Hazardous Location Information

Do you need encoders designed for hazardous environments? To keep pace with the growth of complex industrial processes, BEI has developed rugged, quality encoders that meet high standards and certifications for use in potentially explosive environments. There are a variety of protection methods available depending on the circumstance of a particular installation. For optical encoders, the most commonly used methods are explosion proof construction and intrinsic safety, detailed below:

Explosion Proof Construction Method

In this encoder protection technique the equipment is contained in an enclosure that can withstand an internal explosion of the most volatile gas-to-air mixture that can penetrate into the interior of the encoder enclosure. The enclosure must contain the explosion without damage and without allowing the flame to leave the enclosure through any joints or other openings.

Intrinsic Safety Method

This encoder protection technique uses an apparatus that limits the maximum level of current and voltage (usually measured as energy in millijoules) that can be delivered into the hazardous location. This equipment ensures that even in a double fault condition, there will not be enough energy to ignite the gas or vapor in that area. Note that encoders that use this method of protection, must use energy limiting devices (commonly called Barriers) in their installation. An Intrinsically Safe encoder, installed without an Intrinsic Safety Barrier is not an Intrinsically Safe system.

Table 2.1–European and N. American Intrinsic Safety Approvals

Encoder Type	Output Driver	Input VDC	CENELEC/ATEX	U.S. Standards	Canadian U.S. Standards Class I, Div. I, Group	C UL Standards Class II, Div I, Group	System Diagram Class I, Div I, Zone 0
H25, L25, E25, HS25[1], H35, HS35, H37, H38, or H40	4469	5	EEx ia IIC T4	A, B, C, D	E, F, G	Group IIC	924-08062-001, 002, or 003
	3904R	5	EEx ia IIC T4	A, B, C, D	E, F, G	Group IIC	924-08063-001 or 002
	3904	5	EEx ia IIC T4	A, B, C, D	E, F, G	Group IIC	924-08064-001 or 002
	3904	9	EEx ia IIB T4	C, D	E, F, G	Group IIB	924-08064-001 or 002
H20[4], H25[3] HS20[4] HS25[4] HS35[2,3] HS45[2]	5V/V	5	EEx ia IIC T4	A, B, C, D	E, F, G	Group IIC	924-08172-001, or 002
	5V/OCR	5	EEx ia IIC T4	A, B, C, D	E, F, G	Group IIC	924-08173,-001, or 002
	5V/OC	5	EEx ia IIC T4	A, B, C, D	E, F, G	Group IIC	924-08174-001, or 002
	9V/OC	9	EEx ia IIB T4	C, D	E, F, G	Group IIB	924-08174-001, or 002

[1] Rating only available with 4469 output driver
[2] Single and dual output versions available
[3] Line driver version available with interpolation T2, T3, T4, T5, T8, T12, T16
[4] Rating only available with 5V/V

Table 2.2 –Europe and North American "Explosion Proof" Approvals

Encoder Type	CENELEC/ATEX	C UL US NEMA 7 U.S. Standards Class I, Div I, Group:	C UL US NEMA 7 U.S. Standards Class II, Div I, Group:
H38 (Standard)		D	
H38 (w/ Labyrinth Seal)	EExd IIB T4	C, D	E, F, G
H40		D	

Encoders with metal connector or conduit terminations are rated to EN 55011 and EN 61000-6-2.
For plastic connector, pigtail or shielded/jacketed cable terminations, consult factory

Table 3–Hazardous Environment Groups

GAS GROUPS		DUST GROUPS
Class I		Class II
Division 1 & 2	Zone 0,1 & 2	Division 1 & 2
A (acetylene)	IIC (acetylene & hydrogen)	E (metals)
B (hydrogen)		F (coal)
C (ethylene)	IIB (ethylene)	G (grain)
D (propane)	IIA (propane)	