PROPORTION-AIR

INSTALLATION, OPERATION AND MAINTENANCE GUIDE

ISQB3 Intrinsically Safe Pressure Regulator

The ISQB3 is a closed-loop pressure regulator consisting of two solenoid valves, an internal pressure transducer, and electronic controls mounted to an integrated mechanical regulator. The pressure is controlled by activating the solenoid valves, which apply pressure to the pilot of the mechanical regulator. One valve functions as inlet control, the other as exhaust. The unit output pressure is measured by a pressure transducer, which is internally mounted to sense pressure in the work port of the ISQB3 and provides a feedback signal to the electronic control circuit. This feedback signal is compared to the command signal. Differences between the command signal and the actual pressure feedback signal causes one of the solenoid valves to open to adjust the pressure in the pilot of the booster/regulator. Pilot pressure is adjusted so that desired downstream operating pressure is achieved and maintained. Because the working pressure is sensed as opposed to pilot pressure, hysteresis in the integrated mechanical regulator is eliminated.

The output pressure is proportional to a 4-20mA electrical command signal.

The uniqueness of the booster design is that it has no stamped gaskets or special molded diaphragm or seal parts. All of the parts related to normal maintenance are standard O-rings.

The ISQB3 may also be used to pilot larger regulators.

HAZARDOUS AREA CLASSIFICATION

The ISQB3 is rated intrinsically safe and is Factory Mutual approved for Class I, II & III, Division 1, Groups C, D, E, F & G.

Entity Parameters
V Max=29 VDC
I Max=150 MA
Ci=0.26uF
Li=0

FM APPROVED

Field Wiring Drawing: ISQB-96026-2

Special Condition for Use:
The apparatus enclosure contains aluminum which is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

NOTES: End user must determine fitness and suitability of the ISQB3 control valve for their application. The ISQB3 requires the use of Intrinsically Safe barriers.

SPECIFICATIONS

ELECTRICAL

Supply Voltage	
Supply Current	<80 mA (50 mA typical)
Command Signal	4-20 mA Differential
Command Signal Impedance	100Ω

MECHANICAL

Pressure Ranges	Vacuum-150 psig *(29.9 in Hg (vac)-10.3 Bar)*
Output Pressure†	0-100% of range
Flow Rate	30 SCFM @ 110 PSIG supply and 80 PSIG output *(850 L/min @ 5.5 Bar)*
Min Closed End Volume	3 in^3
Port Size	1/4" NPT
Filtration Recommended	100 Micron
Linearity/Hysteresis	±0.4% F.S. typical
Accuracy	±0.5% F.S.

Wetted Materials

Elastomers‡	Buna N
Manifold‡	Nickel-Plated Aluminum
Valves	Nickel-Plated Brass
Pressure Transducer	Silicon, Aluminum

PHYSICAL

Operating Temperature	32-104 °F *(0-40 °C) (T4)*
Weight	1.20 lbs (0.544 Kg)
Housing	Blue Anodized Aluminum

†Pressure ranges are customer specified. Output pressures other than 100% are available. ‡Others available.

WARNING: BEFORE YOU BEGIN

- Examine the product. Ensure that you received what you ordered.
- Read this guide first before you start and save it for later use.
- All compressed air/gas and power should be shut off before installing, removing or performing maintenance on this product.
- Installation and use of this product should be under the supervision and control of properly qualified personnel to avoid the risk of injury or death.
- Media vents through exhaust port. If the media is hazardous (classified), the exhaust port should be vented into a safe area.

CONNECTIONS

Pneumatic Connections

CAUTION: USE ONLY THE THREAD SEALANT PROVIDED. OTHER SEALANTS, SUCH AS PTFE TAPE AND PIPE DOPE, CAN MIGRATE INTO THE FLUID SYSTEM CAUSING FAILURES.

1. The valve can be mounted in any position without affecting performance with the exception of low pressure units, which must be mounted upright to ensure proper functionality. Mounting brackets (ordered separately) can be used to attach the unit to a panel or wall surface.
2. A 100 micron in-line filter is recommended on the inlet of the ISQB3 valve.
3. Connect supply pressure to the INLET PORT (I) not to exceed the rated supply pressure. (See Figure 1 and Table 1)
4. Connect the OUTPUT PORT (O) to the device being controlled.
5. **If this is a vacuum or vacuum through positive pressure unit, connect vacuum supply to the EXHAUST PORT (E). Positive pressure is required on the inlet with vacuum units. FOR ANY QUESTIONS, PLEASE CALL THE FACTORY.**
6. For positive pressure only units the exhaust port can be plumbed to a point outside the work area, fitted with a muffler or left open to atmosphere as the application dictates. If the media being controlled is hazardous (classified), the threaded exhaust port should be vented into a safe area.
7. Proceed with electrical connection.

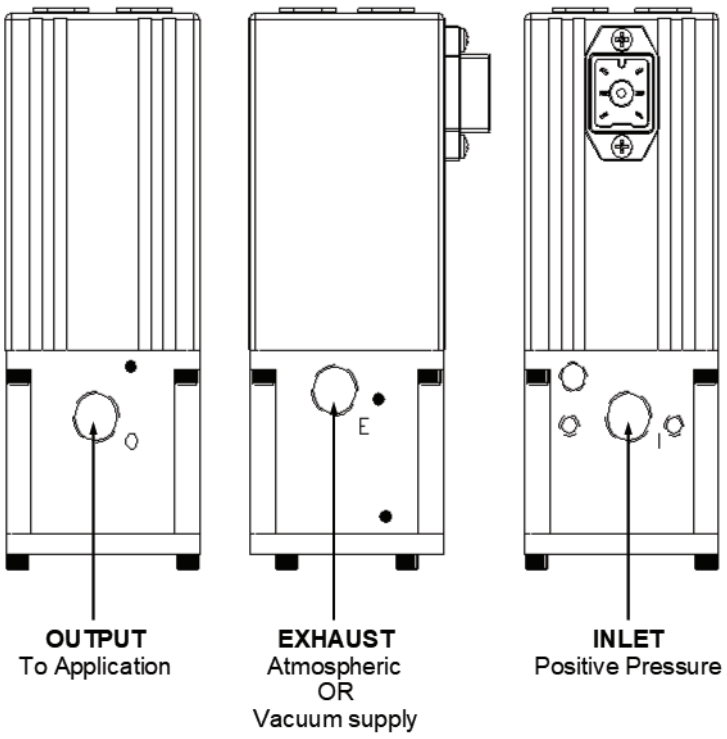


Figure 1

TABLE 1

Rated Pressure for ISQB3 Valves

For valves ordered with MAX calibrated pressure of	MAX inlet pressure is
0 - 8 PSIG	100 PSIG
>8 - 70 PSIG	125 PSIG
>70 - 150 PSIG	165 PSIG

Electrical Connections

1. All intrinsically safe installations must conform to applicable Factory Mutual recommendations, the National Electric Code, and the control drawing (Field Wiring Drawing: ISQB-96026-2), as well as any applicable local codes or fire marshal directives. All intrinsically safe installations must be performed by personnel trained in the proper application of the above.
2. Ensure all power is off before making any electrical connections.
3. Figure 1 shows the location of the ISQB3 electrical connector and Figure 2 shows the connector.
4. The ISQB3 must be wired in accordance with the supplied field wiring drawing.

NOTE: ALL COLOR CODES RELATE TO THE FACTORY WIRED QBT POWER CORD.

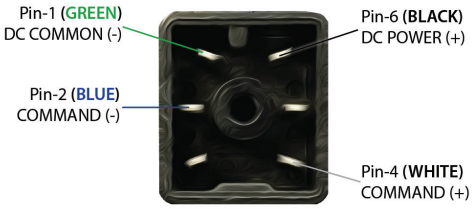


Figure 2

RECALIBRATION PROCEDURE

All ISQB3 valves come calibrated from the factory by trained personnel using precision calibration equipment. The ISQB3 is a closed loop control valve using a precision electronic pressure sensor. Typical drift is less than 1% over the life of the product. If your ISQB3 appears to be out of calibration by more than 1%, it is not likely to be ISQB3. Check the system for plumbing leakage, wiring and electronic signal levels. Verify the accuracy of your measuring equipment before re-calibrating. If the ISQB3 valve needs re-calibration, use this procedure:

1. Wire the ISQB3 according to the "Electrical Connections" section.
2. Connect a precision pressure gage or pressure transducer to the OUTLET PORT of the ISQB3.

NOTE: There must be a closed volume of at least 3 in³ between the OUTLET PORT and the measuring device for the ISQB3 to be stable.

3. Provide supply pressure to the INLET PORT of the ISQB3. (See Figure 1). Make sure supply pressure does not exceed the rating for the valve. (See Table 1)
4. Remove the calibration access plug on top of the ISQB3 to access the HYSTERESIS, SPAN and ZERO adjustment potentiometers (Figure 3).
5. *Only use this step if your device is totally out of calibration. If it is slightly out of calibration, skip this step and go to step 6.* Using a small screwdriver, turn the ZERO and SPAN potentiometers (Figure 3) 15 turns clockwise, then 7 turns counter clockwise. This will put the ISQB3 roughly at mid scale.
6. Set the electrical command input to 20mADC. Adjust the SPAN potentiometer until MAXIMUM desired pressure is reached (clockwise increases pressure).
7. Set the electrical command input to 10 percent of full value (5.6mA).
8. Adjust the ZERO potentiometer until 10 percent of maximum desired pressure is reached. (clockwise increases pressure).
9. If at any time during the calibration procedure the control valve oscillates or becomes unstable for more than one second, turn the HYSTERESIS potentiometer counter-clockwise until the oscillation stops, then turn it one more complete turn (same direction).
10. The ZERO and SPAN potentiometers interact slightly. Repeat steps 6-8 until no error exists.
11. Verify unit shuts off by going to zero command. Check linearity by going to at least six pressure points throughout the full range.

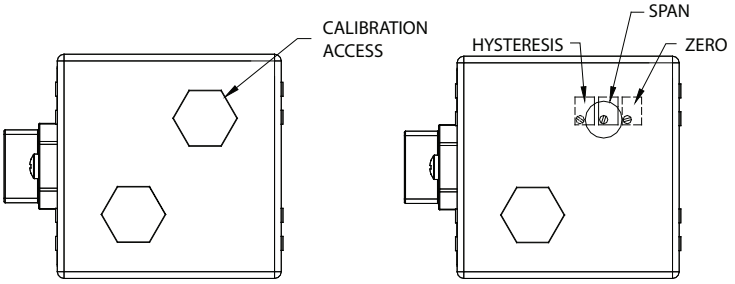
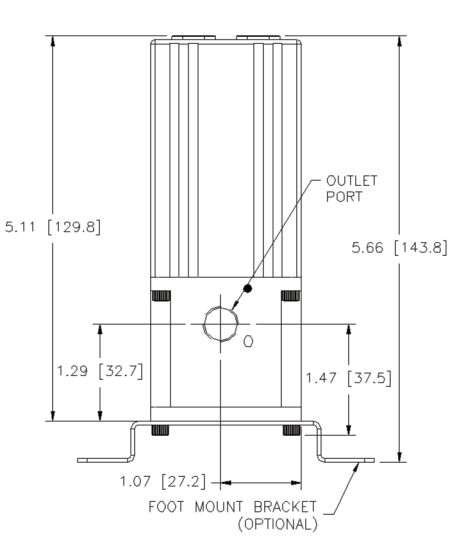
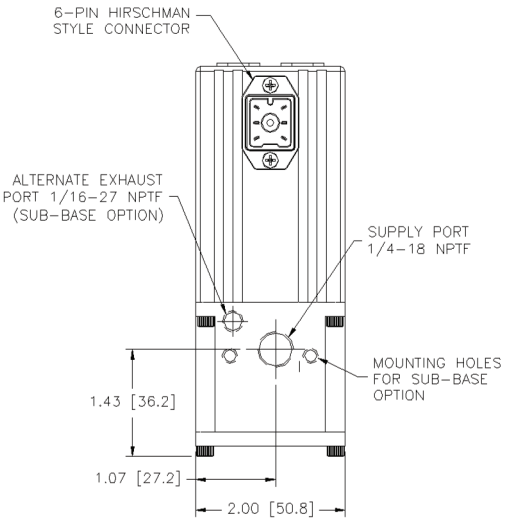
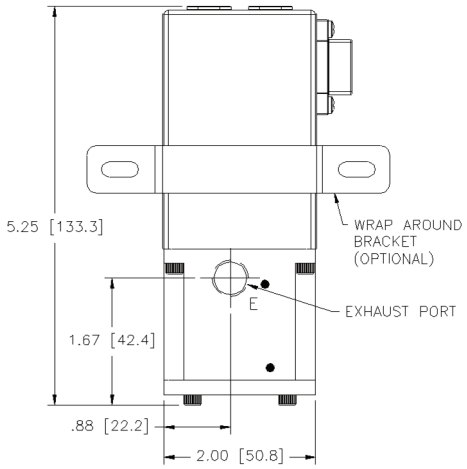


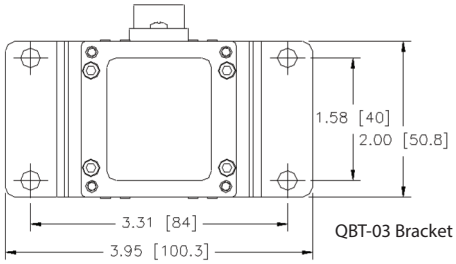
Figure 3

ISQB3 AND BRACKET DIMENSIONS

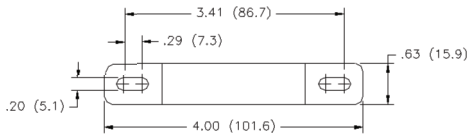


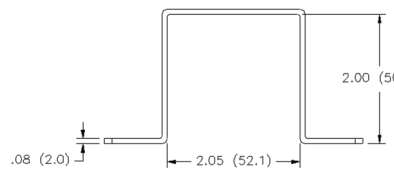






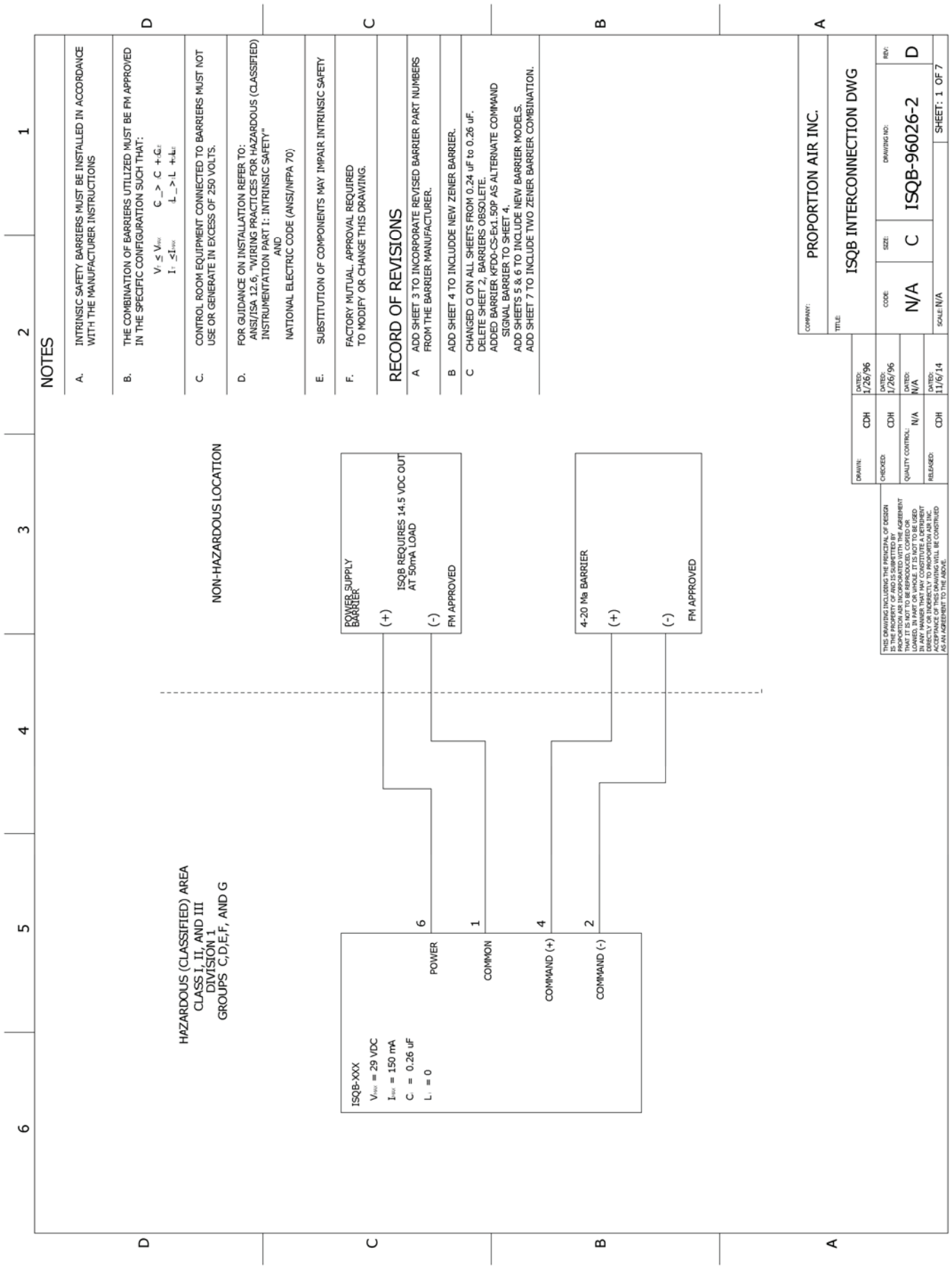
QBT-03 Bracket



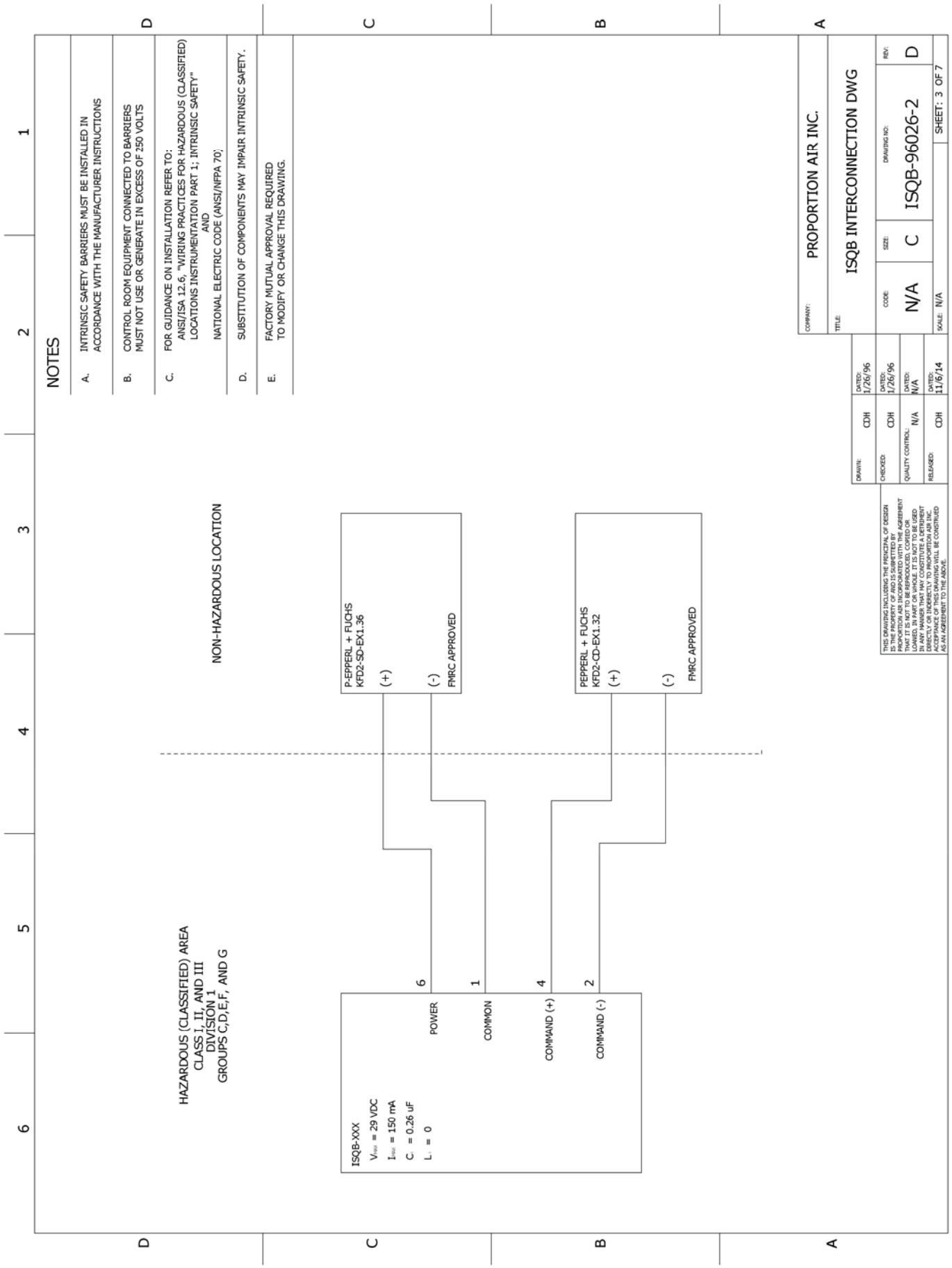


QBT-01 Bracket

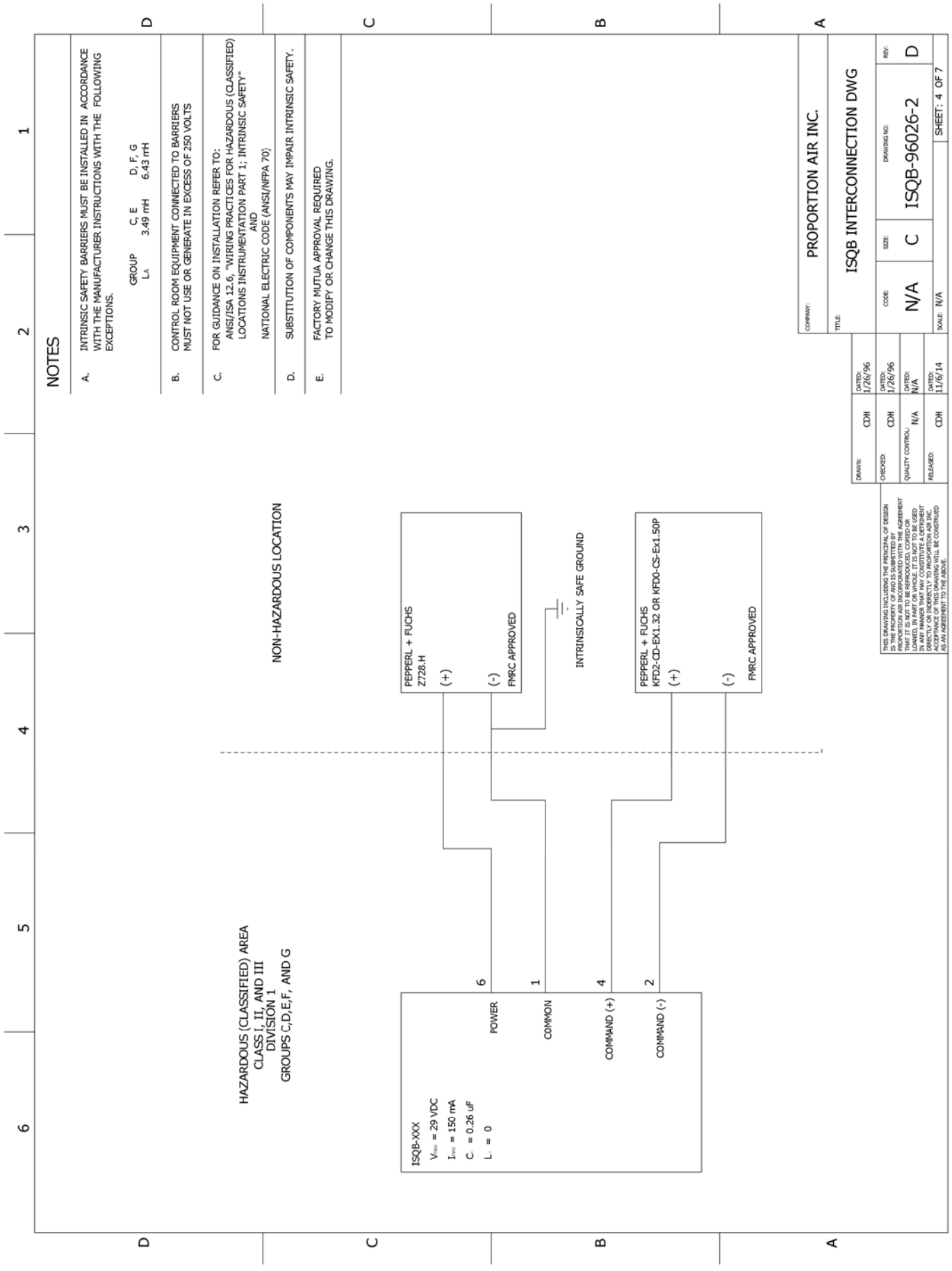
FIELD WIRING DRAWING ISQB-96026-2 *(General Barrier)*



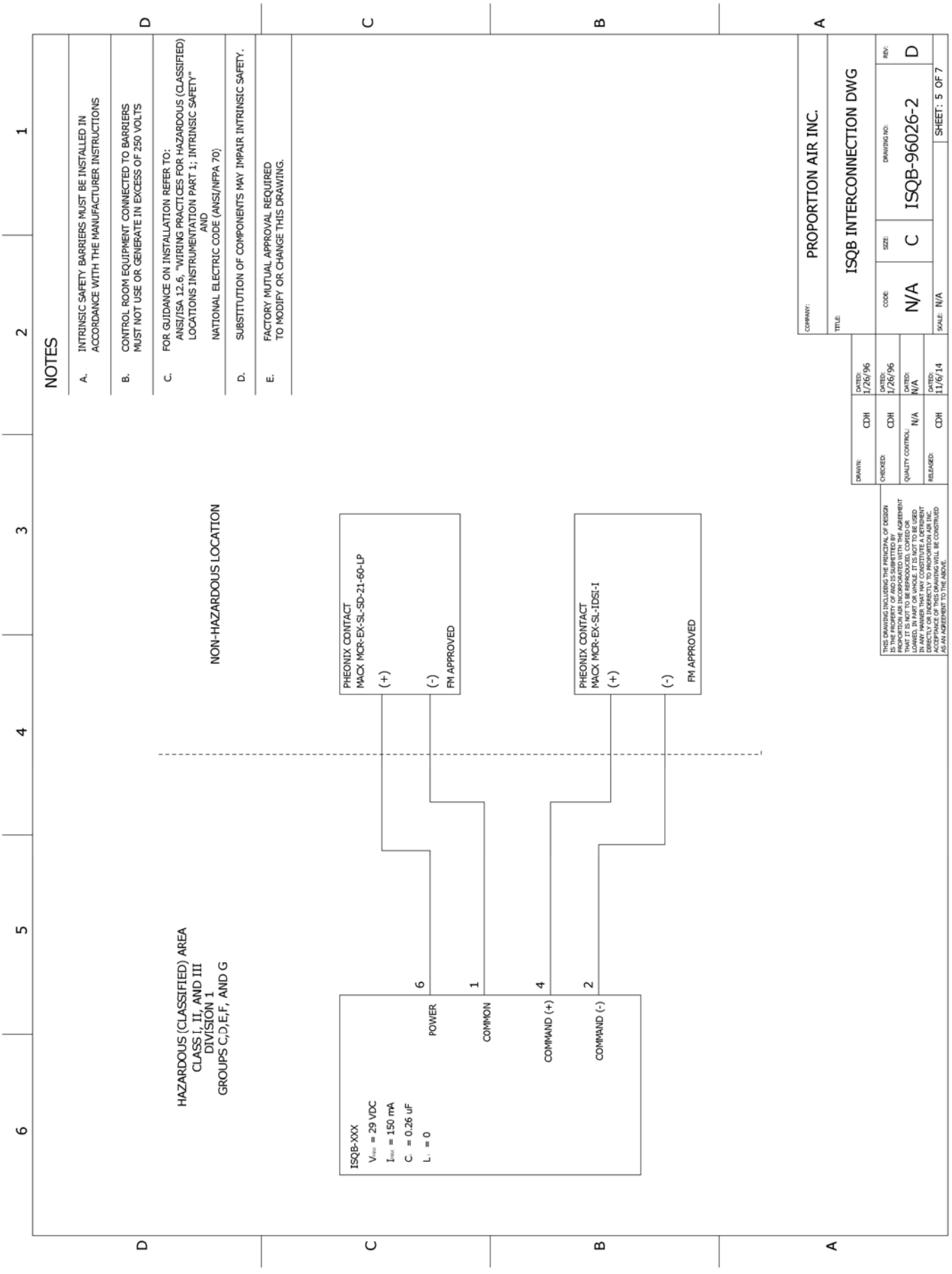
FIELD WIRING DRAWING ISQB-96026-2 *(PEPPERL-FUCHS KFD2)*



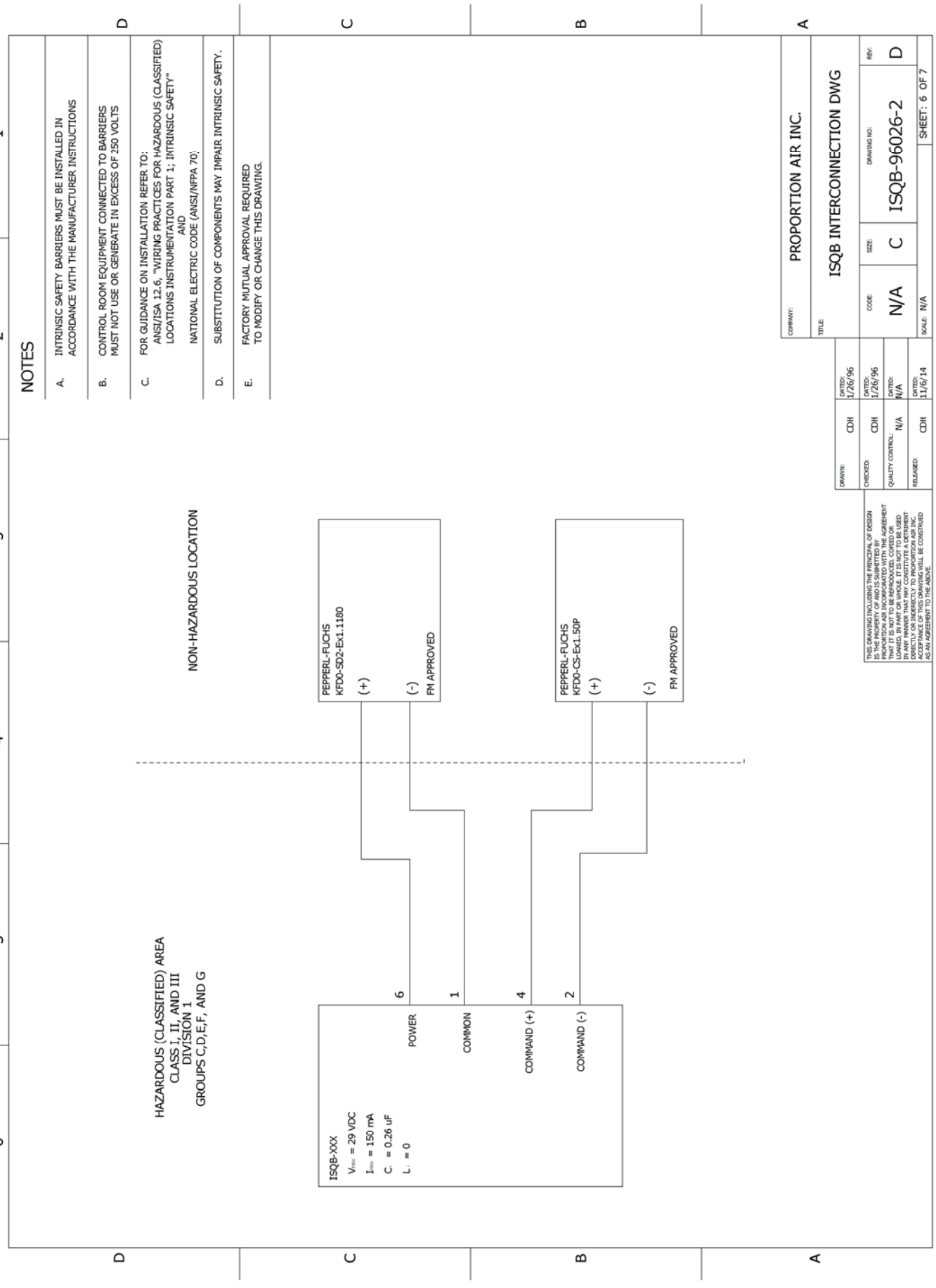
FIELD WIRING DRAWING ISQB-96026-2 *(PEPPERL-FUCHS Z728/KFD2)*



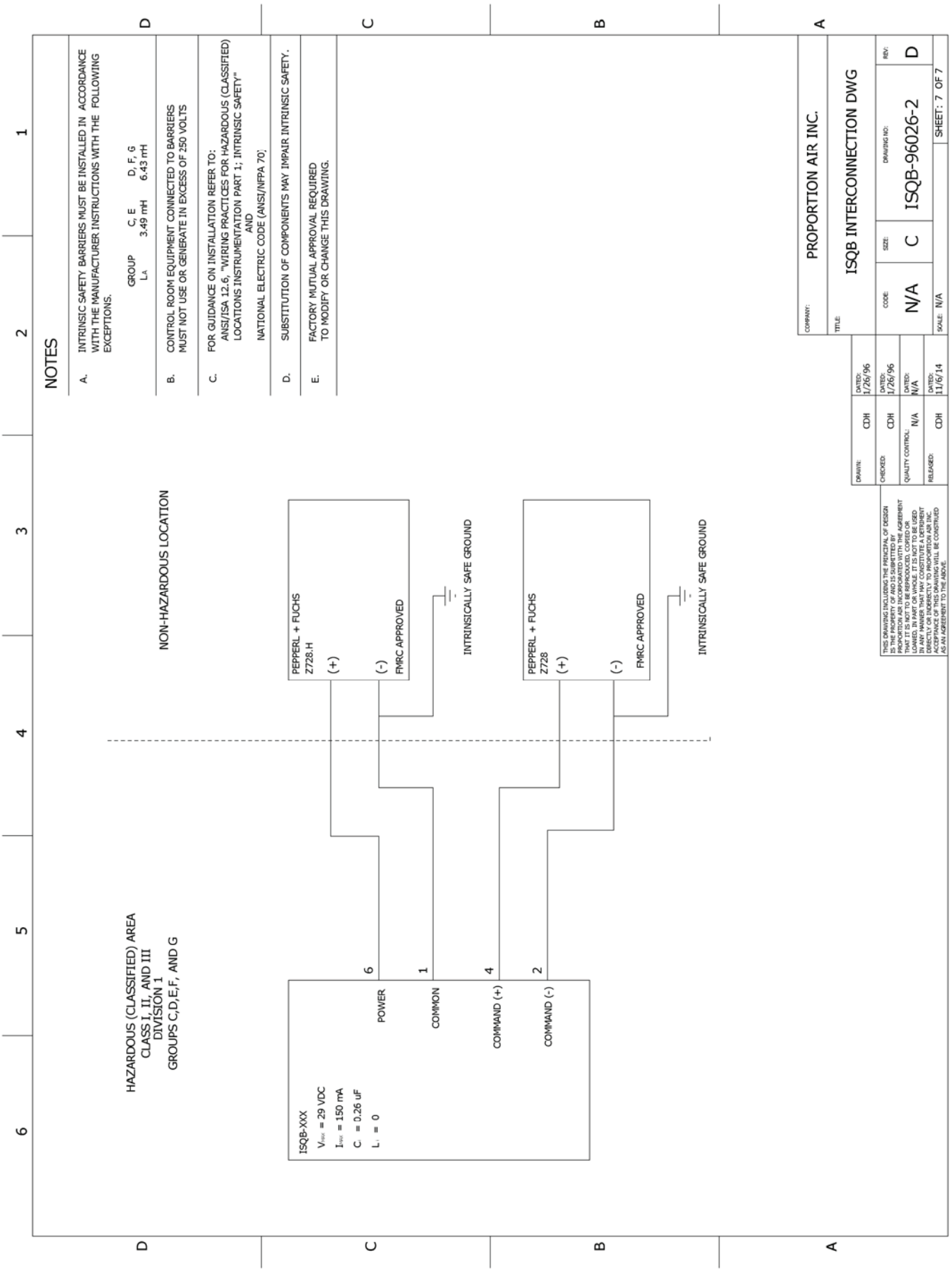
FIELD WIRING DRAWING ISQB-96026-2 *(PHEONIX CONTACT MACX)*



FIELD WIRING DRAWING ISQB-96026-2 *(PEPPERL-FUCHS KFD0)*



FIELD WIRING DRAWING ISQB-96026-2 *(PEPPERL-FUCHS Z728)*



ISQB3 CONFIGURATION

Example Part Number

ISQB3T	B	N	I	X	Z		P	10	BR	G	BR	
1	2	3	4	5	6	7	8	9	10	11	OPTIONS	

Section Reference

1	Series
ISF1T	Nonincendive ISF
ISQBF	Nonincendive ISQBF
ISQB1T	Intrinsically Safe ISQB
ISQBX	Intrinsically Safe ISQBX
ISQB3T	Intrinsically Safe ISQB3
ISQB4T	Intrinsically Safe ISQB4

2	Manifold Material
B	Brass
A	Anodized Aluminum

3	Thread Type
N	NPT
P	BSPP *(Brass Manifold Only)*

4	Input Signal Range
I	4 to 20 mADC

5	Output Signal Range
X	No Monitor

6	Zero Offset
N	0% Pressure is Below Zero
P	0% Pressure is Above Zero
Z	0% Pressure is Zero *(Typical)*

7	Zero Offset Pressure
Typical is 0* - If greater than 30% of full scale pressure *(#9 below)*, please consult factory.	
*If **Z** for Zero Offset, Please Leave this Section (#7) Blank	

8	Full Scale Pressure Type
N	100% Pressure is Below Zero
P	100% Pressure is Above Zero
Z	100% Pressure is Zero

9	Full Scale Pressure
Must be less than or equal to 150 psig	

10	Pressure Unit *(no additional fee)*		
PS	PSI	Inches Hg	**IH**
MB	Millibars	Inches H_2O	**IW**
BR	Bar	Millimeters H_2O	**MW**
KP	Kilo-pascal	Kilograms/cm²	**KG**
MP	Mega-pascal	Torr *(Requires A for Unit of Measure #11)*	**TR**
MH	Millimeters Hg	Centimeters H_2O	**CW**
PA	Pascal		

11	Pressure Unit of Measure
A	Absolute Pressure
G	Gauge Pressure

Common Options	
BR	Install Foot Bracket
O2	Oxygen Cleaned
O3	O2 Cleaned for Non-Oxygen Use
R1	Rotate Connector 180 Degrees

Recommended Accessories	
QBT-01	Wrap-Around Mounting Bracket
QBT-02	Foot-Mount Bracket *(Installed)**
* Use Option **BR** for Foot-Mount Bracket	

PLEASE NOTE: The user has the additional responsibility of supplying and/or ensuring that the connector/cable that is used with any Proportion-Air ISQB3 series FM-approved product meets all local and national codes for intrinsically safe wiring.

MADE IN USA

Safety Precautions

Please read the following safety precautions before installing or operating any Proportion-Air, Inc. equipment or accessories. To confirm safety, be sure to observe 'ISO 4414: Pneumatic Fluid Power - General rules relating to systems' and other safety practices.

Warning

Improper operation could result in serious injury to persons or loss of life!

1. PRODUCT COMPATIBILITY
   Proportion-Air, Inc. products and accessories are for use in industrial pneumatic applications with compressed air media. The compatibility of the equipment is the responsibility of the end user. Product performance and safety are the responsibility of the person who determined the compatibility of the system. Also, this person is responsible for continuously reviewing the suitability of the products specified for the system, referencing the latest catalog, installation manual, Safety Precautions and all materials related to the product.
2. EMERGENCY SHUTOFF
   Proportion-Air, Inc. products cannot be used as an emergency shutoff. A redundant safety system should be installed in the system to prevent serious injury or loss of life.
3. EXPLOSIVE ATMOSPHERES
   Products and equipment should not be used where harmful, corrosive or explosive materials or gases are present. Unless certified, Proportion-Air, Inc. products cannot be used with flammable gases or in hazardous environments.
4. AIR QUALITY
   Clean, dry air is not required for Proportion-Air, Inc. products. However, a 40 micron particulate filter is recommended to prevent solid contamination from entering the product.
5. TEMPERATURE
   Products should be used with a media and ambient environment inside of the specified temperature range of 32°F to 158°F. Consult factory for expanded temperature ranges.
6. OPERATION
   Only trained and certified personnel should operate electronic and pneumatic machinery and equipment. Electronics and pneumatics are very dangerous when handled incorrectly. All industry standard safety guidelines should be observed.
7. SERVICE AND MAINTENANCE
   Service and maintenance of machinery and equipment should only be handled by trained and experienced operators. Inspection should only be performed after safety has been confirmed. Ensure all supply pressure has been exhausted and residual energy (compressed gas, springs, gravity, etc.) has been released in the entire system prior to removing equipment for service or maintenance.

Caution

Improper operation could result in serious injury to persons or damages to equipment!

1. PNEUMATIC CONNECTION
   All pipes, pneumatic hose and tubing should be free of all contamination, debris and chips prior to installation. Flush pipes with compressed air to remove any loose particles.
2. THREAD SEALANT
   To prevent product contamination, thread tape is not recommended. Instead, a non-migrating thread sealant is recommended for installation. Apply sealant a couple threads from the end of the pipe thread to prevent contamination.
3. ELECTRICAL CONNECTION
   To prevent electronic damage, all electrical specifications should be reviewed and all electrical connections should be verified prior to operation.

Exemption from Liability

1. Proportion-Air, Inc. is exempted from any damages resulting from any operations not contained within the catalogs and/or instruction manuals and operations outside the range of its product specifications.
2. Proportion-Air, Inc. is exempted from any damage or loss whatsoever caused by malfunctions of its products when combined with other devices or software.
3. Proportion-Air, Inc. and its employees shall be exempted from any damage or loss resulting from earthquakes, fire, third person actions, accidents, intentional or unintentional operator error, product misapplication or irregular operating conditions.
4. Proportion-Air, Inc. and its employees shall be exempted from any damage or loss, either direct or indirect, including consequential damage or loss, claims, proceedings, demands, costs, expenses, judgments, awards, loss of profits or loss of chance and any other liability whatsoever including legal expenses and costs, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.

Warranty

Proportion-Air, Inc. products are warranted to the original purchaser only against defects in material or workmanship for one (1) year from the date of manufacture. The extent of Proportion-Air's liability under this warranty is limited to repair or replacement of the defective unit at Proportion-Air's option. Proportion-Air shall have no liability under this warranty where improper installation or filtration occurred.

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