

Volume and measurement of sound pressure

The volume indicates the relation between the sound pressure and a reference value in a logarithmic rating. That causes the non-linearity of the volume rating in dB(A). An increase of volume of 6 dB, for example from 100 dB to 106 dB, means doubling the volume.

Generally the loudness rating is valid for measurements done in a distance of 1 m from the source of the noise. Our loudness ratings are based on measurements made in our factory. Of course the loudness values are product-typical and like all measured values have certain tolerances.

The volume of signalling devices can change in accordance to the mode of installation, the mounting position and duty cycle or time of operation. In this case electro-mechanical devices offer the possibility of the magnet-system's re-adjustment according to the instruction manual.

Furthermore the individual noise value in the environment of the signalling devices has to be taken into account. The subjective feeling may appear that the loudness of the signalling device is to low if the noise source and signalling device have similar frequency areas.

Examples of noise in daily life

Min. auditory threshold	0 dB(A)
Rushing leaves	10 dB(A)
Ticking clock	20 dB(A)
Suburban street noise	30 dB(A)
Conversation in a distance of 1m	50 dB(A)
Vacuum cleaner	60 dB(A)
Loud traffic noise	70 dB(A)
Motorbike	100 dB(A)
<i>FHF</i> -signalling bell AW	110 dB(A)
<i>FHF</i> -electronic sounder EV11	118 dB(A)
Aircraft in a distance of 3 m	120 dB(A)
Threshold of pain	130 dB(A)
<i>FHF</i> -pneumatic horn PH 1	135 dB(A)

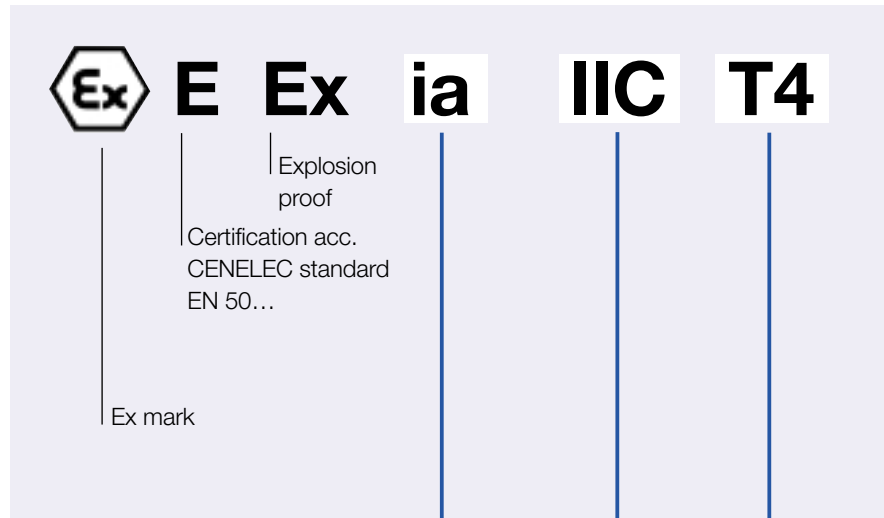
IP protection modes DIN 40050 resp. IEC 529 (EN 60529)

First digit: protection against ingress of solid objects	Second digit: protection against ingress of water
0 No special protection	0 No special protection
1 Objects > 50 mm	1 Vertically dripping water
2 Objects > 12 mm	2 Angled dripping water (15° from the vertical)
3 Objects > 2.5 mm	3 Sprayed water (60° from the vertical)
4 Objects >1.0 mm	4 Splashed and sprayed water (all directions)
5 Entry of dust	5 Low pressure jet water
6 Complete protection against entry of dust (dust tight)	6 Heavy seas
	7 Immersion
	8 Submersion



Terminology of explosion protection

Marking acc. to EN 50014



Ex mark

Explosion proof

Certification acc. CENELEC standard EN 50...

Temperature classes

Electrical apparatus of group II are classified in accordance to their max. surface temperatures

T1	T2	T3	T4	T5	T6
450° C	300° C	200° C	135° C	100° C	85° C

Max. permissible surface temperatures of electrical apparatus

Groups of equipment

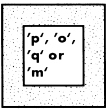
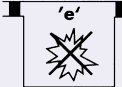
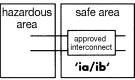

Group I comprises electrical apparatus which are approved for operation in fire damp endangered mines.

Group II for areas "on the surface", i.g. chemical plants, refineries, mills (dust), etc.

Concerning the explosion protection modes "intrinsic safety" and "flame-proof" enclosure a further classification is made into the **groups IIA, IIB** and **IIC** caused by the different ignition energies of different gases.

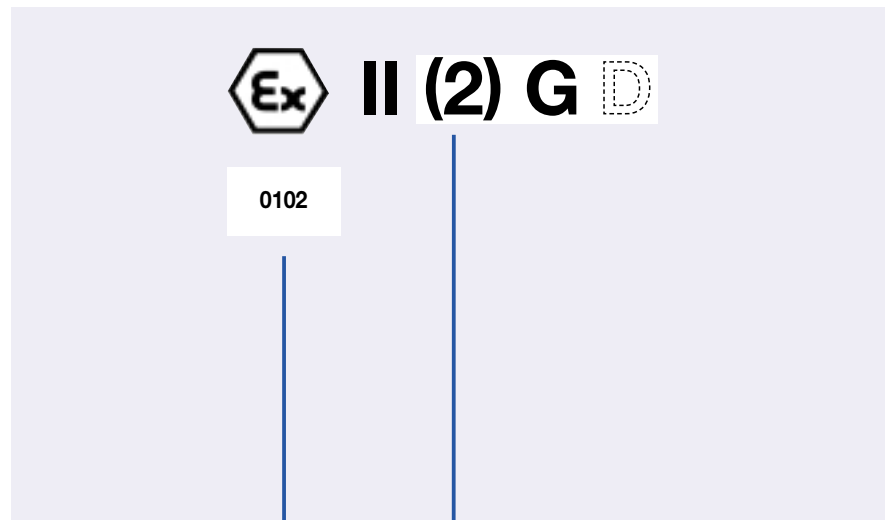
CENELEC marking	Typical gas
I	Methane
IIA	Propane
IIB	Ethylene
IIC	Hydrogen

Explosion protection modes

Safety concept	Explosion protection mode	Application	CENELEC standard
	General requirements		EN 50014
	Oil immersion	o Transformers, switchgears	EN 50015
	Pressurisation	p Control / analyse rooms	EN 50016
	Powder filling	q Measuring instruments	EN 50017
	Encapsulation	m Measuring instruments, electronics	EN 50028
	Increased safety	e Distribution boxes, lamps, enclosures	EN 50019
	Intrinsically safety	i Instrumentation, electronics	EN 50020
	Flameproof	d Power electronics, motors, pumps	EN 50018

Terminology of explosion protection

Additional marking
acc. the ATEX directive (94/9/EC)



Area classification

Electrical apparatus which is certified in accordance to the ATEX directive gets an additional marking. At first there appears the apparatus group, then the category and finally the indication of the atmosphere (gas and/or dust). For the apparatus group II the following classification of categories is valid:

	Category 1 very high degree of safety		Category 2 high degree of safety		Category 3 normal degree of safety	
Safety given by/ in case of	2 protection modes/2 faults		Frequent equipment faults/ 1 fault		Faultless operation	
Operation in	Zone 0	Zone 20	Zone 1	Zone 21	Zone 2	Zone 22
Atmosphere	G	D	G	D	G	D

G = gas, D = dust

Zone division

Areas, where dangerous explosive atmospheres can be present, are divided in different zones in accordance to the probability of the presence of these explosive atmospheres. In case of gassy atmospheres the division is made into zones 0, 1 and 2, for dust atmospheres the the division is zone 20, 21 and 22.

Zone	Definition	
0	20	Explosive atmospheres permanent or long time or frequent
1	21	Explosive atmospheres occasionally
2	22	Explosive atmospheres rarely

Certification authority / test houses

Certification authority	Country	Identifier
PTB	Germany	0102
DMT (BVS)	Germany	0158