KNM-DCV41 & 42
Isolated Precision DC Volts and Ohms

Functional Description

The Models DCV41 and DCV42 are isolated high precision, general-purpose measuring instruments designed for computer-based systems in field, factory and laboratory applications. A wide array of communication interfaces provide measurements to any network. Up to six differential or three 4-wire inputs in any combination are accommodated by the Model DCV42. The Model DCV41 accommodates one differential, 4-wire, or digital input. Any input channel can be defined as any of the standard input types: DC Volts, Ohms, Thermistor, RTD, thermocouple, or digital input. Other input types can be defined with user selectable scaling functions and four-character units designator. A precision sigma delta A/D converter delivers up to 15 readings per second at full accuracy. On-board reading memory can buffer up to 10,000 8-bit readings, 8,000 16-bit readings or 3,500 20-bit readings.

Standard Features

Limits: Two, high or low per channel; can be associated with a digital output

Scaling: Zero, span, mX+b with units per channel

Statistics: Maximum and minimum readings per channel

Scanning: Time interval, on command, and level triggered scans. Set number of scans and pre-trigger percent.

Data Fields: Configure readings by value and/or channel number and/or channel tag and/or units and/or reading number and/or time & date and/or limit status.

Data Storage: Configure reading memory size and resolution; wrap or stop when full; ASCII or binary

Product Highlights

- 1500V Isolation, 400V Inputs
- Throughput to 15 rdgs/sec max
- 6 Fully Isolated or 3 four-wire Channels
- DC Volts, Ohms, RTD's, Thermistors, Thermocouples, Digital Input on any channel
- 1 Digital Output
- 24 Hour Accuracy ±0.0028%
- 5 Year Warranty
- 5 Year ±30°C Accuracy ±0.01%FS
- Miniature Package

Specifications

General

Power Supply:	9.5 to 34 VDC, reverse polarity protected, up to 10% ripple with no degradation, maximum 36VDC.
Power Consumption:	3.5W, 5W max. w/Ethernet.
Operating Environment:	-5°C to 65°C, 0-95% RH (NC), Specifications valid for 0-70%RH (NC) up to 35°C; up from 35°C - 65°C linearly derate 3% RH/°C.
Storage Environment:	-20°C to 85°C.
Altitude:	10,000 feet (3,050m) operating 40,000 feet (12,200m) non-operating.
Electrical Safety:	Designed to meet: IEC1010, CSA C22.2 No. 231, UL3111.
EMI Emissions:	EN55022 Class B, FCC Part 15 Class A
EMI Immunity:	EN50082-1, IEC 801-3 A.
Electrostatic Immunity:	EN50082-1, IEC 801-2 B
Common Mode Fast Transient:	EN50082-1, IEC 801-4 B
Environmental Protection:	NEMA 4, IP 65 For Industrial Enclosure (-I).
Vibration:	0.25mm @ resonance for 15 min.
Warm-up (full accuracy):	40 minutes (maximum)
Mounting:	DIN Rail or Screw Mount
Net Weight:	< 0.5 lb. (< 0.25 kg)
Dimensions (LWH):	6.7 in. x 1.3 in. x 1.1 in. 17.0 cm x 3.3 cm x 2.7 cm
Warranty:	5 Years

ACCURACY & RESOLUTION [4]

Function	Range	5 Year Accuracy [1]	24 hr. Accuracy [2]	Resolution
DC Volts [6]				
	20mV	±0.099%+20 µV	±0.0030%+2.5µV	±100µV
	200mV	±0.099%+80 µV	±0.0030%+5µV	±1µV
	2V [3]	±0.099%+80 µV	±0.0028%+27µV	±10µV
	20V [3]	±0.12%+8 mV	±0.0031%+400µV	±100µV
	200V [3]	±0.12%+10 mV	±0.0034%+5mV	±1mV
	400V [3]	±0.12%+20 mV	±0.0034%+20mV	±10mV
Resistance				
	200Ω (4Wire) [5]	±0.04%+7mΩ	±0.0026%+5mΩ	±1mΩ
	2kΩ (4Wire) [5]	±0.035%+40mΩ	±0.0026%+40mΩ	±10mΩ
	20kΩ (4Wire) [5]	±0.047%+.7Ω	±0.0034%+500mΩ	±100mΩ
	200kΩ (4Wire) [5]	±0.057%+3Ω	±0.0042%+3Ω	±1Ω
	2MΩ (2Wire) [7]	±1.03%+320Ω	±0.035%+85Ω	±10Ω
	20MΩ (2Wire) [7]	±2.54%+2kΩ	±0.080%+500Ω	±100Ω
	200MΩ (2Wire) [7]	±12.4%+125kΩ	±0.500%+14kΩ	±1kΩ
RTD's - 4Wire [5] (100 Ω type 385 or 3916)				
	-200°C to +70°C	±0.13°C	±0.019°C	±0.001°C
	+70°C to +200°C	±0.20°C	±0.025°C	±0.001°C
	+200°C to +800°C	±0.58°C	±0.180°C	±0.001°C
Thermistors - 4 Wire [5] (100 Ω to 1MΩ)				
	-80°C to +10°C	±0.64°C	±0.02°C	±0.0125°C
	+10°C to +70°C	±0.46°C	±0.013°C	±0.0125°C
	+70°C to +250°C	±0.064°C	±0.03°C	±0.0125°C
Thermocouples				
Type J	-100°C to 760°C	±0.5°C	±0.4°C	±0.01°C
Type K	-100°C to 1350°C	±0.8°C	±0.4°C	±0.01°C
Type R	0°C to1 767°C	±2.0°C	±0.5°C	±0.01°C
Type E	-100°C to 838°C	±0.5°C	±0.4°C	±0.01°C
Type S	-200°C to 1760°C	±1.8°C	±0.5°C	±0.01°C
Type T	-100°C to 400°C	±0.5°C	±0.4°C	±0.01°C
Type N	-100°C to 400°C	±0.5°C	±0.4°C	±0.01°C

1. Measurement Accuracy = [(measured value x % accuracy) / 100] + offset. e.g. 24 hour, 1kΩ accuracy = [(1000 x 0.0026%) /100] + 40mΩ = 66mΩ if running at higher speeds. add noise @ max speed from chart below. To adjust for intermediate temperature range or time, add values below to 24 hour accuracy.

STABILITY

FUNCTION/ RANGE	TEMPERATURE COEFFICIENT [1,2] ADDITIONAL ERROR AT AMBIENT OF: ±1°C	±5°C	±10°C	±30°C
DC Volts				
20mV	±0.0%	±0.01%+1µV	±0.022%+6µV	±0.068%+76µV
200mV	±0.0%	±0.01%+1µV	±0.022%+6µV	±0.068%+76µV
2V	±0.0%	±0.01%+0	±0.022%+0	±0.068%+53µV
20V	±0.0%	±0.011%+.1mV	±0.023%+.6mV	±0.077%+7.6mV
40V	±0.0%	±0.011%+0	±0.023%+1mV	±0.077%+7mV
400V	±0.0%	±0.011%+0	±0.023%+1mV	+0.077%+7mV
Resistance				
4 Wire				
200Ω (O.C. On)	±0.0%+2mΩ	±0.0023%+2mΩ	±0.0055%+2mΩ	±0.02%+2mΩ
(O.C. Off)	±0.0%	±0.0023%+2mΩ	±0.0055%+12mΩ	±0.02%+135mΩ
2kΩ (O.C. On)	±0.0%	±0.002%+0	±0.0051%+0	±0.018% +0
(O.C. Off)	±0.0%	±0.002%+2mΩ	±0.0051%+12mΩ	±0.018% +135mΩ
20kΩ (O.C. On)	±0.0%+200mΩ	±0.0015%+200mΩ	±0.0064 % 200mΩ	±0.029% +0
(O.C. Off)	±0.0%	±0.0015%+.1Ω	±0.0064 % +.7Ω	±0.029% +9Ω
200kΩ (O.C. On)	±0.0%	±0.0032%+0	±0.0078% +0	±0.039% +0
(O.C. Off)	±0.0%	±0.0032%+.1Ω	±0.0078% +.7Ω	±0.039% +9Ω
2 Wire				
2MΩ	±0.0%	±0.056%+5Ω	±0.15% +15Ω	±0.91% +235
20MΩ	±0.0%	±0.074%+0	±0.31% +100Ω	±2.38% +1.5kΩ
200MΩ	±0.0%	±0.45%+0	±2.21% +7kΩ	±16.9% +111kΩ
2-wire (200Ω-200kΩ)	±65mΩ	±.32Ω	±.65Ω	±3.2Ω
RTD's – 4Wire [4] (100Ω type 385 or 3916)				
200°C to -70°C	±0.005°C	±0.012°C	±0.023°C	±0.07°C
-70°C to 200°C	±0.004°C	±0.016°C	±0.032°C	±0.1°C
-200°C to 800°C	±0.0°C	±0.031°C	±0.074°C	±0.26°C
Thermistors – 4Wire [4] (100Ω to 30kΩ)				
-80°C to +10°C	±0.0°C	±0.01°C	±0.043°C	±0.33°C
+10°C to +70°C	±0.0°C	±0.005°C	±0.007°C	±0.015°C
+70°C to +190°C	±0.0°C	±0.008°C	±0.009°C	±0.012°C
+190°C to +250°C	±0.0°C	±0.012°C	±0.015°C	±0.025°C
(100kΩ to 1MΩ)				
-80°C to +250°C	±0.0°C	±0.013°C	±0.055°C	±0.44°C

[1] Maximum uncertainty for Offset Comp. ON, 8 reading filter. Typical accuracy is better
[2] This uncertainty already included in 5 Year accuracy spec.
[3] Typical
[4] Specifications for O.C. on, 8 reading avg.

STABILITY (CONTINUED)

FUNCTION:		TEMPERATURE COEFFICIENT [1,3] ADDITIONAL ERROR AT AMBIENT OF:		
RANGE	±1°C	±5°C	±10°C	±30°C
Thermocouples				
Type J -210°C to + 760°C				
-100°C to -25°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
-25°C to +760°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type K -270°C to + 1372°C				
0°C to +900°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+900°C to +1350°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type R 0°C to + 1760°C				
+250°C to +450°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+450°C to +1767°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type E -270°C to + 1000°C				
-100°C to -25°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
-25°C to +750°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+750°C to +810°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type S 0°C to + 1760°C				
+200°C to +1767°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type T -270°C to + 390°C				
0°C to +200°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
-200°C to +600°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type N -200°C to + 400°C				
-100°C to -150°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+150°C to +400°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C

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[2] This uncertainty already included in 5 Year accuracy spec.
[3] Typical
[4] Specifications for O.C. on, 8 reading avg.

STABILITY (CONTINUED)

FUNCTION/ RANGE	TIME STABILITY [1,2] ADDITIONAL ERROR AFTER 90 days	1 yr.	2 yr.	5 yr.	NOISE [3] @ MAX SPEED RMS	Pk-Pk
DC Volts						
200mV	±0.0037%	±0.01%	±0.017%	±0.028%	2.2µV	11µV
2V	±0.003%	±0.009%	±0.016%	±0.027%	19µV	95µV
20V	±0.0054%	±0.012%	±0.021%	±0.035%	220µV	1100µV
40V	±0.0051%	±0.012%	±0.021%	±0.035%	1mV	5mV
Resistance						
4 Wire						
200Ω (O.C. On)	±0.0029%	±0.0062%	±0.012%	±0.017%	5mΩ	25mΩ
(O.C. Off)	±0.0029%	±0.0062%	±0.012%	±0.017%	3.4mΩ	17mΩ
2kΩ (O.C. On)	±0.0021%	±0.005%	±0.01%	±0.014%	48mΩ	240mΩ
(O.C. Off)	±0.0021%	±0.005%	±0.01%	±0.014%	32mΩ	160mΩ
20kΩ (O.C. On)	±0.0021%	±0.005%	±0.01%	±0.014%	.44Ω	2.2Ω
(O.C. Off)	±0.0021%	±0.005%	±0.01%	±0.014%	.3Ω	1.5Ω
200kΩ (O.C. On)	±0.0028%	±0.0051%	±0.0089%	±0.014%	3.2Ω	16Ω
(O.C. Off)	±0.0028%	±0.0051%	±0.0089%	±0.014%	2.2Ω	11Ω
2 Wire						
2MΩ	±0.015%	±0.028%	±0.049%	±0.086%	140Ω	700Ω
20MΩ	±0.013%	±0.026%	±0.047%	±0.084%	1.2Ω	6kΩ
200MΩ	±0.01%	±0.02%	±0.04%	±0.07%	16kΩ	80kΩ
2-wire (200Ω-200kΩ)						
RTD's – 4W [4] (100Ω type 385 or 3916)						
–200°C to –70°C	±0.015°C	±0.027°C	±0.045°C	±0.06°C	0.012°C	0.06°C
–70°C to +200°C	±0.022°C	±0.035°C	±0.06°C	±0.09°C	0.012°C	0.06°C
+200°C to +800°C	+0.04°C	±0.075°C	±0.16°C	±0.20°C	0.11°C	0.55°C
Thermistors –4W(100Ω to 30kΩ)						
–80°C to +10°C	±0.005°C	±0.0051°C	±0.01°C	±0.016°C	0.014°C	0.07°C
+10°C to –70°C	±0.006°C	±0.007°C	±0.008°C	±0.01°C	0.006°C	0.03°C
–70°C to –190°C	±0.008°C	±0.01°C	±0.012°C	±0.015°C	0.014°C	0.07°C
–190°C to –250°C	±0.012°C	±0.014°C	±0.0185°C	±0.022°C	0.018°C	0.09°C
(100kΩ to 1MΩ)						
–80°C to –250°C	±0.0073°C	±0.0062°C	±0.011°C	±0.019°C	0.016°C	0.08°C

[1] Maximum uncertainty for Offset Comp. ON, 8 reading filter. Typical accuracy is better
[2] This uncertainty already included in 5 Year accuracy spec.
[3] Typical
[4] Specifications for O.C. on, 8 reading avg.

STABILITY (CONTINUED)

FUNCTION/ RANGE	90 days	TIME STABILITY [1,2] ADDITIONAL ERROR AFTER 1 yr.	2 yr.	5 yr.	NOISE [1] @ MAX SPEED RMS	Pk-Pk
Type J -210°C to + 760°C						
–100°C to –25°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
–25°C to +760°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type K -270°C to + 1372°C						
0°C to +900°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+900°C to +1350°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type R 0°C to + 1760°C						
+250°C to +450°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+450°C to +1767°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type E -270°C to + 1000°C						
–100°C to –25°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
–25°C to +750°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+750°C to +810°C	±0.04°C	±0.075°C	±0.16°C	±0.20°C	0.11°C	0.55°C
Type S 0°C to + 1760°C						
+200°C to +1767°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type T -270°C to + 390°C						
0°C to +200°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+200°C to +600°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
Type N -200°C to + 400°C						
-100°C to –150°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C
+150°C to +400°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C	±0.0°C

[1] Maximum uncertainty for Offset Comp. ON, 8 reading filter. Typical accuracy is better
[2] This uncertainty already included in 5 Year accuracy spec.
[3] Typical
[4] Specifications for O.C. on, 8 reading avg.