INSTRUCTION MANUAL

Vibration Transducer Interface
Din-Rail Model D1062S

Characteristics

General Description: The single channel DIN Rail Vibration Transducer Interface D1062S provides a fully floating dc supply for energizing vibration transducers, accelerometers or 2-3 wires sensors located in Hazardous Area, and repeats the sensor input voltage in a totally isolated circuit located in Safe Area to drive vibration monitors or analyzers for rotating machinery control and supervision purposes.
Function: 1 channel I.S. analog voltage input for 2-3 wires sensors, provides 3 port isolation (input/output/supply) and voltage output signal.
Signalling LED: Power supply indication (green).
Analog Signal Frequency Band: DC to 10 KHz within 0.1 dB, 10 KHz to 20 KHz within 3 dB.
EMC: Fully compliant with CE marking applicable requirements.

Technical Data

Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.
Current consumption @ 24 V: 60 mA with 20 mA transducer consumption and 2 mA output load, typical.
Power dissipation: 1.1 W with 24 V supply voltage, 20 mA transducer consumption and 2 mA output load typical.
Max. power consumption: at 30 V supply voltage and short circuit condition, 1.9 W.
Isolation (Test Voltage): I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; Out/Supply 500 V.
Input: 0 V to -20 V (10 KΩ impedance at terminals 15-16).
3 wires sensor supply voltage: more than -21.0 V at 0 mA supply, more than -15.0 V at 20 mA supply (current limited at ≈ 25 mA) at terminals 14-16.
2 wires sensor supply voltage: more than -15.0 V with constant current supply mode at terminals 15-16.
Supply current selectable at 4 mA, 6 mA or 10 mA (current supply mode enabled connecting terminals 13-14, 4 mA with terminal 10 not connected, 6 mA connecting terminals 10-11 or 10 mA connecting terminals 10-12).
Output: 0 to -20 V on 10 KΩ load, with 10 Ω output resistance.
Response time: 10 µs (10 to 90 % step change).
Output ripple: ≤ 20 mVrms on 0.5 to 20 KHz band.
Frequency response: DC to 10 KHz within 0.1 dB, 10 KHz to 20 KHz within 3 dB.
Performance: Ref. Conditions 24 V supply, 10 KΩ load, 23 ± 1 °C ambient temperature.
Calibration accuracy: ≤ ± 0.05 % of full scale.
Linearity error: ≤ ± 0.05 % of full scale.
Supply voltage influence: ≤ ± 0.005 % of full scale for a min to max supply change.
Temperature influence: ≤ ± 0.005 % on zero and span for a 1 °C change.
Compatibility:
CE mark compliant, conforms to 94/9/EC Atex Directive and to 2004/108/CE EMC Directive.
Environmental conditions:
Operating: temperature limits -20 to + 60 °C, relative humidity max 90 % non condensing, up to 35 °C.
Storage: temperature limits – 45 to + 80 °C.
Safety Description:
II (1) G [Ex ia Ga] IIC, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I, II 3G Ex nA II T4, [Ex ia Ga] IIC, [Ex ia Da] IIIC, [Ex ia Ma] I associated electrical apparatus.
Uo/Voc = 25.9 V, Io/Isc = 90 mA, Po/Po = 576 mW at terminals 14-16. Uo/Voc = 1.1 V, Io/Isc = 12 µA, Po/Po = 4 µW at terminals 15-16;
Ui/Vmax = 30 V, Ci = 0 nF, Li = 1.5 µH at terminals 15-16 (when used with 3 wires transducer or 2 wires AC sensor connecting terminals 9-14).
Uo/Voc = 27 V, Io/Isc = 90 mA, Po/Po = 576 mW at terminals 15-16 (when used with 2 wire constant current supply mode connecting terminals 13-14).
Um = 250 Vrms, -20 °C ≤ Ta ≤ 60 °C.
Approvals: DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-11,
IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-26, IEC61241-0, IEC61241-11, IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15,
FM & FM-C No. 3024643, 3029921C, conforms to Class 3600, 3610, 3611, 3810 and C22.2 No.142, C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15.
Mounting: T35 DIN Rail according to EN50022.
Weight: about 150 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accomodate terminations up to 2.5 mm^2.
Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4, Class I, Division 2, Groups A, B, C, D Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA T4 installation.
Protection class: IP 20.
Dimensions: Width 22.5 mm, Depth 99 mm, Height 114.5 mm.

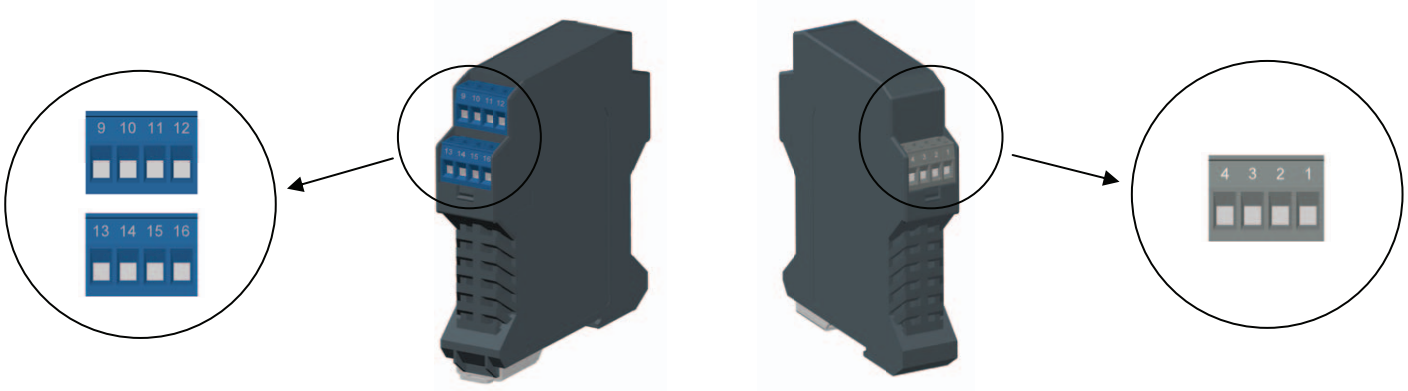
Ordering information

Model:	D1062S	
Power Bus enclosure		/B

Front Panel and Features

- Input from Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- 0 to –20 V Input/Output Signal.
- Wide band signal transfer.
- Input and Output short circuit proof.
- High Accuracy.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4.
- ATEX, IECEx, FM & FM-C Certifications.
- High Reliability, SMD components.
- Simplified installation using standard DIN Rail and plug-in terminal blocks.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

Terminal block connections



HAZARDOUS AREA

9	For AC Output Sensor if connected to terminal 14
10	For Current Selection if connected to terminal 11 or 12
11	For Current Selection if connected to terminal 10
12	For Current Selection if connected to terminal 10
13	For Current Supply if connected to terminal 14
14	- Power Input Ch 1 for 3 wires Vibration Transducer
15	- Signal Input Ch 1 for 3 wires Vibration Transducer
16	Common Input Ch 1 for 3 wires Vibration Transducer

SAFE AREA

1	- Signal Output Ch 1 for Vibration Monitor
2	Common Output Ch 1 for Vibration Monitor
3	+ Power Supply 24 Vdc
4	- Power Supply 24 Vdc

Parameters Table

In the system safety analysis, always check the Hazardous Area/Hazardous Locations devices to conform with the related system documentation, if the device is Intrinsically Safe check its suitability for the Hazardous Area/Hazardous Locations and gas group encountered and that its maximum allowable voltage, current, power (Ui/Vmax, Ii/Imax, Pi/Pi) are not exceeded by the safety parameters (Uo/Voc, Io/Isc, Po/Po) of the D1062 Associated Apparatus connected to it. Also consider the maximum operating temperature of the field device, check that added connecting cable and field device capacitance and inductance do not exceed the limits (Co/Ca, Lo/La, Lo/Ro) given in the Associated Apparatus parameters for the effective gas group. See parameters on enclosure side and the ones indicated in the table below:

D1062 Terminals		D1062 Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	14 - 16	Uo / Voc = 25.9 V	≤	Ui / Vmax
Ch1	15 - 16 (with terminals 3 - 14 connected)	Uo / Voc = 27.0 V		
Ch1	15 - 16 (3 wires sensor or with terminals 9 - 14 connected)	Uo / Voc = 1.1 V		
Ch1	14 - 16	Io / Isc = 90 mA	≤	Ii/ Imax
Ch1	15 - 16 (with terminals 3 - 14 connected)	Io / Isc = 90 mA		
Ch1	15 - 16 (3 wires sensor or with terminals 9 - 14 connected)	Io / Isc = 12 µA		
Ch1	14 - 16	Po / Po = 576 mW	≤	Pi / Pi
Ch1	15 - 16 (with terminals 13 - 14 connected)	Po / Po = 576 mW		
Ch1	15 - 16 (3 wires sensor or with terminals 9 - 14 connected)	Po / Po = 4 µW		

D1062 Terminals		D1062 Associated Apparatus Parameters		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Ch1	14 - 16	Co / Ca = 100 nF Co / Ca = 770 nF Co / Ca = 2.63 µF	(IIC-A, B) (IIB-C) (IIA-D)	≥	Ci / Ci device + C cable
Ch1	15 - 16 (with terminals 13 - 14 connected)	Co / Ca = 90 nF Co / Ca = 705 nF Co / Ca = 2.33 µF	(IIC-A, B) (IIB-C) (IIA-D)		
Ch1	15 - 16 (3 wires sensor or with terminals 9 - 14 connected)	Co / Ca = 100 µF Co / Ca = 1000 µF Co / Ca = 1000 µF	(IIC-A, B) (IIB-C) (IIA-D)		
Ch1	14 - 16	Lo / La = 4.4 mH Lo / La = 17.9 mH Lo / La = 35.8 mH	(IIC-A, B) (IIB-C) (IIA-D)	≥	Li / Li device + L cable
Ch1	15 - 16 (with terminals 13 - 14 connected)	Lo / La = 4.4 mH Lo / La = 17.9 mH Lo / La = 35.8 mH	(IIC-A, B) (IIB-C) (IIA-D)		
Ch1	15 - 16 (3 wires sensor or with terminals 9 - 14 connected)	Lo / La = 1000 mH Lo / La = 1000 mH Lo / La = 1000 mH	(IIC-A, B) (IIB-C) (IIA-D)		
Ch1	14 - 16	Lo / Ro = 61.7 µH/Ω Lo / Ro = 247.1 µH/Ω Lo / Ro = 494.3 µH/Ω	(IIC-A, B) (IIB-C) (IIA-D)	≥	Li / Ri device and L cable / R cable
Ch1	15 - 16 (with terminals 13 - 14 connected)	Lo / Ro = 56.8 µH/Ω Lo / Ro = 227.3 µH/Ω Lo / Ro = 454.7 µH/Ω	(IIC-A, B) (IIB-C) (IIA-D)		
Ch1	15 - 16 (3 wires sensor or with terminals 9 - 14 connected)	Lo / Ro = $11*10^6$ µH/Ω Lo / Ro = $46*10^6$ µH/Ω Lo / Ro = $93*10^6$ µH/Ω	(IIC-A, B) (IIB-C) (IIA-D)		

NOTE for USA and Canada:
IIC equal to Gas Groups A, B, C, D, E, F and G
IIB equal to Gas Groups C, D, E, F and G
IIA equal to Gas Groups D, E, F and G

When used with separate powered intrinsically safe devices, check that maximum allowable voltage, current (Ui/Vmax, Ii/Imax) of the D1062 Associated Apparatus are not exceeded by the safety parameters (Uo/Voc, Io/Isc) of the Intrinsically Safe device, indicated in the table below:

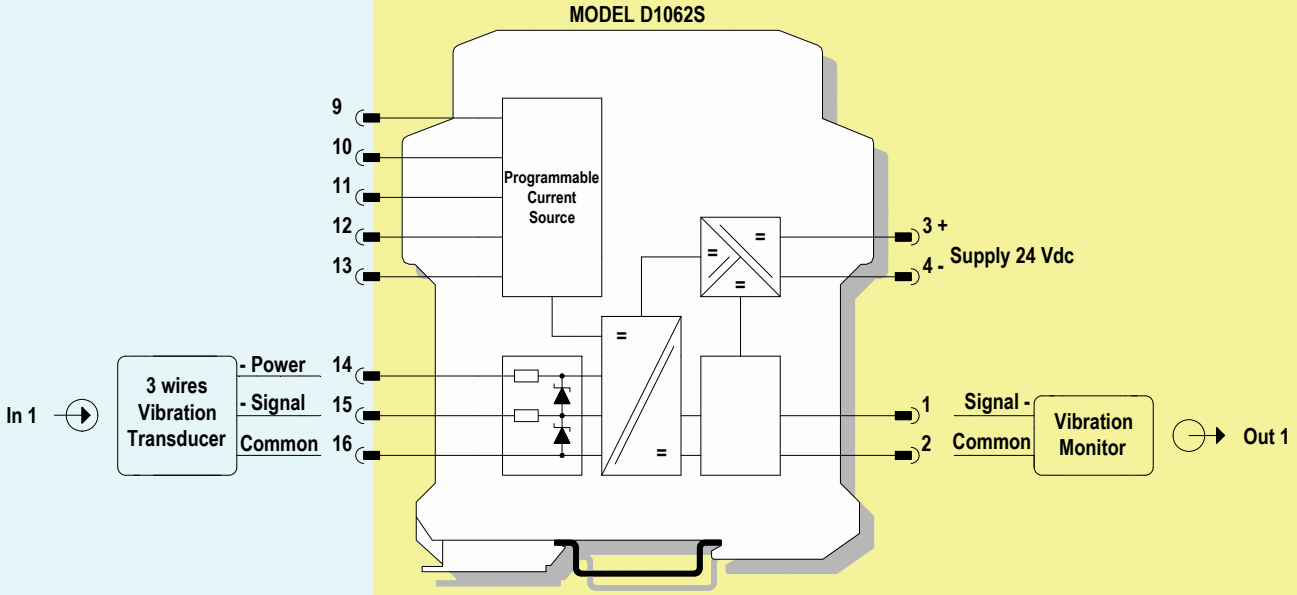
D1062 Terminals		D1062 Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	15 - 16	Ui / Vmax = 30V	≥	Uo / Voc
Ch1	15 - 16	Ci = 0 nF, Li= 0 nH		

For installations in which both the Ci and Li of the Intrinsically Safe apparatus exceed 1 % of the Co and Lo parameters of the Associated Apparatus (excluding the cable), then 50 % of Co and Lo parameters are applicable and shall not be exceeded (50 % of the Co and Lo become the limits which must include the cable such that Ci device + C cable ≤ 50 % of Co and Li device + L cable ≤ 50 % of Lo).
If the cable parameters are unknown, the following value may be used: Capacitance 60pF per foot (180pF per meter), Inductance 0.20µH per foot (0.60µH per meter).
The Intrinsic Safety Entity Concept allows the interconnection of Intrinsically Safe devices approved with entity parameters not specifically examined in combination as a system when the above conditions are respected.
For Division 1 and Zone 0 installations, the configuration of Intrinsically Safe Equipment must be FM approved under Entity Concept (or third party approved);
for Division 2 installations, the configuration of Intrinsically Safe Equipment must be FM approved under non-incendive field wiring or Entity Concept (or third party approved).

Function Diagram

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC, HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D, CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1, CLASS I, ZONE 0, GROUP IIC

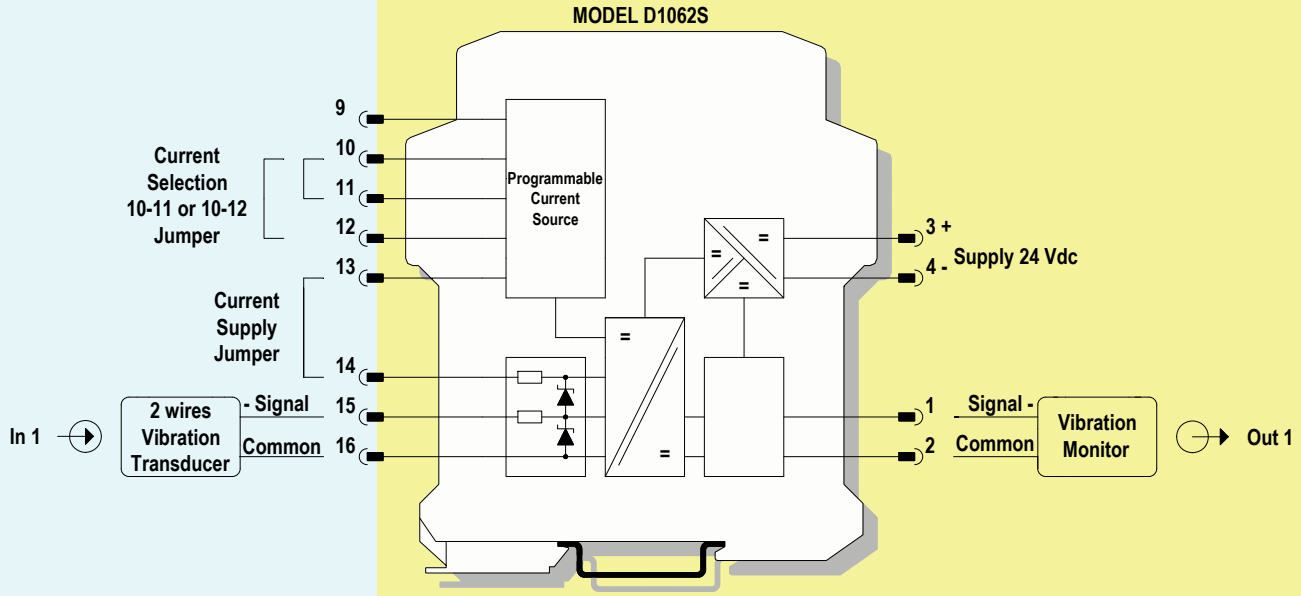
SAFE AREA, ZONE 2 GROUP IIC T4, NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2, GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



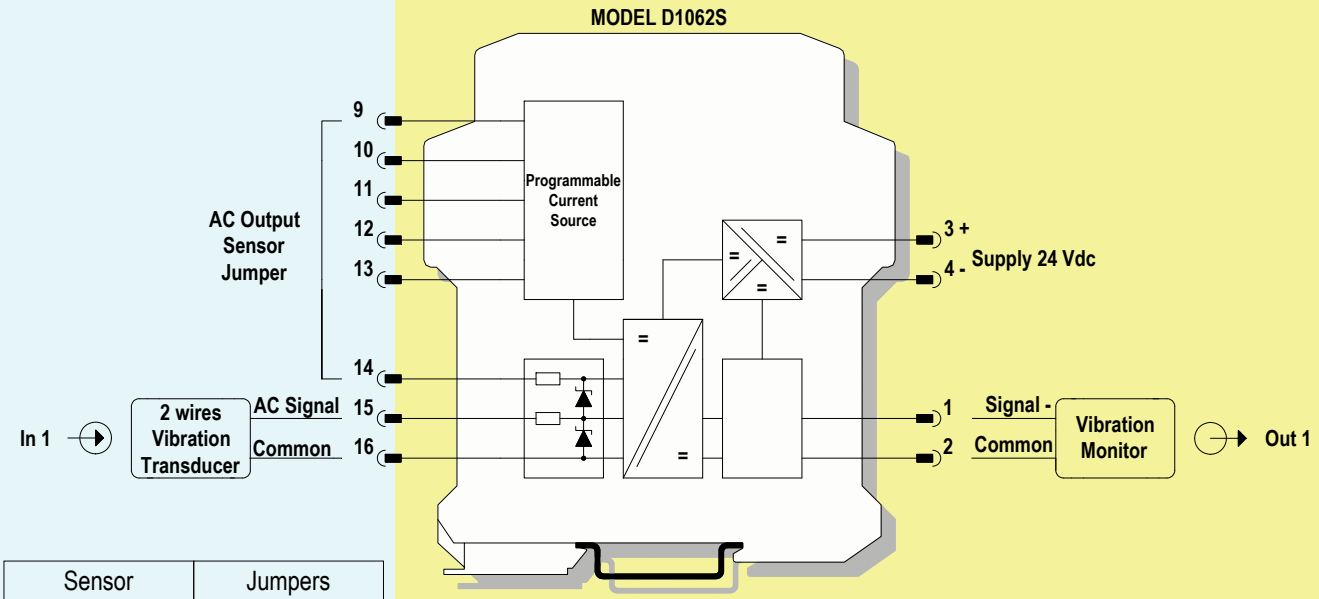
Function Diagram

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



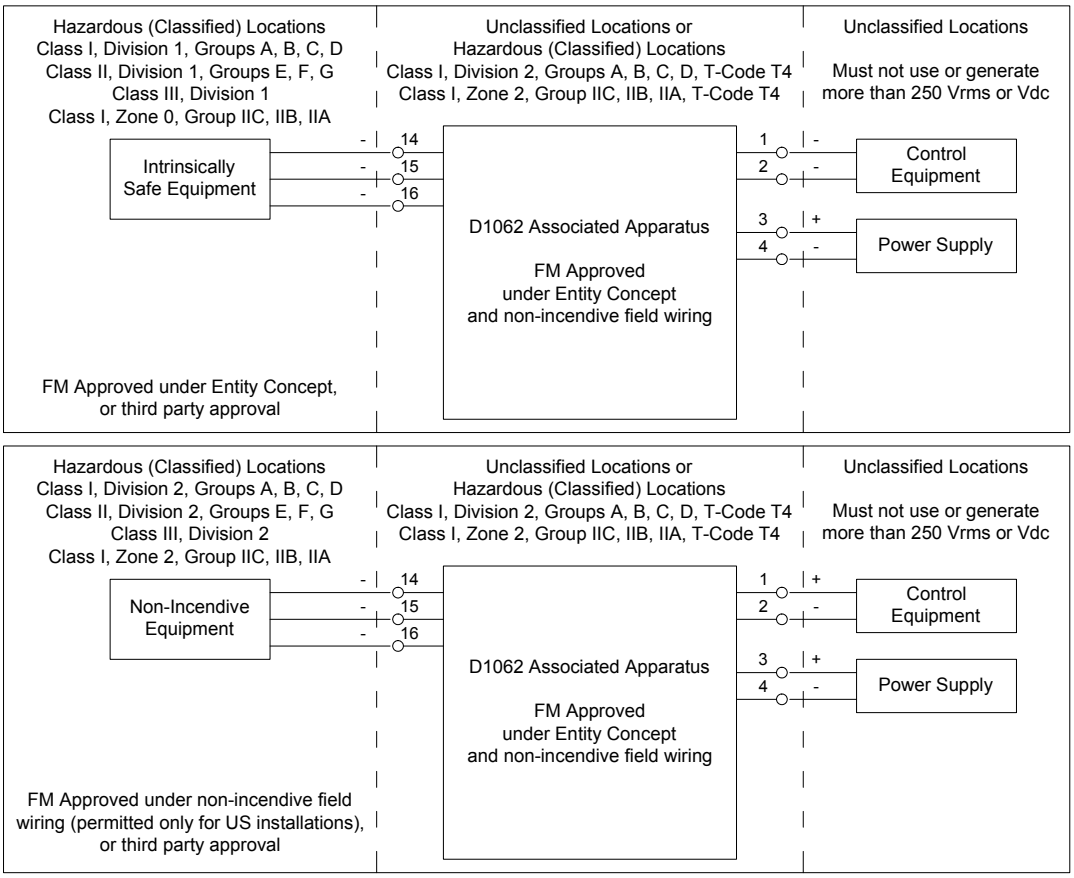
Sensor operating in constant current mode	Jumpers between Input terminals
4 mA	13 - 14
6 mA	13 - 14 10 - 11
10 mA	13 - 14 10 - 12



Sensor operating in AC signal mode	Jumpers between Input terminals
Half scale output value with 0 Volt input	9 - 14

Warning

D1062 is an isolated Intrinsically Safe Associated Apparatus installed into standard EN50022 T35 DIN Rail located in Safe Area/ Non Hazardous Locations or Zone 2, Group IIC, Temperature Classification T4, Class I, Division 2, Groups A, B, C, D, Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA Temperature Code T4 Hazardous Area/Hazardous Locations (according to EN/IEC60079-15, FM Class No. 3611, CSA-C22.2 No. 213-M1987, CSA-E60079-15) within the specified operating temperature limits Tamb -20 to +60 °C, and connected to equipment with a maximum limit for AC power supply Um of 250 Vrms.



Non-incendive field wiring is not recognized by the Canadian Electrical Code, installation is permitted in the US only.
For installation of the unit in a Class I, Division 2 or Class I, Zone 2 location, the wiring between the control equipment and the D1062 associated apparatus shall be accomplished via conduit connections or another acceptable Division 2, Zone 2 wiring method according to the NEC and the CEC.
Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground.
D1062 must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards (e.g. IEC/EN60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines), BS 5345 Pt4, VDE 165, ANSI/ISA RP12.06.01 Installation of Intrinsically Safe System for Hazardous (Classified) Locations, National Electrical Code NEC ANSI/NFPA 70 Section 504 and 505, Canadian Electrical Code CEC) following the established installation rules, particular care shall be given to segregation and clear identification of I.S. conductors from non I.S. ones.
De-energize power source (turn off power supply voltage) before plug or unplug the terminal blocks when installed in Hazardous Area/Hazardous Locations or unless area is known to be nonhazardous.
Warning: substitution of components may impair Intrinsic Safety and suitability for Division 2, Zone 2.
Explosion Hazard: to prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or unless area is known to be nonhazardous.
Failure to properly installation or use of the equipment may risk to damage the unit or severe personal injury.
The unit cannot be repaired by the end user and must be returned to the manufacturer or his authorized representative. Any unauthorized modification must be avoided.

Operation

D1062 provides fully floating DC supply for energizing vibration transducer, accelerometers or 2-3 wires sensors located in Hazardous Area, and repeats the sensor input voltage in a totally isolated circuit located in Safe Area to drive vibration monitors or analyzers for rotating machinery control and supervision purposes.
The circuit provides 3 port isolation (input / output / supply) and a “POWER ON” green led is lit when input power is present.

Installation

D1062 is a vibration transducer interface housed in a plastic enclosure suitable for installation on T35 DIN Rail according to EN50022.
D1062 unit can be mounted with any orientation over the entire ambient temperature range, see section “Installation in Cabinet” and "Installation of Electronic Equipments in Cabinet" Instruction Manual D1000 series for detailed instructions.
Electrical connection of conductors up to 2.5 mm² are accommodated by polarized plug-in removable screw terminal blocks which can be plugged in/out into a powered unit without suffering or causing any damage **(for Zone 2 or Division 2 installations check the area to be nonhazardous before servicing)**.
The wiring cables have to be proportionate in base to the current and the length of the cable.
On the section “Function Diagram” and enclosure side a block diagram identifies all connections and configurations with 2 or 3 wires sensors.
Identify the function and location of each connection terminal using the wiring diagram on the corresponding section, as an example:
Connect 24 Vdc power supply positive at terminal “3” and negative at terminal “4”.
For 3 wires powered sensor (as eddy current probes, piezo-ceramic accelerometers and similar sensor), connect sensor negative supply wire at terminal “14”, sensor signal wire at terminal “15” and sensor common wire (identical for both signal and supply) at terminal “16”.
For 2 wires powered sensor (as position, velocity or acceleration sensors, operating in constant current mode), connect sensor signal wire at terminal “15” and sensor common wire at “16”.
Sensor constant current supply mode is enabled connecting a jumper between terminals “13” and “14”.
Sensor supply current is selectable between three different values: 4 mA without other connections, 6 mA connecting a jumper between terminals “10” and “11”, 10 mA connecting a jumper between terminals “10” and “12”.
For 2 wires un-powered sensor (as suspended mass “seismic” accelerometer or other magnetic pick-up sensor), connect sensor signal wire at terminal “15” and sensor common wire at “16”.
This type of sensor generates AC signals only, therefore the D1062 input must be biased, to provide a half scale output value with 0 Volt input, by connecting a jumper between “9” and “14”.
Connect output signal wire at terminal “1” and output common wire at terminal “2” (output port for vibration monitor).

Intrinsically Safe conductors must be identified and segregated from non I.S. and wired in accordance to the relevant national/international installation standards (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines), BS 5345 Pt4, VDE 165, ANSI/ISA RP12.06.01 Installation of Intrinsically Safe System for Hazardous (Classified) Locations, National Electrical Code NEC ANSI/NFPA 70 Section 504 and 505, Canadian Electrical Code CEC), make sure that conductors are well isolated from each other and do not produce any unintentional connection.
The enclosure provides, according to EN60529, an IP20 minimum degree of mechanical protection (or similar to NEMA Standard 250 type 1) for indoor installation, outdoor installation requires an additional enclosure with higher degree of protection (i.e. IP54 to IP65 or NEMA type 12-13) consistent with the effective operating environment of the specific installation.
Units must be protected against dirt, dust, extreme mechanical (e.g. vibration, impact and shock) and thermal stress, and casual contacts.
If enclosure needs to be cleaned use only a cloth lightly moistened by a mixture of detergent in water.
Electrostatic Hazard: to avoid electrostatic hazard, the enclosure of D1062 must be cleaned only with a damp or antistatic cloth.
Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Any unauthorized card modification must be avoided.
According to EN61010, D1062 must be connected to SELV or SELV-E supplies.

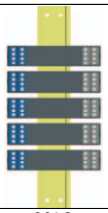
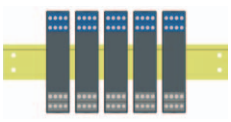
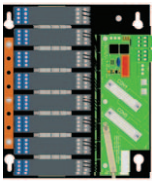
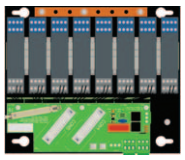
Start-up

Before powering the unit check that all wires are properly connected, particularly supply conductors and their polarity, input and output wires, also check that Intrinsically Safe conductors and cable trays are segregated (no direct contacts with other non I.S. conductors) and identified either by color coding, preferably blue, or by marking.
Check conductors for exposed wires that could touch each other causing dangerous unwanted shorts. Turn on power, the “power on” green led must be lit. For 3 wires powered sensor, the sensor negative supply voltage (referred to common terminal “16”) must be more negative than -15 V (supposing 20 mA maximum value of transducer current consumption).
In addition, for 2 or 3 wires powered sensor, the output signal should be corresponding to the input signal from the sensor, verifying that output signal complies with 0 to - 20 V range (supposing 10 KΩ output load). Instead, for 2 wires un-powered sensor, the AC output signal should be corresponding to the AC input signal from the sensor, considering that the output signal is also composed by -10 V DC component (absent into input signal) because of offset introduced by jumper connection between terminals “9” and “14”.

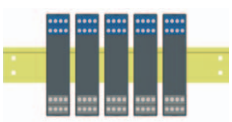
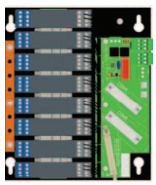
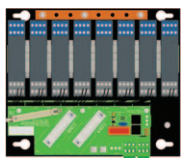
Installation in Cabinet

Power Dissipation of D1062 Isolators
Section “Technical Data” of D1062 isolator specifies the current consumption (maximum current from the nominal power supply, typical 24 Vdc, in normal operation); this data serves to dimension the current rating of the power supply unit. Section “Technical Data” indicates also the maximum power consumption (maximum power required from the power supply in the worst (abnormal) operating conditions like for example supply voltage at 30 Vdc, short circuit on the outputs and on the inputs terminals.
The power dissipated **Pd** inside the enclosure for analog signal isolators is: **Pd = Current Consumption (A) * Supply Voltage (V) - Power Dissipated into the input/output loads**
Analog signal isolators have higher dissipation than digital signal isolators. In analog signal isolators each transmitter requires and dissipates 15 V * 0.02 A = 0.3 W. Usually the loads outside the isolator dissipate 1/3 of the total power used. Isolators are not running at the maximum current all at the same time, the average power consumption of a multitude of isolators can be considered to be only 70 % of the value obtained from the section “Technical Data”. Considering the 1/3 load power and the 70 % above discussed, the power effectively dissipated internally by the isolators can therefore become ½ of the actual power delivered by the power supply. Digital barriers dissipate all the supply power inside the enclosure consequently the total power dissipation into a cabinet, with mixed analog and digital barriers, is determined by the number of channels more than by the number of isolator enclosures.
The following tables give advises for the DIN rail orientation (vertical or horizontal) of the barriers mounting, D1060S (single channel) isolators, installed on DIN rail, bus or custom board assembly.

A) Cabinet with Natural Ventilation
Maximum recommended ambient temperature in °C depending on barrier type and installation method:

Type of Isolator	Single unit Installation	Installation of Multiple units with DIN-rail Bus		Installation on Custom Boards	
	Any orientation	Vertical	Horizontal	Vertical	Horizontal
					
D1062S	60°C	30°C	35°C	35°C	40°C

B) Cabinet with Forced Ventilation
Maximum recommended ambient temperature in °C depending on barrier type and installation method:

Type of Isolator	Single unit Installation	Installation of Multiple units with DIN-rail Bus		Installation on Custom Boards	
	Any orientation	Vertical	Horizontal	Vertical	Horizontal
					
D1062S	60°C	40°C	45°C	45°C	50°C