ON
0
OFF
MENNEKES®
Typ:7417
63A-6h
3P+N+
II 3 D T60°C IP67
Mit Verriegelung
with interlock
avec verrouillage

CEE plugs and sockets for hazardous areas, Ex zone 22

Terminology of explosion protection, provisions, guidelines, standards
Page 274 to 281

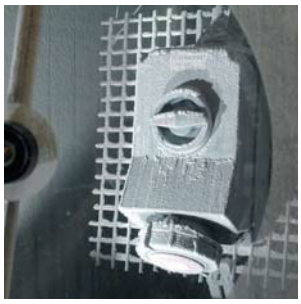
Receptacles, switched, interlocked, DUO, 16A up to 63A, IP 67, for zone 22
Page 272 and 273

Plugs, 16A up to 63A, IP 67, for zone 22
Page 272 and 273

Plugs and sockets for hazardous areas, zone 22

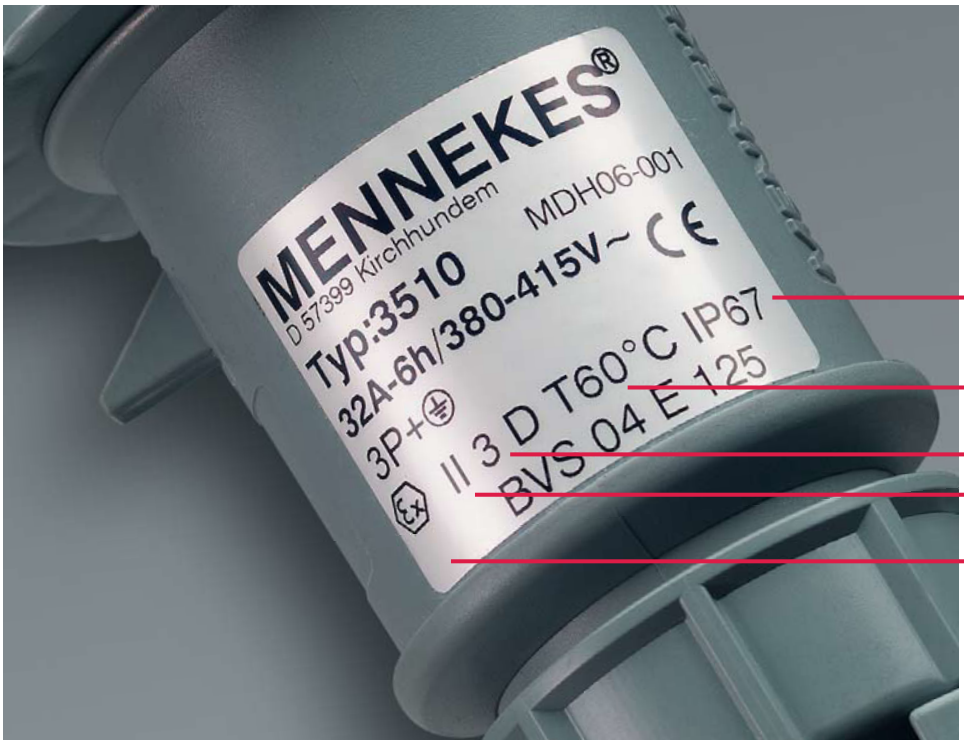
Well protected against dust.

Rugged enclosures with good chemical resistance and a high degree of IP protection – these features make MENNEKES plugs and sockets the products of choice for industrial use in zone 22 hazardous areas.



The MENNEKES range of plugs and sockets: wall mounted receptacles with mechanical DUO interlock and matching plugs with the appropriate number of poles and rated current to IP 67. Wall mounted receptacles only accommodate plugs with the same rated voltage, rated current and number of poles.

The dust proof test in accordance with EN 60529 demonstrates that MENNEKES zone 22 plugs and sockets stay clean – at least on the inside and this is what counts.



All the information you require at a glance.

IP 67 protection

T60°C maximum outside temperature of enclosure in service

3 D protection against dust explosions, zone 22

II not for underground use

Approval no. of test authority

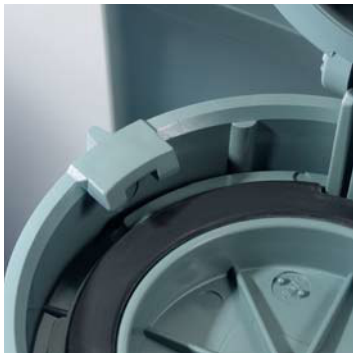
Meeting all requirements.

MENNEKES plugs and sockets 16A, 32A, and 63A with 3-, 4- or 5-poles and various voltages.

Load-break switch, designed for maximum power as per AC 3 and AC 23.

Ergonomic ribs and wings for optimum handling.

High degree of safety in every detail. The enclosure can only be opened using specially approved tools.

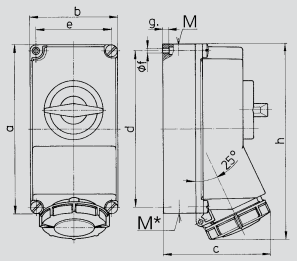


Uniform contact pressure across the sealed area.

MENNEKES switched and interlocked CEE receptacles and plugs

for use in hazardous areas where combustible dust is present to meet zone 22 requirements.

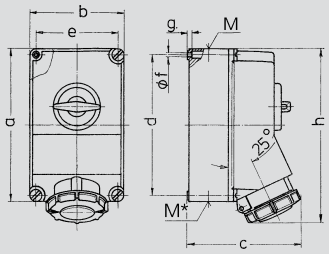
Other voltages and frequencies are available on request.
For detailed information, please see page 270/271 and 274 to 281.



Drawing	Amp.	16			32		
1 MB 207	Poles	3	4	5	3	4	5
Dim. in mm	a	225	225	225	225	225	225
	b	118	118	118	118	118	118
	c	144	146	147	152	152	153
	d	208	208	208	208	208	208
	e	101	101	101	101	101	101
	f	6,3	6,3	6,3	6,3	6,3	6,3
	g.	8	8	8	8	8	8
	h	252	255	259	268	268	274
	M	1xM25 and 1xM32			1xM25 and 1xM32		
	M*	2x25	2x25	2x25	2x25	2x25	2x25
Max. cable diam. (mm)		25	25	25	25	25	25
Terminal for cond. cross section (mm²) min.-max.		1,5 —4	1,5 —4	1,5 —4	2,5 —10	2,5 —10	2,5 —10

Receptacles for zone 22
switched,
with mechanical **DUO** interlock,
explosion-proof cable entry and
explosion-proof sealing plug,
padlockable

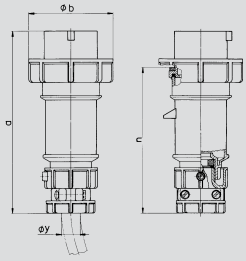
IP 67
Product group 1011, type 7413 shown.



Drawing	Amp.	63		
1 MB 180	Poles	3	4	5
Dim. in mm	a	264	264	264
	b	163	163	163
	c	196	196	196
	d	240	240	240
	e	140	140	140
	f	8,1	8,1	8,1
	g.	8	8	8
	h	300	300	300
	M	40	40	40
	M*	40	40	40
Max. cable diam. (mm)		32	32	32
Terminal for cond. cross section (mm²) min.-max.		6 —25	6 —25	6 —25

Receptacles for zone 22
switched,
with mechanical **DUO** interlock,
explosion-proof cable entry and
explosion-proof sealing plug,
padlockable

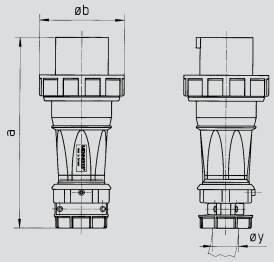
IP 67
Product group 1011, type 7417 shown.



Drawing	Amp.	16			32		
2 MB 171	Poles	3	4	5	3	4	5
Dim. in mm	a	162	172	186	199	199	213
	b	71	79	89	95	95	102
	n	129	139	152	157	157	172
	y	19	19	22	24,5	24,5	28,5
Terminal for cond. cross section (mm²) min.-max.		1 —2,5	1 —2,5	1 —2,5	2,5 —6	2,5 —6	2,5 —6

Plugs for zone 22
with cable gland and external
cable grip

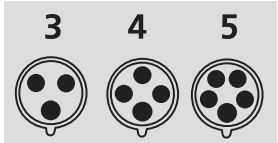
IP 67
Product group 2011, type 3511 shown.



Drawing	Amp.	63			125		
2 MB 207/2	Poles	3	4	5	3	4	5
Dim. in mm	a	246	246	246	293	293	293
	b	114	114	114	131	131	131
	y	36	36	36	50	50	50
Terminal for cond. cross section (mm²) min.-max.		6 —16	6 —16	6 —16	25 —50	25 —50	25 —50

Plugs for zone 22
with cable gland and external
cable grip

IP 67
Product group 2011, type 3514 shown.



Amp.	Poles	230V 50 a. 60 Hz 3-pole 6h	230V 50 a. 60 Hz 4-pole 9h	230V 50 a. 60 Hz 5-pole 9h	400V 50 a. 60 Hz 3-pole 9h	400V 50 a. 60 Hz 4-pole 6h	400V 50 a. 60 Hz 5-pole 6h	Std. Pack. Qty.	Weight g/each
		Part numbers							
16	3		**7409**					1	1060
16	4					**7410**		1	1100
16	5					**7411**		1	1150
32	3		**7412**					1	1165
32	4					**7413**		1	1180
32	5					**7414**		1	1230
63	3		**7415**					1	2500
63	4					**7416**		1	2530
63	5					**7417**		1	2660
16	3		**3500**					1	205
16	4					**3501**		1	260
16	5					**3502**		1	295
32	3		**3503**					1	320
32	4					**3510**		1	345
32	5					**3511**		1	410
63	3		**3512**					1	592
63	4					**3513**		1	707
63	5					**3514**		1	770

EXAM
BBG Prüf- und Zertifizier GmbH
Geprüfter Explosionsschutz

Our plugs and sockets are tested and approved by the accredited testing authority. Approval no. BVS 04 E 125

Plugs and sockets for hazardous areas where combustible dust is present according to zone 22

Terms of dust explosion protection, decrees, directives, standards

Terms

Excerpt from EN 61241-10:2004 (IEC 61241-10:2004)
"Electrical apparatus for use in the presence of combustible dust – Part 10: Classification of areas where combustible dusts are or may be present" and
Excerpt from EN 50281-1-1:1999
"Electrical apparatus for use in the presence of combustible dust – Part 1-1: Electrical apparatus protected by enclosures – Construction and testing".

Area
Three-dimensional region or space.

Atmospheric conditions
(Surrounding conditions)
Conditions that include variations in pressure and temperature above and below reference levels of 101.3 kPa (1 013 mbar) and 20°C (293 K), provided that the variations have a negligible effect on the explosive properties of the combustible dust.

Dust
Small solid particles including fibres and flyings in the atmosphere which settle out under their own weight, but which may remain suspended in air for some time (includes dust and grit as defined in ISO 4225).

Combustible dust
Dust, fibres or flyings that can burn or glow in air and could form explosive mixtures with air at atmospheric pressure and normal temperatures.

Conductive dust
Dust with electrical resistivity equal to or less than 10^3 Ω x m.

Explosive dust atmosphere
Mixture with air, under atmospheric conditions, of flammable substances in the form of dust, fibres or flyings in which, after ignition, combustion spreads throughout the unconsumed mixture.

Hazardous area (dust)
Area in which combustible dust in cloud form is, or can be expected to be, present in quantities such as to require special precautions for the construction and use of equipment in order to prevent ignition of an explosive dust/air mixture.

NOTE: Hazardous areas are divided into zones based upon the frequency and duration of the occurrence of explosive dust/air mixtures.

Ignition temperature of a dust layer
Lowest temperature of a hot surface at which ignition occurs in a dust layer of specified thickness on this hot surface (see EN 50281-2-1).

Ignition temperature (of a dust cloud)
Lowest temperature of the hot inner wall of a furnace at which ignition occurs in a dust cloud in air contained therein (see EN 50281-2-1).

Dust ignition protection
All relevant measures specified in this standard (e.g. dust ingress protection and surface temperature limitation) applied to electrical apparatus to avoid ignition of a dust layer or cloud.

Dust-tight enclosure
Enclosure capable of preventing the ingress of all observable dust particles.

Dust-protected enclosure
Enclosure in which the ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with the safe operation of the equipment; dust shall not accumulate in a position within the enclosure where it is liable to cause an ignition hazard.

Maximum surface temperature
Highest temperature which is attained by any part of the surface of electrical apparatus when tested under the defined dust free conditions.

NOTE: This temperature is attained under the test condition. Increasing the layer thickness can increase this temperature due to the thermal insulation properties of dust.

Maximum permissible surface temperature
Highest temperature a surface of electrical apparatus is allowed to reach in practical service to avoid ignition; the maximum permissible surface temperature will depend upon the type of dust; its layer thickness, and the application of a safety factor.

NOTE: For details see EN 50281-1-2, clause 6.

Equipment group II
This classification applies to equipment for use in all areas (except for underground work in mines and mine equipment above ground which may be subject to a risk from mine gas), which may be exposed to an explosive atmosphere. Equipment group II is classified into three categories, depending on the occurrence of an explosive atmosphere in the application area.

Equipment group II category 1
Equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and ensuring a very high level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by air/dust mixtures are present continuously, for long periods or frequently.

Equipment in this category must ensure the requisite level of protection, even in the event of rare incidents relating to equipment, and is characterized by means of protection such that:
- in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection; or
- the requisite level of protection is assured in the event of two faults occurring independently of each other.

Equipment group II category 2
Equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and of ensuring a high level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by air/dust mixtures are likely to occur.

The means of protection relating to equipment in this category ensure the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account.

Equipment group II category 3
Equipment designed to be capable of functioning in conformity with the operating parameters established by the manufacturer and ensuring a normal level of protection.

Equipment in this category is intended for use in areas in which explosive atmospheres caused by air/dust mixtures are unlikely to occur or, if they do occur, are likely to do so only infrequently and for short periods only.

Equipment in this category ensures the requisite level of protection during normal operation.

Equipment
Machines, apparatuses, stationary or mobile appliances, control or equipment components as well as warning and preventive systems which alone or in combination with each other are intended to produce, transfer, store, measure, control and convert power and/or to process materials which have some potential for ignition and may therefore cause explosion.

Normal operation
Situation when the process equipment is operating within its design parameters.

NOTE: Minor releases of dust which may form a cloud or layer (e.g. releases from filters) can be part of normal operation.

Zones exposed to explosive dust/air mixtures
Areas exposed to an explosive dust atmosphere are classified into zones on the basis of the frequency and duration of the occurrence of explosive dust/air mixtures. Layers, deposits and accumulations of combustible dust, which are to be considered in the same way as any other cause leading to the formation of an explosive atmosphere.

Zone 20
A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is present continuously, or for long periods or frequently for short periods.

Zone 21
A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is likely to occur occasionally in normal operation.

Zone 22
A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air, is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Examples of zones for explosive dust atmospheres

Zone 20
- Locations inside the dust containment;
- hoppers, silos, etc, cyclones and filters;
- dust transport systems, except some parts of belt and chain conveyors, etc;
- blenders, mills, dryers, bagging equipment, etc.

Zone 21
- Areas outside dust containment and in the immediate vicinity of access doors subject to frequent removal or opening for operation purposes when internal explosive dust/air mixtures are present.
- Areas outside dust containment in the proximity of filling and emptying points, feed belts, sampling points, truck dump stations, belt dump over points, etc. where no measures are employed to prevent the formation of explosive dust/air mixtures.
- Areas outside dust containment where dust accumulates and where, due to process operations, the dust layer is likely to be disturbed and form explosive dust/air mixtures.
- Areas inside dust containment where explosive dust clouds are likely to occur (but neither continuously, nor for long periods, nor frequently), e.g. silos (if filled and/or emptied only occasionally) and the dirty side of filters, if large self-cleaning intervals exist.

Zone 22

- Outlets from bag filter vents which, in the event of a malfunction, can emit explosive dust/air mixtures.
- Locations near equipment opened at infrequent intervals or equipment that, from experience, can easily form leaks where, due to above atmospheric pressure, dust is blown out; pneumatic equipment, flexible connections that can become damaged, etc.
- Storage of bags containing dusty products. Failure of bags can occur during handling, causing dust emission.
- Areas that are normally classified as zone 21 can fall into zone 22 when measures are employed to prevent the formation of explosive dust/air mixtures. Such measures include exhaust ventilation. The measures taken should be carried out in the vicinity of (bag) filling and emptying points, feed belts, sampling points, truck dump stations, belt dump over points, etc.
- Areas where controllable dust layers are formed that are likely to be disturbed and create explosive dust/air mixtures. Only if the layer is removed by cleaning before hazardous dust/air mixtures can be formed, is the area designated non-hazardous.

Containers enclosing dust

They are used as parts of equipment in processes where substances are handled, processed, conveyed, or stored which, among other measures, prevent the release of dust into the ambient atmosphere.

Source of dust release

This is a point or a place from where combustible dust may be released into the atmosphere. The dust may escape from a dust enclosing container or may result from dust deposits.

Release sources

They are classified in the order of decreasing hazard as follows:

- Permanent formation of dust clouds: Places where a dust cloud constantly occurs or can be expected over a long period of time or occurs frequently for short periods of time;
- Primary degree of release: A source from which an occasional release of combustible dust can be expected under normal operating conditions;
- Secondary degree of release: A source from which no release of combustible dust can be expected under normal operating conditions. If dust is released, it will only be on rare occasions and for short periods of time.

Extent of zones of explosive dust/air mixtures

The extent of a zone of explosive dust/air mixtures is defined as the distance from the edge of the dust source up to the point (in any direction) where the risk arising from such zone is considered to be non existent. It must be remembered that fine dust can be carried upwards, away from the source, due to the movement of air in a building.

Definition of zones

The definition of the explosive area (zone) must be made on the basis of the operational requirements. The following shall be considered: places of release, possible movement of air in the equipment, constructional design, weather effects such as wind and rain for outdoor equipment, type and quantity of dust, grain size, humidity, product throughput, dust deposits, risk of dust dispersion. When defining the zones, the EU directive 1999/92 EC, the decree on operational safety and the explosion protection regulations must be observed.

Combustion and explosion parameters of dust
Ignition temperature, glow ignition temperature and conductibility of dust can be found in the special brochure entitled BIA report (Institut für Arbeitssicherheit – BIA – St. Augustin.)

Installation of electrical equipment in areas exposed to dust explosion from July 01, 2003

Areas exposed to dust explosion classified as zones 20, 21 and 22 may occur e.g. in

- Various industries
- Chemical, plastic producing and processing, metal processing, pharmaceutical industries, feed industry, rubber, wood, lacquer, leather, food and textile industries.
- Factories, warehouses, potato and other agricultural processing, milk powder producing works, mills and peat processing works, factories for the processing of magnesium; warehouses in agricultural collectives, in docks and in logistics plants associated with the storage of unpacked, combustible plastics and food and the related raw materials.
- Equipment
  Coal processing and coal dust equipment.

Please note:
- EU directive 1999/92 EC
- Ordinance on Operational Safety (Betriebssicherheitsverordnung – BetrSichV) dated September 27, 2002
- Explosion Protection Regulations – EX-RL (BGR 104)
- EN 50281-3:2002 (VDE 0165 part 102:2003-05) "Electrical equipment for use in the presence of combustible dust. Classification of areas where combustible dusts are or may be present".

- EN 50281-1-2:1998 (VDE 0165 part 2:1999-11) "Electrical equipment for use in the presence of combustible dust. Selection, installation and maintenance".

The electrical equipment, protective systems and components used must be in line with the EU directive 94/9 CE (ATEX) and must be designed according to the applicable EN standards. Compliance with the EU directive and standards is demonstrated by a type approval issued by a nominated control body (e.g. PTB, EXAM) and certified by a declaration of conformity issued by the manufacturer.

The surface temperature of the equipment must not be so high that dispersed dust or dust deposited on the equipment may ignite.

For this to apply, the following conditions must be complied with:

a) The surface temperature must not exceed 2/3 of the ignition temperature in °C of the particular dust/air mixture.
b) On surfaces where a hazardous deposit of dust capable of glow ignition cannot be effectively prevented, a temperature of 75K below the glow ignition temperature of the dust must not be exceeded. In the case of a layer thickness greater than 5 mm, a further reduction of the surface temperature is necessary. In the case of dust deposits with a layer thickness greater than 5 mm, the temperature of the surface of the enclosure must be further reduced if necessary.
c) The lower of the values determined according to a) and b) above shall be applicable.

No connectors or adapters may be used.

Selection of plugs and sockets for zone 22 areas where combustible dusts are or may be present

Only plugs and sockets may be used which are in line with EU directive 94/9 EC (ATEX) and are designed according to standard EN 50281-1-1:1999. Only plugs and sockets should be used which have been type tested by a nominated control body. Plugs and sockets must be approved for group IID, at least category 3. In order to prevent dust ingress, the maximum IP protection according to EN 60529, e.g. IP 67 should be used.

The MENNEKES Ex-plugs and sockets for use in zone 22 where there is a risk of dust explosion shown on the following pages comply with these requirements.

Obligation to retrofit existing equipment by January 01, 2006.

The decree on operational safety, which converts the EU directive 1999/92 EC into German law, provides that all equipment must be adapted to the required state of the art by January 01, 2006.
In the past, equipment of good industrial quality was used in the former zone 11, which has been replaced by zones 21 and 22, which was not approved by a control body and only complied with the requirements of the former VDE standard 0165:1991-02. Such equipment must be replaced by new equipment according to the EU directive 94/9 EC (ATEX), if a risk assessment by the operator and by the inspection authority so requires.

MENNEKES Ex-plugs and sockets for zone 22

As a result of their high IP protection and their robust enclosure with good chemical resistance, the MENNEKES EX-plugs and sockets are well suited for the power supplies for mobile, explosion-proof electrical equipment, for a use in industry in zone 22 areas where an explosive atmosphere in the form of a cloud of combustible dust may arise, in moist rooms and outdoors at ambient temperatures from -20°C to +40°C.

The surface temperature of the enclosure does not exceed +60°C, so that there is a sufficient safety margin between the ignition and the glow ignition temperatures of many types of dust. Dust ingress is effectively prevented by the IP 67 dust- and waterproof enclosure according to EN 60529.

The plugs and sockets are based on the standardised system for industrial plugs and sockets to EN 60309-1:1999 and 60309-2:1999. Furthermore, the plugs and sockets are in line with EN 50281-1-1:1998 "Protection provided by enclosure".
The system of plugs and sockets is made up of a wall mounted receptacle with mechanical interlocking (DUO interlock) and the matching plug with the appropriate number of poles and rated current, protection IP 67. Only wall mounted receptacles and plugs with the same rated voltage, the same rated current and the same number of poles may be plugged together. All plugs and sockets have a protective (PE) conductor. The wall mounted receptacle is provided with a disconnecting switch with a breaking capacity of AC 3 and AC 23 (see technical data). Therefore, overloads can be switched off by the wall mounted receptacle without risk.
The switch is suitable as a main switch and is in line with IEC 60947-3, EN 60947-3 and the VDE provision 660 part 107: Forced activation of contacts during switching off and on. The on and off positions of the switch are marked on the outside of the enclosure of the wall mounted receptacle. The connecting terminals of the switches are finger proof according to VDE 0106 part 100 and are protected to IP 20. All external conductors and the neutral conductor are switched. The receptacle insert with contact bushings is ready wired with the switch using single wires. The protective conductor is connected to a separate PE terminal on the switch. The interlocking mechanism is installed in the upper part of the enclosure of the wall mounted receptacle, so as to prevent the receptacle being switched on without the plug being connected and the plug being unplugged when under load. The plug can only be plugged in or unplugged when the receptacle is switched off. The receptacle can be locked using a padlock when in the off position. The plug is made up of the front portion with the contact carrier, the nickel plated contact pins and the cover with cable entry.

Conformity with standards
The plugs and sockets are in conformity with the **EU directive 94/9 EC "Equipment and Protective Systems I Intended for the Use in Potentially Explosive Atmospheres"** and the **EU directive 89/336 EC "Electromagnetic Compatibility".**
The plugs and sockets and installed components are in line with the following standards, if applicable:
EN 50281-1-1; DIN EN 50281-1-1:1999-10 (VDE 0170/0171 part 15-1-1)
EN 60309-1; DIN EN 60309-1:2000-05 (VDE 0623 part 1)
EN 60309-2; DIN EN 60309-2:2000-05 (VDE 0623 part 20)
EN 60947-3; DIN EN 60947-3:2001-12 (VDE 660 part 107)

Type testing
The plugs and sockets are type tested according to EN 50281-1, e.g. by a nominated control body, in accordance with the EU directive 94/9 EC.

Type test certificate no.
04 BVS 04 E 125
Identification according to EU directive 94/9 EC:
Ex II 3 D T 60 °C CE

Protection type
The ignition protection of the plugs and sockets according to EN 50281-1-1:1998 is "Protection provided by enclosure". With the existing seals and the design of the enclosure, IP 67 to EN 60529 is achieved when the hinged cover is closed and the plug is locked using the bayonet ring.

Technical data - Plugs and sockets 16A, 32A and 63A

Wall-mounted receptacles						
Rated current		I_n	A	16	32	63
Rated operating voltage,	3 poles	U_n	V	200 – 250		
	4, 5 poles			380 – 415		
Rated frequency		f	Hz	50 – 60		
Position of retaining nose (hour position)			h	6		
Ambient temperature		T_u	°C	-20 to +40		
Storage temperature		T	°C	-40 to +80		
IP protection with closed and secured hinged cover or plugged-in plug				IP 67		
Cable entry in the enclosure Number and connecting threads EN 60423		A_1	mm	1 x M32 x 1.5 3 x M25 x 1.5		2 x M40
Cable entry, included in the supply			St.	1 x M25	1 x M32	1 x M40
Cable cross section for M40 x 1.5			mm	22 to 32		
Cable cross section for M32 x 1.5			mm	18 to 25		
Cable cross section for M25 x 1.5			mm	13 to 18		
Explosion-proof sealing plug, included in the supply			St.	1 x M32 2 x M25	3 x M25	1 x M40
Cross section for connection, min. – max. of the terminals on the switch						
one or more wires			mm^2	1.5 – 6	2.5 – 16	6 – 70
stranded wire without ferrule			mm^2	1.5 – 4	2.5 – 10	6 – 50
stranded wire with ferrule DIN 46228			mm^2	1.5 – 4	2.5 – 10	6 – 50
Technical data of the installed switch						
Rated permanent current, encapsulated		I_{the}	A	32	63	80
Rated breaking capacity						
AC-3	3 poles	220V – 240V	kW	3	7.5	15
	3 a. 4 poles	380V – 440V	kW	7.5	18.5	37
AC-23 A(B)	2 poles, 1 phase	230V	kW	4	7.5	15
	3 a. 4 poles, 3 phase	380V – 440V	kW	11	22	45

Plug						
Rated current		I_n	A	16	32	63
Cable entry						
Cable diameter, min. – max.	3 a. 4 poles,	D	mm	9 – 19	11–24.5	12 –36
	5 poles			11.4 – 22	11–28.5	12 –36
Cross section for connection, min. – max.						
stranded wire without ferrule			mm^2	1 – 2.5	2.5 – 6	6 – 16
stranded wire with ferrule DIN 46228			mm^2	1 – 2.5	2.5 – 6	6 – 16