MODEL SW6000 & SM6100 CENELEC INSTRUCTIONS

Installation Manual

AGENCY APPROVED PRODUCT
DO NOT DEVIATE FROM DOCUMENTED CONSTRUCTION OR LISTED PARTS

CE 1180

METRIX
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M9091 REV G

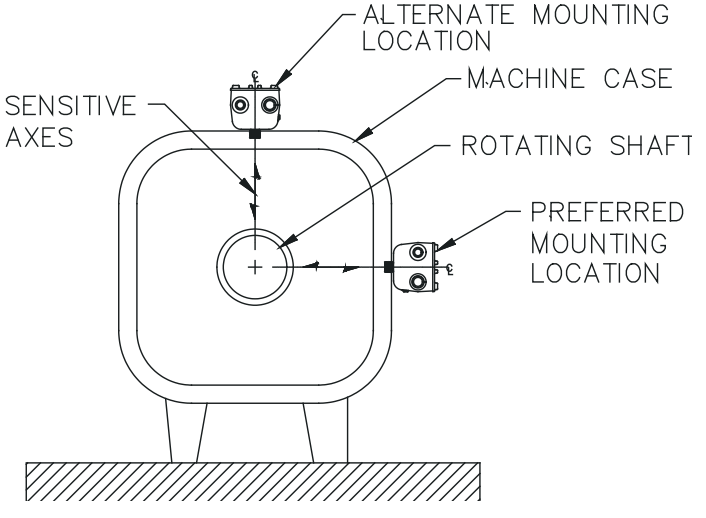
SECTION A - MECHANICAL INSTALLATION

1.0 Switch Installation

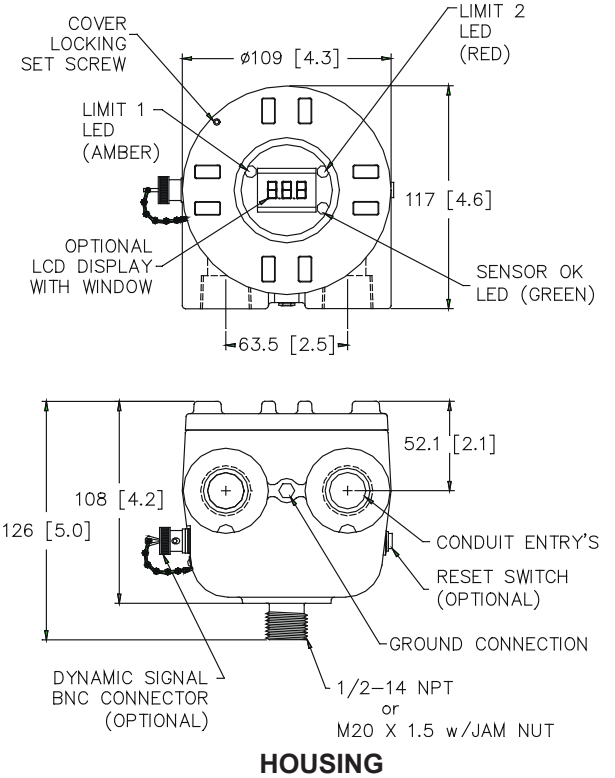
The sensitive axis of the switch can be mounted on any radial axis, although the horizontal axis is preferred so the unit sees maximum vibration. The horizontal axis also reduces the temperature exposure vs a vertical axis. If a bracket is required, it should be rigidly constructed to prevent spurious mechanical resonances in the SW6000 frequency range.

Stud Mount Unit:
Requires a tapped hole, see Product Identification "F" or use a model 7084 flange mount adapter. If an NPT mounting stud is selected the stud will tighten before the switch casing touches the machine case. The SW6000 should be hand tightened and then wrench tightened to bring the conduit connections to the appropriate location. Studs with straight threads are provided with a locking nut.

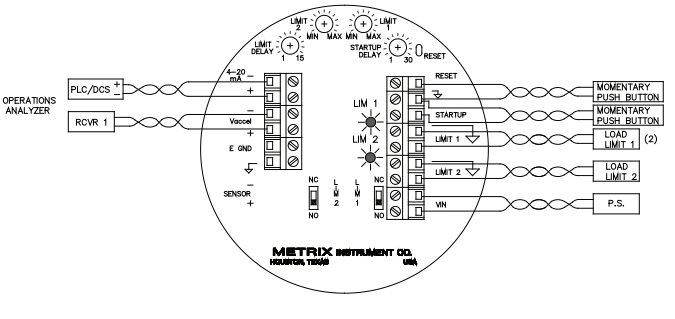
The optional display can be rotated in 90 degree increments to bring it to a readable position. Refer to Section B 1.0 for further information.



MOUNTING LOCATIONS
Figure 1



HOUSING
Figure 2



WIRING DIAGRAM
Figure 3

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NOTE: 1) Diagrams show all available options, see Product Identification to verify options on your particular unit.
2) On Single Limit Models, use Load Limit Two (2).

SECTION B - WIRING

NOTE: On CENELEC approved units, a locking set screw must be loosened prior to lid removal.

1.0 Terminal Wiring

If you have selected the optional display, the display circuit board must be removed (two screws) to expose the terminal strips. The display board cable should not be disconnected. Simply place the display board out of the way to allow wiring to the terminal strips. The display may be reinstalled in any of the four possible orientations. Connection to the unit is through one or two conduit entries (See Sheet 3 of drawing 9030). The cable gland or conduit entries shall be in accordance with 13.1 of EN60079-1 and IEC 60079-1. The user must provide appropriate seal and sealing materials for the rates installation. Unused conduit entries must be plugged with a plug that conforms to Clause 13.2 of EN60079-1 and IEC 60079-1. The internal ground connector allows for the connection of a 14 AWG wire. This has a cross section of 2 mm^2. The external ground terminal can accommodate a 10 AWG wire that has an area of 5 mm^2. It is comprised of an M5 bolt with two flat washers and one lock washer.

Refer to figure 3 for wiring information. For incoming power and switch output(s) use approved wire of 14 AWG (1.5 sq. mm) or smaller. NOTE: On CENELEC installations, a means for disconnecting power to the switch must be provided. Also, the symbol signifies a protective earth terminal. For reset and startup delay functions, use a twisted pair to reduce electrical noise pickup.

For the current and dynamic signal outputs a shielded, twisted pair is recommended. By convention, the shield should be tied to common only at the receiver end. A cable consisting of separate shielded twisted pairs can also be used. For the dynamic signal output the capacitance of the cable run must not exceed .03 uF (typically 1000 feet).

CAUTION: Conduit seals are highly recommended to prevent the entry of moisture into the switch. Moisture will damage the switch and void the warranty. Internal and external protective earth connections must be connected to the installation protective earth circuits.

1.1 Power Wiring

It is highly recommended that all power and triac/FET wiring be routed separately from the dynamic signal and 4-20mA wiring in order to reduce a.c./transient noise pickup.

The power required is indicated on the nameplate. The voltage supply must be within the following limits:

24 VDC: 20 to 28 VDC 115 VAC: 95 to 125 VAC, 50/60 Hz 230VAC: 190 to 250 VAC, 50/60 Hz

Polarity does not need to be observed when wiring for DC power. The preferred method of operation is to continuously apply power to the SW6000. If power is to be applied as a part of the machine startup sequence it is advisable to apply power to the SW6000 30 seconds prior to starting the machine in order to allow the electronics circuits to stabilize. This is particularly important if the adjustable startup delay option is utilized and the delay is set to less than 20 seconds.

1.2 Alarm Limit Triac Output Wiring

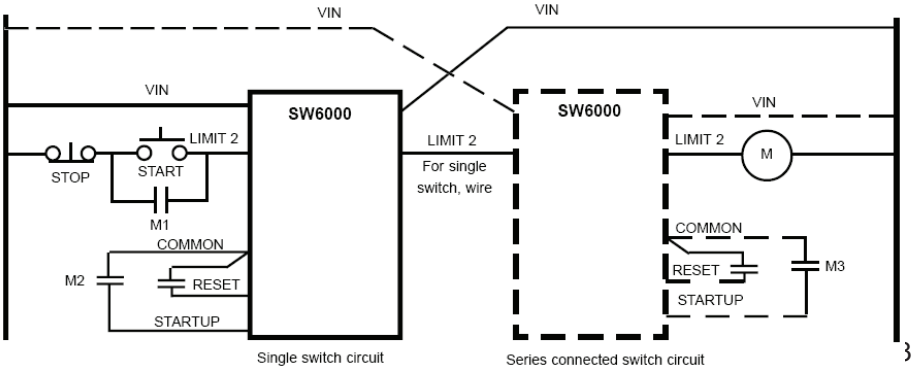
The triac output(s) are electro-optically isolated from each other, power, and the internal circuit. These are medium power devices with high immunity to electrical transients. If desired, each triac can be supplied from an AC voltage source different from the main supply. The triacs can be connected in series with the triacs of other units. See Fig. 4. Parallel connection of two switches doubles the triac holding (minimum load) current requirements. The maximum triac supply voltage is 250 VAC. The worst case triac leakage (off) current is 2 mA. The maximum triac holding current is 35 mA at 25°C (60mA at -40°C) which requires that the relay pull-in current have a greater value. Do not use a DC supply. The triacs can be set for NC or NO operation by positioning the Limit 1/Limit 2 switches accordingly.

TYPICAL CONTROL CIRCUITS SW6000 w/AC Power Wired to Interrupt Motor Starter (series connection)

a. Set each SW6000 for N.C. (normally closed) operation. (See Figure 3)

b. M2, M3 and remote reset contacts must each be isolated.

FIGURE 4



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SECTION B - WIRING (con't)

1.3 Alarm Limit FET Output Wiring (optional)

The optional FET limit output(s) provide a low leakage switch for DC inputs to PLC's or other devices. Do not use on an AC supply. Observe proper polarity when wiring the FET(s) (See figure 3). Damage to the FET(s) will result from improper wiring. As with the triacs, the FET(s) can be set for N.C. or N.O. operation by positioning the Limit 1/Limit 2 switches accordingly.

1.4 Limit Trip Delay

The base unit has an adjustable (1-15 sec.) limit trip delay. The vibration level must be continuously above the limit setting for the duration of the time delay before the output devices switch. The 4-20 mA output is not affected by this time delay. To reset the limit output devices, the internal reset push-button or the optional external reset push-button must be pressed. Remote reset by a N.O. push-button or momentary contacts may be made by wiring to the remote reset terminals. Note that the vibration level must be below the trip level for the reset to function.

1.5 Startup Trip Delay

Some machines generate vibration levels during startup which are higher than normal running levels. These high vibration levels can exceed the Alarm Trip Limits which are set above the normal running vibration level. The standard SW6000 has a fixed time delay which inhibits alarm trips for 30 seconds from the closing of the startup contacts.

An optional adjustable startup trip delay (1-30 sec.) permits the Alarm Trip Limits to become operative in less than 30 seconds. Protection of machines with short startup times can be improved by utilizing the adjustable Startup Trip delay.

The Startup Trip Delay is triggered by closing a set of contacts (momentary or continuous) connected to the startup terminals. The contacts must be opened before the internal startup delay timer can be initiated again. Connecting these terminals to a set of isolated auxiliary N.O. contacts in a motor starter is a method commonly used to initiate the startup trip delay. The 4-20 mA current output is inhibited (set to 4.0 mA) during the startup trip delay.

1.6 Remote Reset Wiring (optional)

If remote reset capability is desired, connect Reset terminals (see Figure 3) to a remotely located, momentary N.O. push-button switch. Observe hazardous area requirements if applicable.

1.7 4-20 mA Current Source Output (optional)

If the optional 4-20 mA output is installed it may be connected to a remote receiver, as shown on the wiring diagram (see Figure 3). This output is a current source (at 15VDC) and requires no external loop power supply. Full scale current (20 mA) corresponds to the full scale vibration response marked on the face plate. A current of 4.0 mA represents a zero vibration condition. The maximum load resistance is 600 ohms. In high electrical noise locations a shielded, twisted pair cable is recommended.

FORMULA: $\frac{\text{Measured mA - 4mA}}{\text{20mA - 4mA}}$ X Full scale vibration = Actual vibration

EXAMPLE: Measured mA	Full Scale Vibration	Actual Vibration
4.0	1.0 ips, peak	0.0 ips, peak
12.0	1.0 ips, peak	0.5 ips, peak
20.0	1.0 ips, peak	1.0 ips, peak

1.8 Dynamic Outputs

The sensor (acceleration) signal is available at the terminal block and is capable of driving a cable with a capacitance of up to .03 uF (typically 300m/1000 feet). Longer runs with greater than .03 uF of capacitance can be used without the buffer becoming unstable. However, the frequency response will be reduced due to the increased capacitance.

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PRODUCT IDENTIFICATION

A B C D E F
SW6000-❒-❒❒-❒-❒-❒-❒

*NOTE: add 30 to part no. for RMS calibration
EX: SW6000-1-31-1-2-0-0, similar to example, now with RMS calibration.

Example Part Number: SW6000-1-01-1-2-0-0

A ❒ Limits and Delay

1 = one limit, triac
2 = two limits, triacs
3 = one limit, FET
4 = two limits, FETs
5 = one limit, triac, with display
6 = two limits, triacs, with display
7 = one limit, FET, with display
8 = two limits, FETs, with display

B ❒❒ Full Scale Range

Velocity Response
0 1 = 1 ips, pk*
3 1 = 1 ips, RMS
0 2 = 2 ips, pk*
3 2 = 2 ips, RMS
0 3 = 20 mm/sec, pk*
3 3 = 20 mm/sec, RMS
0 4 = 50 mm/sec, pk*
3 4 = 50 mm/sec, RMS

Displacement Response
5 1 = 20 mils, pk-pk
5 2 = 50 mils, pk-pk
5 3 = 200 microns, pk
5 4 = 500 microns, pk

C ❒ Input Power

1 = 115 VAC, 50/60 Hz, 5 watts, max.
2 = 230 VAC, 50/60 Hz, 5 watts, max.
3 = 24 VDC, 7 watts, max.

D ❒ Hazard Area Rating/External Reset Options

2 = Class I (B, C & D), Div 1
3 = Class I (B, C & D), Div 1 with external reset
4 = CENELEC EEx d IIB + H2 T4
5 = CENELEC EEx d IIB + H2 T4 with external reset
8 = Non-Agency Approved Locations
9 = Non-Agency Approved Locations with external reset

E ❒ Input/Output Options

0 = Standard
1 = 4-20 mA proportional to full-scale range
2 = BNC for external access to dynamic signal
3 = Adjustable startup trip delay
4 = Options 1 & 2
5 = Options 1 & 3
6 = Options 2 & 3
7 = Options 1, 2, & 3

NOTE: Options 2, 4, 6, and 7 not available
on hazardous area (D = 2, 3, 4, 5) versions

F ❒ Mounting/Conduit Entry

0 = 1/2” NPT stud mount / 3/4” NPT conduit entry (standard)
1 = M20 x 1.5 straight thread / stud mount with jam nut / M20 x 1.5 conduit entry
2 = 1/2-20 UNF straight thread stud mount with jam nut / 3/4” NPT conduit entry

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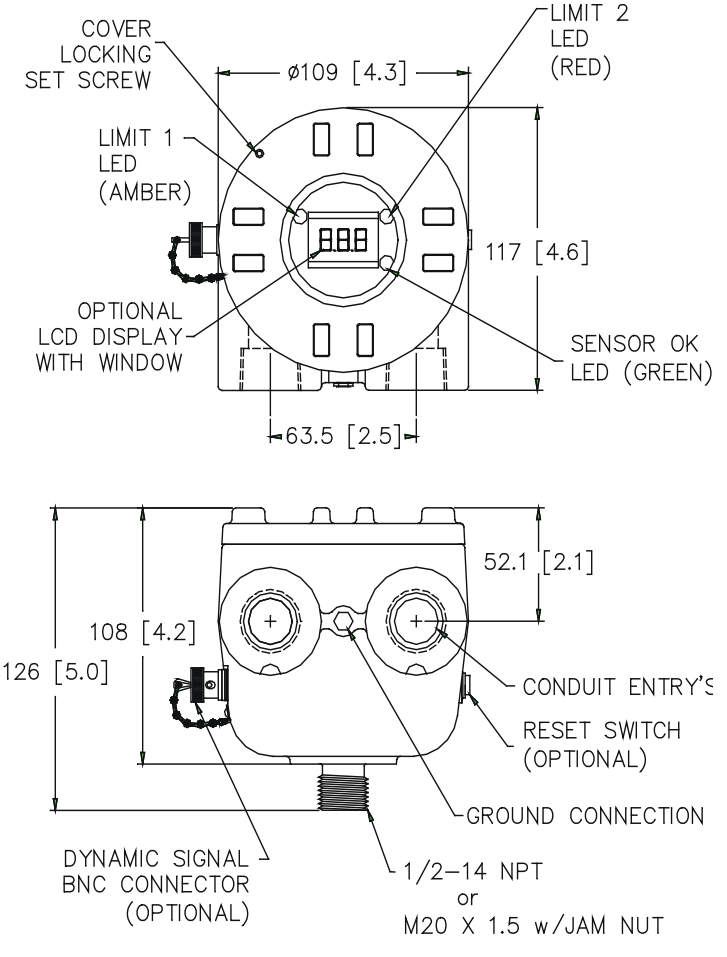
SECTION A - MECHANICAL INSTALLATION

1.0 Monitor Installation

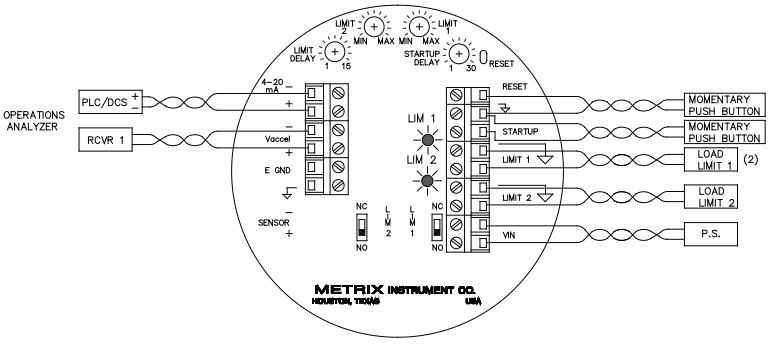
The Model SM6100 Monitor can be mounted in any convenient location where the display can be viewed. Unit requires a tapped hole, see Product Identification “F” or use a model 7084 flange mount adapter.

If an NPT mounting stud is selected the stud will tighten before the switch casing touches the machine case. The SM6100 should be hand tightened and then wrench tightened to bring the conduit connections to the appropriate location. Studs with straight threads are provided with a locking nut.

HOUSING
Figure 5



WIRING DIAGRAM
Figure 6



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SECTION B - WIRING

NOTE: On CENELEC approved units, a locking set screw must be loosened prior to lid removal.

1.0 Terminal Wiring

If you have selected the optional display, the display circuit board must be removed (two screws) to expose the terminal strips. The display board cable should not be disconnected. Simply place the display board out of the way to allow wiring to the terminal strips. The display may be reinstalled in any of the four possible orientations.

Refer to figure 3 for wiring information. For incoming power and switch output(s) use approved wire of 14 AWG (1.5 sq. mm) or smaller. NOTE: On CENELEC installations, a means for disconnecting power to the switch must be provided. Also, the symbol ⏚ signifies a protective earth terminal. For reset and startup delay functions, use a twisted pair to reduce electrical noise pickup.

For the current and dynamic signal outputs a shielded, twisted pair is recommended. By convention, the shield should be tied to common only at the receiver end. A cable consisting of separate shielded twisted pairs can also be used. For the dynamic signal output the capacitance of the cable run must not exceed .03 uF (typically 1000 feet).

CAUTION: Conduit seals are highly recommended to prevent the entry of moisture into the switch. Moisture will damage the switch and void the warranty.

1.1 Power Wiring

It is highly recommended that all power and triac/FET wiring be routed separately from the dynamic signal and 4-20mA wiring in order to reduce AC/transient noise pickup.
The power required is indicated on the nameplate. The voltage supply must be within the following limits:

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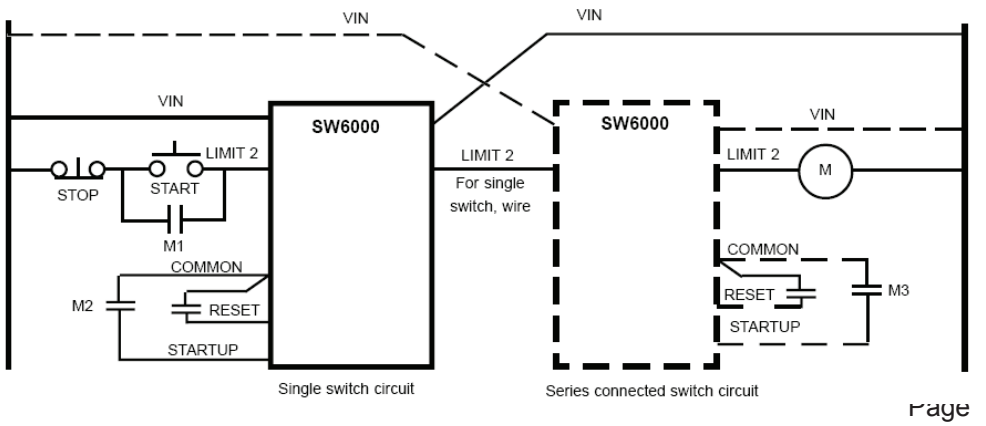
TYPICAL CONTROL CIRCUITS SW6000 w/AC Power Wired to Interrupt Motor Starter (series connection)

a. Set each SW6000 for N.C. (normally closed) operation. (See Figure 3)

b. M2, M3 and remote reset contacts must each be isolated.

Figure 6



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1.3 Alarm Limit FET Output Wiring (optional)

The optional FET limit output(s) provide a low leakage switch for DC inputs to PLC's or other devices. Do not use on an AC supply. Observe proper polarity when wiring the FET(s) (See figure 3). Damage to the FET(s) will result from improper wiring. As with the triacs, the FET(s) can be set for N.C. or N.O. operation by positioning the Limit 1/Limit 2 switches accordingly.

1.4 Limit Trip Delay

The base unit has an adjustable (1-15 sec.) limit trip delay. The vibration level must be continuously above the limit setting for the duration of the time delay before the output devices switch. The 4-20 mA output is not affected by this time delay. To reset the limit output devices, the internal reset push-button or the optional external reset push-button must be pressed. Remote reset by a N.O. push-button or momentary contacts may be made by wiring to the remote reset terminals. Note that the vibration level must be below the trip level for the reset to function.

1.5 Startup Trip Delay

Some machines generate vibration levels during startup which are higher than normal running levels. These high vibration levels can exceed the Alarm Trip Limits which are set above the normal running vibration level. The standard SM6100 has a fixed time delay which inhibits alarm trips for 30 seconds from the closing of the startup contacts.

An optional adjustable startup trip delay (1-30 sec.) permits the Alarm Trip Limits to become operative in less than 30 seconds. Protection of machines with short startup times can be improved by utilizing the adjustable Startup Trip delay.

The Startup Trip Delay is triggered by closing a set of contacts (momentary or continuous) connected to the startup terminals. The contacts must be opened before the internal startup delay timer can be initiated again. Connecting these terminals to a set of isolated auxiliary N.O. contacts in a motor starter is a method commonly used to initiate the startup trip delay. The 4-20 mA current output is inhibited (set to 4.0 mA) during the startup trip delay.

1.6 Remote Reset Wiring (optional)

If remote reset capability is desired, connect Reset terminals (see Figure 3) to a remotely located, momentary N.O. push-button switch. Observe hazardous area requirements if applicable.

1.7 External Sensor

The Model SM6100 requires the use of an external sensor. Refer to Product Identification, option 'G' to determine the type of sensor required. Mount and connect the sensor per the manufacturer's instructions and Figure 2.

1.8 4-20 mA Current Source Output (optional)

If the optional 4-20 mA output is installed it may be connected to a remote receiver, as shown on the wiring diagram (see Figure 3). This output is a current source (at 15VDC) and requires no external loop power supply. Full scale current (20 mA) corresponds to the full scale vibration response marked on the face plate. A current of 4.0 mA represents a zero vibration condition. The maximum load resistance is 600 ohms. In high electrical noise locations a shielded, twisted pair cable is recommended.

FORMULA: $\frac{\text{Measured mA - 4mA}}{\text{20mA - 4mA}}$ X Full scale vibration = Actual vibration

EXAMPLE: Measured mA	Full Scale Vibration	Actual Vibration
4.0	1.0 ips, peak	0.0 ips, peak
12.0	1.0 ips, peak	0.5 ips, peak
20.0	1.0 ips, peak	1.0 ips, peak

1.9 Dynamic Outputs

The sensor (transducer) signal is available at the terminal block and is capable of driving a cable with a capacitance of up to .03 uF (typically 300m/1000 feet). Longer runs with greater than .03 uF of capacitance can be used without the buffer becoming unstable. However, the frequency response will be reduced due to the increased capacitance.

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PRODUCT IDENTIFICATION

A B C D E F G H
SM6100-❒-❒❒-❒-❒-❒-❒-❒-❒❒❒

*NOTE: add 30 to part no. for RMS calibration
EX: SM6100-1-31-1-2-0-0-1-100, similar to example, now with RMS calibration.

Example Part Number: SM6100-1-01-1-2-0-0-1-100

A ❒ Limits and Delay

1 = one limit, triac
2 = two limits, triacs
3 = one limit, FET
4 = two limits, FETs
5 = one limit, triac, with display
6 = two limits, triacs, with display
7 = one limit, FET, with display
8 = two limits, FETs, with display

B ❒❒ Full Scale Range

Velocity Response
0 1 = 1 ips, pk*
0 2 = 2 ips, pk*
0 3 = 20 mm/sec, pk*
0 4 = 50 mm/sec, pk*
0 5 = 5 ips, pk*
0 6 = 100 mm/sec, pk*

Displacement Response
5 1 = 20 mils, pk-pk
5 2 = 50 mils, pk-pk
5 3 = 100 mils, pk
6 1 = 200 microns, pk
6 2 = 500 microns, pk
6 3 = 1.00 mm, pk

C ❒ Input Power

1 = 115 VAC, 50/60 Hz, 5 watts, max.
2 = 230 VAC, 50/60 Hz, 5 watts, max.
3 = 20 - 28 VDC

D ❒ Hazard Area Rating/External Reset Options

2 = Class I (B, C & D), Div 1
3 = Class I (B, C & D), Div 1 with external reset
4 = CENELEC EEx d IIB + H2 T4
5 = CENELEC EEx d IIB + H2 T4 with external reset
8 = Non-Agency Approved Locations
9 = Non-Agency Approved Locations with external reset

E ❒ Input/Output Options

0 = Standard
1 = 4-20 mA proportional to full-scale range
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4 = Options 1 & 2
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NOTE: Options 2, 4, 6, and 7 not available
on hazardous area (D = 2, 3, 4, 5) versions

F ❒ Mounting/Conduit Entry

0 = 1/2” NPT stud mount / 3/4” NPT conduit entry (standard)
1 = M20 x 1.5 straight thread / stud mount with jam nut / M20 x 1.5 conduit entry
2 = 1/2-20 UNF straight thread stud mount with jam nut / 3/4” NPT conduit entry

G ❒ Remote Sensor Type

1 = Remote accelerometer constant current drive, 10 - 100 mV/g

2 = Remote velocity transducer 100 - 500 mV/ips

3 = Remote piezo-velocity transducer constant current drive, 100 - 500 mV/ips

H ❒ ❒❒ Input Sensitivity

Specify input sensitivity with 3 digit number

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