0 + 0.8 |
| | | | Temp. Coeff. /°C ³ (all ranges) | 0.10 + 0.003 | 0.030 + 0.003 | 0.005 + 0.003 | 0.006 + 0.005 | 0.01 + 0.006 | 0.03 + 0.01 |
| | | | | 3 Hz – 5Hz | 5 Hz – 10Hz | 10Hz – 2kHz | 2kHz – 5kHz | 5kHz – 10kHz | |
| Current ² | 1.000000mA ⁷ | 1nA | | 1.0 + 0.04 | 0.30 + 0.04 | 0.08 + 0.03 | 0.09 + 0.03 | 0.09 + 0.03 | |
| | 10.00000mA | 10nA | | 1.0 + 0.04 | 0.30 + 0.04 | 0.08 + 0.03 | 0.09 + 0.03 | 0.09 + 0.03 | |
| | 100.0000mA | 100nA | 90 Day / 1 Year | 1.0 + 0.04 | 0.30 + 0.04 | 0.08 + 0.03 | 0.09 + 0.03 | 0.09 + 0.03 | |
| | 1.000000A | 1µA | | 1.0 + 0.04 | 0.30 + 0.04 | 0.20 + 0.04 | 0.88 + 0.04 | 2.0 + 0.04 | |
| | 3.00000A | 10µA | | 1.0 + 0.05 | 0.30 + 0.05 | 0.20 + 0.05 | 0.88 + 0.05 | 2.0 + 0.05 | |
| | | | | Temp. Coeff. /°C ³ (all ranges) | 0.10 + 0.004 | 0.030 + 0.004 | 0.005 + 0.003 | 0.006 + 0.005 | 0.006 + 0.005 |
| | | | Accuracy: | ±(ppm of reading + offset ppm) (3Hz – 500kHz) | (333ms – 2µs) | | | | |
| Frequency ⁴ and Period | 100.0000mV | 0.333 ppm | | 80 + 0.333 | 80 + 0.333 | (0.25s gate) | | | |
| | to | 3.33 ppm | 90 Day / 1 Year | 80 + 3.33 | 80 + 3.33 | (100ms gate) | | | |
| | 300.000V | 33.3 ppm | (all ranges) | 80 + 33.3 | 80 + 33.3 | (10ms gate) | | | |

| Additional Uncertainty ±(% of reading) | Detector bandwidth | | | |
|--|---------------------------|---------------------|-----------------------|-------------------------|
| | Low Frequency Uncertainty | 3 (3Hz – 300kHz) | 30 (30Hz – 300kHz) | 300 (300Hz – 300kHz) |
| 20Hz – 30Hz | | 0 | 0.3 | — |
| 30Hz – 50Hz | | 0 | 0 | — |
| 50Hz – 100Hz | | 0 | 0 | 4.0 |
| 100Hz – 200Hz | | 0 | 0 | 0.72 |
| 200Hz – 300Hz | | 0 | 0 | 0.18 |
| 300Hz – 500Hz | | 0 | 0 | 0.07 |
| >500Hz | | 0 | 0 | 0 |

| Additional Uncertainty ±(% of reading) | Detector bandwidth | Crest Factor ⁵ | | | |
|--|--------------------|---------------------------|-------|-------|-------|
| | | 1 - 2 | 2 - 3 | 3 - 4 | 4 - 5 |
| 5Hz – 10Hz | 3 | 0.50 | 1.20 | 1.30 | 1.40 |
| 10Hz – 30Hz | 3 | 0.20 | 0.30 | 0.60 | 0.90 |
| 30Hz – 100Hz | 3 or 30 | 0.20 | 0.30 | 0.60 | 0.90 |
| >100Hz | 3 or 30 | 0.05 | 0.15 | 0.30 | 0.40 |
| 300Hz – 500Hz | 300 only | 0.50 | 1.20 | 1.30 | 1.40 |
| ≥500Hz | 300 only | 0.05 | 0.15 | 0.30 | 0.40 |

AC MEASUREMENT CHARACTERISTICS

AC Volts

MEASUREMENT METHOD: AC-coupled, True RMS.

INPUT IMPEDANCE: 1MΩ±2% // by <150pF.

INPUT PROTECTION: 300VDC or 300Vrms rear inputs or 37xx cards.

AC Current

MEASUREMENT METHOD: AC-coupled, True RMS.

| Range | 3A | 1A | 100mA | 10mA | 1mA |
|---------------------------------------|-----------|-----------|----------|-----------|-----------|
| Shunt Resistance guaranteed by design | 0.05Ω | 0.05Ω | 1.0Ω | 10Ω | 100Ω |
| Burden Voltage Rear panel | <1.75Vrms | <0.55Vrms | <0.4Vrms | <150mVrms | <125mVrms |
| Burden Voltage 3721card | <2.4Vrms | <1.0Vrms | <0.6Vrms | <200mVrms | <130mVrms |

INPUT PROTECTION: 3A, 250V fuse.

FREQUENCY and PERIOD

MEASUREMENT METHOD: Reciprocal Counting technique.

GATE TIME: dmm.aperture=0.273 → 0.01. Default 0.01s.

AC General

AC CMRR⁶: 70dB

VOLT * HERTZ PRODUCT: ≤8 × 10⁷ Volt*Hz (guaranteed by design), ≤2.1 × 10⁷ Volt*Hz verified. Input frequency verified for ≤3x10⁵ Hz.

AC Notes

- 20 % overrange on AC functions except 1% on 300V and 3.33% on 3A. Default resolution is 5-½ digits; maximum useable resolution is 6-½ with 7-½ digits programmable.
- Specification are for Detector Bandwidth 3 and sinewave inputs >5% of range. Detector Bandwidth 3 and 30 are multi-sample A/D conversions. Detector bandwidth 300 is a single A/D conversion, programmable from 0.0005plc to 15plc. Default condition set to 1plc.
- Applies to 0°C - 18°C and 28°C - 50°C.
- Specified for square wave inputs. Input signal must be >10% of ACV range. If input is <20mV on the 100mV range then the frequency must be >10Hz. For sinewave inputs, frequency must be >100Hz.
- Applies for non-sinewave inputs, 5Hz → 10kHz, and DC content ≤3% of range.
- For 1kohm unbalance in LO lead.
- For Model 3721, 1mA ACI, add 0.05% to “of reading” uncertainty from 250Hz → 10kHz.

GENERAL SPECIFICATIONS

EXPANSION SLOTS: 6
POWER LINE: Universal, 100V to 240V.
LINE FREQUENCY: 50Hz and 60Hz, automatically sensed at power-up.
POWER CONSUMPTION: 28VA with DMM and display, up to 140VA with (6) 3700 cards.
OPERATING ENVIRONMENT: Specified for 0°C to 50°C, ≤80%RH at 35°C, altitude up to 2000 meters
STORAGE ENVIRONMENT: -40°C to 70°C.
REAL TIME CLOCK: Battery backed, 10-years typical life.
WARRANTY: 1-yr.
EMC: Conforms to European Union EMC Directive.
SAFETY: Conforms to European Union Low Voltage Directive.
VIBRATION: MIL-PRF-28800F Class 3, Random.
WARM-UP: 2-hours to rated accuracy.

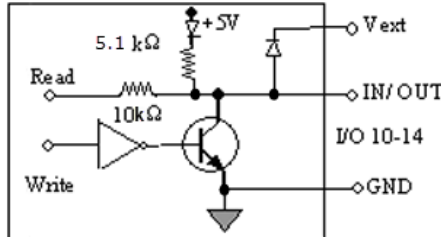
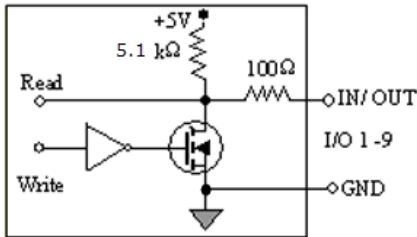
DIMENSIONS:

| | High | Wide | Deep |
|--|----------------------|-------------------|-------------------|
| Rack Mounted | 89mm (3.5 in.) | 483mm (19 in.) | 457mm (18 in.) |
| Bench Configuration (includes handle and feet) | 104mm (4.125 in.) | 483mm (19 in.) | 457mm (18 in.) |

SHIPPING WEIGHT: 13kg (28 lbs).

DIGITAL I/O: 25-pin female D-shell.

| | I/O 1-9 | I/O 10-14 | Vext |
|-----------------------------|-------------------|-------------------|-------------|
| ISINK, max | 5mA | 250mA | — |
| ISource, max | 960µa | 980µa | — |
| Absolute VIN | 5.25V → -0.25V | 5.25V → -0.25V | 5V → 33V |
| VIH min | 2.2V | 2.2V | — |
| VIL max | 0.7V | 0.7V | — |
| VOL max at 5mA Isink | 0.7V | 0.7V | — |
| VOL max at Isink max | — | 2.3V | — |
| VOH min, 0.4mA sour | 2.7V | 2.4V | — |
| Min VIN pulse | 2µs | 10µs | — |
| Min VO pulse | 1µs | 50µs | — |



TRIGGERING AND MEMORY: **Window Filter Sensitivity:** 0.01%, 0.1%, 1%, 10%, or full-scale of range (none).
Trigger Delay: 0 to 99 hrs (10us step size)
External Trigger Delay: <10us.
Memory: Up to 650,000 time-stamped readings with web page disabled. Additional memory available with external "thumb drive".
Non-volatile Memory: Single user save setup, with up to 75 DMM configurations and ≥600 Channel Patterns (dependent on name length, DMM function and configuration, and pattern image size). Additional memory available with external "thumb drive".

MATH FUNCTIONS: Rel, dB, Limit Test, %, 1/x, and mX + b with user defined displayed.

REMOTE INTERFACE: Ethernet: RJ-45 connector, LXI Class C V1.3, 10/100BT, auto MDIX.

GPIB: IEEE-488.1 compliant. Supports IEEE-488.2 common commands and status model topology.

USB device (rear panel, type B): USB 2.0, high speed, USBTMC compliant.

USB host (front panel, type A): USB 2.0, high speed, support for thumb drives.

LXI COMPLIANCE: LXI Class B V1.3 with V2.0 IEEE 1588-2008 precision time protocol.

LXI TIMING (applies to scanning) and SPECIFICATION:

 Receive LAN[0-7] event delay: n/s. Min, 800us. Typ., n/s Max.
 Alarm to trigger delay: 25 us. Min., 50us. Typ., n/s Max..
 Generate LAN[0-7] event: n/s. Min., 800us. Typ., n/s Max.
 [minimums are probabilistic and represent a 95% confidence factor]
 Clock accuracy: 25 ppm.
 Synchronization accuracy: < 150ns. [probabilistic and represent a 95% confidence factor]
 Timestamp accuracy: 100 us.
 Timestamp resolution: 20 ns.

LANGUAGE: Embedded Test Script Processor (TSP) accessible from any host interface. Responds to individual Instrument Control Library (ICL) commands. Responds to high-speed test scripts comprised of ICL commands and Test Script Language (TSL) statements (e.g. branching, looping, math, etc.). Able to execute high-speed test scripts stored in memory without host intervention.

ACCESSORIES SUPPLIED: Product Information CD-ROM and 3m Ethernet cable.

ACCESSORIES AVAILABLE: 3700 Cards, 3700-MTC cables, 3706-BKPL (analog backplane extender), 3706A-3Y/5Y-EW (extended warranty)

 C/3706A-3Y (Calibration / Data / ISO 17025), Software IVI/VISA drivers for VB, VC/C++, LabView, TSP Script, Script Builder, and LabWindows/CVI.

IP CONFIGURATION: Static, DHCP, or mDNS.

PASSWORD PROTECTION: 11 characters

MINIMUM PC HARDWARE: Intel Pentium 3, 800MHz, 512Mbyte RAM, 210Mbyte disk space or better.

OPERATING SYSTEMS /SOFTWARE: Windows 2000 and XP compatible, supports Web browsers with Java plug-in (requires Java plug-in 1.6 or higher). Web pages served by 3706.

Specifications are subject to change without notice.