Ex-de Encapsulated MCCB EATON

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Protection Types for Group II, Zone 1

Type of protection	**Flameproof enclosure**	Sand encapsulation	Pressurization	Oil encapsulation	Encapsulation	**Increased safety**	**Intrinsic safety**
Symbol	**d**	q	p	o	m	**e**	**i**
IEC CENELEC	IEC 60079-1	IEC 60079-5	IEC 60079-2	IEC 60079-6	IEC 60079-18	IEC 60079-7	IEC 60079-11
Principle							
Application	Power operated equipment, switchgear, motors (all equipment that produce an ignition source in normal operation)	Capacitors, electronic components, fuses	Power operated equipment (active safety measures are required)	Transformers (rarely applied)	Measuring and control engineering, relays, electronic circuits.	Connection and distribution boxes, luminaires, measuring instruments, squirrel cage motors (no ignition source in normal operation)	Measuring and control engineering, data engineering (low electrical values)

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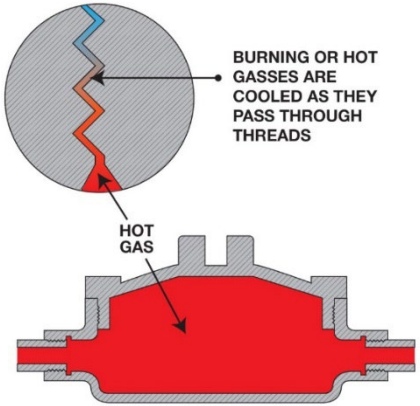
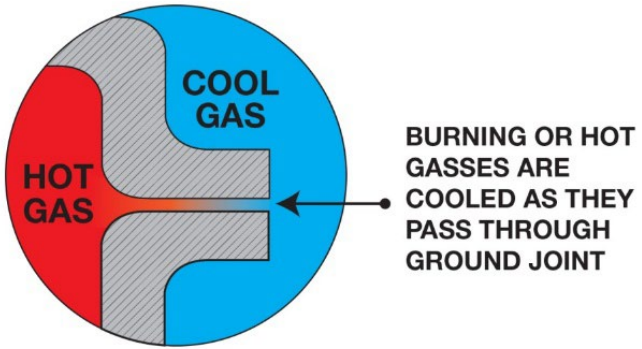
Key Protection Types for Group II, Zone 1

- Type of Protection:
- Flameproof Enclosure “d“
- parts that can ignite an explosive atmosphere are built into an enclosure that can withstand the pressure in the event of the explosion of an explosive mixture.
- Prevention of the transmission of the explosion to external atmosphere.
- Minimum degree of protection of enclosure IP54
- withstand the explosion pressure generated without any lasting deformation
- Propagation of the explosion is prevented by means of defined flame paths

Threaded Joint



Flanged/ Flat/ Ground Joint



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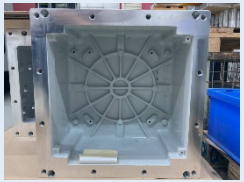
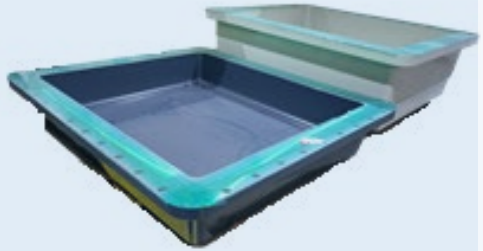
Ex-d Enclosures

IIC

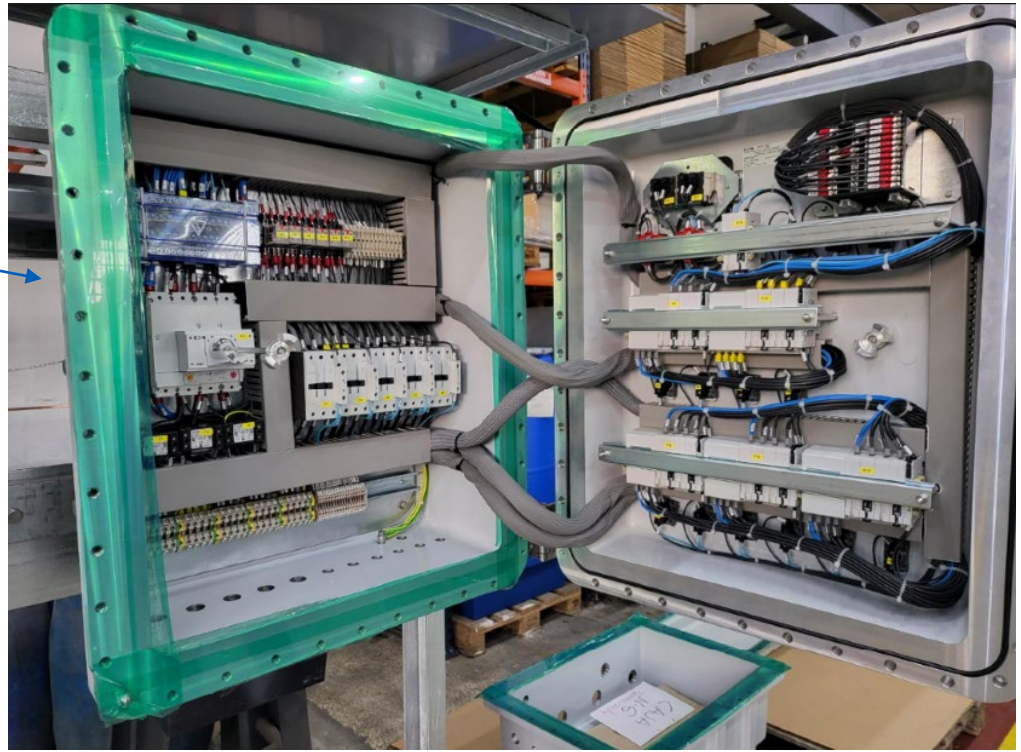
IIB+H2





IIB

Ex-d Solutions



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Ex-d Advantages / Disadvantages

Advantage

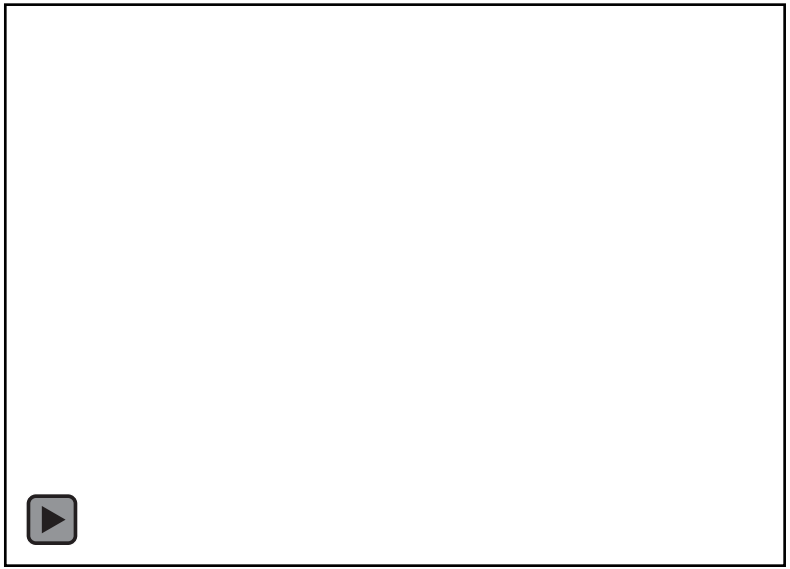
- Industrial components an be used
- Stock / usage of Industrial parts that we are used to
- Multiple suppliers
- Well know technique
- Compact solutions
- Lead time / Suppliers on the market

Disadvantage

- High weight
- Entrance with Compound Glands
- High maintenance needed
  (not painted flamepath – Grease)
- Maintenance for paint finish
  (to consider Paint thickness due to electro static)
- Sensibility of the flamepath
- Screws need to be tighthened with correct torque

Ex-d take away

High maintenance needed, knowledge and trained personell mandatory / we are all human and there is a potential risk for mistakes



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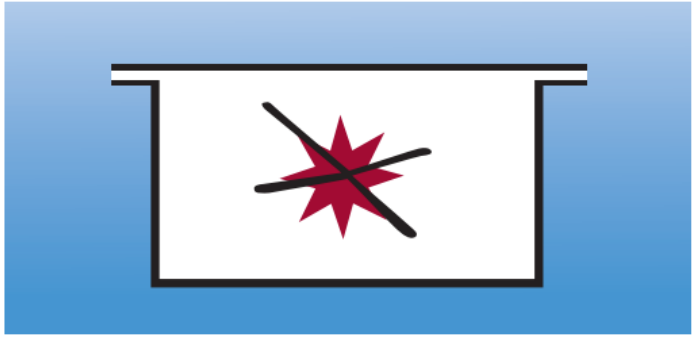
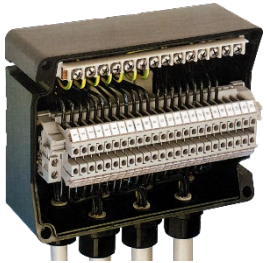
Basically the best way to prevent a potential risk is to minimize the work on the Ex-d enclosures on side and get the solution turn key ready from the plant.
Therefore often a combination of protection type “d” and “e” is used

What is protection type “e”?

Key Protection Types for Group II, Zone 1

- **Type of Protection:**
- **Increased Safety “e“**
- measures are taken to prevent the possibility of inadmissibly high temperatures and the occurrence of arcs or sparks in the interior or on the external parts of electrical apparatus during normal operation.
- Minimum degree of protection IP 54
- High impact-resistance
- No arcs or sparks in normal operation
- Special requirements for terminals with regards to contact pressure and self-loosening
- No hot-spots above the temperature class
- Larger distances and gaps compared to standard equipment (creepage and clearance)





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Ex-de solutions

Advantage

- Customer can connect in the Ex-e connection box without opening the Ex-d enclosure SAFETY!
- No compound glands are needed
- Ex-d compartment can reduce in size / deepth
- Line Bushings can be used

Ex-d

- Switch
- Line bushings

Ex-e

- Terminals
- Cable glands for Exe

Due to the success of these combination of the protection types we started years ago with the development of circuit breakers which are Ex-de certified and can be used in Ex-e enclosures

This increased the flexibility for our customers and strengthened the safety philosophy

Our modular Ex-e Enclosures

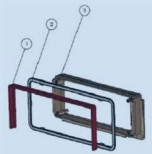
Stainless Steel enclosures

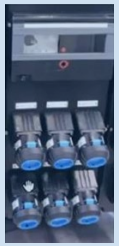
Size	High	Width	Deep
1	312,5	175	135
2	312,5	312,5	135
2 high	312,5	312,5	210
3	627	312,5	135
3 high	627	312,5	210
4	941,5	312,5	135

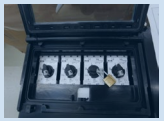
GRP enclosures

Size	High	Width	Deep
1	271	135	136
2	271	271	136
2 high	271	271	210
3	544	271	136
3 high	544	271	210
4	817	271	136
4 high	**817**	**271**	**210**

Assesories







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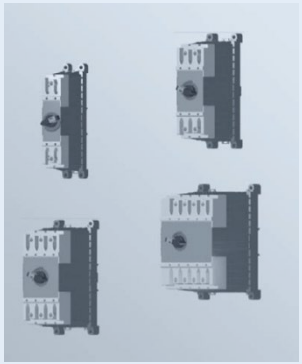
Our Ex-de encapsulations MCB/RCD/RCBO

GHG62 encapsulations

Size	High	Width	Deep
1	177	36	132
2	177	54	132
3	177	72	132
4	177	108	132

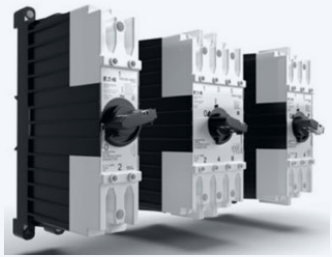


CPD encapsulations

Size	High	Width	Deep
2	177	54	132
3	177	72	132
4	177	108	132

GHG623 encapsulations

Size	High	Width	Deep
1	177	36	132
2	177	54	132
3	177	72	132
4	177	108	132



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Panel Boards with Main Incoming MCCB

GHG 619 panel in GRP or Stainless Steel prior to new encapsulated MCCB

- MCCB requires Ex-d enclosure coupled to Ex-e enclosures for branches

Example Panel

- ATEX/IECEx, IIC gas group
- T4 @ -20 °C to +55 °C ambient
- 160 A main MCCB, 4-pole
- 12 feeders of 20 amp 2-pole MCB/RCD c/w DDA block
- 5ea. 150 mm² incoming terminals
- 36ea. 10 mm² outgoing terminals

Prior Solution: MCCB in Ex-d enclosure

Disadvantages of Ex d metallic solution:

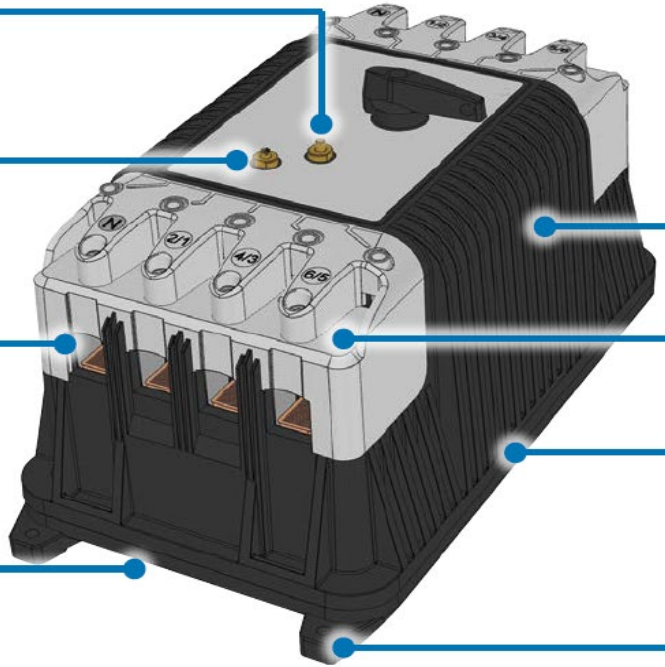
- Increased weight of the panel
  - 1 cast aluminum Ex d enclosure 430x430x284 weighs ~35kg
- Increased width of the panel
  - Minimum 430mm + mounting framework
- Difficulty mounting the panel
  - Size & weight raise the mounting costs and space required
- Extra cost of Ex d enclosure
  - Cost with connection box, drillings, & cover actuators add in addition to the price
- Enclosure material must be aluminum (no GRP option)
  - Cannot comply with GRP specs, or will have very high cost for Ex d stainless steel
- Maintenance risk to flame path integrity
  - During maintenance, care must be taken to ensure cover bolts are torqued properly, and there are no issues with flame path corrosion, scratches, grease, and cover threads

Ex-d metallic enclosures are typical for MCCBs in hazardous

The missing piece for a homogen GRP design and to Benefit from all the advantages of the Ex-e enclosures a encapsulated MCCB was need – we are the market leader on the MCCB which we developed with 4 poles up to 250A

This increased the flexibility for our customers and complete the safety philosophy

GHG 6277 Features & Benefits



Test button
push-to-trip mechanism for manual trip and testing of the breaker operation

Adjustable settings
allows to adjust/set the trip setting down to the next available amperage (i.e. 160 A down to 125 A). (IEC version only)

Wire connecting terminals
Allows for single conductor up to 185 mm²

Engineered air gap
Aids in temperature reduction and improves air flow

Heat dissipation ribs
Enlarged surface area for better cooling of the integrated components

IP20
touch safe (IP20) operating controls

Tamper-proof friction welded design
Maximum security to eliminate risk of flame path damage and prevent safety critical changes to the MCCB during maintenance

Mounting feet
Easy access for mounting/removing breakers

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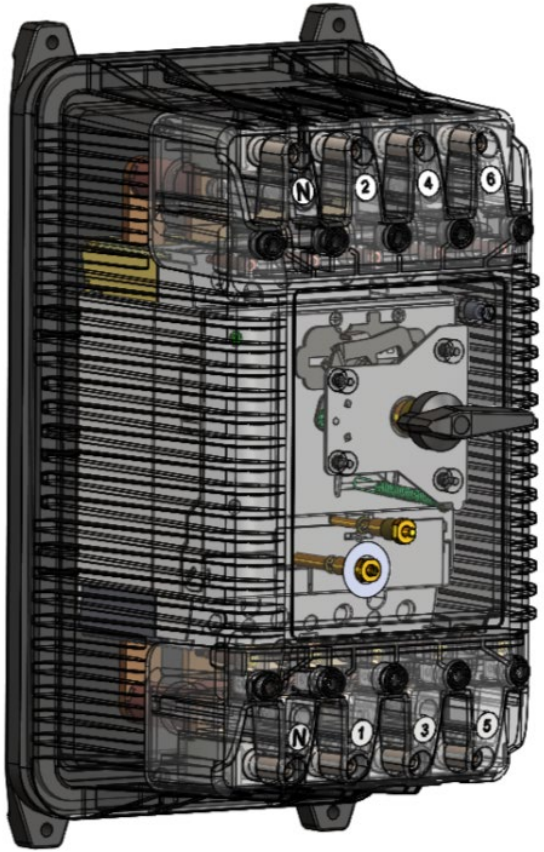
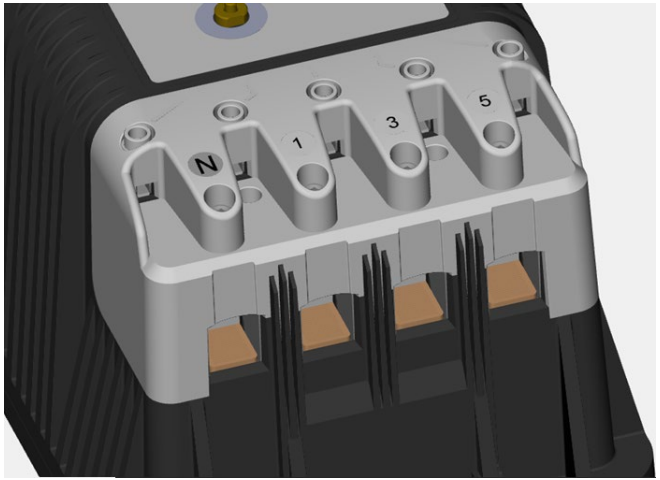
It is built in an industrial MCCB (NZM)





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Friction molded

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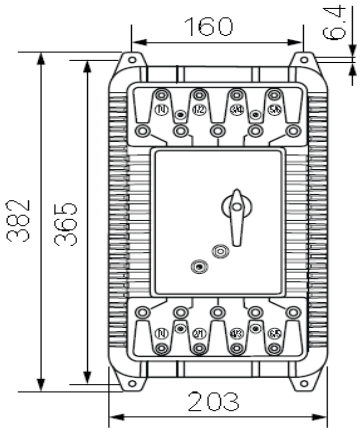
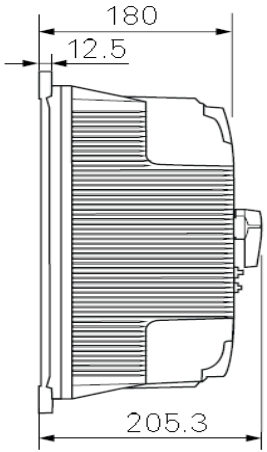
Encapsulated MCCB key data

GHG 6277 - encapsulated MCCB for IEC & NEC markets

- IEC 63A – 250 A, 3pole & 4pole @ 415 V AC
- NEC 60A – 225 A 3pole, 60A-150 A 4pole @ 277/480 V AC
- Ambient temperature range: -20 °C +55 °C
- 25 kA short circuit rating
- Eaton Moeller NZM2 series components
- Optional built-in accessories
  - aux contacts, shunt trip or UV release
- Size: 202x205x382 mm





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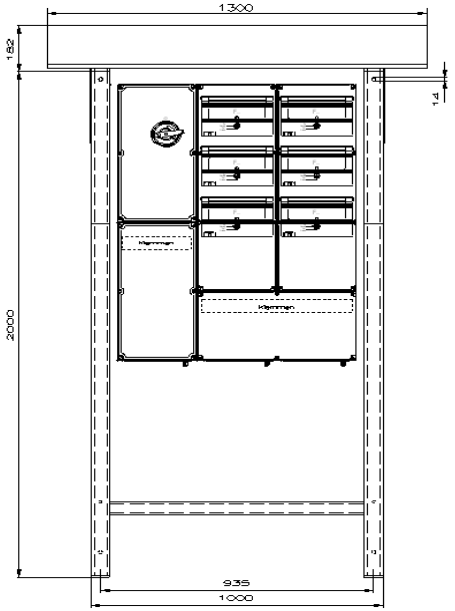
Panel Boards – With new Ex-de MCCB

Same GHG 619 panel board with new GHG 6277 incoming MCCB



Panel Specs

- ATEX/IECEx, IIC gas group
- T4 @ -20 °C to +55 °C ambient
- 160 A main MCCB, 4-pole
- 12 feeders of 20 amp 2-pole MCB/RCD
  5ea. 150 mm² incoming terminals
- 36ea. 10 mm² outgoing terminals

Eaton Advantage:

Save horizontal space
Save weight
Save on panel board price

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Panel samples with MCCB

GRP Solution GHG62

Stainless Steel Solution GHG62

Synergex Solution GHG623


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