

We Provide Position Feedback and Sensors for Hazardous Areas!



Explanation of Markings



ATEX

Marking according to EU directive 94/9/EG (ATEX)

Gas	II	1/2G
	1	2a
Dust	II	1/2D
	1	2b



IECEX

Marking according to EN 60079 and IEC 60079

Ex	d	IIC	T6/T5	Ga/Gb	Ta +65 °C (T6) + 80 °C (T5)
3	4	5a	6a	7	9
Ex	t	IIIC	T85/T100 °C	Da	IP68 Ta +65 °C (T85) + 80 °C (T100)
3	4	5b	6b	7	9

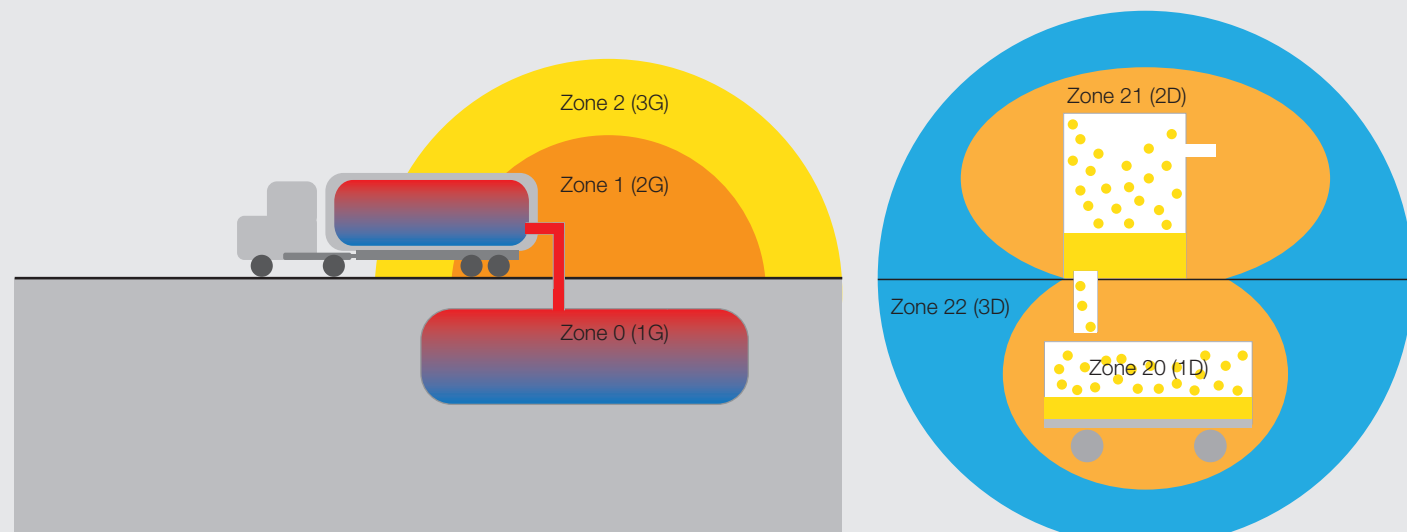


NEC

Marking according to NEC 500 (US)/CEC Annex J (CA)

Class I	Division 1	Groups ABCD	T5/T6
10	11	12	13
Class II	Division 1	Groups EFG	T5/T6
10	11	12	13
Class III	Enclosure Type 4X/6P		
10	14		

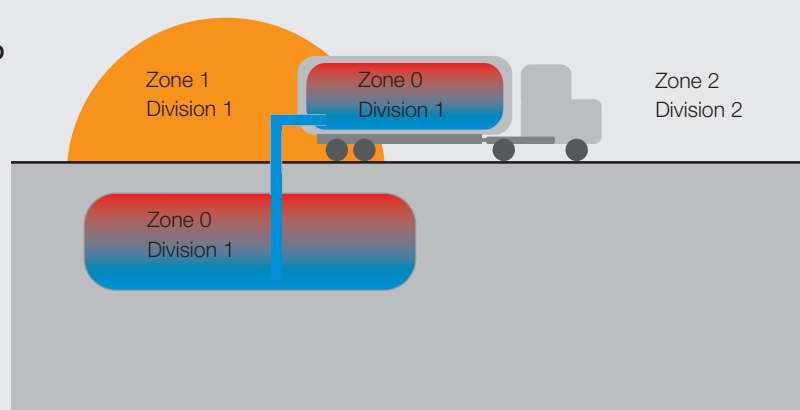
Ambient Temperature Range: -40...+65 °C (T6) or -40...+80 °C (T5)



1	Equipment Group
2	Equipment Category Gas (= marking of a device with two categories)
2b	Equipment Category Dust
3	(Ex for Electrical Apparatus)
4	Type of Protection
5	Explosion Group Gas
5b	Explosion Group Dust
6	Temperature Class (Gas)
6b	Max. Surface Temperature (Dust)
7	EPL—Equipment Protection Level
8	(IP-Code)
9	(Max. Ambient Temperature)












Marking according to NEC 505 (US)

Class	Zone 1	AEx	d	IIC	T5/T6	Ga/Gb
10	15	16	17	18	19	19
10	Hazard Class					
11	Permitted Division					
12	Permitted Group					
13	Temperature Class					
14	(U.S. Enclosure Type)					
15	Permitted Zone					
16	A = American National Standard Ex = Explosion Protected					
17	Type of Protection					
18	Explosion Group					
19	(EPL-Equipment Protection Level)					



Equipment Group	I-Mines	II – Other Places <u>21</u> <u>23</u>				
Explosive atmosphere		Continuously, for a long period frequently	Occasionally		Rarely and for a short period	
Hazardous places		Zone 0	Zone 20	Zone 1	Zone 21	Zone 22
Equipment Category	M1 or M2	1G	1D	2G	2D	3G
EPL (IEC/EN 60079-0)	Ma or Mb	Ga	Da	Gb	Db	Gc
						Dc

I	Equipment Group 1	Definition
I		Equipment group 1 applies to equipment intended for use in underground parts of mines, and to those parts of surface installations of such mines, liable to be endangered by fire/damp and/or combustible dust.
II		Equipment group 1 applies to equipment intended for use in other places liable to be endangered by explosive atmospheres.

Protection Type for Electrical Apparatus						
Type of Protection	Symbol	Symbol Alternative	EPL 	For Zone	Standard	Definition
Increased safety	e	eb	Gb	1	EN 60079-7	Additional measures are applied to prevent the possibility of ignisibility high temperatures and the occurrence of sparks or electric arcs within the enclosure or on exposed parts of electrical equipment, where such ignition sources would not occur in normal service.
 Flameproof enclosures	d	db	Gb	1	EN 60079-1	Parts which can ignite a potentially explosive atmosphere are surrounded by an enclosure which withstands the pressure of an explosive mixture exploding inside the enclosure and prevents the transmission of the explosion to the atmosphere surrounding the enclosure.
 Balluff DEX						
Pressurized enclosures	px py pz p p	pxb pyb pzb pb pc	Gb Gb Gb Dc Dc	1 1 2 21 22	EN 60079-2	The formation of a potentially explosive atmosphere inside an enclosure is prevented by maintaining a positive internal pressure of protective gas in relation to the surrounding atmosphere and by supplying the inside of the enclosure with a constant flow of protective gas which dilutes any combustible mixtures.
 Intrinsic safety	ia ib ic	ia ib ic	Ga and Da Gb and Db Gb and Dc	0, 20 1, 21 2	EN 60079-11	Equipment only contains intrinsically safe electric circuits. An electric circuit is intrinsically safe if any spark or thermal effect produced under normal operation is not capable of causing ignition of a given explosive atmosphere.
 Balluff EEX						
Oil immersion	o	ob	Gb	1	EN 60079-6	Equipment are immersed in a protective fluid (e. g. oil) in such a way that a potentially explosive atmosphere existing above the surface or outside of the encapsulation cannot be ignited.
 Powder filling	q	qb	Gb	1	EN 60079-5	Filling the enclosure with a fine grained packing material has the effect of making it impossible for an electric arc created in the enclosure under normal operating conditions to ignite a potentially explosive atmosphere surrounding the enclosure. Ignition must neither be caused by flames nor by elevated temperatures on the enclosure surface
 Encapsulation	ma mb mc		Ga and Da Gb and Db Gc and Dc	0, 20 1, 21 2, 22	EN 60079-18	Parts that are capable of lighting an explosive atmosphere are enclosed in a compound in such a way that ignition of an explosive atmosphere is prevented.
 Type of protection „n“					EN 60079-15	
Non-sparking	nA	nAc	Gc	2		Additional measures are applied to prevent the occurrence of sparks or electric arcs within the enclosure, where such ignition sources would not occur in normal service.
 Balluff NEX						
Spark-proof	nC	nCc	Gc	2		
Restricted breathing	nR	nRc	Gc	2		
 Protection by enclosures	ta tb tc		Da Db Dc	20 21 22	EN 60079-31	Tightness of the enclosure prevents ingress of dust or limits it to a nonhazardous amount. The surface temperature of the enclosure must not ignite the surrounding atmosphere.
 IPXX						

Explosion Groups				
Gas	IIA	IIB	IIC	
Ammonia, methane, ethane, propane		Town gas, acrylonitrile	Hydrogen	Ignition Temperature > 450 °C
Ethanol, cyclohexane, n-butane		Ethylene, ethylene oxide	Acetylene	Temperature Class T1...T6
Gasoline, kerosene, n-hexane		Ethylene glycol, hydrogen sulfide		> 300...450 °C
Acetic aldehyde		Ethyl ether		> 200...300 °C
				> 135...200 °C
				> 100...135 °C
			Carbon disulfide	> 85...135 °C

Ignition Temperature of Gases and Vapors	Max. Surface Temperature on the Equipment	Temperature Class
> 450 °C	450 °C	T1
> 300...450 °C	300 °C	T2
> 200...300 °C	200 °C	T3
> 135...200 °C	135 °C	T4
> 100...135 °C	100 °C	T5
> 85...135 °C	85 °C	T6

Explosion Groups				
Dust				
IIIA	IIIB	IIIC	Ignition Temperature	Temperature Class
Combustible flyings	Non-conductive dust	Conductive dust	Surface temperature is specified directly	Non

Area Classification		Flammable Material/ Present Continuously	Flammable Material/ Present Intermittently	Flammable Material/ Present Abnormally
11	NEC 505 (US)	Zone 0	Zone 1	Zone 2
12	NEC 500 (US)		Division 1	Division 2
	CEC Section 18 (CA)	Zone 0	Zone 1	Zone 2
	CEC Annex J (CA)		Division 1	Division 2
	US classification per ANSI/NFPA 70 National Electrical Code (NEC) Article 500 or Article 505			
	CA classification per CSA C22.1 Canadian Electrical Code (CEC) Section 18 or Annex J			

IEC	Type of Protection	Code	Country	Application	Protection Principle	Standard
General requirements			US	Class I, Division 1 and 2		FM 3600
			CA	Class I, Division 1 and 2		CSA C22.2 No. 0
	AEx		US	Class I, Division 1 and 2		ISA 60079-0
			CA	Class I, Division 1 and 2		CSA C22.2 No. 60079-0
Increased safety	AEx e (or AEx eb)		US	Class I, Zone 1		ISA 60079-7
	Ex e	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-7
Non-incendive	(NI)		US	Class I, Division 2	No arcs, sparks or hot surfaces	FM 3611
	(NI)		CA	Class I, Division 2		CSA C22.2 No. 213
Non-sparking	AEx nA (or AEx nAc)		US	Class I, Zone 2		ISA 60079-15
	Ex nA	CA	US	Class I, Zone 2		CSA C22.2 No.60079-15
Explosionproof	(XP)		US	Class I, Division 1		FM 3615
	(XP)		CA	Class I, Division 1		CSA C22.2 No. 30
Flameproof	AEx d (or AEx db)		US	Class I, Zone 1		ISA 60079-1
	Ex d	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-1
Powder-filled	AEx q (or AEx qb)		US	Class I, Zone 1	Contain the explosion and extinguish the flame	ISA 60079-5
	Ex q	CA	US	Class I, Zone 1		CSA C22.2 No.60079-5
Enclosed break	AEx nC (or AEx nCc)		US	Class I, Zone 2		ISA 60079-15
	Ex nC	CA	US	Class I, Zone 2		CSA C22.2 No.60079-15
Intrinsic safety	(I.S.)		US	Class I, Division 1		FM 3610
	(I.S.)		CA	Class I, Division 1		CSA C22.2 No. 157
	AEx Ia		US	Class I, Zone 0		FM 3610
	Ex ia	CA	US	Class I, Zone 0		CSA C22.2 No. 60079-11
	AEx Ib		US	Class I, Zone 1		FM 3610
	Ex Ib	CA	US	Class I, Zone 1	Limit energy of sparks and surface temperature	CSA C22.2 No. 60079-11
	AEx Ic		US	Class I, Zone 2		FM 3610
	Ex Ic	CA	US	Class I, Zone 2		CSA C22.2 No. 60079-11
Limited energy	AEx nC (or AEx nCc)		US	Class I, Zone 2		ISA 60079-15
	Ex nL	CA	US	Class I, Zone 2		CSA C22.2 No. 60079-15
Pressurized	Type X		US	Class I, Division 1		FM 3620 (NFPA 496)
	Type X	CA	US	Class I, Division 1		NFPA 496
	Type Y		US	Class I, Division 1		FM 3620 (NFPA 496)
	Type Y	CA	US	Class I, Division 1		NFPA 496
	Type Z		US	Class I, Division 2		FM 3620 (NFPA 496)
	Type Z	CA	US	Class I, Division 2		NFPA 496
	AEx px (or AEx pxb)		US	Class I, Zone 1		CSA C22.2
	Ex px	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-2
	AEx py (or AEx pyb)		US	Class I, Zone 1		ISA 60079-2
	Ex py	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-2
Restricted breathing	AEx pz (or AEx pzb)		US	Class I, Zone 2		ISA 60079-2
	Ex pz	CA	US	Class I, Zone 2		CSA C22.2 No. 60079-2
	AEx nR (or AEx nRc)		US	Class I, Zone 2	Keep flammable gas out	ISA 60079-15
	Ex nR	CA	US	Class I, Zone 2		CSA C22.2 No. 60079-15
Encapsulation	AEx ma		US	Class I, Zone 0		ISA 60079-18
	Ex ma	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-18
	AEx m		US	Class I, Zone 1		ISA 60079-18
	AEx mb		US	Class I, Zone 1		ISA 60079-18
	Ex mb	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-18
	AEx mc		US	Class I, Zone 2		ISA 60079-18
	Ex mc	CA	US	Class I, Zone 2		CSA C22.2 No. 60079-18
	AEx o (or AEx ob)		US	Class I, Zone 1		ISA 60079-6
	Ex o	CA	US	Class I, Zone 1		CSA C22.2 No. 60079-6

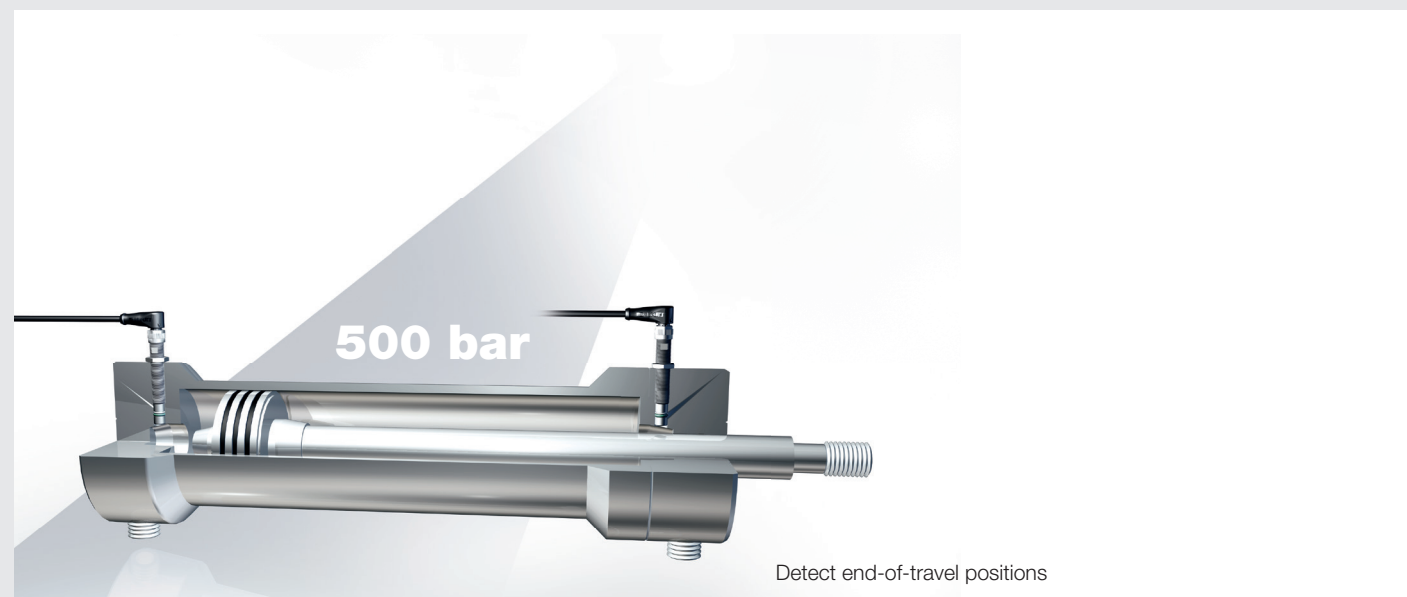
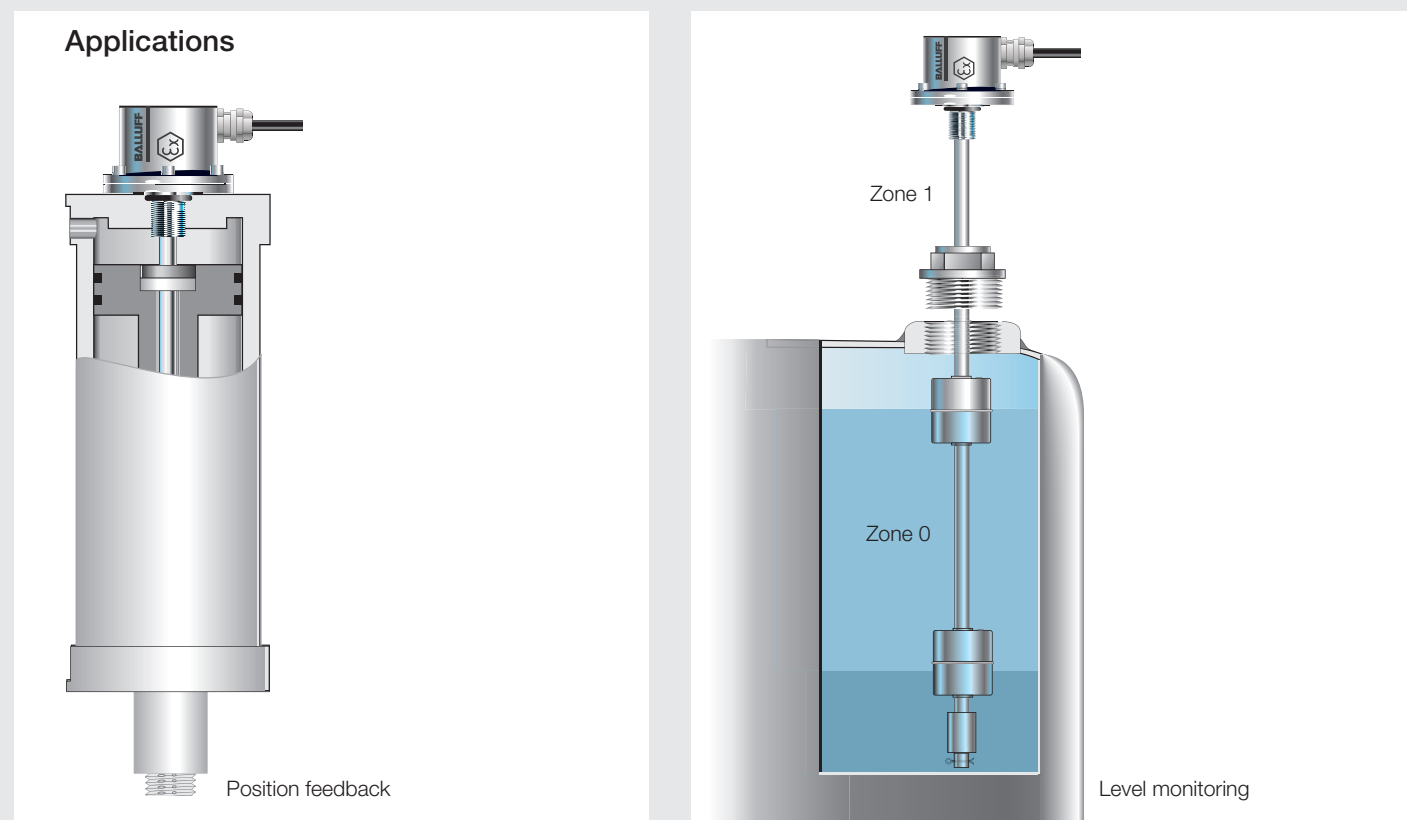
Group			
Substance	Hazard Class 10	NEC 500 12	NEC 505 16
Acetylene		Group A	IIC
Hydrogen		Group B	IIC
Ethylene	Class I	Group C	IIB
Propane		Group D	IIA
Methane (mining)		Group D	
Metal (conductive) dust		Group E	
Coal (carbonaceous) dust		Group F	
Grain dust	Class II		
		Group G	
Combustible fibers and flyings	Class III, fibers and flyings		

10 Temperature Classes		
NEC 505 (US)	NEC 500 (US)	Max. Surface Temperature ²⁾
T1	T1	450 °C
T2	T2	300 °C
	T2A	280 °C
	T2B	260 °C
	T2C	230 °C
	T2D	215 °C
T3	T3	200 °C
	T3A	180 °C
	T3B	165 °C
	T3C	160 °C
T4	T4	135 °C
	T4A	120 °C
T5	T5	100 °C
T6	T6	85 °C

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Doc. No. 922419/Mat. No. 246745 EN, G15; Subject to modification. Replaces E15.

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