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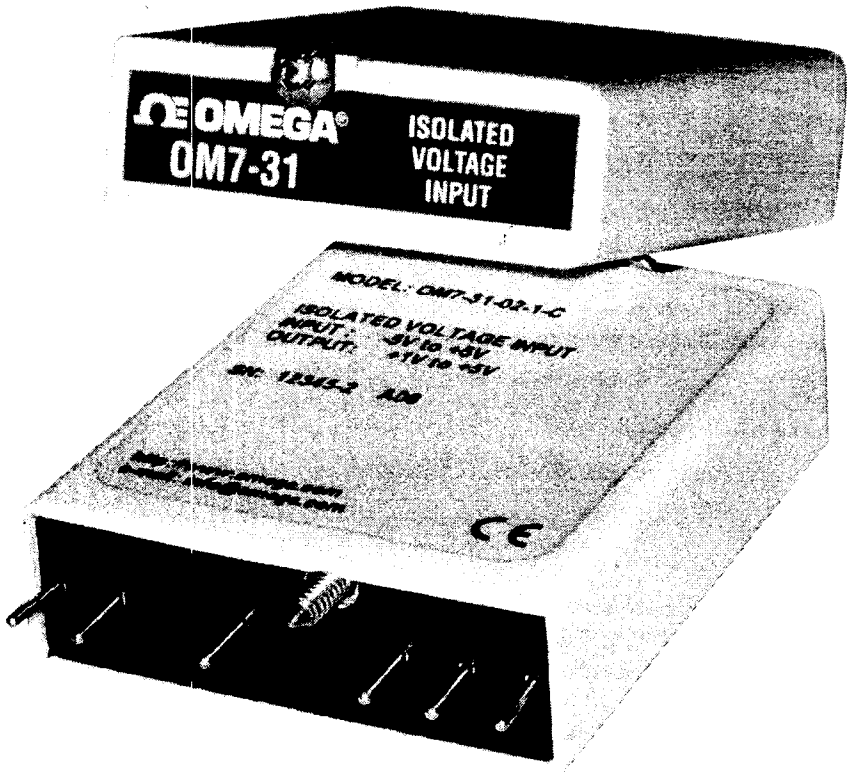
User's Guide



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OM7-C
Modular Signal Conditioners

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OM7 Isolated Process Control Signal Conditioning Products

OM7 Modules

OM7 Isolated Process Control Signal Conditioning modules include a complete selection of backpanels, DIN rail mounting accessories, interface cables, and rack mounting hardware. Each OM7 module provides a single channel of isolated analog input or output. Various input modules accept analog voltage or current signals from all types of field sensors and sources, filter, isolate, amplify, linearize, and convert these input signals to high-level analog outputs suitable for use in a process control system. Output modules accept high-level analog voltage signals from a process control system, then buffer, isolate, filter, and amplify before providing a current or voltage output to a field device.

Custom Signal Conditioning

Custom modules are available: consult factory for minimum quantity and pricing details on custom input ranges, output ranges, bandwidth, and other key parameters.

OM7 Features

- Low cost
- Improved performance
  - ◊ Low peak and RMS noise
  - ◊ 5-pole low pass filtering
  - ◊ Low drift input circuitry for long-term stability
- Wide supply voltage, 14 - 35VDC
- 1500V common mode isolation & 120Vrms field-side protection
- Factory-calibrated accuracy, ±0.03% of Span typical, ±0.1% max
- Transient protection, ANSI/IEEE C37.90.1-1989
- Backpanels allow use of industry standard digital I/O, Solid State Relay modules
- DIN rail mounting
- Customization available
- CSA certification and FM approval pending
- European EMC Directive compliant
- CE approval for low voltage directive not applicable. We comply with ENG1010 (IEC1010).

SELECTION GUIDE

ISOLATED VOLTAGE INPUT MODULES Page 4

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-21-C	±10V	±10V
OM7-30-01-1-C	0 to +10mV	◆
OM7-30-02-1-C	0 to +100mV	◆
OM7-30-03-1-C	0 to +1V	◆
OM7-30-05-1-C	+1 to +5V	◆
OM7-30-06-1-C	±10mV	◆
OM7-30-07-1-C	±100mV	◆
OM7-30-08-1-C	±1V	◆
OM7-31-01-1-C	0 to +10V	◆
OM7-31-02-1-C	±5V	◆
OM7-31-03-1-C	±10V	◆

ISOLATED PROCESS VOLTAGE INPUT MODULES Page 8

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-33-01-1-C	+1 to +5V	◆
OM7-33-02-1-C	0 to +5V	◆

ISOLATED PROCESS CURRENT INPUT MODULES Page 8

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-32-01-1-C	4 to 20mA	◆
OM7-32-02-1-C	0 to 20mA	◆

ISOLATED LINEARIZED 100Ω Pt RTD INPUT MODULES ($\alpha = 0.00385$) Page 10

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-34-01-1-C	-100°C to +100°C (-148°F to +212°F)	◆
OM7-34-02-1-C	0°C to +100°C (+32°F to +212°F)	◆
OM7-34-03-1-C	0°C to +200°C (+32°F to +392°F)	◆
OM7-34-04-1-C	0°C to +600°C (+32°F to +1112°F)	◆
OM7-34-05-1-C	-50°C to +350°C (-58°F to +662°F)	◆

ISOLATED LINEARIZED 120Ω Ni RTD INPUT MODULES ($\alpha = 0.00672$) Page 10

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-34-N-01-1-C	0°C to +300°C (+32°F to +572°F)	◆
OM7-34-N-02-1-C	0°C to +200°C (+32°F to +392°F)	◆

ISOLATED 2-WIRE XMTR INTERFACE MODULES WITH LOOP POWER Page 12

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-35-01-1-C	4 to 20mA	◆
OM7-35-02-1-C	4 to 20mA	+2 to +10V

ISOLATED POTENTIOMETER INPUT MODULES Page 14

MODEL (TYPE)	INPUT RANGE	OUTPUT RANGE
OM7-36-01-1-C	0 to 100Ω	◆
OM7-36-02-1-C	0 to 200Ω	◆
OM7-36-03-1-C	0 to 500Ω	◆
OM7-36-04-1-C	0 to 1KΩ	◆
OM7-36-05-1-C	0 to 5KΩ	◆
OM7-36-06-1-C	0 to 10KΩ	◆

ISOLATED THERMOCOUPLE INPUT MODULES Page 16

MODEL (TYPE)	INPUT RANGE	OUTPUT RANGE
OM7-37-J-01-1-C	-100°C to +760°C (-148°F to +1400°F)	◆
OM7-37-J-10-1-C	0°C to +200°C (+32°F to +392°F)	◆
OM7-37-J-11-1-C	0°C to +400°C (+32°F to +752°F)	◆
OM7-37-J-12-1-C	0°C to +600°C (+32°F to +1112°F)	◆
OM7-37-J-13-1-C	+300°C to +600°C (+572°F to +1112°F)	◆
OM7-37-K-02-1-C	-100°C to +1350°C (-148°F to +2462°F)	◆
OM7-37-K-20-1-C	0°C to +300°C (+32°F to +572°F)	◆
OM7-37-K-21-1-C	0°C to +600°C (+32°F to +1112°F)	◆
OM7-37-K-22-1-C	0°C to +1200°C (+32°F to +2192°F)	◆
OM7-37-K-23-1-C	+600°C to +1200°C) (+1112°F to +2192°F)	◆
OM7-37-T-03-1-C	-100°C to +400°C (-148°F to +752°F)	◆
OM7-37-E-04-1-C	0°C to +900°C (+32°F to +1652°F)	◆
OM7-37-R-05-1-C	0°C to +1750°C (+32F to +3182°F)	◆
OM7-37-S-06-1-C	0°C to +1750°C (+32F to +3182°F)	◆
OM7-37-B-07-1-C	0°C to +1800°C (+32F to +3272°F)	◆

ISOLATED VOLTAGE INPUT MODULES, WIDE BANDWIDTH Page 20

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-40-02-1-C	0 to +100mV	◆
OM7-40-03-1-C	0 to +1V	◆
OM7-40-07-1-C	±100mV	◆
OM7-40-08-1-C	±1V	◆
OM7-41-01-1-C	0 to +10V	◆
OM7-41-02-1-C	±5V	◆
OM7-41-03-1-C	±10V	◆
OM7-41-04-1-C	0 to +5V	◆
OM7-41-05-1-C	0 to +20V	◆
OM7-41-06-1-C	0 to +40V	◆

ISOLATED LINEARIZED THERMOCOUPLE INPUT MODULES Page 22

MODEL (TYPE)	INPUT RANGE	OUTPUT RANGE
OM7-47-J-01-1-C	0°C to +760°C (+32°F to +1400°F)	◆
OM7-47-J-02-1-C	-100°C to +300°C (-148°F to +572°F)	◆
OM7-47-K-03-1-C	0°C to +1300°C (+32°F to +2372°F)	◆
OM7-47-K-04-1-C	0°C to +600°C (+32°F to +1112°F)	◆
OM7-47-T-05-1-C	0°C to +400°C (+32°F to +752°F)	◆
OM7-47-T-06-1-C	-100°C to +200°C (-148°F to +392°F)	◆
OM7-47-E-07-1-C	0°C to +900°C (+32°F to +1652°F)	◆
OM7-47-R-08-1-C	+500°C to +1750°C (+932°F to +3182°F)	◆
OM7-47-S-09-1-C	+700°C to +1750°C (+1292°F to +3182°F)	◆
OM7-47-B-10-1-C	+800°C to +1800°C (+1472°F to +3272°F)	◆
OM7-47-N-11-1-C	+200°C to +1300°C (+392°F to +2372°F)	◆

ISOLATED VOLTAGE OUTPUT MODULES Page 6

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-22-C	±10V	±10V

ISOLATED CURRENT OUTPUT MODULES Page 18

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-39-01-C	+1 to +5V	4 to 20mA
OM7-39-02-C	0 to +10V	0 to 20mA
OM7-39-03-C	0 to +10V	4 to 20mA

ACCESSORIES Page 25

MODEL	DESCRIPTION
OM7-PROTO	OM7 breadboard kit
OM7-BP-EV	1 channel evaluation backpanel
OM7-BP-01-C	1 channel backpanel
OM7-BP-01-DIN-C	1 channel backpanel (DIN)
OM7-BP-02-C	2 channel backpanel
OM7-BP-02-C-DIN	2 channel backpanel (DIN)
OM7-BP-04-C	4 channel backpanel
OM7-BP-04-DIN-C	4 channel backpanel (DIN)
OM7-BP-08-C	8 channel backpanel
OM7-BP-08-DIN-C	8 channel backpanel (DIN)
OM7-BP-16-C	16 channel backpanel
OM7-BP-16-DIN-C	16 channel backpanel (DIN)
OM7-CA-01	6" system adapter cable (DB25F to 26M)
OM7-CA-02	3' system interface cable (DB25F to DB25F)
OM7-CA004-XX	xx-meter system interface cable (26F to 26F)
OM7-IF	Universal interface board
OM7-RK002	19" rack for mounting backplanes
OM7-R1	250Ω current conversion resistor
OM7-DIN-SF	DIN Base element with snap foot
OM7-DIN-WSF	DIN Base element without snap foot
OM7-DIN-CP	DIN Connection pins

THERMOCOUPLE ALLOY COMBINATIONS

TYPE	MATERIAL
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
E	Nickel-Chromium vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum
B	Platinum-30% Rhodium vs. Platinum-6% Rhodium
N	Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4% Silicon- 0.1% Magnesium

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-30-01-1-C
0 to +10V	-2-C	OM7-30-01-2-C

CE

OM7-21/30/31
Isolated Analog Voltage Input Modules

FEATURES

- ACCEPTS MILLIVOLT OR VOLTAGE INPUTS
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 500µV PEAK (5MHz), 250µV RMS (100KHz)
- CMRR, UP TO 160dB
- NMR, UP TO 85dB
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

Each OM7-21/30/31 voltage input module accepts one channel of analog voltage input which is filtered, isolated, amplified, and converted to a high level analog voltage for output to the process control system.

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

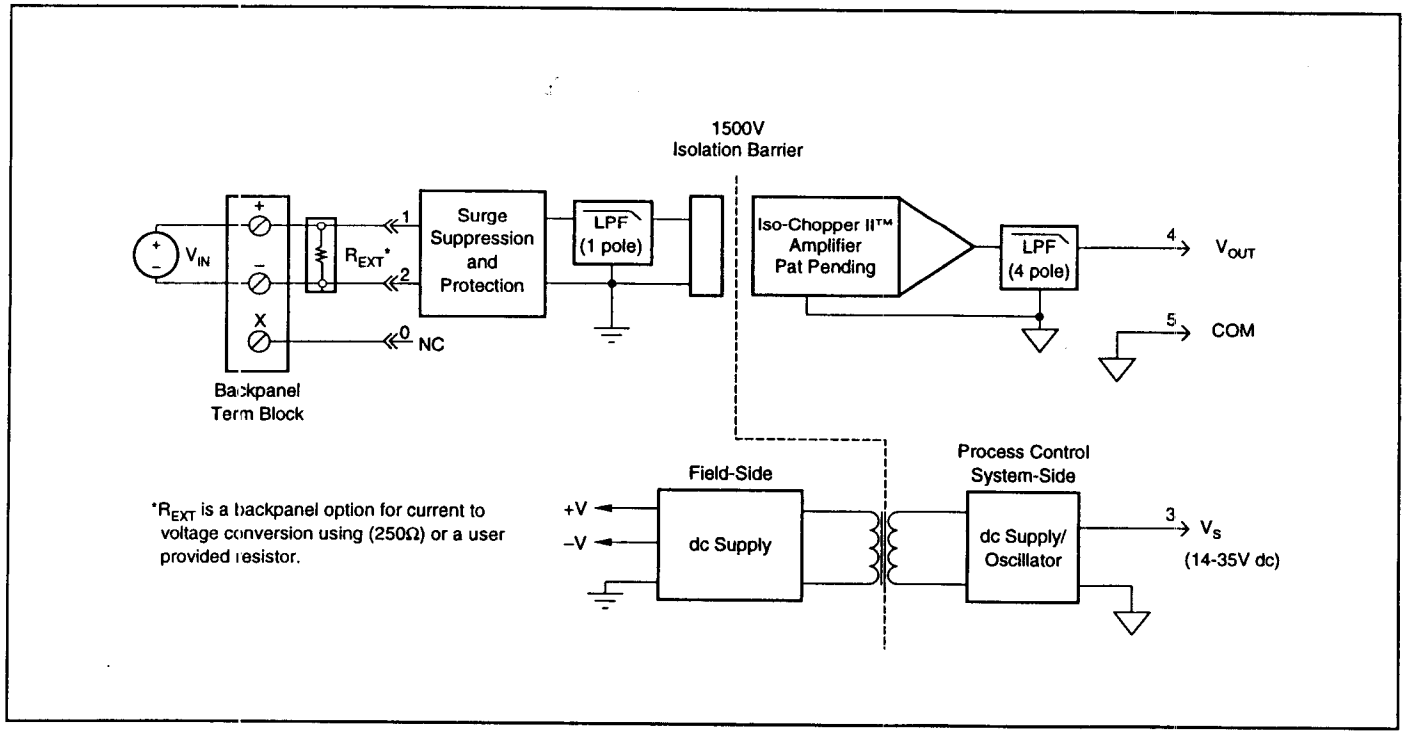


Fig 1: OM7-21/30/31 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-21	OM7-30	OM7-31
Input Range	±10V	±10mV to ±1V	±1V to ±10V
Input Bias Current	±0.1nA	±0.5nA	±0.05nA
Input Resistance			
Normal	2MΩ min	50MΩ	500kΩ min
Power Off	2MΩ min	30kΩ min	500kΩ min
Overload	2MΩ min	30kΩ min	500kΩ min
Input Protection			
Continous	120Vrms max	"	"
Transient	ANSI/IEEE C37.90.1-1989	"	"
Output Range[1]	±10V	◆	◆
Output Effective Available Power[1]	10mW	40mW	"
Output Resistance	<1Ω	"	"
Output Protection	Continuous Short-to-Ground	"	"
Output Voltage/Current Limit	±12V, ±14mA	"	"
CMV (Input-to-Output)			
Continuous	1500Vrms max	"	"
Transient	ANSI/IEEE C37.90.1-1989	"	"
CMRR (50 or 60Hz)	100dB	160dB	120dB
Accuracy[2]	±0.03% Span typical, ±0.1% Span max	"	"
Nonlinearity[3]	±0.02% Span max	"	"
Stability (-40C to +85°C)			
Gain	±55ppm/°C	±35ppm/°C	±55ppm/°C
Input Offset	N/A[4]	±0.5µV/°C	±5µV/°C
Zero Suppression	N/A	±0.005%(V_z)[5]/°C	"
Output Offset	±0.001% Span/°C	±0.002% Span/°C	"
Noise			
Peak @ 5MHz B/W	1mV	500µV	"
RMS @ 10Hz to 100kHz B/W	250µV	"	"
Peak @ 0.1Hz to10Hz B/W	1µV	"	"
Frequency and Time Response			
Bandwidth, -3dB	300Hz	3Hz	"
NMR (50/60Hz)	80dB/decade >300Hz	80/85dB	"
Step Response, 90% Span	1.5ms	150ms	"
Supply Voltage	14 to 35VDC	"	"
Current[1]	30mA max	"	"
Sensitivity	±0.0002%/%V_s	±0.0001%/%Vs	"
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max	"	"
	54.1mm x 43.3mm x 15.4mm max	"	"
Environmental			
Operating Temperature Range	-40°C to +85°C	"	"
Storage Temperature Range	-40°C to +85°C	"	"
Relative Humidity	0 to 90% noncondensing	"	"
Emissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)	"	"
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)	"	"

NOTES
" Specification same as preceding model.
[1] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the Output Effective Available Power that guarantees output range, accuracy, and linearity specifications.
[2] Accuracy includes the effects of repeatability, hysteresis, and linearity.
[3] Nonlinearity is calculated using the best-fit straight line method.
[4] Input offset term included in output offset specification.
[5] V_z is the nominal input voltage that results in a 0V output.

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-30-01-1-C
0 to +10V	-2-C	OM7-30-01-2-C

ORDERING INFORMATION

MODEL	INPUT RANGE
OM7-21	±10V
OM7-30-01	0 to +10mV
OM7-30-02	0 to +100mV
OM7-30-03	0 to +1V
OM7-30-05	+1 to +5V
OM7-30-06	±10mV
OM7-30-07	±100mV
OM7-30-08	±1V
OM7-31-01	0 to +10V
OM7-31-02	±5V
OM7-31-03	±10V
OM7-31-04	0 to +5V

CE

OM7-22-C
Isolated Bipolar Voltage Output Modules

FEATURES

- ACCEPTS HIGH LEVEL INPUT TO ±10V
- PROVIDES HIGH LEVEL OUTPUT TO ±10V
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- NONLINEARITY, ±0.02% OF SPAN, MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- OUTPUT PROTECTED TO 120Vrms CONTINUOUS
- INPUT PROTECTED TO ±35VDC
- NOISE, 2mV PEAK (5MHz), 1mV RMS (100KHz)
- CMRR, 100dB
- 80dB PER DECADE OF ATTENUATION ABOVE 400Hz
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

OM7-22-C voltage output modules accept input signals in the ±10V range from the process control system. The signal is isolated, buffered, and filtered to provide a unity gain field voltage output (Figure 1).

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the process control system side of the isolation barrier; four are on the field side.

After the initial process control system-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for field-side output.

Modules accept a wide 19 - 29VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

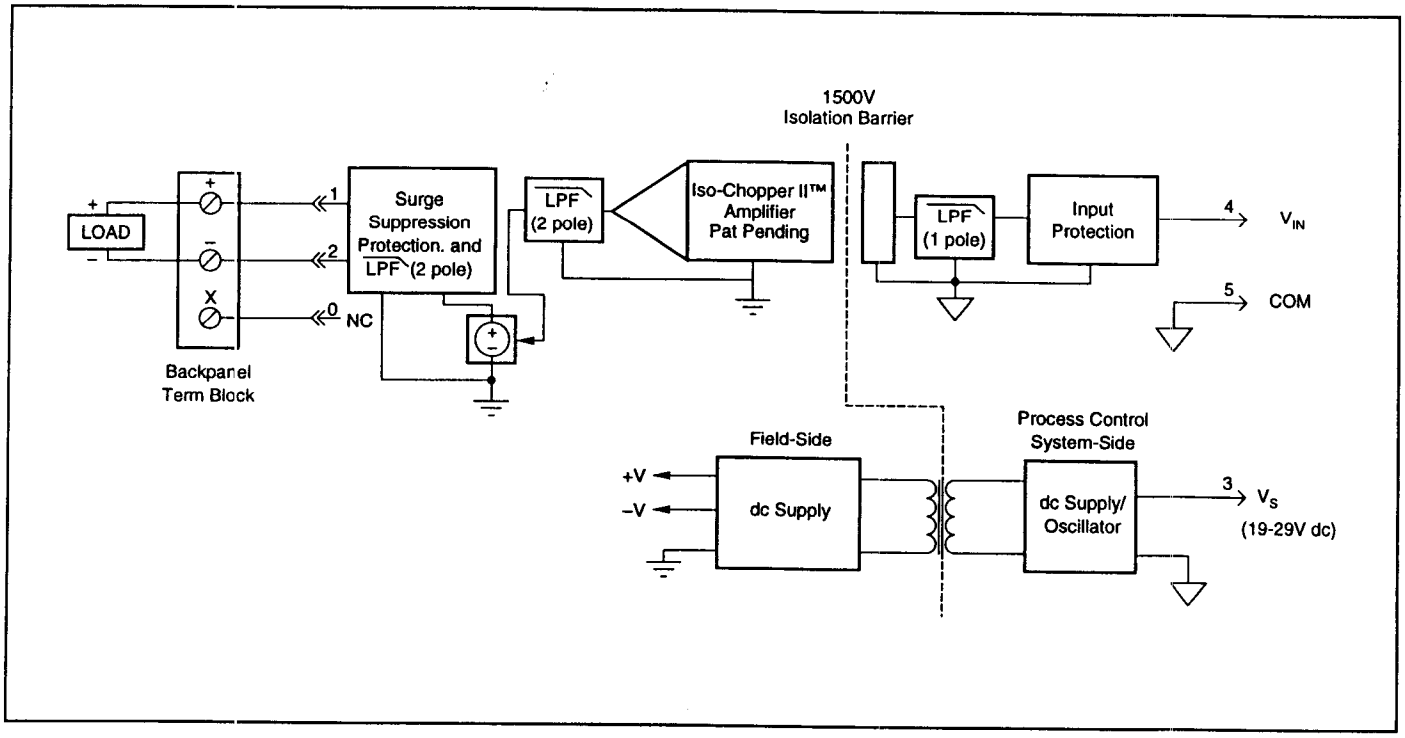


Fig 1: OM7-22-C Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-22-C
Output Range[1]	±10V
Output Effective Available Power[1]	20mW
Output Resistance	<1Ω
Output Protection	
Continuous	120Vrms
Transient	ANSI/IEEE C37.90.1-1989
Output Voltage/Current Limit	±12.5V, ±40mA
Input Range	±10V
Input Bias Current	±0.5nA
Input Resistance	2MΩ min
Input Protection	±35Vdc (no damage)
CMV (Input-to-Output)	
Continuous	1500Vrms
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 or 60Hz)	100dB
Accuracy[2]	±0.03% Span typical, ±0.1% Span max
Nonlinearity[3]	±0.02% Span max
Stability (-40C to +85°C)	
Gain	±35ppm/°C
Output Offset	±0.001% Span/°C
Noise	
Peak @ 5MHz B/W	2mV
RMS @ 10Hz to 100kHz B/W	1mV
Peak @ 0.1Hz to 10Hz B/W	10µV
Frequency and Time Response	
Bandwidth, -3dB	400Hz
NMR (-3dB at 400Hz)	80dB per decade above 400Hz
Step Response, 90% Span	1ms
Supply Voltage	19 to 29VDC
Current[1]	30mA max
Sensitivity	±0.0001%/%V_s
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max
Environmental	
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-40°C to +85°C
Relative Humidity	0 to 90% noncondensing
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)

NOTES

[1] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the Output Effective Available Power that guarantees output range, accuracy, and linearity specifications.

[2] Accuracy includes the effects of repeatability, hysteresis, and linearity.

[3] Nonlinearity is calculated using the best-fit straight line method.

ORDERING INFORMATION

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-22-C	±10V	±10V

CE

OM7-32/33

Isolated Process Current/Voltage Input Modules

FEATURES

- ACCEPTS CURRENT OR VOLTAGE INPUT
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- NONLINEARITY, ±0.02% OF SPAN, MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 500µV PEAK (5MHz), 300µV RMS (100KHz)
- CMRR, UP TO 105dB
- 80dB PER DECADE OF ATTENUATION ABOVE 100Hz
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

The OM7-32 current input modules accept input signals in the 4-20mA or 0-20mA ranges from the field and provide a high level output to the process control system (Figure 1). Current to voltage conversion occurs internal to the module, which is factory calibrated to ensure the highest accuracy.

OM7-33 voltage input modules accept input signals in the +1 to +5V or 0 to +10V ranges from the field and provide a high level output to the process control system. As an alternative, the OM7-33 can be used with an external 250Ω resistor to accept input signals in the 4-20mA or 0-20mA ranges. Using the external sense resistor allows the module to be removed without disrupting the current loop. All OM7-33s are shipped with a 250Ω resistor.

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

After the initial field-side filtering (conversion-OM7-32 only), the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

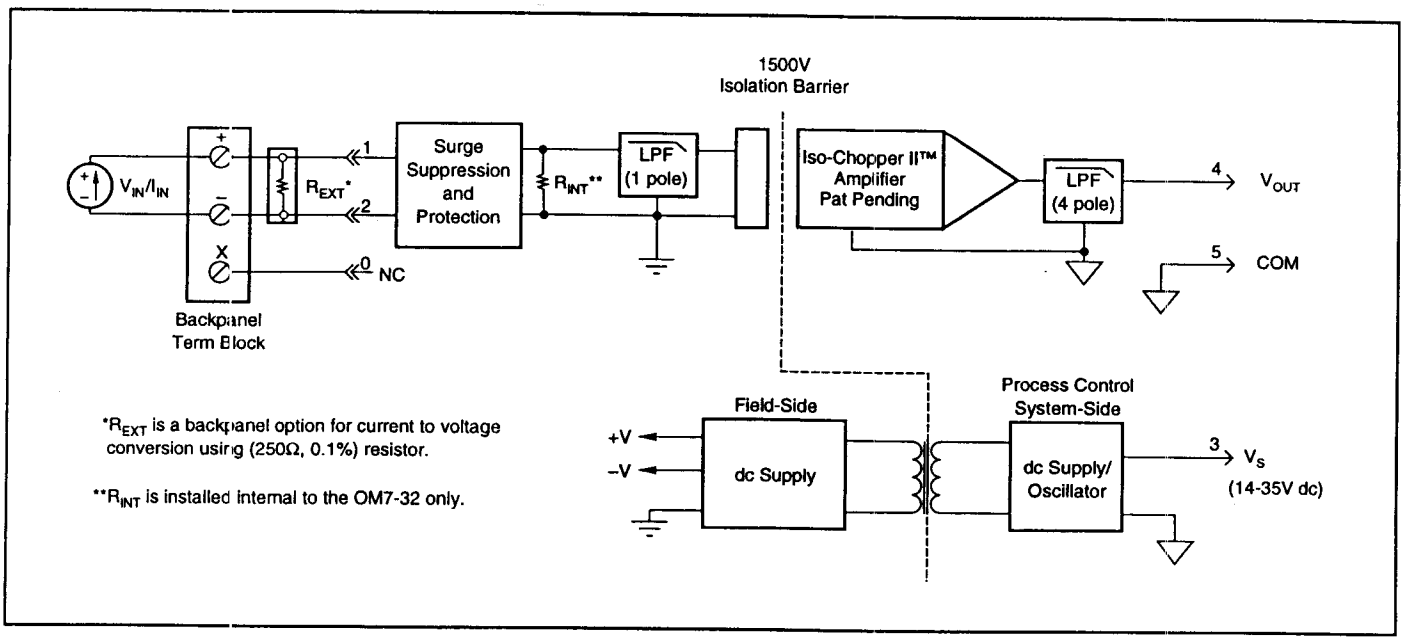


Fig 1: OM7-32/33 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-32	OM7-33
Input Range	4-20mA, 0-20mA	+1 to +5V, 0 to +5V
Input Bias Current	N/A	±0.1nA
Input Resistance		
Normal	<100Ω	2MΩ
Power Off	<100Ω	2MΩ
Overload	30kΩ	2MΩ
Input Protection		
Continous	120Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
Output Range[1]	◆	◆
Output Effective Available Power[1]	40mW	*
Output Resistance	<1Ω	*
Output Protection	Continuous Short-to-Ground	*
Output Voltage/Current Limit	±12V, ±14mA	*
CMV (Input-to-Output)		
Continuous	1500Vrms	*
Transient	ANSI/IEEE C37.90.1-1989	*
CMRR (50 or 60Hz)	105dB	*
Accuracy[2]	±0.03% Span typical, ±0.1% Span max	*
Nonlinearity[3]	±0.02% Span max	*
Stability (-40C to +85°C)		
Gain	±35ppm/°C	*
Input Offset	N/A[4]	*
Output Offset	±0.003% Span/°C	*
Noise		
Peak @ 5MHz B/W	500µV	*
RMS @ 10Hz to 100kHz B/W	300µV	*
Peak @ 0.1Hz to 10Hz B/W	1µV	*
Frequency and Time Response		
Bandwidth, -3dB	100Hz	*
NMR (-3dB at 100Hz)	80dB per decade above 100Hz	*
Step Response, 90% Span	5ms	*
Supply Voltage	14 to 35VDC	*
Current[1]	30mA max	*
Sensitivity	±0.0001%/%V_s	.
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max	* *
Environmental		
Operating Temperature Range	-40°C to +85°C	*
Storage Temperature Range	-40°C to +85°C	*
Relative Humidity	0 to 90% noncondensing	*
Emissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)	*
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)	*

NOTES
*Specification same as preceding model
[1] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the output Effective Available Power that guarantees output range, accuracy, and linearity specifications.
[2] Accuracy includes the effects of repeatability, hysteresis, and linearity.
[3] Nonlinearity is calculated using the best-fit straight line method.
[4] Input offset term included in output offset specification.

ORDERING INFORMATION

MODEL	INPUT RANGE
OM7-32-01	4 to 20mA
OM7-32-02	0 to 20mA
OM7-33-01	+1 to +5V
OM7-33-02	0 to +5V

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-32-01-1-C
0 to +10V	-2-C	OM7-32-01-2-C

CE

OM7-34/34-N

Isolated Linearized 2- Or 3-Wire RTD Input Modules

FEATURES

- INTERFACES TO 100Ω PLATINUM OR 120Ω NICKEL RTDS
- PROVIDES 250μA RTD EXCITATION CURRENT
- LINEARIZES RTD SIGNAL RESPONSE
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.05% TO ±0.15% OF SPAN TYPICAL
- NONCONFORMITY, ±0.025% TO ±0.07% OF SPAN TYPICAL
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 500μV PEAK (5MHz), 250μV RMS (100KHz)
- CMRR, UP TO 160dB
- NMR, UP TO 85dB
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

Each OM7-34/34-N RTD input module accepts a single channel of 100Ω Platinum (α = 0.00385) or 120Ω Nickel (α = 0.00672) RTD input and produces an input voltage in response to a low level current excitation. The input signal is filtered, isolated, amplified, linearized, and converted to a high level analog voltage for output to the process control system (Figure 1).

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

In response to the low level current excitation signal, the RTD input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Linearization is achieved by creating a non-linear transfer function through the module itself. This non-linear transfer function is configured at the factory and is designed to be equal and opposite to the specific RTD non-linearity. Lead compensation is achieved by matching two current paths thus cancelling the effects of lead resistance.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

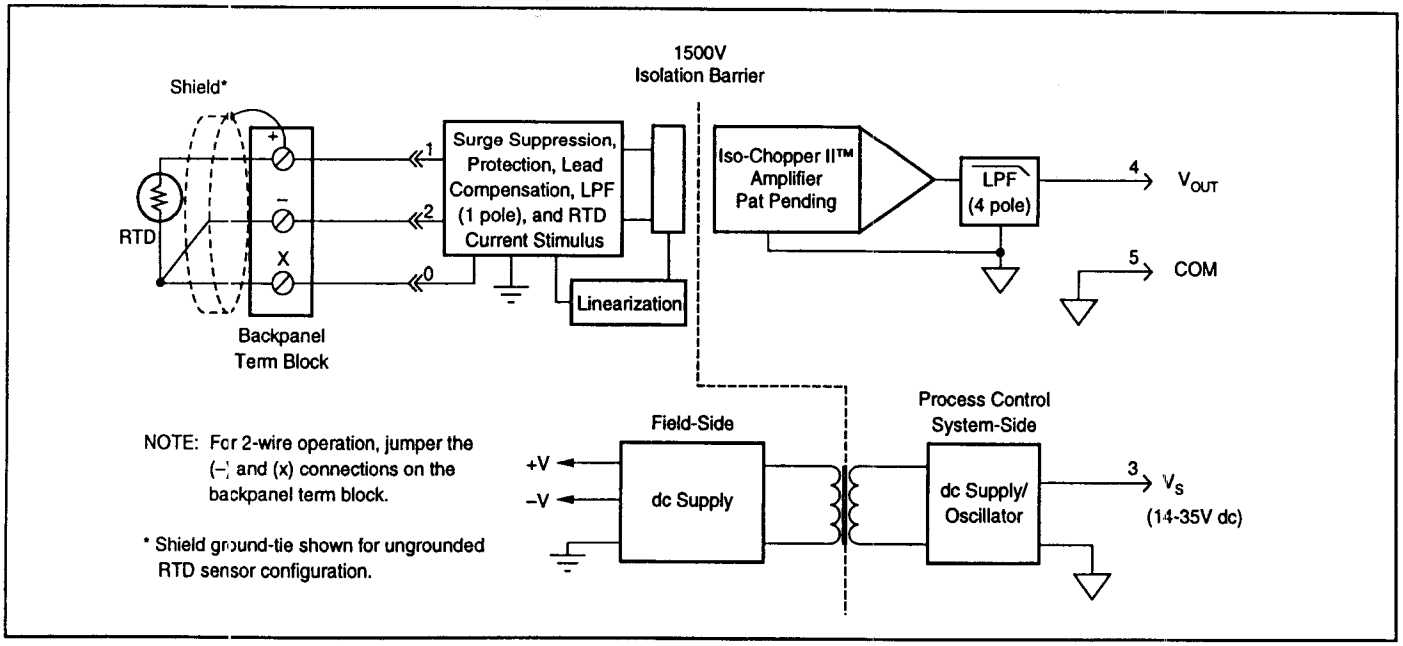


Fig 1: OM7-34/34-N Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-34	OM7-34-N
Input Range	100Ω Pt RTD (See Ordering Information below)	120Ω Ni RTD *
Input Protection		
Continous	120Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
Output Range[1]	◆	◆
Output Effective Available Power[1]	40mW	*
Output Resistance	<1Ω	*
Output Protection	Continuous Short-to-Ground	*
Output Voltage/Current Limit	±12V, ±14mA	*
CMV (Input-to-Output)		
Continuous	1500Vrms	*
Transient	ANSI/IEEE C37.90.1-1989	*
CMRR (50 or 60Hz)	160dB	*
Accuracy[2]	(See Ordering Information below)	*
Nonconformity[3]	(See Ordering Information below)	*
Stability (-40C to +85°C)		
Gain	±60ppm/°C	*
Input Offset	±1µV/°C	*
Zero Suppression	±0.002%(R_Z/R_{SPAN})[4]/°C	*
Output Offset	±0.002% Span/°C	*
Noise		
Peak @ 5MHz B/W	500µV	*
RMS @ 10Hz to 100kHz B/W	250µV	*
Peak @ 0.1Hz to 10Hz B/W	1µV	*
Lead Resistance Effect	±0.02°C/Ω max	*
Sensor Excitation Current[5]	≈250µA	*
Frequency and Time Response		
Bandwidth, -3dB	3Hz	*
NMR (50/60Hz)	80/85dB	*
Step Response, 90% Span	250ms	*
Supply Voltage	14 to 35VDC	*
Current[1]	30mA max	*
Sensitivity	±0.0001%/%V_S	*
Mechanical Dimensions(H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max	* *
Environmental		
Operating Temperature Range	-40°C to +85°C	*
Storage Temperature Range	-40°C to +85°C	*
Relative Humidity	0 to 90% noncondensing	*
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)	*
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)	*

NOTES
*Specification same as preceding model.
[1] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the output Effective Available Power that guarantees output range, accuracy, and conformity specifications.
[2] Accuracy includes the effects of repeatability, hysteresis, and conformity.
[3] Nonconformity is calculated using the best-fit straight line method.
[4] R_Z is the value of the RTD resistance at the lowest measurement point. R_{SPAN} is the change in resistance over the measurement span.
[5] Sensor excitation current is model dependent.

ORDERING INFORMATION

MODEL	INPUT RANGE	ACCURACY[2]		NONCONFORMITY[3]	
		TYPICAL	MAX	TYPICAL	MAX
100Ω Pt (α = 0.00385)					
OM7-34-01	-100°C to +100°C (-148°F to +212°F)	±0.075% (0.15°C)	±0.15% (0.30°C)	±0.025% (0.05°C)	±0.05% (0.10°C)
OM7-34-02	0°C to +100°C (+32°F to +212°F)	±0.10% (0.10°C)	±0.2% (0.20°C)	±0.025% (0.025°C)	±0.05% (0.05°C)
OM7-34-03	0°C to +200°C (+32°F to +392°F)	±0.075% (0.15°C)	±0.15% (0.30°C)	±0.025% (0.05°C)	±0.05% (0.10°C)
OM7-34-04	0°C to +600°C (+32°F to +1112°F)	±0.05% (0.30°C)	±0.1% (0.60°C)	±0.025% (0.15°C)	±0.05% (0.30°C)
OM7-34-05	-50°C to +350°C (-58°F to +662°F)	±0.05% (0.20°C)	±0.1% (0.40°C)	±0.025% (0.1°C)	±0.05% (0.20°C)
120Ω Ni (α = 0.00672)					
OM7-34-N-01	0°C to +300°C (+32°F to +572°F)	±0.15% (0.45°C)	±0.3% (0.90°C)	±0.06% (0.18°C)	±0.12% (0.36°C)
OM7-34-N-02	0°C to +200°C (+32°F to +392°F)	±0.15% (0.30°C)	±0.3% (0.60°C)	±0.07% (0.14°C)	±0.14% (0.28°C)

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-34-01-1-C
0 to +10V	-2-C	OM7-34-01-2-C

CE

OM7-35

Isolated 2-Wire Transmitter Interface Modules With Loop Power

FEATURES

- 2-WIRE TRANSMITTER INTERFACE
- ACCEPTS 4-20mA SIGNALS
- PROVIDES AN ISOLATED +24VDC SUPPLY TO POWER THE LOOP
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- NONLINEARITY, ±0.02% OF SPAN, MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- 120Vrms INPUT PROTECTION
- CMRR, 105dB
- 80dB PER DECADE OF ATTENUATION ABOVE 100Hz
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

OM7-35 current input modules accept input signals in the 4-20mA range from the field and provide a high level voltage output to the process control system (Figure 1). Current to voltage conversion occurs internal to the module, which is factory calibrated to ensure the highest accuracy.

Loop power is provided by the module, enabling a 2-wire transmitter to be directly connected without the need for a separate dc power supply for the 2-wire transmitter.

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Modules accept a wide 18 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

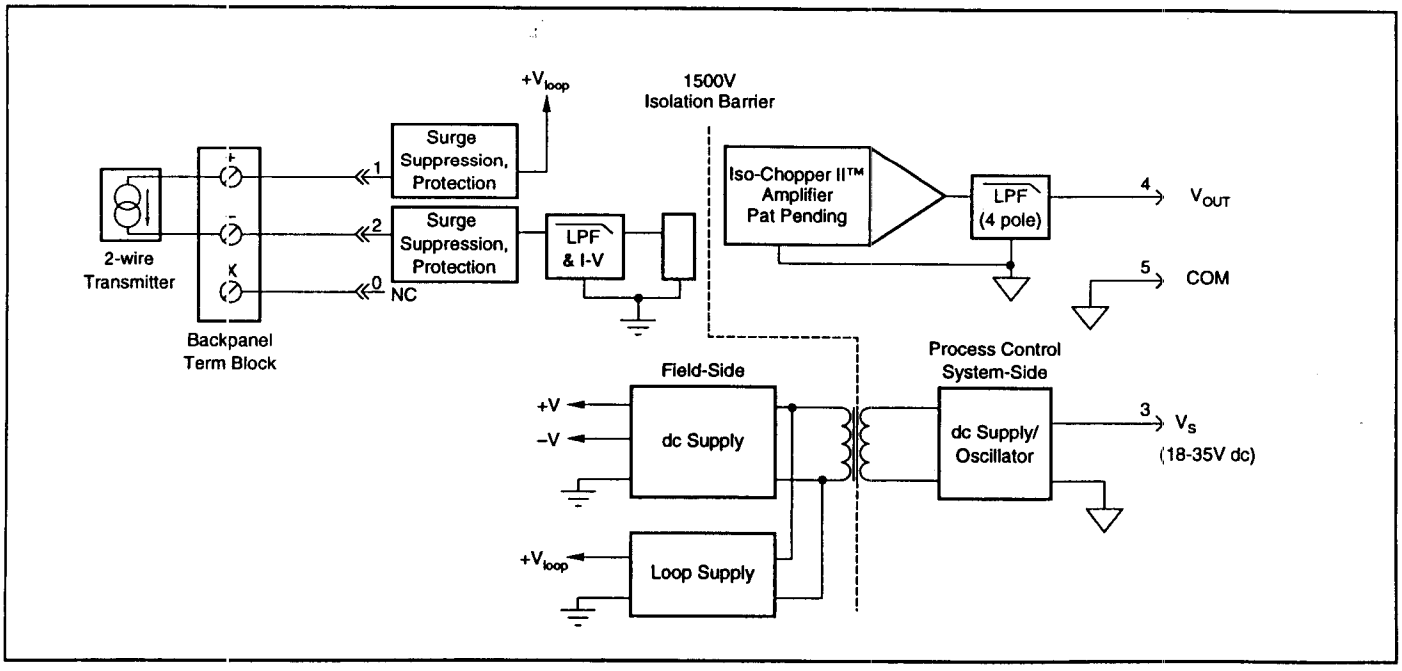


Fig 1: OM7-35 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-35
Input Range	4-20mA
Input Protection	
Continous	120Vrms max
Transient	ANSI/IEEE C37.90.1-1989
Loop Voltage	+24Vdc[5]
Output Range[1]	(see ordering information)
Output Effective Available Power[1]	40mW
Output Resistance	<1Ω
Output Protection	Continuous Short-to-Ground
Output Voltage/Current Limit	±16V, ±14mA
CMV (Input-to-Output)	
Continuous	1500Vrms
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 or 60Hz)	105dB
Accuracy[2]	±0.03% Span typical, ±0.1% Span max
Nonlinearity[3]	±0.02% Span max
Stability (-40C to +85°C)	
Gain	±40ppm/°C
Input Offset	N/A[4]
Output Offset	±0.003% Span/°C
Noise	
Peak @ 5MHz B/W	5mV
RMS @ 10Hz to 100kHz B/W	500µV
Peak @ 0.1Hz to 10Hz B/W	3µV
Frequency and Time Response	
Bandwidth, -3dB	100Hz
NMR (-3dB at 100Hz)	80dB per decade above 100Hz
Step Response, 90% Span	5ms
Supply Voltage	18 to 35VDC
Current[1]	70mA
Sensitivity	±0.0002%/%V_s
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max
Environmental	
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-40°C to +85°C
Relative Humidity	0 to 90% noncondensing
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)

NOTES

[1] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{out}^2/P_E, where P_E is the Output Effective Available Power that guarantees output range, accuracy, and linearity specifications.

[2] Accuracy includes the effects of repeatability, hysteresis, and linearity.

[3] Nonlinearity is calculated using the best-fit straight line method.

[4] Input offset term included in output offset specification.

[5] +24V will be supplied to the loop for an open loop condition. Approximately +22V to +16V will be supplied for a corresponding 4mA to 20mA input. Loop voltage is independent of supply voltage.

ORDERING INFORMATION

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-35-01-1-C	4 to 20mA	+1 to +5V
OM7-35-01-2-C	4 to 20mA	0 to +10V
OM7-35-02-1-C	4 to 20mA	+2 to +10V

CE

OM7-36
Isolated Potentiometer Input Modules

FEATURES

- INDUSTRY'S FIRST 7B POTENTIOMETER INPUT MODULE
- INTERFACES 100Ω TO 10KΩ POTENTIOMETERS
- HIGH LEVEL VOLTAGE OUTPUTS
- 1500VRMS TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- NONLINEARITY, ±0.02% OF SPAN, MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120VAC CONTINUOUS
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

Each OM7-36 Potentiometer input module provides a single channel of resistance input which is filtered, isolated, amplified, and converted to a high level analog voltage output.

The OM7-36 module interfaces to slidewires and potentiometers in both two or three wire configuration and incorporates a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Bessel and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side. In the 3-Wire configuration, lead resistance compensation is provided if the resistance of the "x" lead is closely equivalent to that of the "+" lead. Internal to the module, measurement error due to lead resistance is canceled.

In response to the low level current excitation, and after initial field-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Six standard input resistance ranges are offered, from 100Ω to 10kΩ, with three output ranges available: 0-5V, 1-5V, and 0-10V. Modules accept a wide 14-35VDC power supply range (+24VDC nominal). Their compact packages (2.13" x 1.705" x 0.605" max.) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of Dataforth's "-DIN" backpanels.

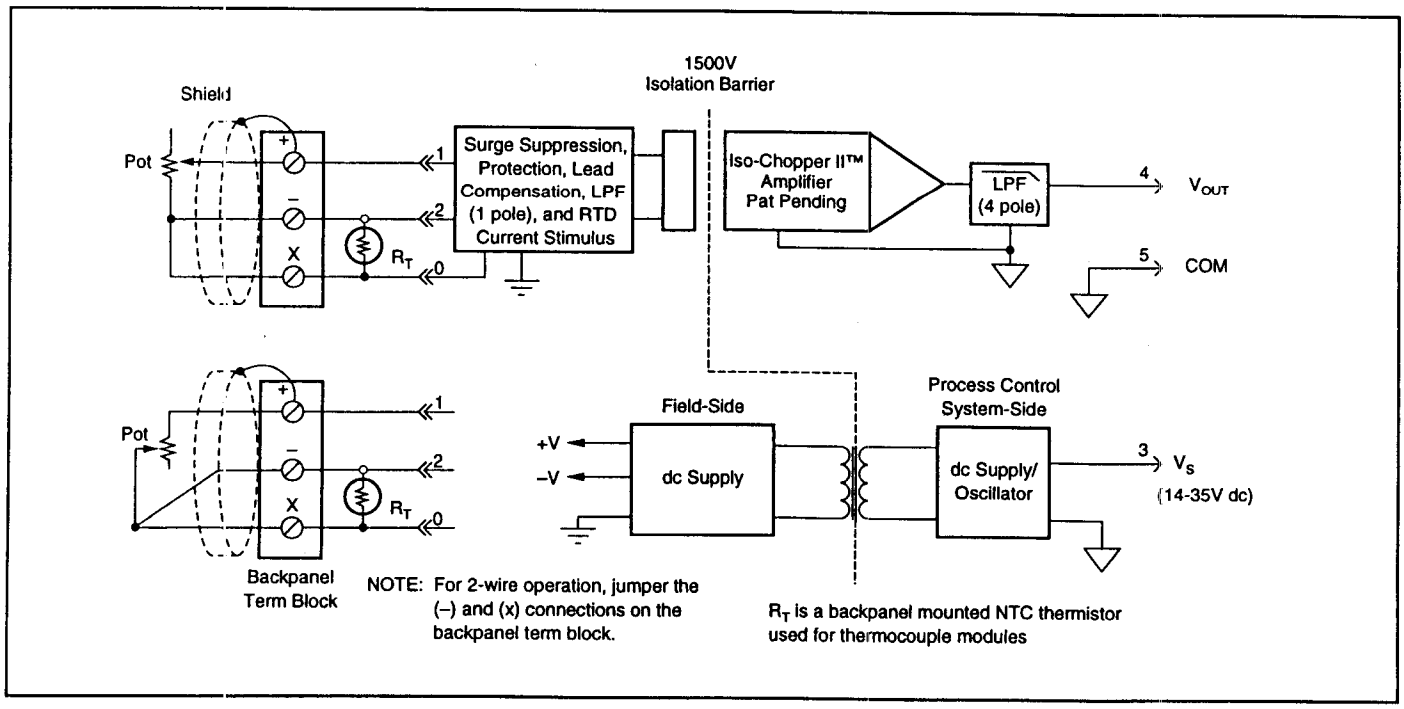


Fig 1: OM7-36 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-36
Input Range	(See Ordering Information below)
Protection	
Continuous	120 Vrms max
Transient	ANSI/IEEE C37.90.1-1989
Sensor Excitation Current	65µA (10kΩ) to 260µA (100Ω)
Lead Resistance Effect (3-Wire)[1]	
	-01 thru -04 : ±0.005Ω/Ω
	-05 : ±0.02Ω/Ω
	-06 : ±0.04Ω/Ω
Output Range[2]	◆
(See Output Range below)	
Effective Available Power[2]	40 mW
Resistance	< 1Ω
Protection	Continuous Short-to-Ground
Voltage/Current Limit	±12 V, ±14 mA
CMV (Input to Output)	
Continuous	1500 Vrms
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 or 60Hz)	120 dB
Accuracy[3]	±0.03% Span typical, ±0.1% Span max
Nonlinearity [4]	±0.02% Span max
Stability (-40°C to +85°C)	
Input Offset	±0.01Ω/°C
Output Offset	±30µV/°C
Gain	±60 ppm/°C
Noise Peak @ 5Mhz B/W	1 mV
RMS @ 10Hz to 100Khz B/W	250 µV
Peak @ 0.1Hz (10Hz B/W	1 µV
Frequency and Time Response	
Bandwidth, -3dB	3 Hz
NMR (50/60 Hz)	80/85dB
Step Response, 0 to 90%	250 ms
Supply Voltage	14-35 Vdc
Current[2]	30 mA max
Sensitivity	±0.0001%/% Vs
Mechanical Dimensions (H)(W)(D)	2.13" x 1.705" x 0.605", max
Environmental	
Operating Temp. Range	-40°C to +85°C
Storage Temp. Range	-40°C to +85°C
Relative Humidity	0 to 90% Noncondensing
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)

NOTES
[1] Lead resistance effect is given for the condition of not having the NTC thermistor installed in the backpanel. As a general rule; as long as the lead resistance of the (+) lead matches the parallel combination of the thermistor and lead resistance in the (X) lead, the given specifications apply.
[2] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{out}^2/P_E, where P_E is the output Effective Available Power that guarantees output range and accuracy specifications.
[3] Accuracy includes the effects of repeatability, hysteresis, and linearity, but does not include sensor accuracy.
[4] Nonlinearity is calculated using the best-fit straight line method.

ORDERING INFORMATION

MODEL	INPUT RANGE
OM7-36-01	0 - 100Ω
OM7-36-02	0 - 200Ω
OM7-36-03	0 - 500Ω
OM7-36-04	0 - 1KΩ
OM7-36-05	0 - 5KΩ
OM7-36-06	0 - 10KΩ

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-36-01-1-C
0 to +10V	-2-C	OM7-36-01-2-C

CE

OM7-37

Isolated Thermocouple Input Modules

FEATURES

- INTERFACES TO TYPE J, K, T, E, R, S, AND B THERMOCOUPLES
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- NONLINEARITY, ±0.02% OF SPAN, MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 500µV PEAK (5MHz), 250µV RMS (100KHz)
- CMRR, 160dB
- NMR, UP TO 85dB
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

OM7-37 modules accept a single channel of input from Type J, K, T, E, R, S, or B thermocouples. The signal is filtered, isolated, amplified, and converted to a high level analog voltage for output to the process control system (Figure 1).

Cold junction compensation (CJC) is performed using an NTC thermistor (see AN701 for further information) externally mounted under the field-side terminal block on the backpanel (Figure 1). Open thermocouple detection is upscale using a 30nA current source in the input circuitry.

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

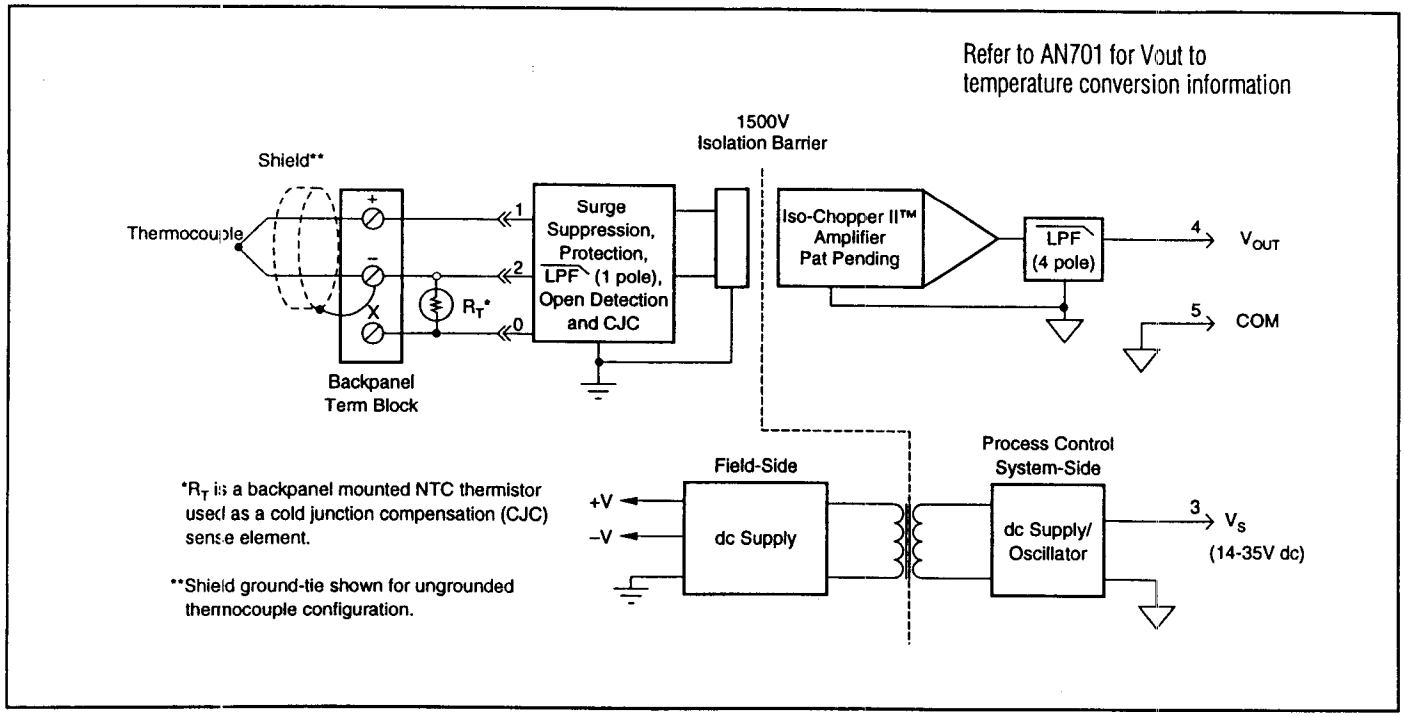


Fig 1: OM7-37 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-37
Input Range (See Ordering Information below)	Thermocouple[1]
Input Bias Current	-30nA
Input Resistance	
Normal	50MΩ
Power Off	30kΩ min
Overload	30kΩ min
Input Protection	
Continous	120Vrms max
Transient	ANSI/IEEE C37.90.1-1989
Output Range[2]	◆
Output Effective Available Power[2]	40mW
Output Resistance	<1Ω
Output Protection	Continuous Short-to-Ground
Output Voltage/Current Limit	±12V, ±14mA
CMV (Input-to-Output)	
Continuous	1500Vrms
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 or 60Hz)	160dB
Accuracy[3]	±0.03% Span typical, ±0.1% Span max
Nonlinearity[4]	See Ordering Information
Stability (-40C to +85°C)	
Gain	±35ppm/°C
Input Offset	±0.5µV/°C
Zero Suppression	±0.005%(V_z[5])/°C
Output Offset	±0.002% Span/°C
Noise	
Peak @ 5MHz B/W	500µV
RMS @ 10Hz to 100kHz B/W	250µV
Peak @ 0.1Hz to 10Hz B/W	1µV
CJC Accuracy[6], +5°C to +45°C ambient	±0.25°C typ, ±1°C max
Open Input Response	Upscale
Open Input Detection Time	10s max
Frequency and Time Response	
Bandwidth, -3dB	3Hz
NMR (50/60Hz)	80/85dB
Step Response, 90% Span	150ms
Supply Voltage	14 to 35VDC
Current[2]	30mA max
Sensitivity	±0.0001%/%V_s
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max
Environmental	
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-40°C to +85°C
Relative Humidity	0 to 90% noncondensing
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)

NOTES
[1] Thermocouple characteristics per NIST monograph 175, ITS-90.
[2] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the output Effective Available Power that guarantees output range, accuracy, and linearity specifications.
[3] Accuracy includes the effects of repeatability, hysteresis, and linearity.
[4] Nonlinearity is calculated using the best-fit straight line method.
[5] V_z is the nominal input voltage that results in a 0V output.
[6] The CJC sensor accuracy should be added to the module accuracy and thermocouple accuracy to compute the overall measurement accuracy.

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-37-J-01-1-C
0 to +10V	-2-C	OM7-37-J-01-2-C

ORDERING INFORMATION

MODEL	INPUT RANGE	ACCURACY (TYP)[3]	ACCURACY (MAX)[3]	Nonlinearity (Max)[4]
OM7-37-J-01	-100°C to +760°C (-148°F to +1400°F)	±0.03% (0.26°C)	±0.1% (0.86°C)	±0.02% (0.17°C)
OM7-37-J-10	0°C to +200°C (+32°F to +392°F)	" (0.06°C)	" (0.20°C)	" (0.04°C)
OM7-37-J-11	0°C to +400°C (+32°F to +752°F)	" (0.12°C)	" (0.40°C)	" (0.08°C)
OM7-37-J-12	0°C to +600°C (+32°F to +1112°F)	" (0.18°C)	" (0.60°C)	" (0.12°C)
OM7-37-J-13	+200°C to +600°C (+572°F to +1112°F)	" (0.09°C)	" (0.30°C)	" (0.06°C)
OM7-37-K-02	-100°C to +1350°C (-148°F to +2462°F)	" (0.44°C)	" (1.45°C)	" (0.29°C)
OM7-37-K-20	0°C to +300°C (+32°F to +572°F)	" (0.09°C)	" (0.30°C)	" (0.06°C)
OM7-37-K-21	0°C to +600°C (+32°F to +1112°F)	" (0.18°C)	" (0.60°C)	" (0.12°C)
OM7-37-K-22	0°C to +1200°C (+32°F to +2192°F)	" (0.36°C)	" (1.20°C)	" (0.24°C)
OM7-37-K-23	+600°C to +1200°C (+1112°F to +2192°F)	" (0.18°C)	" (0.60°C)	" (0.12°C)
OM7-37-T-03	-100°C to +400°C (-148°F to +752°F)	" (0.15°C)	" (0.50°C)	" (0.10°C)
OM7-37-E-04	0°C to +900°C (+32°F to +1652°F)	" (0.27°C)	" (0.90°C)	" (0.18°C)
OM7-37-R-05	0°C to +1750°C (+32F to +3182°F)	" (0.53°C)	" (1.75°C)	" (0.35°C)
OM7-37-S-06	0°C to +1750°C (+32F to +3182°F)	" (0.53°C)	" (1.75°C)	" (0.35°C)
OM7-37-B-07	0°C to +1800°C (+32F to +3272°F)	" (0.54°C)	" (1.80°C)	" (0.36°C)

CE

OM7-39

Isolated Process Current Output Modules

FEATURES

- ACCEPTS HIGH LEVEL VOLTAGE INPUT
- PROVIDES 4-20mA OR 0-20mA CURRENT OUTPUT
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- NONLINEARITY, ±0.02% OF SPAN, MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- OUTPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 46µA PEAK (5MHz), 4µA RMS (100KHz)
- CMRR, 110dB
- 80dB PER DECADE OF ATTENUATION ABOVE 100Hz
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

OM7-39 process current modules accept high level signals from the process control system and provide either 0 to 20mA or 4 to 20mA current to the field (Figure 1).

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the process control system side of the isolation barrier, and the other four poles are on the field side.

After the initial process control system side filtering, the signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed, filtered, and converted to a process current for output to the field.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

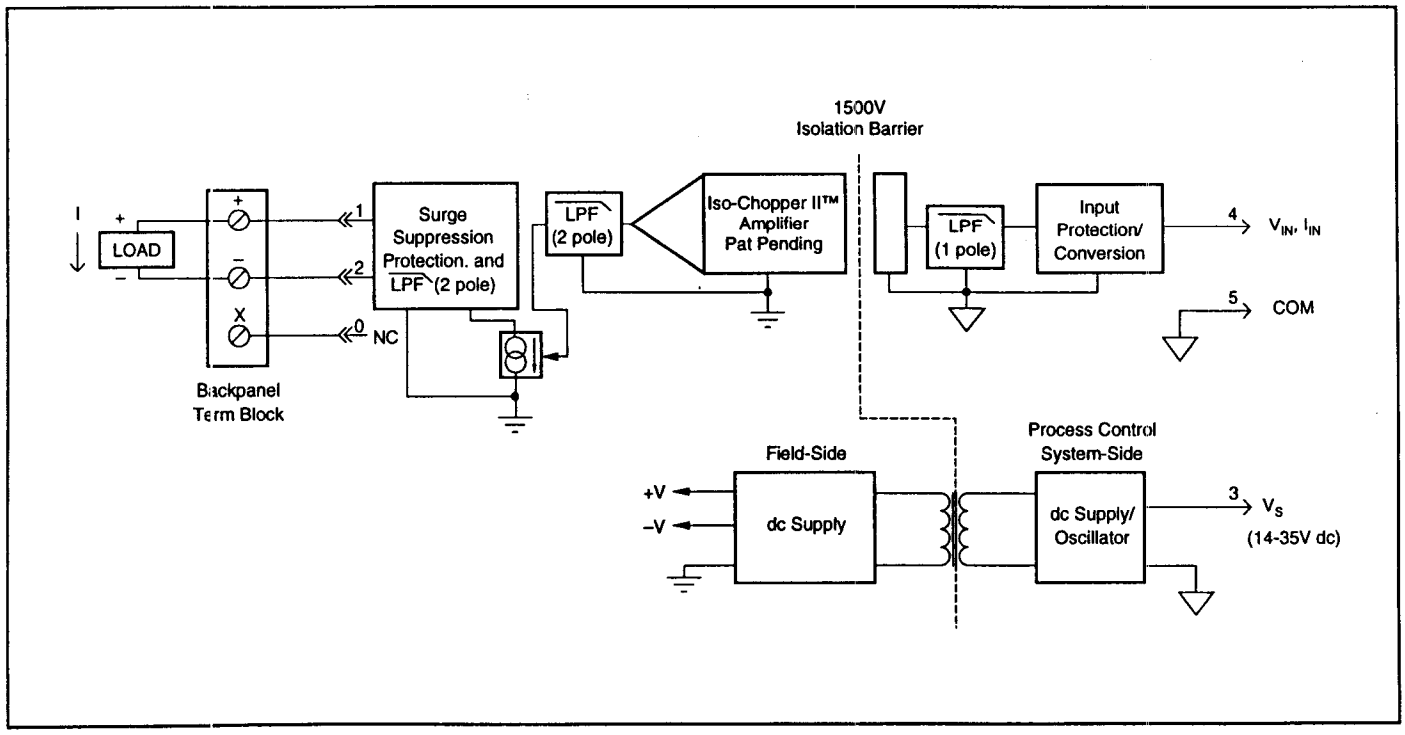


Fig 1: OM7-39 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-39
Output Range[1]	4-20mA, 0-20mA
Output Effective Available Power[1]	320mW
Output Protection	
Continous	120Vrms max
Transient	ANSI/IEEE C37.90.1-1989
Output Current Limit	32mA
Input Range	1 to +5V, 0 to +10V
Input Bias Current	±1nA
Input Resistance	
Normal	10MΩ
Power Off	30kΩ min
Overload	30kΩ min
Input Protection	±35Vdc (no damage)
CMV (Input-to-Output)	
Continuous	1500Vrms
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 or 60Hz)	110dB
Accuracy[2]	±0.03% Span typical, ±0.1% Span max
Nonlinearity[3]	±0.02% Span max
Stability (-40C to +85°C)	
Gain	±25ppm/°C
Output Offset	±0.0035% Span/°C
Noise	
Peak @ 5MHz B/W	46µA
RMS @ 10Hz to 100kHz B/W	4µA
Peak @ 0.1Hz to 10Hz B/W	42nA
Frequency and Time Response	
Bandwidth, -3dB	100Hz
NMR (-3dB at 100Hz)	80dB per decade above 100Hz
Step Response, 90% Span	5ms
Supply Voltage	18 to 35VDC
Current[1]	70mA max
Sensitivity	±0.0003%/%V_s
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max
Environmental	
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-40°C to +85°C
Relative Humidity	0 to 90% noncondensing
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)

NOTES
[1] Output Range and Supply Current specifications are based on maximum output load resistance. Maximum output load resistance is calculated by P_E/I_{OUT}^2 where P_E is the Output Effective Available Power that guarantees output range, accuracy, and linearity specifications. Output effective available power is independent of supply voltage.
[2] Accuracy includes the effects of repeatability, hysteresis, and linearity.
[3] Nonlinearity is calculated using the best-fit straight line method.

ORDERING INFORMATION

MODEL	INPUT RANGE	OUTPUT RANGE
OM7-39-01-C	+1 to +5V	4 to 20mA
OM7-39-02-C	0 to +10V	0 to 20mA
OM7-39-03-C	0 to +10V	4 to 20mA

CE

OM7-40/41

Isolated Analog Voltage Input Modules, Wide Bandwidth

FEATURES

- ACCEPTS MILLIVOLT OR VOLTAGE INPUTS
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 10KHZ BANDWIDTH
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.03% OF SPAN TYPICAL, ±0.1% MAX
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

Each OM7-40/41 voltage input module accepts one channel of analog voltage input which is filtered, isolated, amplified, and converted to a high level analog voltage for output to the process control system.

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

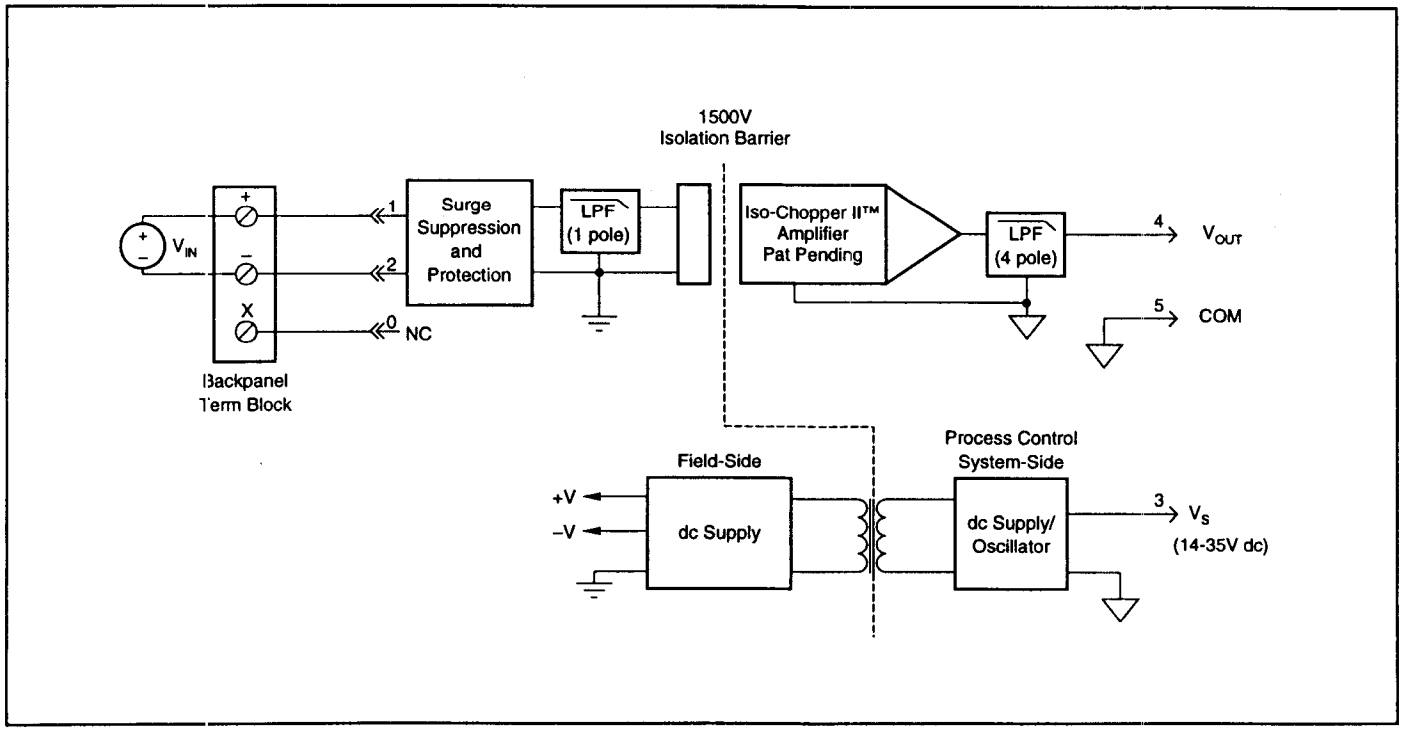


Fig 1: OM7-40/41 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-40	OM7-41
Input Range	-1V to +1V	-10V to +40V
Input Bias Current	±1nA	±0.1nA
Input Resistance		
Normal	50MΩ	500kΩ min
Power Off	30kΩ min	500kΩ min
Overload	30kΩ min	500kΩ min
Input Protection		
Continous	120Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
Output Range[1]	◆	◆
Output Effective Available Power[1]	40mW	*
Output Resistance	<1Ω	*
Output Protection	Continuous Short-to-Ground	*
Output Voltage/Current Limit	±12V, ±14mA	*
CMV (Input-to-Output)		
Continuous	1500Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
CMRR (50 or 60Hz)	110dB	100dB
Accuracy[2]	±0.03% Span typical, ±0.1% Span max	*
Nonlinearity[3]	±0.02% Span max	*
Stability (-40C to +85°C)		
Gain	±35ppm/°C	±55ppm/°C
Input Offset	±0.5µV/°C	±5µV/°C
Zero Suppression	±0.005%(V_z)[5]/°C	*
Output Offset	±0.002% Span/°C	*
Noise		
Peak @ 5MHz B/W	2mV	*
RMS @ 10Hz to 100kHz B/W	1mV	*
Peak @ 0.1Hz to10Hz B/W	1µV	*
Frequency and Time Response		
Bandwidth, -3dB	10KHz	*
NMR	80dB/decade >10KHz	*
Step Response, 90% Span	40µs	*
Supply Voltage	14 to 35VDC	*
Current[1]	30mA max	*
Sensitivity	±0.0001%/%Vs	*
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max	* *
Environmental		
Operating Temperature Range	-40°C to +85°C	*
Storage Temperature Range	-40°C to +85°C	*
Relative Humidity	0 to 90% noncondensing	*
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)	*
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)	*

NOTES
* Specification same as preceding model.
[1] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the Output Effective Available Power that guarantees output range, accuracy, and linearity specifications.
[2] Accuracy includes the effects of repeatability, hysteresis, and linearity.
[3] Nonlinearity is calculated using the best-fit straight line method.
[4] V_z is the nominal input voltage that results in a 0V output.

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-40-02-1-C
0 to +10V	-2-C	OM7-40-02-2-C

ORDERING INFORMATION

MODEL	INPUT RANGE
OM7-40-02	0 to +100mV
OM7-40-03	0 to +1V
OM7-40-07	±100mV
OM7-40-08	±1V
OM7-41-01	0 to +10V
OM7-41-02	±5V
OM7-41-03	±10V
OM7-41-04	0 to +5V
OM7-41-05	0 to +20V
OM7-41-06	0 to +40V

CE

OM7-47

Isolated Linearized Thermocouple Input Modules

FEATURES

- INTERFACES TO TYPES J, K, T, E, R, S, B AND N THERMOCOUPLES
- LINEARIZES THERMOCOUPLE SIGNALS
- PROVIDES HIGH LEVEL VOLTAGE OUTPUTS
- 1500Vrms TRANSFORMER ISOLATION
- ACCURACY, ±0.06% TO ±0.16% OF SPAN TYPICAL
- ANSI/IEEE C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 1mV PEAK (5MHz), 500µV RMS (100KHz)
- CMRR, 160dB
- NMR, UP TO 85dB
- EASY DIN RAIL MOUNTING
- CSA CERTIFICATION AND FM APPROVAL PENDING
- CE COMPLIANT

DESCRIPTION

OM7-47 modules accept a single channel of input from Type J, K, T, E, R, S, B, or N thermocouples. The signal is filtered, isolated, amplified, linearized, and converted to a high level analog voltage for output to the process control system (Figure 1).

Linearization is achieved by creating a non-linear transfer function through the module itself; refer to AN505. This non-linear transfer function is configured at the factory and is designed to be equal and opposite to the thermocouple non-linearity.

Cold junction compensation (CJC) is performed using an NTC thermistor (see AN701 for further information) externally mounted under the field-side terminal block on the backpanel (Figure 1). Open thermocouple detection is upscale using a 30nA current source in the input circuitry.

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

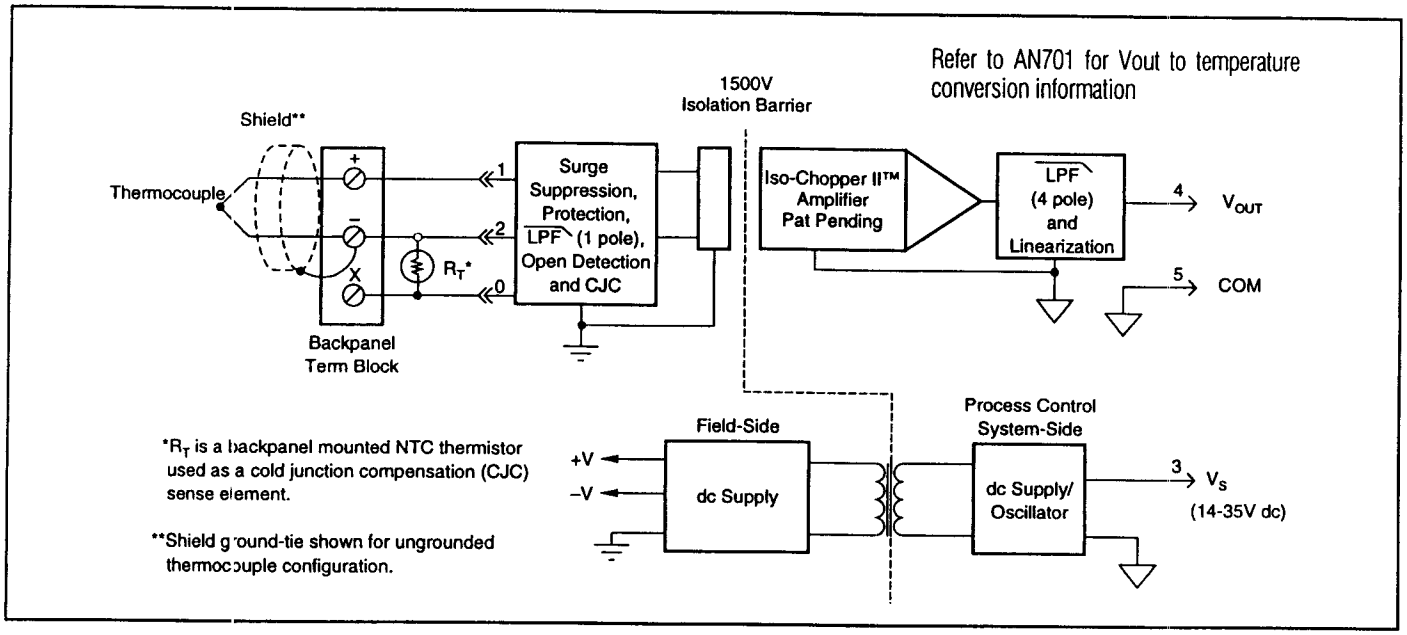


Fig 1: OM7-47 Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	OM7-47
Input Range	Thermocouple[1] (See Ordering Information below)
Input Bias Current	–30nA
Input Resistance	
Normal	50MΩ
Power Off	30kΩ min
Overload	30kΩ min
Input Protection	
Continous	120Vrms max
Transient	ANSI/IEEE C37.90.1-1989
Output Range[2]	◆
Output Effective Available Power[2]	40mW
Output Resistance	<1Ω
Output Protection	Continuous Short-to-Ground
Output Voltage/Current Limit	±12V, ±14mA
CMV (Input-to-Output)	
Continuous	1500Vrms
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 or 60Hz)	160dB
Accuracy[3]	(See Ordering Information below)
Stability (-40C to +85°C)	
Gain	±40ppm/°C
Input Offset	0.5µV/°C
Zero Suppression	±0.005%(V_z)[4]/°C
Output Offset	±0.002% Span/°C
Noise	
Peak @ 5MHz B/W	1mV
RMS @ 10Hz to 1100kHz B/W	500µV
Peak @ 0.1Hz to 10Hz B/W	1µV
CJC Accuracy[5], +5°C to +45°C ambient	±0.25°C Typ, ±1°C max
Open Input Response	Upscale
Open Input Detection Time	10s max
Frequency and Time Response	
Bandwidth, -3dB	3Hz
NMR (50/60Hz)	80/85dB
Step Response, 90% Span	150ms
Supply Voltage	14 to 35VDC
Current[2]	30mA max
Sensitivity	±0.0001%/%V_s
Mechanical Dimensions (H)(W)(D)	2.13"x1.705"x0.605" max 54.1mm x 43.3mm x 15.4mm max
Environmental	
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-40°C to +85°C
Relative Humidity	0 to 90% noncondensing
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)

◆OUTPUT RANGES AVAILABLE

OUTPUT RANGE	PART NUMBER MODIFIER	EXAMPLE
+1 to +5V	-1-C	OM7-47-J-01-1C
0 to +10V	-2-C	OM7-47-J-01-2-C

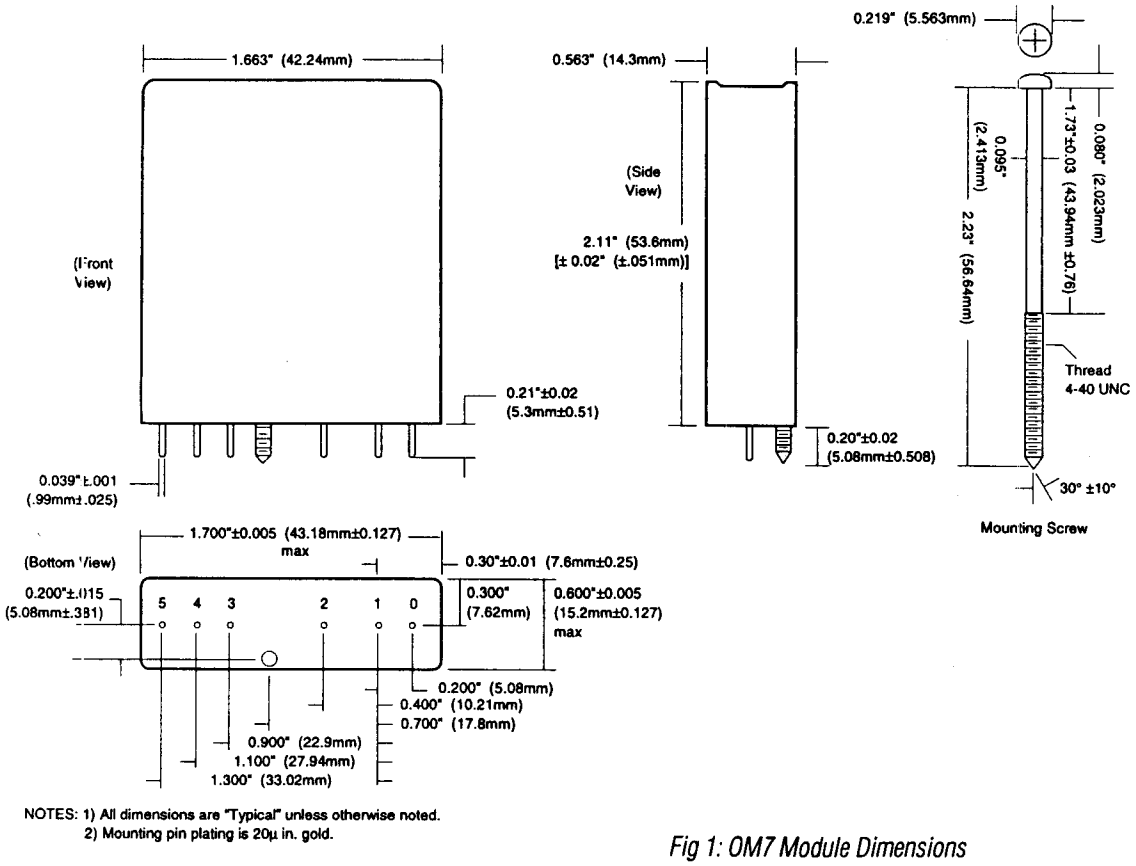
NOTES
[1] Thermocouple characteristics per NIST monograph 175, ITS-90.
[2] Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the output Effective Available Power that guarantees output range, accuracy, and linearity specifications.
[3] Accuracy includes the effects of repeatability, hysteresis, and conformity.
[4] V_Z is the nominal input voltage that results in a 0V output.
[5] The CJC sensor accuracy should be added to the module accuracy and thermocouple accuracy to compute overall measurement accuracy.

ORDERING INFORMATION

MODEL	INPUT RANGE	ACCURACY (TYPICAL)[3, 5]	ACCURACY (MAXIMUM)[3, 5]
OM7-47-J-01	0°C to +760°C (+32°F to +1400°F)	±0.11% Span (0.84°C)	±0.32% Span (3.43°C)
OM7-47-J-02	-100°C to +300°C (-148°F to +572°F)	±0.10% Span (0.40°C)	±0.30% Span (1.20°C)
OM7-47-K-03	0°C to +1300°C (+32°F to +2372°F)	±0.11% Span (1.43°C)	±0.32% Span (4.16°C)
OM7-47-K-04	0°C to +600°C (+32°F to +1112°F)	±0.06% Span (0.36°C)	±0.18% Span (1.08°C)
OM7-47-T-05	0°C to +400°C (+32°F to +752°F)	±0.13% Span (0.52°C)	±0.38% Span (1.52°C)
OM7-47-T-06	-100°C to +200°C (-148°F to +392°F)	±0.16% Span (0.48°C)	±0.47% Span (1.41°C)
OM7-47-E-07	0°C to +900°C (+32°F to +1652°F)	±0.11% Span (0.99°C)	±0.34% Span (3.06°C)
OM7-47-R-08	+500°C to +1750°C (+932°F to +3182°F)	±0.10% Span (1.25°C)	±0.30% Span (3.75°C)
OM7-47-S-09	+700°C to +1750°C (+1292°F to +3182°F)	±0.08% Span (0.84°C)	±0.25% Span (2.63°C)
OM7-47-B-10	+800°C to +1800°C (+1472°F to +3272°F)	±0.12% Span (1.20°C)	±0.35% Span (3.50°C)
OM7-47-N-11	+200°C to +1300°C (+392°F to +2372°F)	±0.09% Span (0.99°C)	±0.27% Span (2.97°C)

OM7
Module Dimensions and Pinouts

The following mechanical drawing is useful if designing circuit boards to mount the OM7 modules. Many sockets are available which accept the mounting pins. As an example, AMP Inc. provides a socket with part number 50865-5. The captive nut for the 4-40 mounting screw can be obtained from PEM (Penn Engineering and Manufacturing), part number KSF2-440 ET.



NOTES: 1) All dimensions are "Typical" unless otherwise noted.
2) Mounting pin plating is 20µ in. gold.

Fig 1: OM7 Module Dimensions

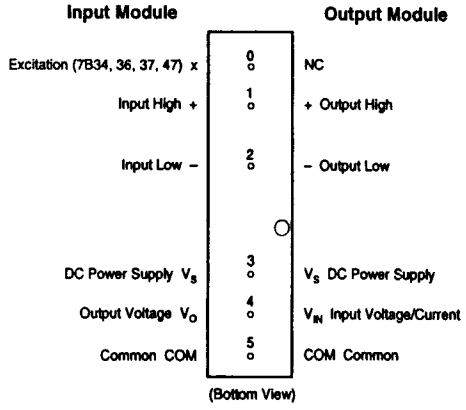


Fig 2: OM7 Pinouts

OM7-BP-EV

INTRODUCTION

The OM7-BP-EV is a single channel backpanel that can accept any of the OM7 analog modules. It is meant to be used primarily for module evaluation. Unlike multiple channel backpanels, the single high-level system output (or input) signal is routed to all channel pins on the system interface DB25 connector. The backpanel contains four standoffs to allow mounting, using a #6 or smaller screw.

SYSTEM SIDE - POWER

Using the "V+" supply input, the power supply voltage can be as little as +14VDC. If +15VDC is available, it is recommended that the supply be connected between the "V+A" or "V+B" connections and "COM"; this will protect the module against accidental supply reversal. Using both these connections with two power supplies enables redundant operation. It is also recommended that a diode transient absorber be installed to reduce power supply transient events from degrading system performance. An "accessory" location, between the supply and common lines, is provided for this purpose. The backpanel is fused at 1/4 Amp for module protection.

SYSTEM SIDE - SIGNAL

The OM7-BP-EV uses either the OM7-CA-01 (DB25 to 26-pin adapter cable) and OM7-CA004-XX (26-pin to 26-pin interface cable), or the OM7-CA-02 (DB25 to DB25 interface cable), depending on system requirements.

FIELD SIDE - SIGNAL

On the field side, a temperature sensor is mounted underneath the field side terminal block to provide cold junction compensation for thermocouple modules, and a current-to-voltage conversion resistor socketing location is provided (supplied with OM7-33 modules). Field connections are terminated with three screw terminals.

SPECIFICATIONS

Operating Temperature:	–40°C to +85°C 90% relative humidity
Interface Connector:	
Field	High density screw clamp, 10-24 AWG
System	DB25 (male) with 4-40 screwlocks

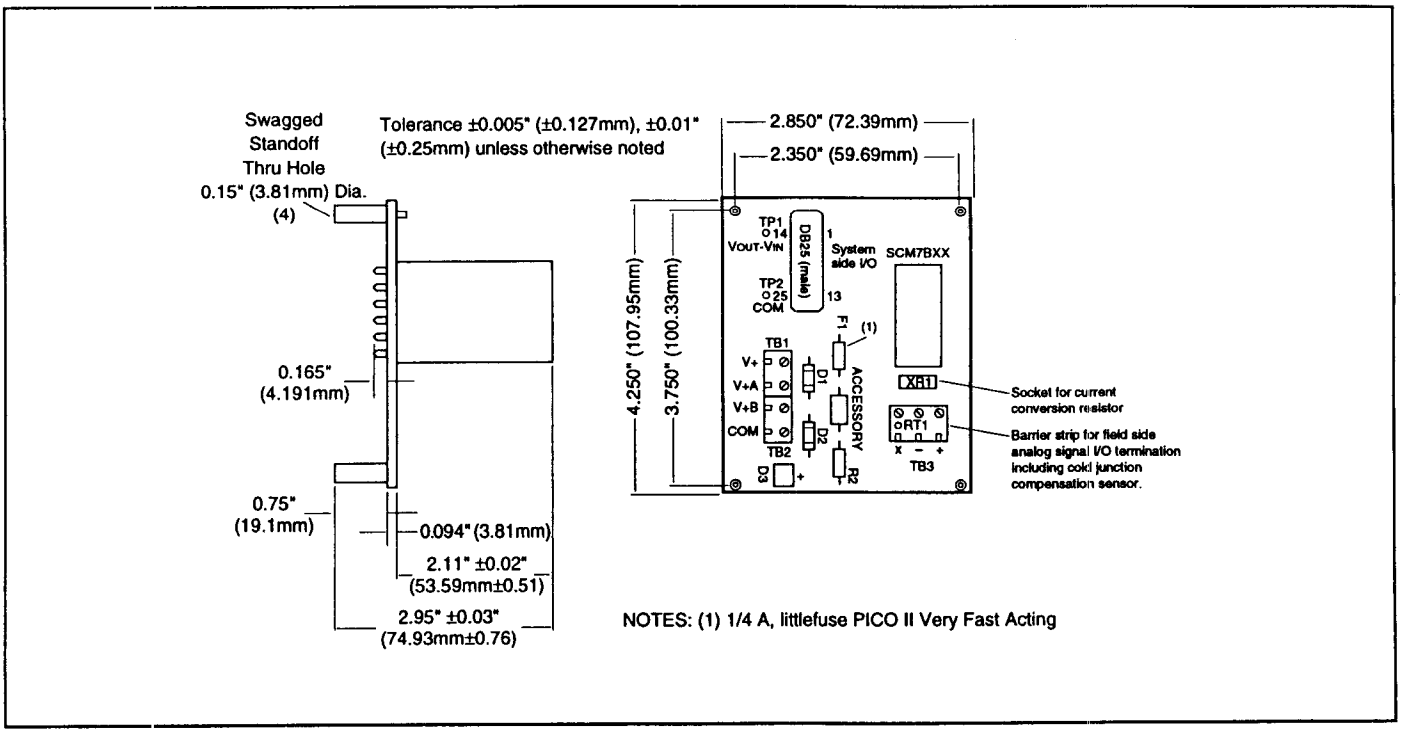


Fig 1: OM7-BP-EV Dimensions

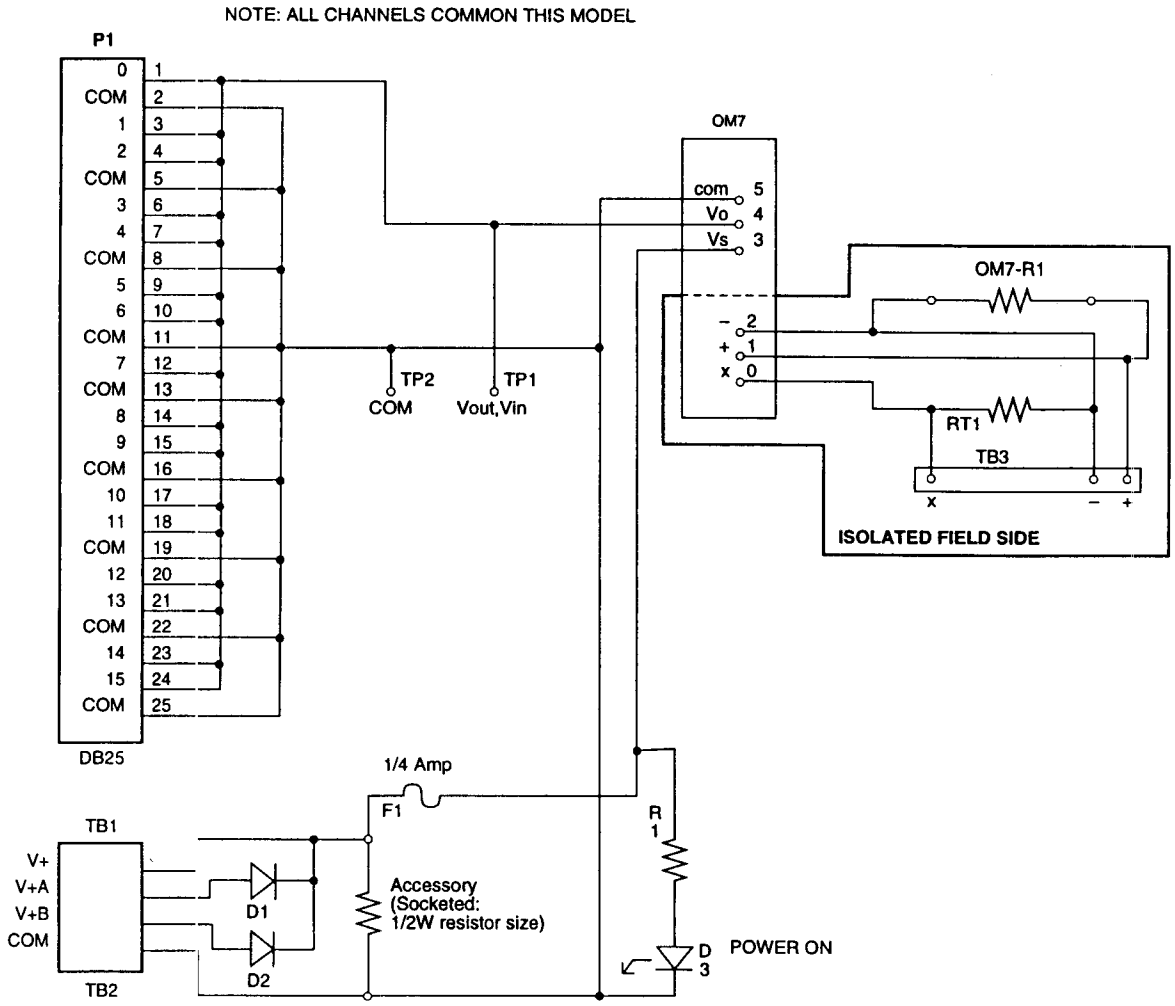


Fig 2: OM7-BP-EV Schematic Diagram

OM7-BP-01-C/OM7-BP-02-C

Introduction

The OM7-BP-01-C & OM7-BP-02-C are 1 and 2 channel backpanels. Unlike other backpanels available, both the system and field side sides have screw terminal connectors able to accept discrete wire (10-24 AWG). The backpanels contain standoffs to allow mounting, using a #6 or smaller screw.

SYSTEM SIDE - POWER

Both backpanels accept 14-35VDC between "V+" and "COM" using a screw terminal (10-24 AWG) block. No reverse supply diodes are provided with this model, but both are fused at 1/4 Amp (01) or 1/2 Amp (02) for module protection.

FIELD SIDE - SIGNAL

On the field side, a temperature sensor is mounted underneath the field side terminal block to provide cold junction compensation for thermocouple modules, and a current-to-voltage conversion resistor (OM7-R1) socket location is provided (supplied with OM7-33 modules).

SPECIFICATIONS

Operating Temperature:	–40°C to +85°C 90% relative humidity
Interface Connector:	
Field	High density screw clamp, 10-24 AWG
System	High density screw clamp, 10-24 AWG

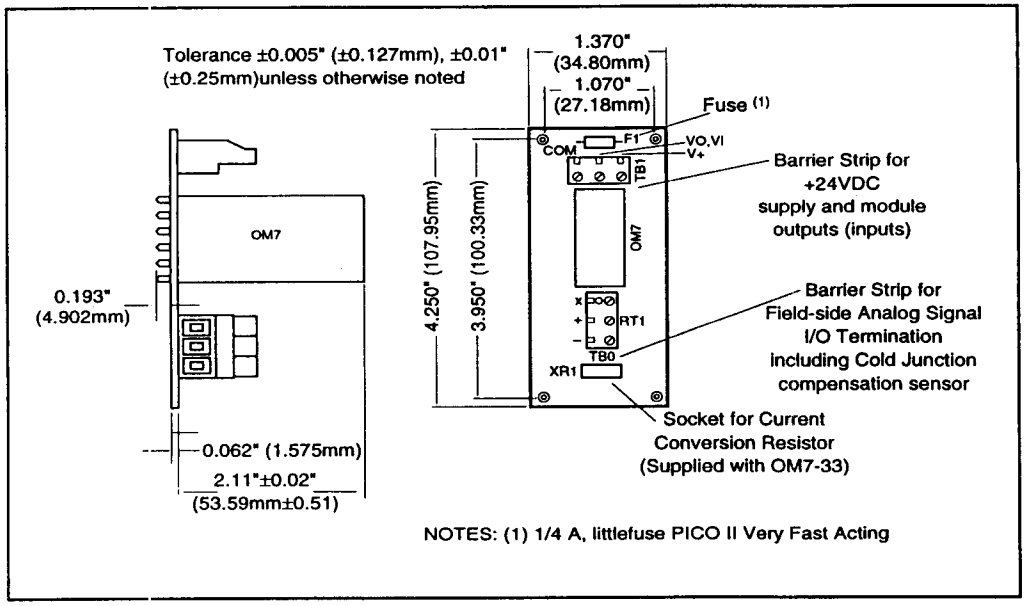


Fig 3: OM7-BP-01-C Dimensions

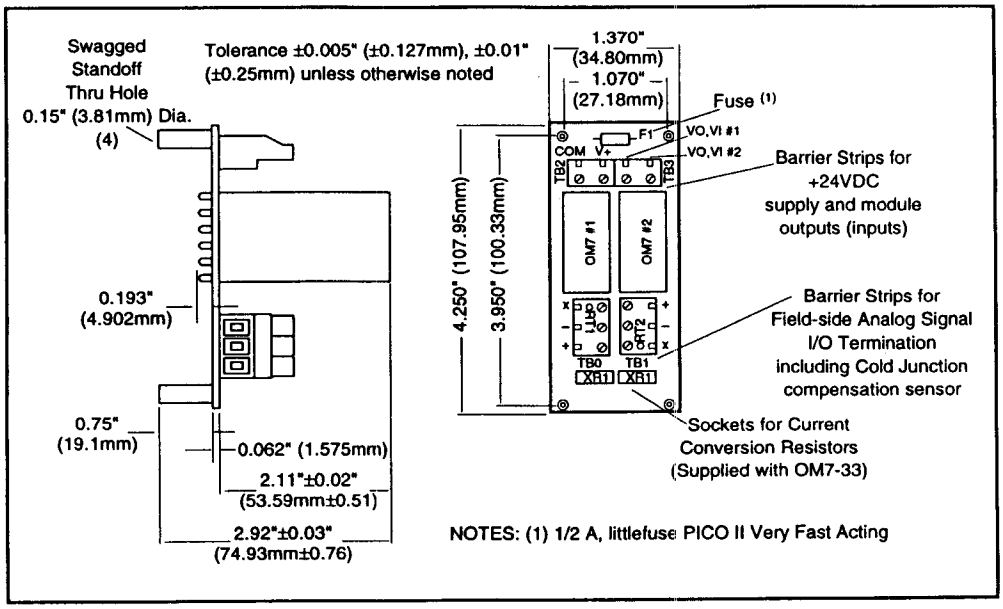


Fig 4: OM7-BP-02-C Dimensions

OM7-BP-01-DIN-C/OM7-BP-02-DIN-C & DIN RAIL MOUNTING ACCESSORIES

DESCRIPTION

The OM7-BP-01-DIN-C & OM7-BP-02-DIN-C are 1 and 2 channel panels meant for DIN rail based systems. They are identical to the OM7-BP-01-C & 02 models but without mounting standoffs.

The following parts are required for DIN mounting one OM7-BP-01-DIN-C or OM7-BP-02-DIN-C panel:

Qty	Model	Description
1	OM7-DIN-SF	Base element with snap foot
2	OM7-DIN-SE	Side element

The following parts are required for DIN mounting two OM7-BP-01-DIN-C and/or OM7-BP-02-DIN-C panels:

Qty	Model	Description
2	OM7-DIN-SF	Base element with snap foot
2	OM7-DIN-SE	Side element
4	OM7-DIN-CP	Connection pins

The following parts are required for DIN mounting three or more OM7-BP-01-DIN-C and/or OM7-BP-02-DIN-C panels:

Qty	Model	Description
2	OM7-DIN-SF	Base element with snap foot
2	OM7-DIN-SE	Side element
(# panels) - 2	OM7-DIN-WSF	Base element without snap foot
(4 x (# panels)) - 4	OM7-DIN-CP	Connection pins

SPECIFICATIONS

Operating Temperature:	–40°C to +85°C 95% relative humidity, non-condensing
Interface Connector: Field Logic	 High Density Screw Clamp, 14 AWG Max High Density Screw Clamp, 14 AWG Max

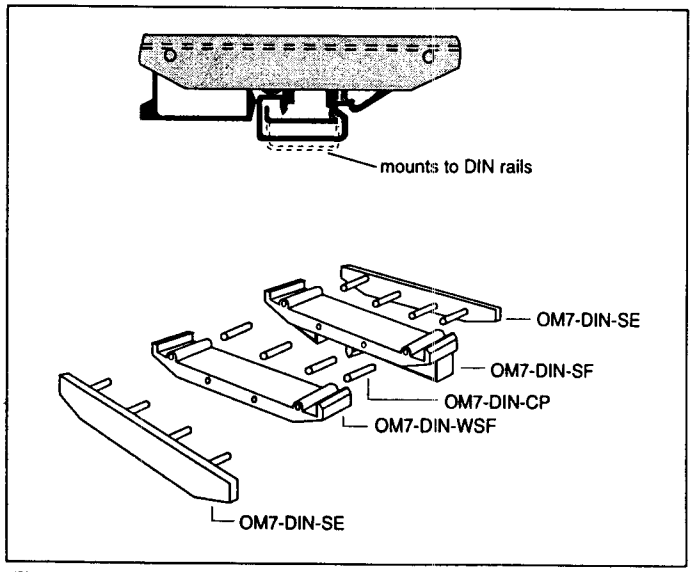


Fig 12: DIN Rail Mounting Elements.

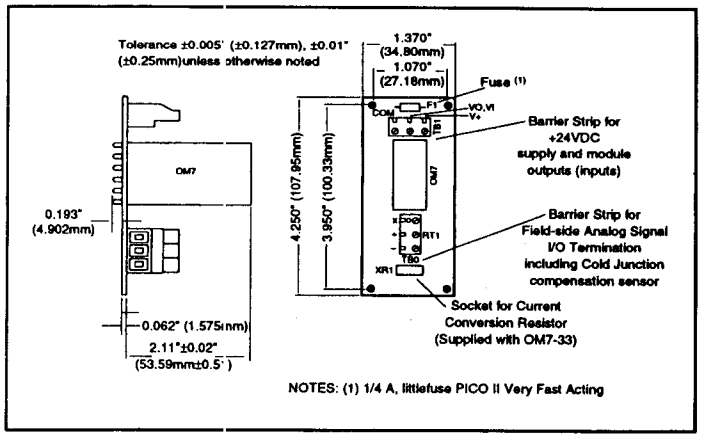


Fig 13: OM7-BP-01-DIN-C Dimensions

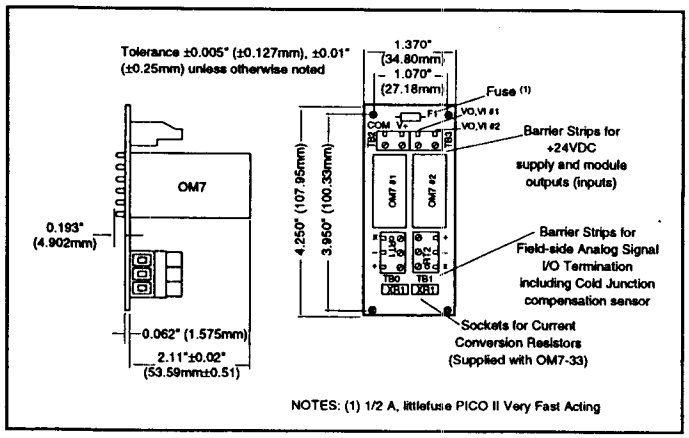


Fig 14: OM7-BP-02-DIN-C Dimensions

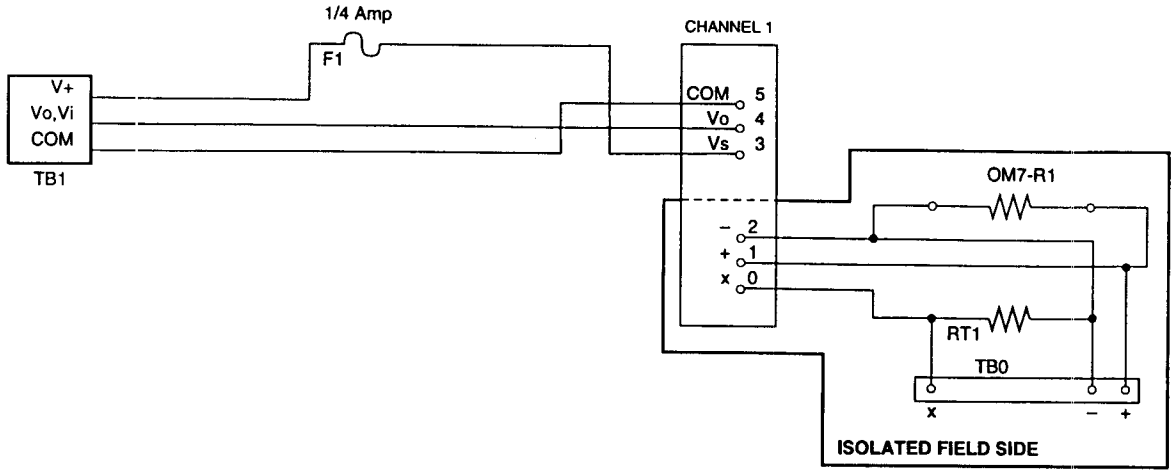


Fig 5: OM7-BP-02-DIN-C Schematic Diagram

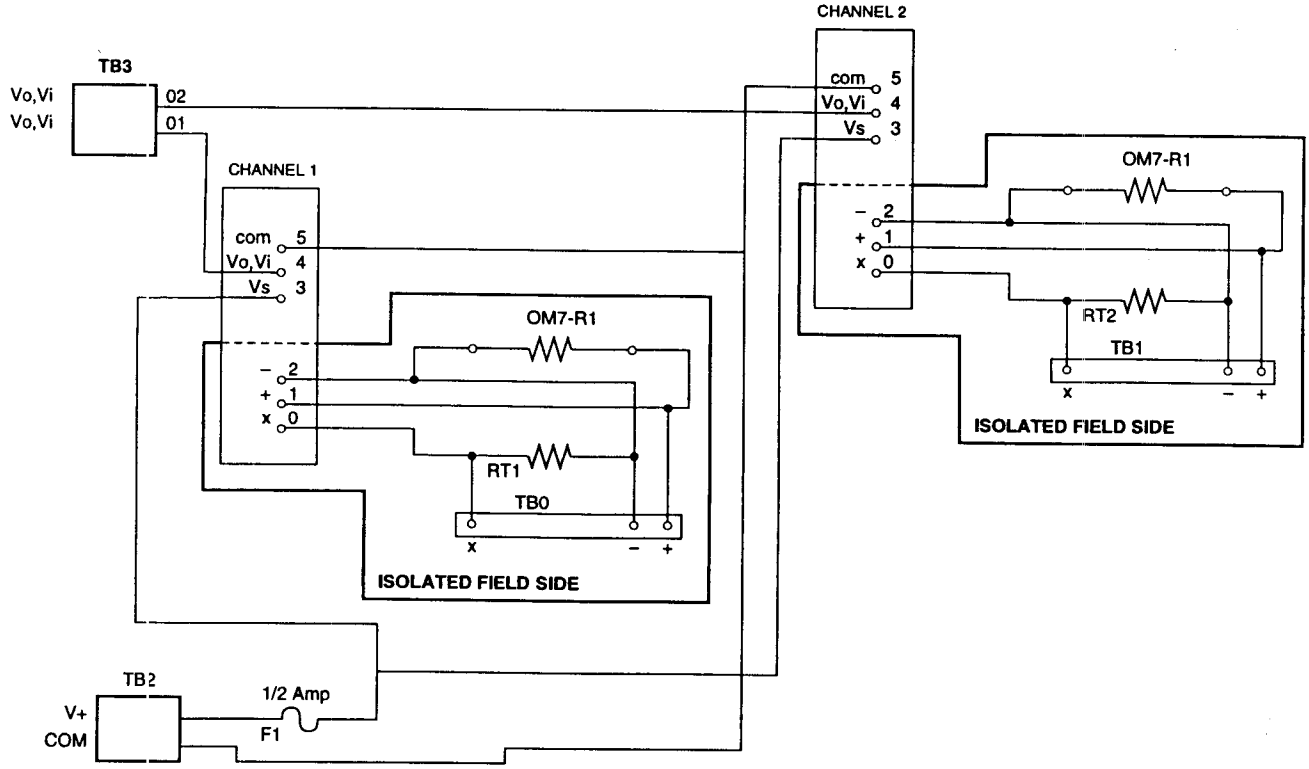


Fig 6: OM7-BP-02-DIN-C Schematic Diagram

OM7-BP-04-DIN-C/OM7-BP-08-DIN-C/OM7-BP-16-DIN-C

Introduction

The OM7-BP-04, OM7-BP-08, & OM7-BP-16 are 4, 8, & 16 channel backpanels that can accept any of the OM7 analog modules. All three of these backpanels can either be rack mounted using Omega's 19-inch rack P/N OM7-RK-002 (using the provided 3mm screws), or directly mounted to a surface using #6 or smaller screws. The OM7-BP-04-DIN-C, OM7-BP-08-DIN-C, and OM7-BP-16-DIN-C are identical to their standoff counterparts but with DIN rail mounting brackets attached instead of standoffs. These brackets allow the backpanels to be mounted on either EN 50022-35 x 7.5 (35 x 15) or EN 50035-G32 type DIN rails.

SYSTEM SIDE - POWER

Using the "V+" power supply input, the power supply voltage can be as little as +14VDC. If +15VDC is available, it is recommended that the supply be connected between the "V+A" or "V+B" connections and "COM"; this will protect the modules against accidental supply reversal. Using both these connections with two power supplies enables redundant power supply operation. It is also recommended that a diode transient absorber be installed to reduce power supply transient events from degrading system performance. An "accessory" location, between the supply and common lines, is provided for this purpose. A system side grounding #10-32 stud is also provided for use if desired. All backpanels are fused according to channel count, allowing 1/4 Amp per channel.

SYSTEM SIDE - SIGNAL

Two system interface DB25 connectors are used, to enable using both input and output modules simultaneously, or to route the signal from an input module backplane to an output module backplane. These backpanels use either the OM7-CA-01 (DB25 to 26-pin adapter cable) and OM7-CA004-XX (26-pin to 26-pin interface cable), or the OM7-CA-02 (DB25 to DB25 interface cable), depending on system requirements.

FIELD SIDE - SIGNAL

On the field side a temperature sensor is mounted underneath the field side terminal block to provide cold junction compensation for thermocouple modules, and a current-to-voltage conversion resistor (OM7-R1) socket location is provided (supplied with OM7-33 modules) for each channel. Field connections are terminated with three screw terminals.

SPECIFICATIONS

Operating Temperature:	–40°C to +85°C 90% relative humidity
Interface Connector:	
Field	High density screw clamp, 10-24 AWG
System	2 DB25 (male) connectors with 4-40 screwlocks

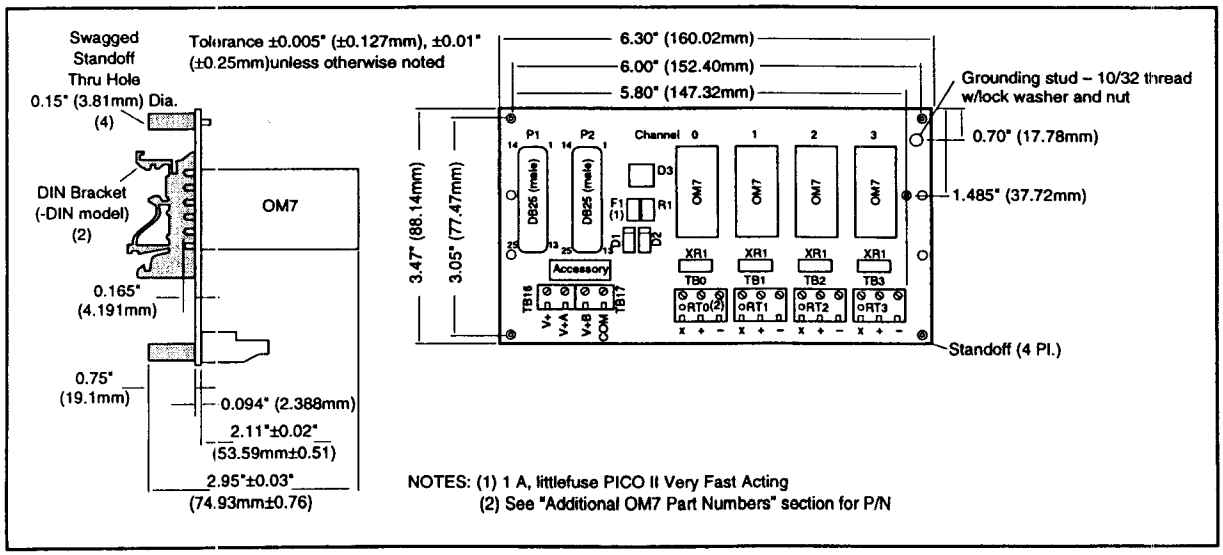


Fig 7: OM7-BP-DIN-C Dimensions

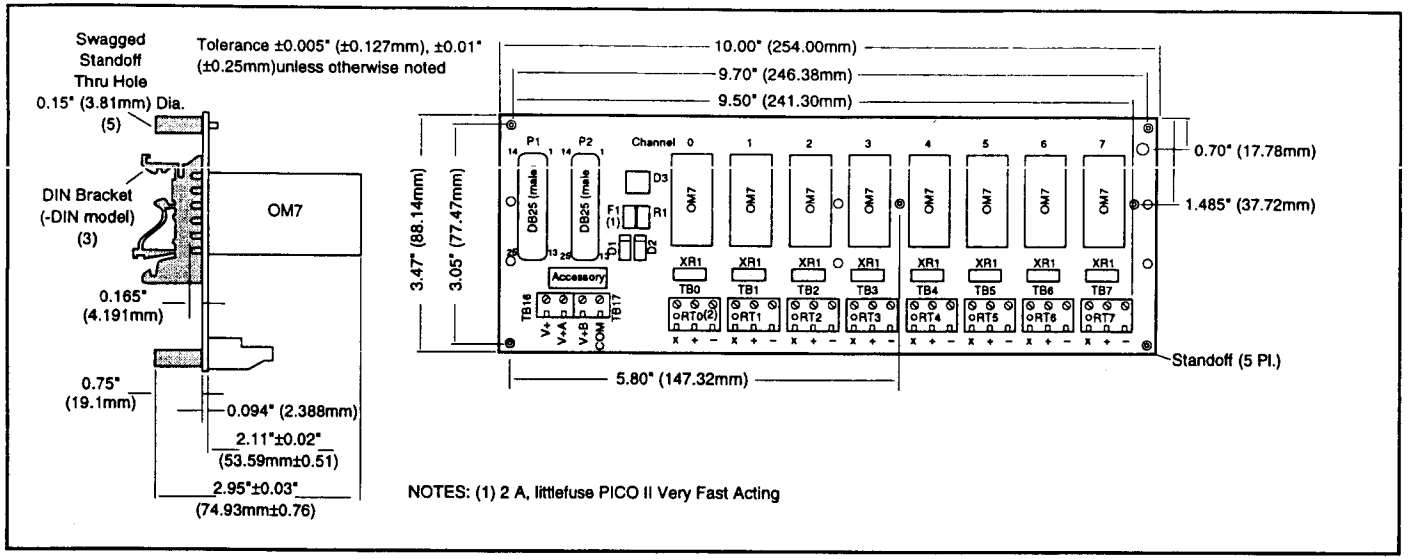


Fig 8: OM7-BP-08-DIN-C Dimensions

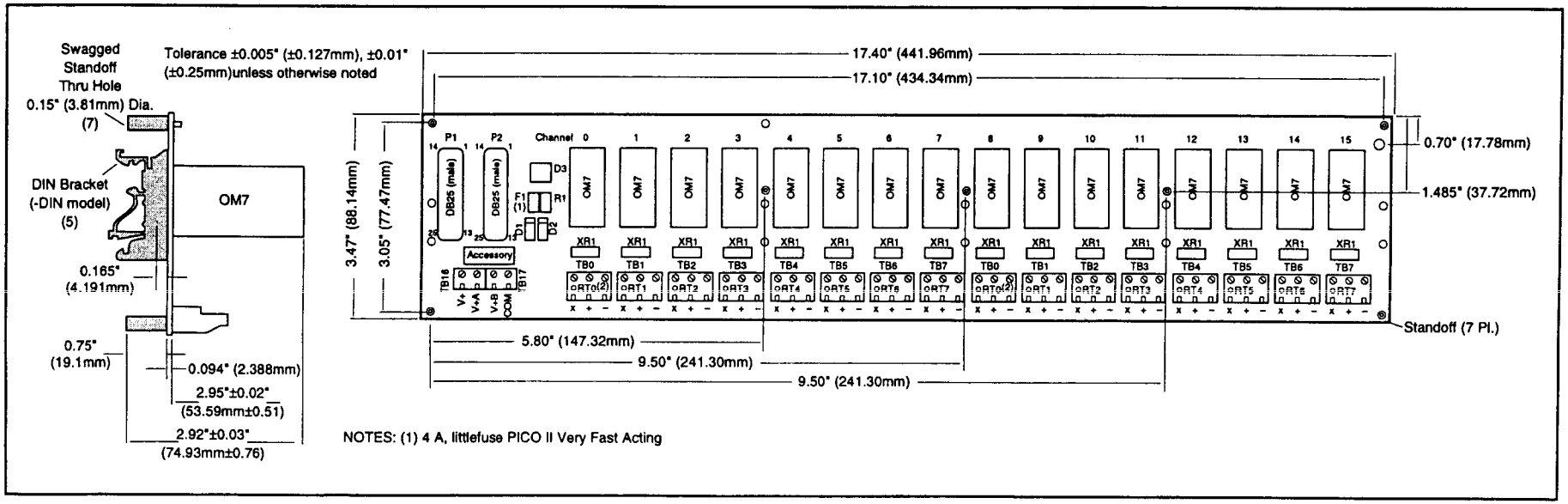


Fig 9: OM7-BP-16-DIN-C Dimensions

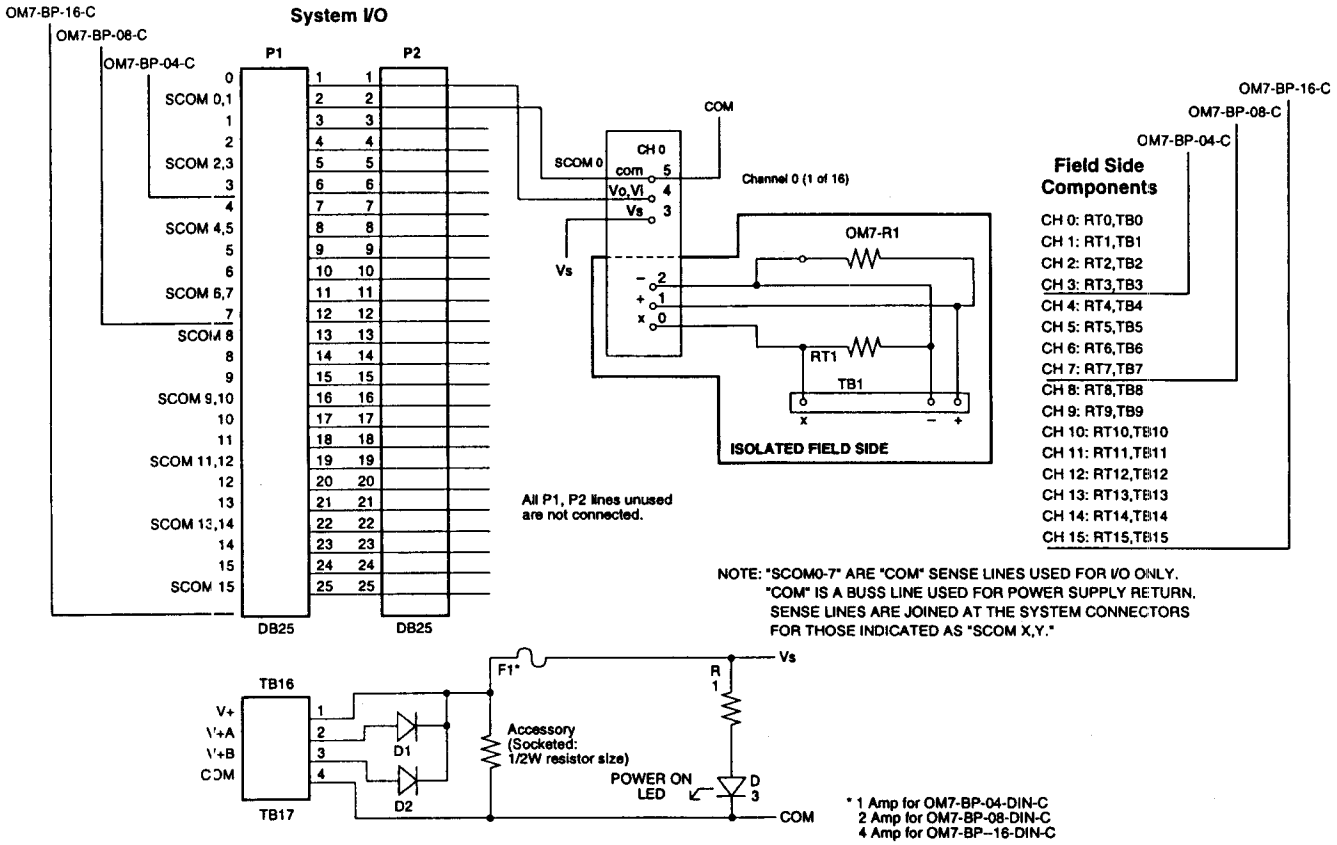


Fig 10: OM7-BP-04/08/16-DIN-C Schematic Diagram

OM7-RK002 19 INCH METAL MOUNTING RACK

DESCRIPTION

The OM7-RK002 is a 19-inch metal rack for mounting the OM7-BP 04/08/16-C backpanels. It also provides capability to mount a system power supply and the universal interface board, P/N OM7-IF. (See Figure 11 for dimensions.)

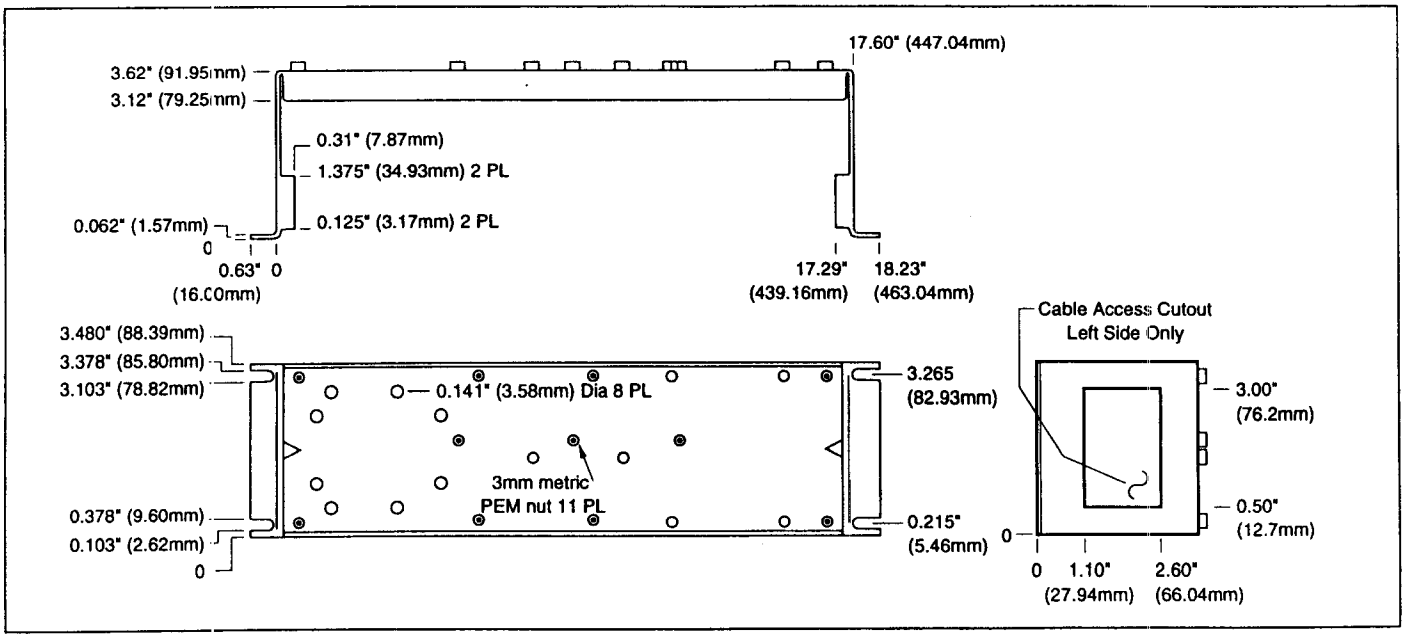


Fig 11: OM7-RK002 Analog Rack Dimensions.

DESCRIPTION

OM7-CA-01

The OM7-CA-01 adapter cable converts the OM7-BP-EV/04/08/16-C channel backpanel male DB25 connection to a male 26-pin ribbon connection.

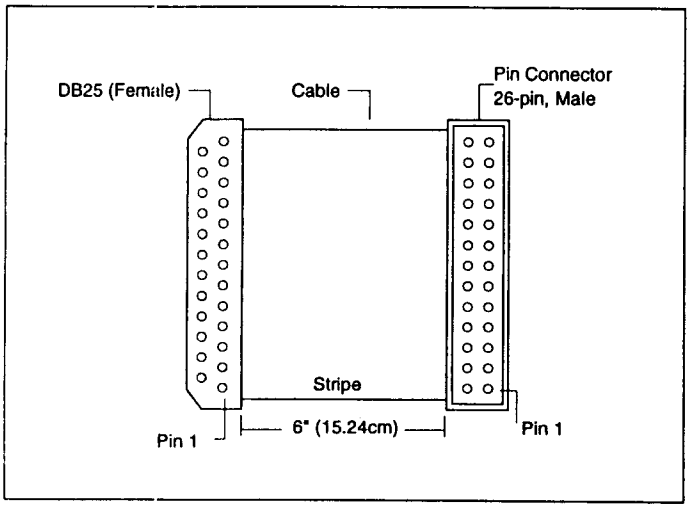


Fig 15: OM7-CA-01

OM7-CA-02

The OM7-CA-02 interface cable is used between the OM7-BP-EV/04/08/16-C channel backpanels and host system capable of accepting a DB25 (female) interface connector.

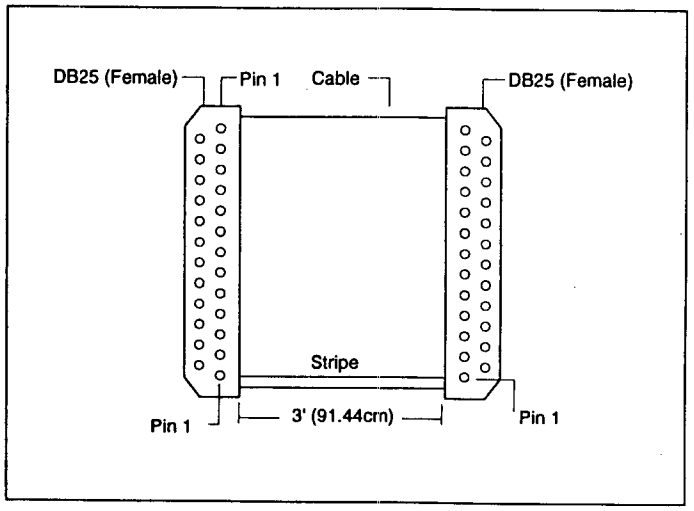


Fig 17: OM7-CA-02

OM7-CA004-XX

The OM7-CA004-XX interface cable is used with the OM7-CA-01 adapter cable to provide interface either between host systems requiring a 26-pin ribbon interface or between the universal interface board (ribbon-to-discrete wire), P/N OM7-IF. Specify cable length (-XX) in meters.

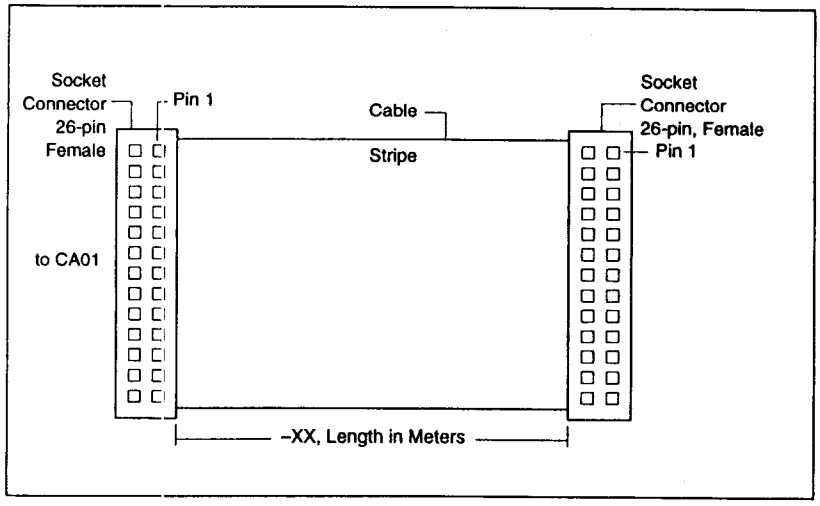


Fig 16: OM7-CA004-XX

OM7-IF UNIVERSAL INTERFACE BOARD

DESCRIPTION

The OM7-IF is a universal interface board which converts 26-pin ribbon cable input to 26-screw terminals for discrete wire, or vice versa. Using two of these can enable any pin arrangement between two 26-pin ribbon cables. It can be mounted on the back of the OM7-RK-002 mounting rack; standoffs and mounting hardware are included. Use OM7-CA-004-XX cable.

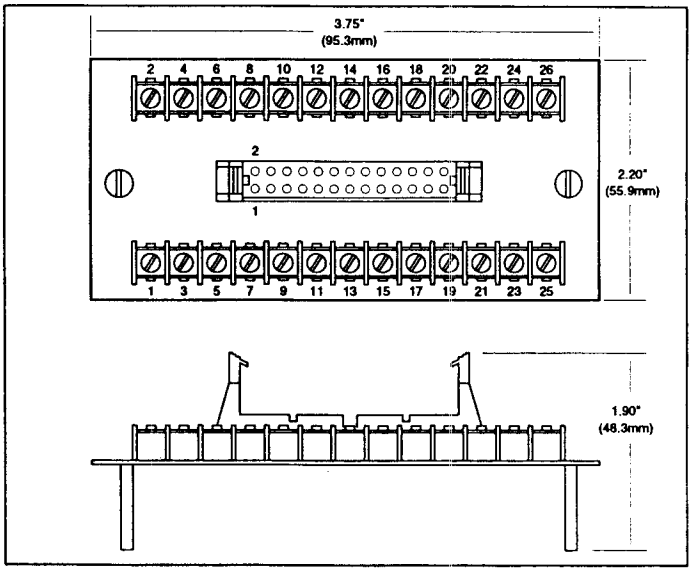


Fig 18: OM7-IF Universal Interface Board Dimensions.

OM7-R1 CURRENT CONVERSION RESISTOR

DESCRIPTION

The OM7-R1 current-to-voltage conversion resistor (250Ω, 0.1%, 10ppm) is used with the OM7-33 voltage input modules. Sockets are provided on all backpanels to allow installation of this resistor. Other values are available; consult the factory for ordering details and specifications.

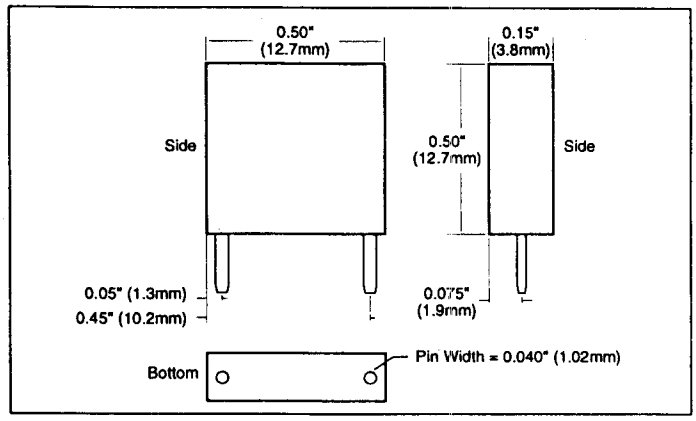


Fig 19: OM7-R1 Dimensions.

OM7-BPT NON-ISOLATED PASS THRU MODULE

DESCRIPTION

The OM7-BPT is a non-isolated signal pass-thru module which shorts together the signal inputs-to-outputs.

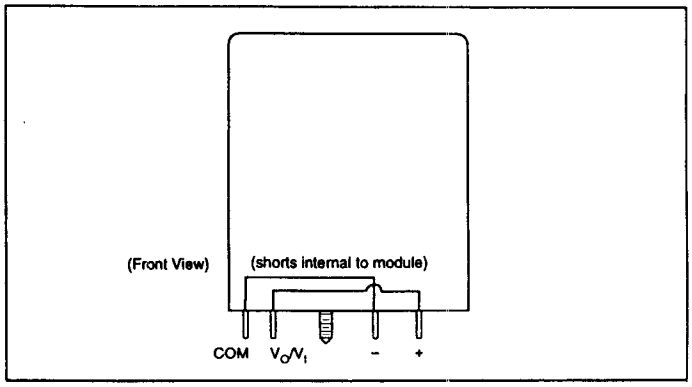


Fig 20: OM7-BPT

OM7-PROTO: Breadboard Kit

DESCRIPTION

The OM7-PROTO breadboard kit was designed to allow users to incorporate their own module functions using an OM7 format. Figure 1 shows the parts provided in the kit and assembly information. Figure 2 and 3 show the bare copper metalization or both sides of the PCB, while Figure 4 shows the component-mounting hole locations.

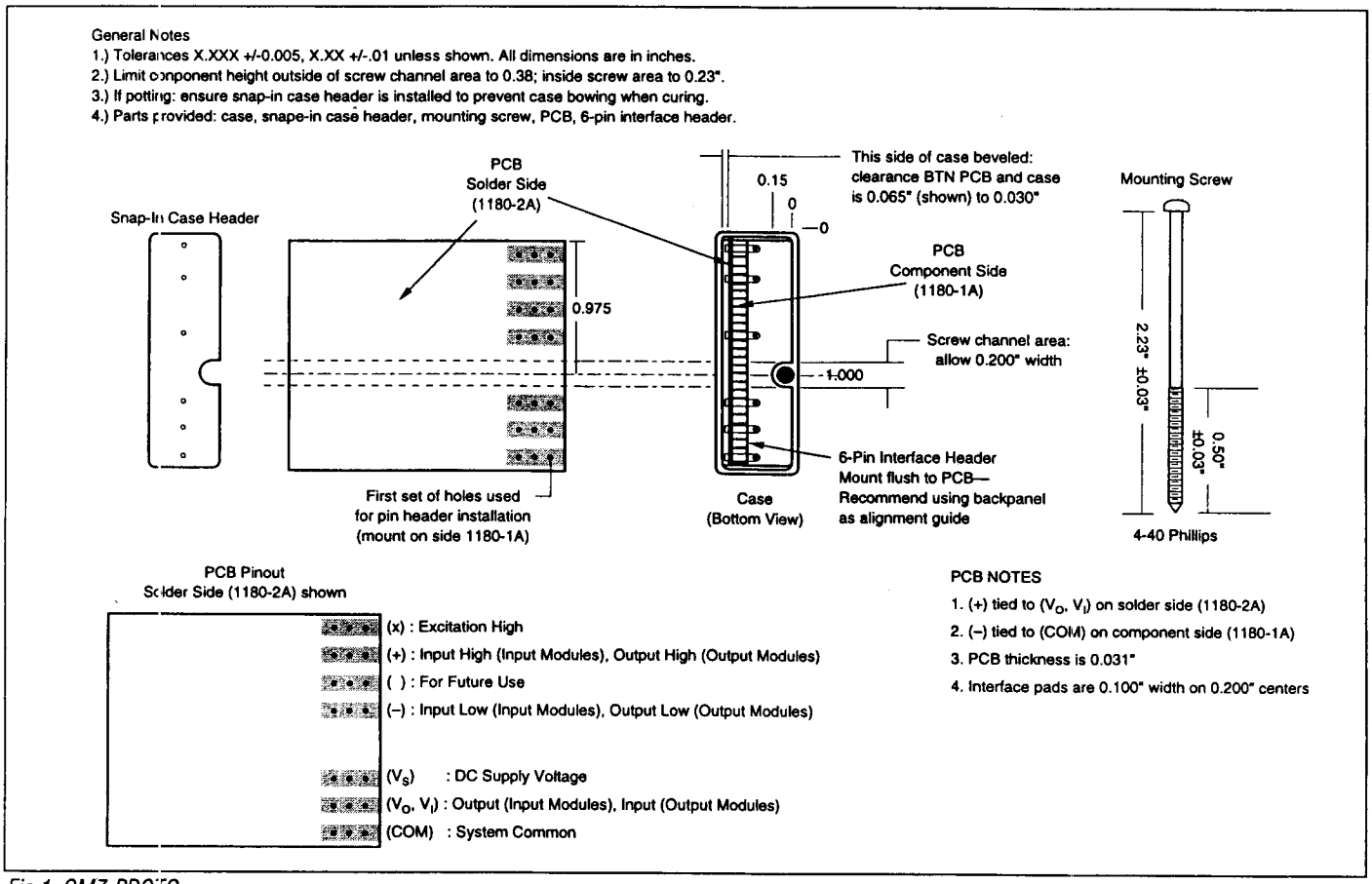


Fig 1: OM7-PROTO

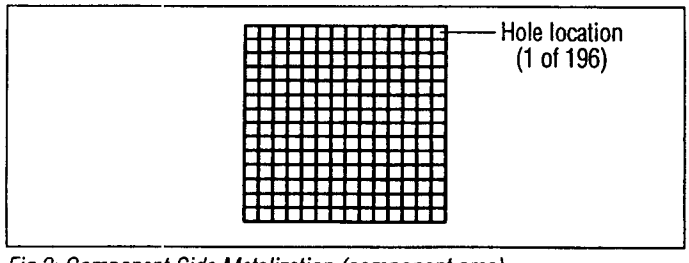


Fig 2: Component Side Metalization (component area)

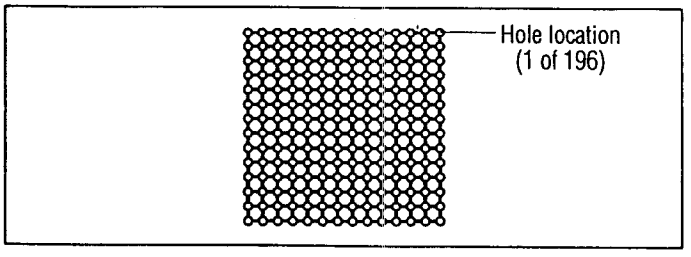
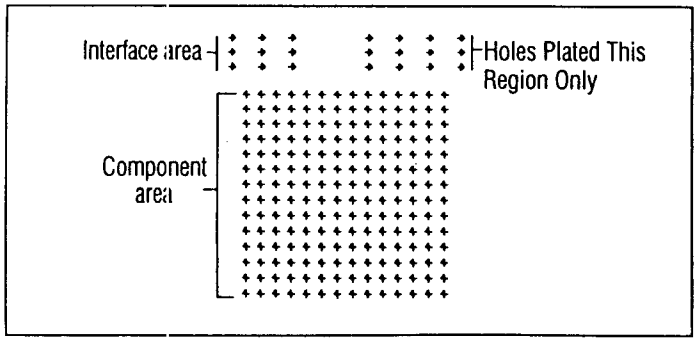


Fig 3: Solder Side Metalization (component area)



Symbol	Hole Diameter
✦	0.045"
✚	0.042"

Fig 4: PCB Drill-hole Sizes

Application Note AN701: OM7 Thermocouple Modules and CJC

A. VOLTAGE-TO-TEMPERATURE CONVERSION

When **OM7-37 thermocouple modules** are used to measure temperature, the measured output voltage must often be converted back to temperature. This is readily done with the OM7-37 series because Cold Junction Compensation (CJC) is incorporated into the module and OM7 backpanels.

The conversion method is illustrated with an example:

A type "K" thermocouple (TC) is to be used with the OM7-37K-02-1-C:

1. Identify the TC and Module Voltage ranges:

Temperature Input	Module Voltage Output
–100°C	+1V
+1350°C	+5V

The Minus Full Scale Module Output (known as the "Pedestal") = +1V

The "Module V_{OUT} Range" is 5 – 1 = 4V

2. From the type "K" TC tables determine the full scale voltages:

V(–100°C) = –3.5531mV (TC Neg. F.S. Voltage)

V(+1350°C) = +54.138mV (TC Pos. F.S. Voltage)

TC V_{IN} Range = TC Pos. F.S. Voltage – TC Neg. F.S. Voltage

The OM7-37-K module gain (G), is given by:

G = Module V_{OUT} Range / TC V_{IN} Range

$\therefore$ G = (4) / [0.054138 – (–0.0035531)] = 69.335 V/V

3. Calculate the effective TC voltage (V_T) from the Measured Module Output Voltage (V_{OUT}) using the following formula:

OM7-37 Module Output Voltage-to-Thermoelectric Voltage

$$\mathbf{V_T = [(V_{OUT} - Pedestal) / G] + (TC\ Neg.\ F.S.\ Voltage)} \qquad \textbf{Equation 1}$$

$\therefore V_T$ = (Module Measured V_{OUT} – 1V) / 69.335) + (–0.003553)

4. Find the value of the field temperature being measured by crossing V_T to thermocouple temperature in your application program's thermocouple looktable (referenced to a 0°C CJC temperature, which is the case as long as the thermocouple-backpanel junction is within the specified CJC ambient range).

OM7-37 Module values used in Equation 1 are shown in the following table. ITS-90 characteristics were used to calculate.

MODULE TYPE	G (V/V)	PEDESTAL, V	Thermocouple Neg. Full Scale (mV)
OM7-37-J-01-1-C	84.120	+1	–4.6325
OM7-37-J-01-2-C	210.300	0	–4.6325
OM7-37-J-10-1-C	371.101	+1	0.0
OM7-37-J-10-2-C	927.752	0	0.0
OM7-37-J-11-1-C	183.083	+1	0.0
OM7-37-J-11-2-C	457.707	0	0.0
OM7-37-J-12-1-C	120.837	+1	0.0

MODULE TYPE	G (V/V)	PEDESTAL, V	Thermocouple Neg. Full Scale (mV)
OM7-37-J-12-2-C	302.093	0	0.0
OM7-37-J-13-1-C	238.447	+1	+16.3272
OM7-37-J-13-2-C	596.118	0	+16.3272
OM7-37-K-02-1-C	69.335	+1	–3.5531
OM7-37-K-02-2-C	173.338	0	–3.5531
OM7-37-K-20-1-C	327.639	+1	0.0
OM7-37-K-20-2-C	819.097	0	0.0
OM7-37-K-21-1-C	160.607	+1	0.0
OM7-37-K-21-2-C	401.518	0	0.0
OM7-37-K-22-1-C	81.903	+1	0.0
OM7-37-K-22-2-C	204.758	0	0.0
OM7-37-K-23-1-C	167.135	+1	+24.9055
OM7-37-K-23-2-C	417.837	0	+24.9055
OM7-37-T-03-1-C	164.945	+1	–3.3786
OM7-37-T-03-2-C	412.362	0	–3.3786
OM7-37-E-04-1-C	58.151	+1	0.0
OM7-37-E-04-2-C	145.377	0	0.0
OM7-37-R-05-1-C	191.598	+1	0.0
OM7-37-R-05-2-C	478.994	0	0.0
OM7-37-S-06-1-C	216.177	+1	0.0
OM7-37-S-06-2-C	540.441	0	0.0
OM7-37-B-07-1-C	294.331	+1	0.0
OM7-37-B-07-2-C	735.828	0	0.0

When the **OM7-47 thermocouple modules** are used to measure temperature, the measured output voltage is also often converted back to temperature. This is readily done with the OM7-47 series because, like the OM7-37 Modules, Cold Junction Compensation (CJC) is incorporated into the module and SCM7B backpanels. However, unlike the OM7-37 Modules, the module output voltage is a linear representation (Y = M X + B) of the input temperature.

The conversion method is illustrated with an example.

A type "T" thermocouple (TC) is to be used with the OM7-47-T-06.

1. Determine the Module Transfer Function:

Temperature Input	Module Voltage Output
–100°C	+1V
+200°C	+5V

Let T_{LOW} ≡ Neg. Full Scale Temperature = –100°C

Let M ≡ (Output Voltage Span) / (Input Temp Span) = +13.333mV / °C

2. Find the Temperature corresponding to Module Output Voltage:

Since Y = MX + B, with X = (Field Temperature – T_{LOW})

V_{OUT} = M x (Field Temperature – T_{LOW}) + Pedestal

Solving for the Field Temperature gives:

OM7-47 Voltage-to-Temperature Conversion

Temperature = (V_{OUT} – Pedestal) / M + T_{LOW}
with M = (Module Output Volt Span) / (Input Temp Span)

Equation 2

In this case, Temperature (°C) = (V_{OUT} – 1V) / 13.333mV + (–100°C)

OM7-47 Module values used in Equation 2 are shown in the following table:

MODULE TYPE	M (mV/°C)	Pedestal, V	T_{LOW}, °C
OM7-47-J-01-1-C	5.2632	+1	0
OM7-47-J-01-2-C	13.1579	0	0
OM7-47-J-02-1-C	10.0000	+1	–100
OM7-47-J-02-2-C	25.0000	0	–100
OM7-47-K-03-1-C	3.0769	+1	0
OM7-47-K-03-2-C	7.6923	0	0
OM7-47-K-04-1-C	6.6667	+1	0
OM7-47-K-04-2-C	16.6667	0	0
OM7-47-T-05-1-C	10.0000	+1	0
OM7-47-T-05-2-C	25.0000	0	0
OM7-47-T-06-1-C	13.3333	+1	–100
OM7-47-T-06-2-C	33.3333	0	–100
OM7-47-E-07-1-C	4.4444	+1	0
OM7-47-E-07-2-C	11.1111	0	0
OM7-47-R-08-1-C	3.2000	+1	+500
OM7-47-R-08-2-C	8.0000	0	+500
OM7-47-S-09-1-C	3.8095	+1	+700
OM7-47-S-09-2-C	9.5238	0	+700
OM7-47-B-10-1-C	4.0000	+1	+800
OM7-47-B-10-2-C	10.0000	0	+800
OM7-47-N-11-1-C	3.6364	+1	+200
OM7-47-N-11-2-C	9.0909	0	+200

B. COLD JUNCTION COMPENSATION (CJC)

A negative temperature coefficient Thermistor is used as the OM7- CJC sense element in a voltage divider configuration. It is mounted underneath each field side terminal block. A nonlinear current is used to develop a linear voltage potential which is input to the modules X^+ input pin. This potential changes over temperature. Inside the module, this slope is modified to match the thermocouple type's Seebeck Coefficient (at+25°C) which offsets the effect of the thermocouple to backplane junction potential. Thus, the module high-level output potential is the field Thermocouple temperature and NOT the difference between the field temperature and backpanel temperature.

This Thermistor is manufactured by BetaTHERM, P/N 100K6A1 .

The Thermistor is rated at 100kΩ @ +25°C, ±0.2°C from 0°C to +70°C. For temperatures other than +25°C, the Steinhart-Hart Equation can be used with coefficients provided by the Thermistor manufacturer.

STEINHART-HART EQUATION

$$\boxed{1/T = A + B \cdot \ln(R) + C \cdot [\ln(R)]^3} \qquad \textbf{Equation 3}$$

Where T is in Kelvin, Thermistor Resistance (R) in Ohms, and coefficients A,B,C are given by:

A = 8.27153E-04
B = 2.08796E-04 (per BetaTHERM for model 100K6A1)
C = 8.060985E-08

To convert to °C, simply subtract 273.15 from the Kelvin temperature result.

Application Note AN702: OM7 Frequency and Time Response

Figures 1 through 4 are the result of performing a 100-run Monte Carlo analysis on the OM7 filter circuitry in both the frequency and time domains.* In this type of analysis, al component values are simultaneously (and randomly) varied between the specified ±tolerances. 100 runs ensures an adequate statistical sample. Although the circuit bandwidth used is 3Hz, the results can be extended to higher bandwidths by appropriate scaling.

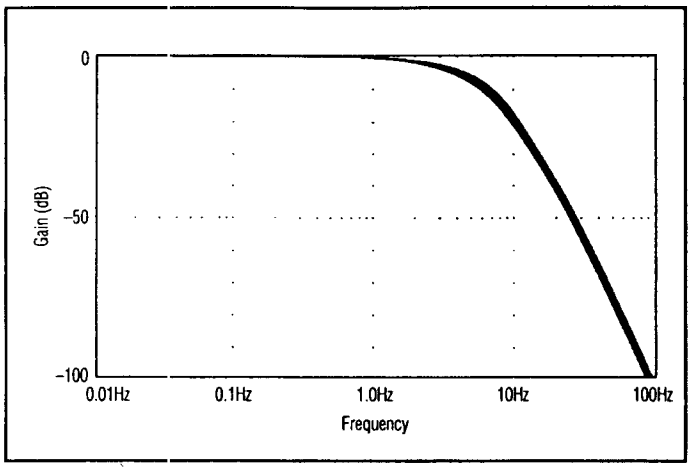


FIGURE 1. Gain Response.

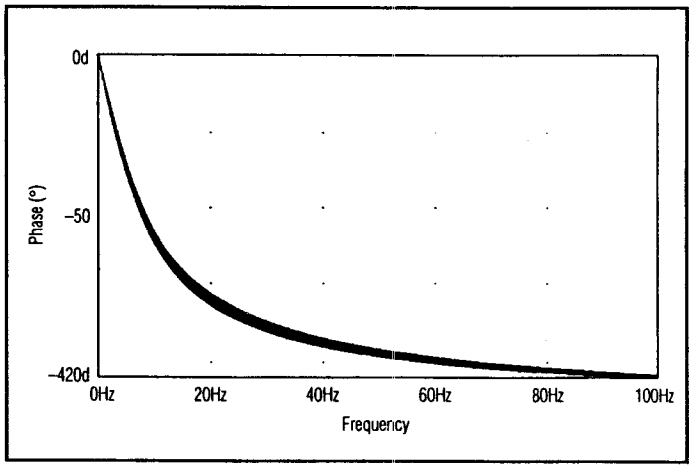


FIGURE 2. Phase Response.

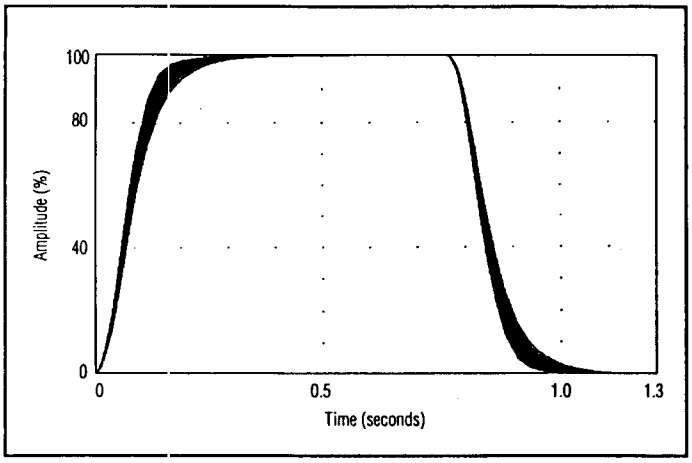


FIGURE 3. Time Response.

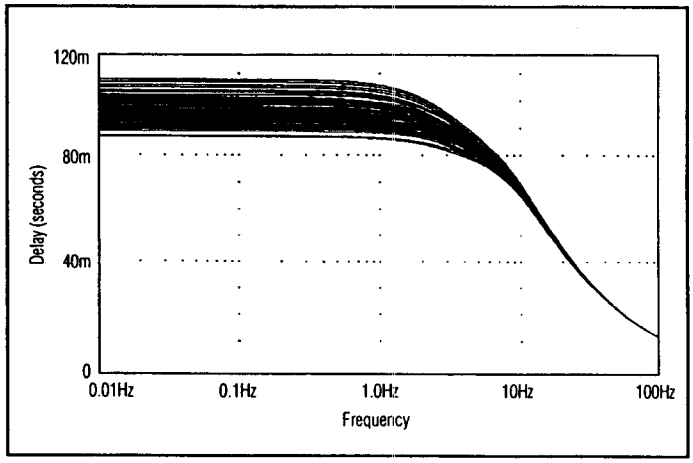


FIGURE 4. Delay Time (fundamental).

Model represented: OM7-34-02-2-C

Application Note AN703: OM7 Performance Data Sheets

Every OM7 module is shipped with a Performance Data Sheet which shows module accuracy at the time of shipment. Serialized, a copy of every Performance Data Sheet is retained at the factory for referral if necessary. Below is a sample Performance Data Sheet for a OM7-39-03-C. The number of data points may vary according to OM7 Model.

SAMPLE PERFORMANCE DATA SHEET

MODEL: OM7-39-03-C

Date: 10-20-1997 Serial Number: 99999-1

MODULE PERFORMANCE

Vin (V)	Calculated I_{out} (mA)	Measured I_{out} (mA)	Error (µA)	Error (%)
-0.000	+4.000	+4.001	+1	+0.005
+1.250	+6.000	+6.001	+1	+0.004
+2.500	+8.000	+8.000	-0	-0.002
+3.750	+10.000	+9.999	-1	-0.006
+5.000	+12.000	+11.999	-1	-0.006
+6.250	+14.000	+13.998	-2	-0.010
+7.500	+16.000	+16.000	+0	+0.001
+8.750	+18.000	+17.999	-1	-0.005
+9.983	+19.973	+19.974	+1	+0.003

Packing Check List

Module Appearance: ____ Mounting Screw: _____

Pins Straight: _____ Top Label (Family):_____

Pin Protector: _____ Side Label: ____

TESTER_____ QC_____

It is hereby certified that the above product is in conformance with all requirements to the extent specified. This product is not authorized or warranted for use in life support devices and/or systems.

Application Note AN704: OM7 Failure Rate Calculation and Prediction

Failure rate calculations for the OM7 modules are derived from 1.) the MIL-HDBK-217 (Reliability Prediction of Electronic Equipment), and 2.) Demonstrated Performance.

MIL-HDBK-217 RELIABILITY PREDICTION

The "Part Stress Analysis" method was used at a ground benign environment, +35°C temperature, and quality level B-2 to D-1 depending on component. The failure rates presented apply to modules under normal operating conditions.

MODEL	FIT	MTBF (hours)
OM7-21	1416	706,000
OM7-22	1808	553,000
OM7-30	1375	727,000
OM7-31	1373	728,000
OM7-32	1448	691,000
OM7-33	1375	727,000
OM7-34	1479	676,000
OM7-35	1647	607,000
OM7-36	1464	683,000
OM7-37	1434	697,000
OM7-39	1623	609,000
OM7-40	1375	727,000
OM7-41	1373	728,000
OM7-47	1852	540,000
OM7-BP-01-DIN-C	92	10,834,000
OM7-BP-02-DIN-C	154	6,477,000
OM7-BP-04-DIN-C	278	3,594,000
OM7-BP-08-DIN-C	465	2,150,000
OM7-BP-16-DIN-C	829	1,206,000

* FIT = Estimated failures per 1 billion device hours

DEMONSTRATED RELIABILITY

All OM7s undergo a 48 hour powered and under bias burn-in at +85°C before final calibration and shipment. This "preconditioning" serves to minimize field failures by stabilizing components and causing "infant failures", if any, to occur.

In addition, Omega's quality system includes an ongoing OM7 reliability program which continuously generates accelerated life test data for reliability prediction. The reliability prediction model used is based upon the exponential failure rate, which assumes constant failure rate in time and no failure mechanism change between stress and use conditions. The Chi-squared prediction method is used to qualify this assumption (using actual data for the Bartlett statistic), as indicated by the confidence level. Coupled with the Arrhenius temperature equation (using 1eV activation energy), temperature derating is performed to determine the MTBF and FIT at various operating temperatures.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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