EMC

Directives and standards

The concept of **Electromagnetic Compatibility** (EMC) is the reversal in the positive sense of what was until recently known as **Electromagnetic Interference** (EMI): **we have electromagnetic compatibility** between a device and the environment (including surrounding equipment) when there is no reciprocal electromagnetic interference or when this is within tolerable limits.

In other words, **to obtain electromagnetic compatibility,** measures must be adopted aimed at bringing the electrical or electronic equipment to levels of **emission** and electromagnetic **immunity** against electromagnetic interference such that it continues to function properly without causing disturbance to other equipment present in the surrounding environment.

In the electrical equipment of industrial machines, rectangular multipole connectors with their metallic enclosures are widely used due to their high standards of safety, reliability, mechanical robustness and resistance to corrosion and pollution.

These connectors are passive electromechanical components: they do not generate electromagnetic interference and are not disturbed in their function. Taken by themselves, therefore, they fall outside the scope of Directive 2014/30/EU on electromagnetic compatibility and the CE marking is therefore not required for EMC aspects: it still applies, however, under the Low Voltage Directive 2014/35/EU.

It is rather the devices and industrial equipment mentioned above, in which the connectors are for the most part used (e.g. on-board electric panels) which, taken as a whole, must be CE marked also for EMC aspects, having to meet the essential requirements of the EMC Directive.

For the EMC in **industrial environments** two European standards are in force, not intended for specific equipment, which regulate the **emissions** and **immunity** of devices.

These are therefore generic standards, one for **emissions EN 61000-6-4**:2007 + A1:2011 (class. CEI 210-66:2007 + 210-66;V1:2011, equivalent to IEC 61000-4:2006 + A1:2010) and one for **immunity EN 61000-6-2**:2005 (class. CEI 210-54:2006, equivalent to IEC 61000-6-2:2005) [1].

These apply in the absence of provisions in the particular EMC product standards or in the total absence of the latter.

For industrial equipment, when appliances are not intentionally designed to generate radio frequencies[2], the latter case applies (no particular standards). In the European standards for switchgear and controlgear (EN 60947-1) and in those for the electrical equipment of machines EN 60204-1 emission and immunity limits have been for some time in the process of being issued, as well as their verification, if necessary, with reference to above mentioned EMC standards for industrial environment.

EMC testing should not be performed on individual components, but rather on the entire apparatus, sometimes not without inconsiderable logistical difficulties, due to their size, reproducing as far as possible their operation in real operating conditions.

It is therefore incorrect to assign limits of electromagnetic emission and immunity imposed on the equipment on, for example, electrical connectors used as components of the equipment.

*[1] There are two similar standards for the other standardized environment, defined as **residential**, **commercial and light industrial environment**, respectively EN 61000-6-3:2007 + A1:2011 (class. CEI 210-65:2007 + CEI 2010-61;V1:2011) for emissions (equivalent to IEC 61000-6-3:2006 + A1:2010) and **EN 61000-6-1**:2007 (class. CEI 210-64:2007) for immunity (equivalent to IEC 61000-6-1:2006).*

*[2] In which case for such devices, called ISM (industrial, scientific, medical) the – **EN 55011**:2007 standard for emission of radio interference would apply.*

Electromagnetic interference and ILME connectors

Many years ago the entry into force of the first EMC European Directive, with requirement for electrical and electronic equipment to comply with the levels of electromagnetic pollution dictated by the standards, brought renewed interest in all the appropriate steps to mitigate the effects of electromagnetic interference.

Electromagnetic interference can occur in two forms: **conducted or radiated**. With reference to connectors, **conducted interference** transmitted on conductors wired to the connectors, is, for example: harmonics, superimposed on the voltage of the power supply at 50 Hz, caused by withdrawal of biased current or by electromechanical or electronic switches, or radio frequency interference noise which is inductively or capacitively coupled with the cable, overlapping transported signals.

This is characterized by frequency and amplitude (intensity) and can be filtered to some extent, in both in the outgoing (emission) and incoming (immunity) directions, only via in-line passive electrical filters, which the designer of the electrical equipment must foresee since he is the only one with a knowledge of all the terms of the problem [3)].

Radiated interference, transmitted in the form of electromagnetic waves, is characterized by the values of amplitude of associated electric (V/m) and magnetic fields and with the frequency or frequency band (rarely is this located on a single frequency, more often it occupies a band). This may come from inside the device: in this case it is necessary to mitigate emissions. Or from the outside, in which case it is necessary to raise immunity.

By test convention, **interference with frequency up to 30 MHz** is considered to be conducted and **irradiated with frequency above 30 MHz up to 1 GHz.**

The sources of electromagnetic interference are classified as **intentional** and **unintentional**.

The first (e.g. radio-telecommunication antennas, mobile phones) use high frequency electromagnetic fields for functional reasons. For the second (e.g. ignition of internal combustion engines, electric arc furnaces) they are a by-product.

In most industrial applications, compared to the overall EMC issues of a device, connectors (inserts + enclosures), taken by themselves, are not the priority concern of the designer.

The enclosures of the low-frequency industrial connectors, taking shape as a barrier to a “shell”, are implicitly a “peripheral” aspect: the designer of electrical equipment / electronics will take care first of all the “core” of the EMC problem, that of the active components inside of their systems, by limiting the emissions and enhance immunity.

In fact, to have significant problems due to radiation through the opening constituted by a connector enclosure on a control panel, there must be a particularly “efficient” radiofrequency source inside the panel.

Essentially, significant design errors must have been committed regarding the EMC of the entire equipment.

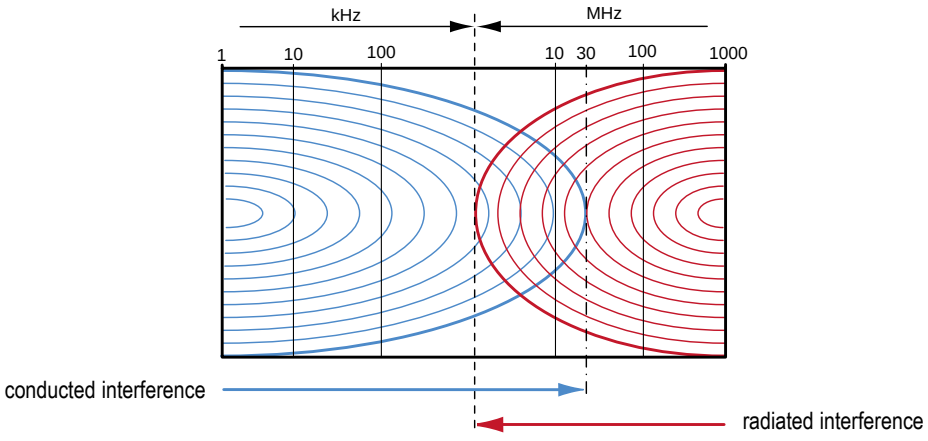
In certain cases the coupling of connectors may constitute the weak link in the chain, for example where it is not possible for functional reasons to further reduce interference of the electronics inside the control panel. In these cases one must rely on the efficiency of the shield. Even if the equipment manufacturer uses shielded fabrication and high quality shielded cables, continuity and homogeneity of such shielding could be significantly degraded precisely in the passage between free connector and panel.

In dealing with electromagnetic compatibility of electrical equipment of an industrial machine, a second aspect to be addressed as a priority is the presence of large quantities of interface cabling.

In these cases, the significant attenuation of the shield necessary for the cables must not be jeopardised by the connector enclosures due to imperfect earthing of the cable shield.

It should nevertheless be pointed out that increasing shielding may not be sufficient to solve possible problems and should be considered as a complementary choice.

[3)] *For example, for trapezoidal D-Sub type connectors for digital data transmission, there are connectors on the market which incorporate “general purpose” filters for any conducted interference.*



Electromagnetic shielding of connectors: fundamental principles

To consider the electromagnetic compatibility aspects of an electrical/electronic device in the final verification rather than in the design phase almost always leads to a substantial increase in overall development time and costs.

The designer who deals with electromagnetic compatibility issues should use the same rules and the same precautions regardless of whether the equipment is subsequently shielded.

Numerous products meet electromagnetic compatibility standards without the use of shielding. However, when all other limiting interventions are impossible or uneconomical, recourse to increased efficiency of the electromagnetic shield is the only answer.

An **electromagnetic shield** is a barrier to the transmission of electromagnetic fields.

To generalise the concept to include conducted emissions, a filter can be considered as a shield. We will restrict ourselves here to considering a shield as a barrier to radiated emissions.

The metallic containers which completely enclose an electrical/electronic device or a part thereof **constitute an electromagnetic shield**, with the task of preventing the emissions of electrical/electronic devices or a part thereof to radiate outside the equipment container itself.

A cable connected to a device is part of the same for the purposes of electromagnetic compatibility.

A flexible multicore cable is shielded by surrounding the insulated conductors with a conductive metal mesh.

An electromagnetic shield is characterized by a parameter which measures its efficiency.

The shielding attenuation is the ratio between the radiated power generated inside a device and the residual radiated power outside the unit. The attenuation introduced by a shield can be measured by comparing the absence and presence of the shield.

Shielding attenuation is measured in dB (decibel). 20 dB is equivalent to an order of magnitude, i.e. attenuation of a factor of 10, 40 dB = attenuation of a factor of 100, etc.

To obtain large shielding attenuation values (e.g. 100 dB) the shield must completely enclose the electronic device and not have any means of access from the outside, such as openings, joints, cracks or cables. Any means of access through a shield, if not properly treated, can drastically reduce the efficiency of the shield.

The passage of a cable through a shield must be properly considered. One common method is to place filters on the cable at which it crosses the shield. Another is to use shielded cables, with their shields connected for the entire perimeter to the equipment shield.

To reduce radiated emissions of a cable, the cable shield must be connected to a point with zero potential (an ideal ground therefore, not the “signal” ground of an electronic circuit).

To achieve electromagnetic shielding conductive materials (metals) are used.

Shielding attenuation depends mainly on the electrical conductivity of the material and the thickness of the shield.

Rectangular or square connectors – special case – intrinsically *anisotropic*, are more difficult to shield and less predictable in behaviour than circular connectors (isotropic geometry) used, not by accident, with coaxial terminations for RF applications.

Connector enclosures are typically made of aluminium die cast alloy, an excellent metal for shielding electric fields because it is an excellent conductor. It is also better than steel in shielding phenomena of an impulsive nature (typical example is electrostatic discharge) which cause interference in the high frequency spectrum and is among the most insidious and dangerous.

It is important to ensure electrical continuity along the boundary of the enclosure, not only to ensure high shielding attenuation but also to avoid accumulation of static electricity.

It is important not to “economically” tip the balance of a screening system which is only as effective as its weakest component.

A good shielded cable has a shield attenuation greater than that attributable to the connector, but only for very small lengths of cable (e.g. one metre). When the length of the shielded cable increases, shield attenuation is significantly reduced.

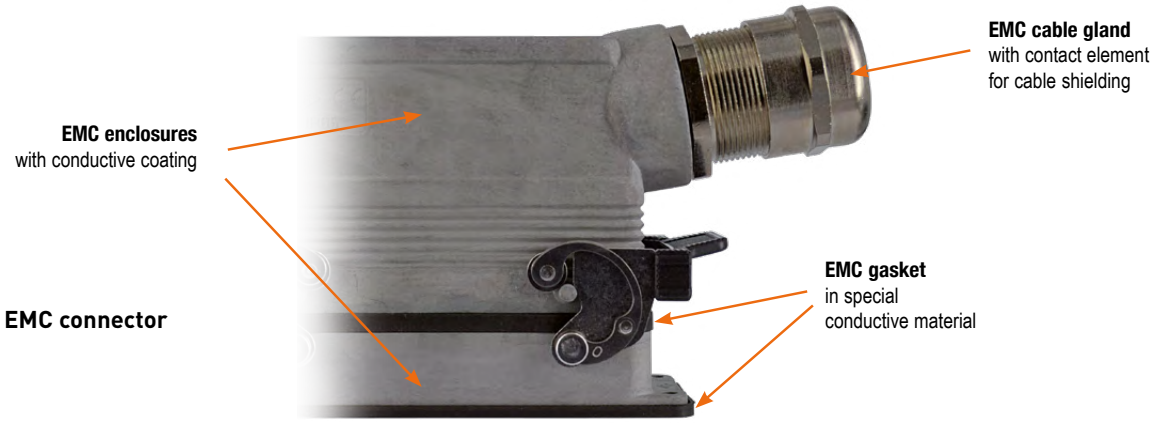
This indicates that it is much more important to improve the shield quality of cables, which are mainly responsible for radiated interference emissions and in an electrical system are often present in considerable quantity, before that of the connector.

What dramatically increases the efficiency of shielding is the quality of its connection to the conductor: EMC cable glands create a very homogeneous and continuous contact between the cable shield and connector enclosure.

EMC connector enclosures and accessories

In light of the foregoing, ILME has developed for the designers of the electrical/electronic equipment of machines the EMC series of connector enclosures and accessories.
Available as bulkhead mounting housings and hood versions in the various sizes 44.27, 57.27, 77.27 and 104.27, they maintain the robustness and reliability of standard types whilst possessing increased high frequency shielding characteristics.
In the development of EMC enclosures recourse to geometrical modifications compared to the standard versions has been avoided so as not to affect their dimensional compatibility with the latter: in using EMC enclosures the equipment designer need not foresee any changes in layout due to increased dimensions and need not renounce the convenience of the traditional locking lever closures.

The increase in shielding attenuation is achieved primarily by providing a homogeneous and as uniform as possible electrical continuity of earthing to the cable shield in the connection between cable and hood and between hood and housing.
At the contact between the bulkhead-mounting housings and the fixing surface a special conductive gasket is foreseen.



The enclosure surfaces are treated to make them extremely conductive while maintaining the necessary corrosion resistance.

The bulkhead mounting housing has a special conductive gasket.

For best results the surface underneath the gasket should be conductive. Since the use of this enclosure system presupposes the use of shielded cables, the hood should comprise a special cable gland with anchoring device for the cable shield.

These metal cable glands ensure IP66 protection rating, are resistant to corrosion and equipped internally with a contact element with geometry that ensures uniform earthing of the cable conductor shield on the metal shell of the hood.

Even with standard enclosures (not EMC), the contact with an EMC cable gland between the cable shield and the connector housing, permanently earthed through to the connector insert inside, produces an attenuation of electromagnetic interference on average higher (by approx. 6 – 15 dB up to 600 MHz, corresponding to a factor of 2 – 5,6) than the attenuation achieved by connecting the shield mesh directly to the earth terminal of the connector insert.

The reasons for this are:

- the uniform 360° contact via the contact device of the EMC cable gland avoids what instead happens when the shield mesh is earthed to the earth terminal of the connector, i.e. the discontinuity of the shield which necessarily opens precisely around the connector;
- more efficient distribution of induced current circulating on the shield mesh;
- directly involving the metal shell constituted by the enclosure avoids transmitting interference to the connector, as happens when the shield is connected to the earth terminal of the connector.

Experimental tests

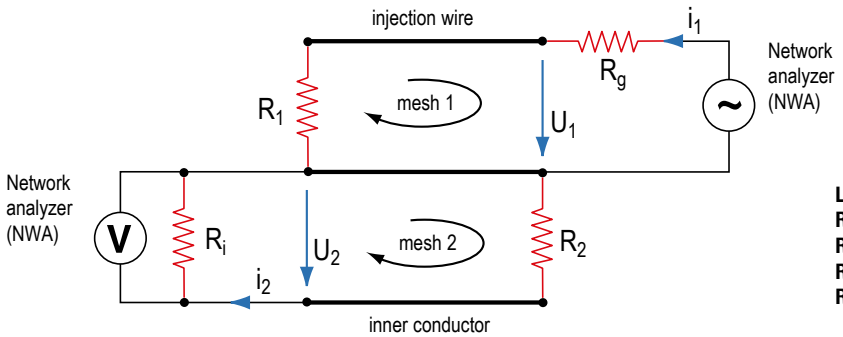
Tests for measurement of the shielding of ILME special EMC enclosures for multipole rectangular connectors for industrial use were conducted at the CESI EMC Laboratory in Milan, national notified body for certification under the EMC Directive. Shielding attenuation of a component is defined as the ratio of the power radiated within the component and the maximum interference power outside the component in the room (**VG 95214-11**).

For a connector it can be expressed, in analogy with cables, as a function of transfer impedance, which is the ratio between the voltage induced in the shield and the current flowing outside the same. The transfer impedance measurement is a widely used and accepted method to determine shielding attenuation of coaxial cables and connectors.

Only recently, due to the increase in digital data transmission speeds and the increase in frequencies of transmitted signals, the issue of identifying efficient and repeatable methods for measuring shielding efficiency, also for connectors traditionally considered low frequency, has been addressed at a regulatory level.

An experimental method for determining surface transfer impedance of coupled low frequency connectors is still being studied by IEC.

The method chosen by ILME for verification of its system of EMC enclosures and accessories is the **line injection method** based on German military standards **VG 95214-10** and **VG 95214-11.**



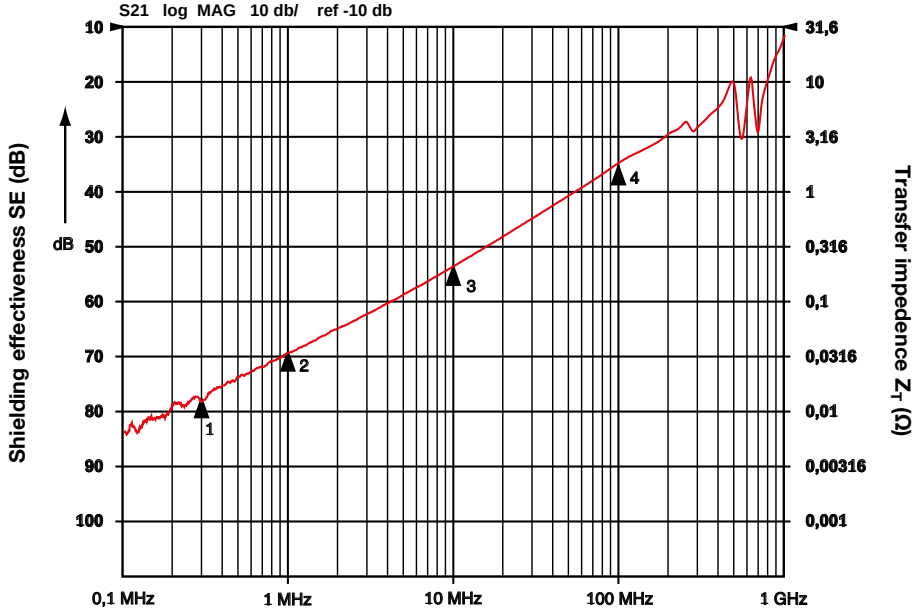
Legend:
R_g = output impedance of the signal generator (NWA port1)
R_1 = termination resistance of the generator circuit (mesh 1)
R_i = input impedance of the measuring instrument (NWA port 2)
R_2 = termination resistance of the generator circuit (mesh 2)

A signal with a frequency of 0,1 MHz to 1000 MHz generated by port 1 of the measuring device (a network analyzer with 75 Ω output impedance) circulates in the mesh 1 consisting of an insulated conductor (injection wire) resting on the surface of two coupled enclosures (shield), terminating on a calibrated (and shielded) resistance of 75 Ω. As a result of the current i_1 injected in the mesh 1, an induced voltage U_2 is generated in the mesh 2, consisting of an inner pick-up conductor connected to two contacts at the center of the connector inserts, terminated on another calibrated resistance of 75 Ω (shielded), in turn earthed on the coupled enclosures which act as a shield. The voltage is measured on port 2 of the measuring device for S parameters (scattering parameters). The network analyzer sees the device under test as a filter and calculates the measurement providing a graph illustrating the **shielding attenuation** (measured in dB) as a function of frequency in MHz.

The tests were performed on:
- coupled standard enclosures
- coupled EMC enclosures

The results are summarized in the diagrams below.

Figure 1 - Standard enclosure diagram



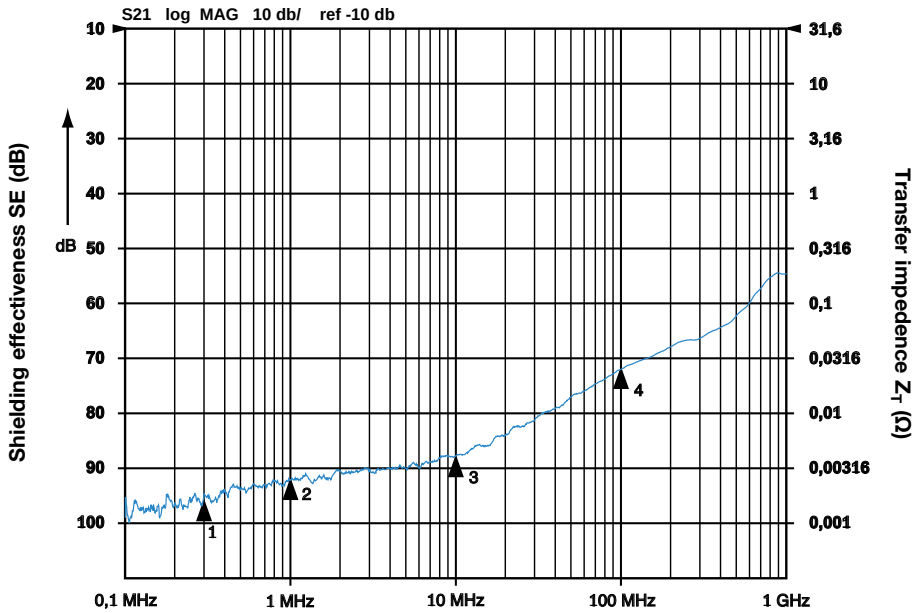
1_:-78.167 dB
300 kHz

2_:-69.369 dB
1 MHz

3_:-53.543 dB
10 MHz

4_:-34.719 dB
100 MHz

Figure 2 - EMC enclosure diagram



1_:-93.988 dB
300 kHz

2_:-91.86 dB
1 MHz

3_:-87.557 dB
10 MHz

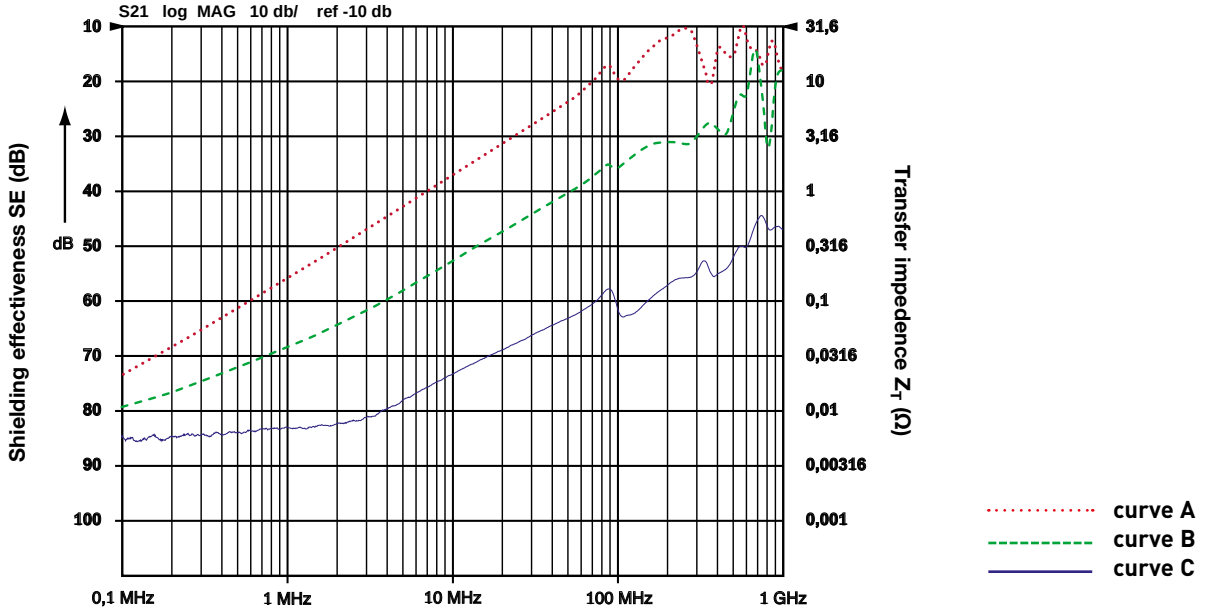
4_:-71.649 dB
100 MHz

To highlight the influence of the cable gland the shielding attenuation measurements were repeated on:

- coupled standard enclosures with standard cable gland and cable shield earthed to the earth terminal of the connector
  see curve A
- coupled standard enclosures with EMC cable gland and cable shield earthed to the cable gland
  see curve B
- coupled EMC enclosures with EMC cable gland and cable shield earthed to the cable gland
  see curve C

The results are summarized in the diagrams of Figure 3 below.

Figure 3 - Overview diagrams



NOTE
For the relationship between Shielding effectiveness SE and Transfer impedence (Ω) see also IEC 60512-23-3: SE = 40 - $20_{log}10Z_T$ (dB)

Conclusions

The measurements suggest the following considerations:

- standard enclosures already provide good levels of shielding attenuation;
- when used with EMC cable glands, standard enclosures clearly increase their shielding attenuation;
- EMC enclosures, with better shielding attenuation values, provide further improvements.

CKA -CKAX and MKA - MKAX EMC version for electromagnetic compatibility

inserts

bulkhead mounting housings straight and angled

hoods

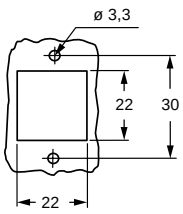
description	part No. (entry Pg 11)	part No. (entry M20)	part No. (entry Pg 11)	part No. (entry M20 / M25)
with stainless steel lever and gasket	**CKAXS 03 I**			
without cable entry, with stainless steel lever and gasket	**CKAXS 03 IA**			
with cable entry, with stainless steel lever and gasket	**CKAXS 03 IAP**	**MKAXS IAP20**		
with cable entry, with stainless steel lever and gasket bulkhead hole closed	**CKAXS 03 AP**	**MKAXS AP20**		
with pegs, top entry			**CKAS 03 V**	**MKAS V20**
with pegs, top entry				**MKAS V25**
with pegs, side entry			**CKAS 03 VA**	**MKAS VA20**
with stainless steel lever, top entry			**CKAXS 03 VG**	**MKAXS VG20**
gasket and screw kit for IP66/IP67/IP69 [1] for CK, CKSH, CQ4, CQ inserts	**CKR 65**		**CKR 65**	
gasket and screw kit for IP66/IP67/IP69 [1] for CD 08 inserts	**CKR 65 D**		**CKR 65 D**	

[1] To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12

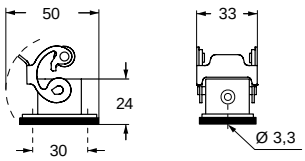
NOTE: Housing type may vary upon specific part No.

versions with glued gasket (DESINA®) upon request

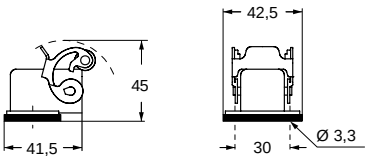
panel cut-out for bulkhead mounting housings



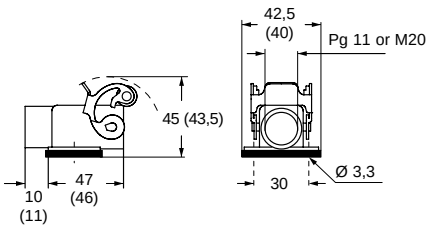
CKAXS I



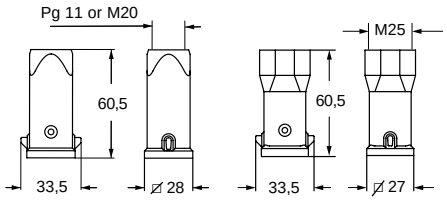
CKAXS IA



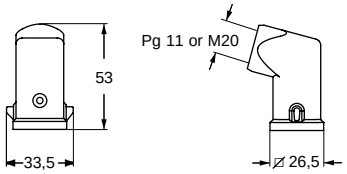
CKAXS IAP (CKAXS AP) and **MKAXS IAP (MKAXS AP)**



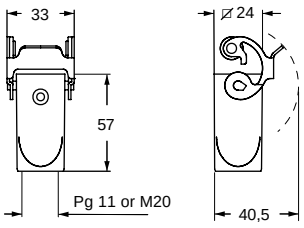
CKAS V and **MKAS V** **MKAS V25**



CKAS VA and **MKAS VA**



CKAXS VG and **MKAXS VG**



Type 12
Type 4/4X only
with CKR 65 (D)

IP66/IP67/IP69 with CKR 65 (D) [1]

EMC

CKAX - CKA - CKAXX EMC version for electromagnetic compatibility

inserts		page:
CK	3 poles + ⏚	58
CK	4 poles + ⏚	58
CKS	3 poles + ⏚	-
CKS	4 poles + ⏚	-
CKSH	3 poles + ⏚	63
CKSH	4 poles + ⏚	63
CD	8 poles	67
CQ4	2 poles + ⏚	182
CQ4 H	2 poles + ⏚	183
CQ4	3 poles + ⏚	184
CQ	5 poles + ⏚	186
CQ	7 poles + ⏚	187
CQ	12 poles + ⏚	189
CQ	21 poles	190

angled bulkhead mounting housings with stainless steel lever

angled bulkhead mounting housings with galvanized steel rigid lever and stainless steel rigid lever

GALVANIZED 2)

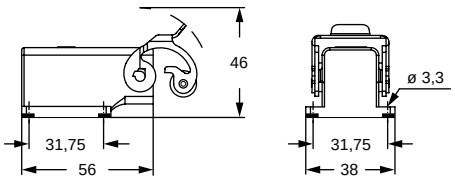
STAINLESS 3)

description	part No.	part No.
without cable entry, fixing by 4 screws	**CKAXS 03 IA4**	
without cable entry, fixing by 4 screws 2)		**CKAS 03 IA4**
without cable entry, fixing by 4 screws 3)		**CKAXXS 03IA4**
gasket and screw kit for IP66/IP67/IP69 1) for CK, CKSH, CQ4, CQ inserts	**CKR 65**	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 1) for CD 08 inserts	**CKR 65 D**	**CKR 65 D**

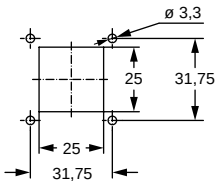
1) To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12

NOTE: Housing type may vary upon specific part No.

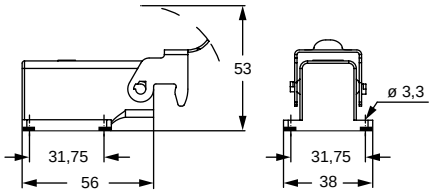
CKAXS IA4



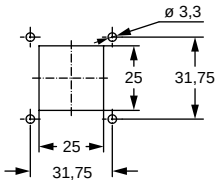
panel cut-out for enclosures



CKAS IA4 - CKAXXS IA4



panel cut-out for enclosures



EN 60529 IP44 IEC 60529 IP66/IP67/IP69 with CKR 65 (D) 1)

MKAX EMC version for electromagnetic compatibility

inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles	**190**

if the counterpart has glued gasket:

CLK 04 SC	**239**
CX 1/2 BD	**243**
CXL 2/4 PF/PM	**251**
CXL 2/4 PFH/PMH	**251**
CXL PF/PM	**251**

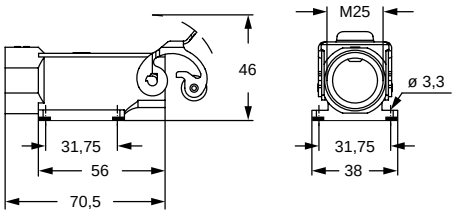
angled surface mounting housings with stainless steel lever

angled surface mounting housings with stainless steel lever

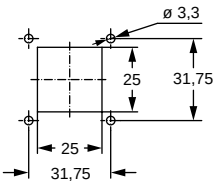
description	part No. (entry M25)	part No. (entry M25)
with cable entry, fixing by 4 screws	**MKAXS IAP25**	
with cable entry, fixing by 4 screws, bulkhead hole closed (without gasket)		**MKAXS AP25**
gasket and screw kit for IP66/IP67/IP69 [1] for CK, CKSH, CQ4, CQ, inserts	**CKR 65**	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 [1] for CD 08 inserts	**CKR 65 D**	**CKR 65 D**

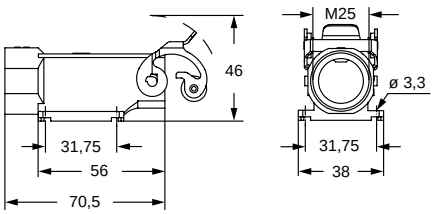
[1] To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH, CXL PF/PM

NOTE: Housing type may vary upon specific part No.

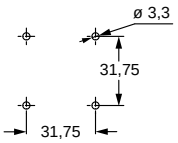


panel cut-out for enclosures





panel cut-out for enclosures



EMC

EN 60529 IP44 IEC 60529 IP66/IP67/IP69 with CKR 65 (D) [1]

MKA - MKAXX EMC version for electromagnetic compatibility

inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles	**190**
if the counterpart has glued gasket:		
CLK 04 SC		**239**
CX 1/2 BD		**243**
CXL 2/4 PF/PM		**251**
CXL 2/4 PFH/PMH		**251**
CXL PF/PM		**251**

angled surface mounting housings with galvanized steel rigid lever

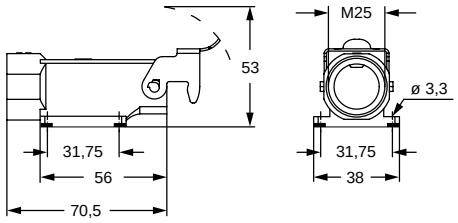
angled surface mounting housings with stainless steel rigid lever

description	part No. (entry M25)	part No. (entry M25)
with cable entry, fixing by 4 screws	**MKAS IAP25**	
with cable entry, fixing by 4 screws, bulkhead hole closed (without gasket)	**MKAS AP25**	
with cable entry, fixing by 4 screws		**MKAXXS IAP25**
with cable entry, fixing by 4 screws, bulkhead hole closed (without gasket)		**MKAXXS AP25**
gasket and screw kit for IP66/IP67 [1] for CK, CKSH, CQ4, CQ, inserts	**CKR 65**	**CKR 65**
gasket and screw kit for IP66/IP67 [1] for CD 08 inserts	**CKR 65 D**	**CKR 65 D**

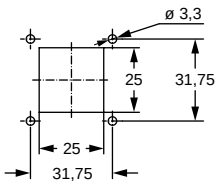
[1] To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH

NOTE: Housing type may vary upon specific part No.

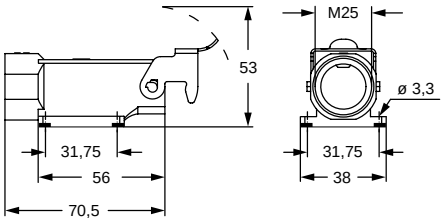
MKAS IAP



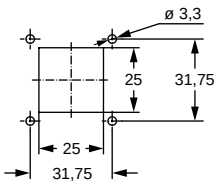
panel cut-out for enclosures



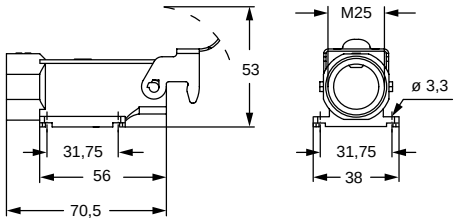
MKAXXS IAP



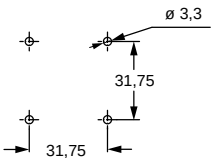
panel cut-out for enclosures



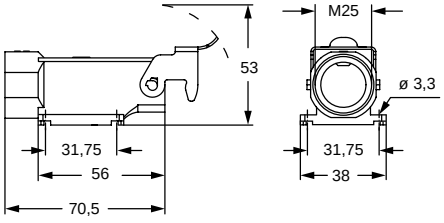
MKAS AP



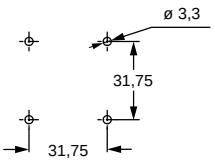
panel cut-out for enclosures



MKAXXS AP



panel cut-out for enclosures



EN 60529 IP44 IEC 60529 IP66/IP67/IP69 with CKR 65 (D) [1]

EMC

MKAX EMC version for electromagnetic compatibility

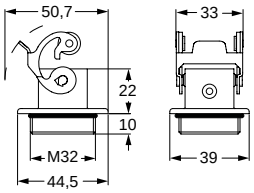
inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles	**190**
if the counterpart has glued gasket:		
CJ KF		**223**
CJK 8FT		**226**
CLK 04 SC		**239**
CX 1/2 BD		**243**
CXL 2/4 SF/SM		**250**
CXL SF/SM		**250**
CXL 2/4 PF/PM		**251**
CXL 2/4 PFH/PMH		**251**
CXL PF/PM		**251**

bulkhead mounting housings with stainless steel lever

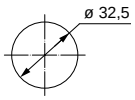
description	part No. (entry M32)
M32 fixing thread (•) 1)	**MKAXS IF**
gasket and screw kit for IP66/IP67/IP69 1)	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 1) specific for CD 08 inserts	**CKR 65 D**

1) To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CJ KF
- CJK 8FT
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH /SF /SM, CXL SF/M
- CXL PF /PM

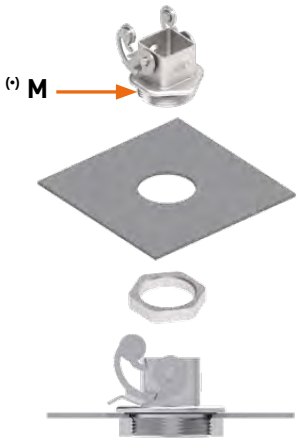
NOTE: Housing type may vary upon specific part No.



panel cut-out for enclosures



(•) Locknut supplied on request, see Cable glands catalogue (article AS M32N metallic).



cURus
Type 4/4X/12 pending

EN 60529 IP44 IEC 60529 IP66/IP67/IP69 with CKR 65 (D) 1)

EMC

MKA - MKAXX EMC version for electromagnetic compatibility

inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles	**190**
if the counterpart has glued gasket:		
CJ KF		**223**
CJK 8FT		**226**
CLK 04 SC		**239**
CX 1/2 BD		**243**
CXL 2/4 SF/SM		**250**
CXL SF/SM		**250**
CXL 2/4 PF/PM		**251**
CXL 2/4 PFH/PMH		**251**
CXL PF/PM		**251**

bulkhead mounting housings with galvanized steel rigid lever

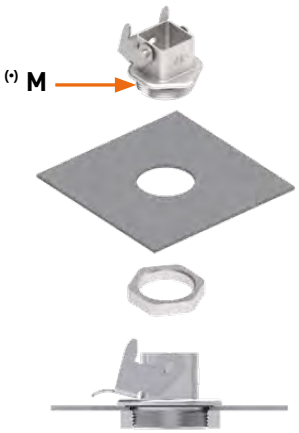
bulkhead mounting housings with stainless steel rigid lever

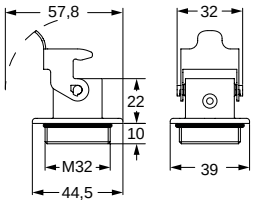
description	part No. (entry M32)	part No. (entry M32)
M32 fixing thread (•) 1)	**MKAS IF**	
M32 fixing thread (•) 1)		**MKAXXS IF**
gasket and screw kit for IP66/IP67/IP69 1)	**CKR 65**	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 1) specific for CD 08 inserts	**CKR 65 D**	**CKR 65 D**

1) To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CJ KF
- CJK 8FT
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH /SF /SM, CXL SF/M
- CXL PF /PM

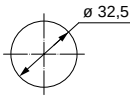
NOTE: Housing type may vary upon specific part No.

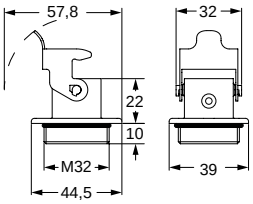
(•) Locknut supplied on request, see Cable glands catalogue (article AS M32N metallic).



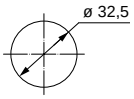


panel cut-out for enclosures





panel cut-out for enclosures



cURus
Type 4/4X/12 pending

IP66/IP67/IP69 with CKR 65 (D) 1)

EMC

MKAX EMC version for electromagnetic compatibility

inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles	**190**

if the counterpart has glued gasket:

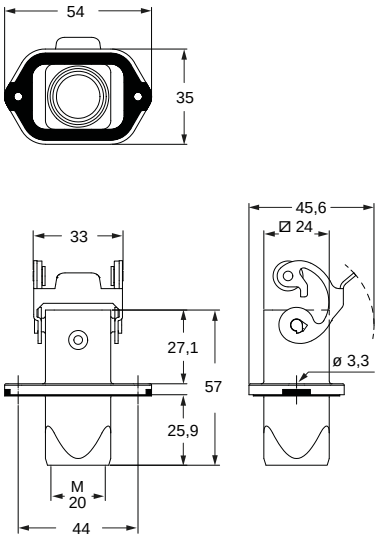
CLK 04 SC	**239**
CX 1/2 BD	**243**
CXL 2/4 PF/PM	**251**
CXL 2/4 PFH/PMH	**251**
CXL PF/PM	**251**

bulkhead mounting housings with stainless steel lever

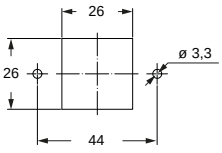
description	part No. (entry M20)
M20 cable entry [1]	**MKAXS IVG20**
gasket and screw kit for IP66/IP67/IP69 [1]	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 [1] specific for CD 08 inserts	**CKR 65 D**

[1] To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH /SF /SM
- CXL PF /PM

NOTE: Housing type may vary upon specific part No.



panel cut-out for enclosures



cURus
Type 12 / Type 4/4X only with CKR 65 (D) pending

EN 60529 IP44 IEC 60529 IP66/IP67/IP69 with CKR 65 (D) [1]

EMC

MKA - MKAXX EMC version for electromagnetic compatibility

inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles	**190**

if the counterpart has glued gasket:

CLK 04 SC	**239**
CX 1/2 BD	**243**
CXL 2/4 PF/PM	**251**
CXL 2/4 PFH/PMH	**251**
CXL PF/PM	**251**

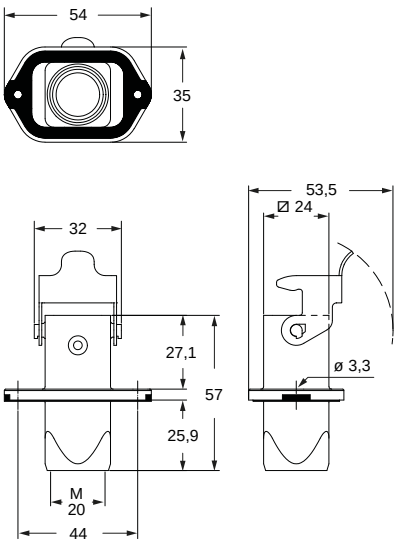
bulkhead mounting housings with galvanized steel rigid lever

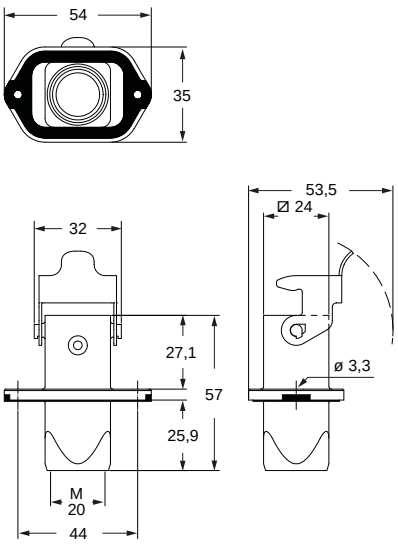
bulkhead mounting housings with stainless steel rigid lever

description	part No. (entry M20)	part No. (entry M20)
M20 cable entry [1]	**MKAS IVG20**	
M20 cable entry [1]		**MKAXXS IVG20**
gasket and screw kit for IP66/IP67/IP69 [1]	**CKR 65**	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 [1] specific for CD 08 inserts	**CKR 65 D**	**CKR 65 D**

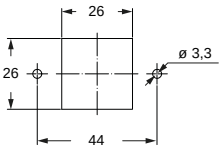
[1] To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH /SF /SM
- CXL PF /PM

NOTE: Housing type may vary upon specific part No.

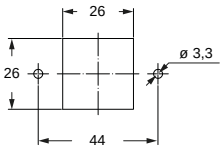




panel cut-out for enclosures



panel cut-out for enclosures



cURus
Type 12 / Type 4/4X only with CKR 65 (D) pending

IP66/IP67/IP69 with CKR 65 (D) [1]

EMC

MKAX - MKA - MKAXX EMC version for electromagnetic compatibility

inserts		page:
CK	3 and 4 poles + ⏚	**58**
CKS	3 and 4 poles + ⏚	**-**
CKSH	3 and 4 poles + ⏚	**63**
CD	8 poles	**67**
CQ4	2 poles + ⏚	**182**
CQ4 H	2 poles + ⏚	**183**
CQ4	3 poles + ⏚	**184**
CQ	5 poles + ⏚	**186**
CQ	7 poles + ⏚	**187**
CQ	12 poles + ⏚	**189**
CQ	21 poles + ⏚	**190**

if the counterpart has glued gasket:

CLK 04 SC	**239**
CX 1/2 BD	**243**
CXL 2/4 PF/PM	**251**
CXL 2/4 PFH/PMH	**251**
CXL PF/PM	**251**

hoods
with stainless steel lever

hoods
with galvanized steel rigid lever
and stainless steel rigid lever

GALVANIZED 2)

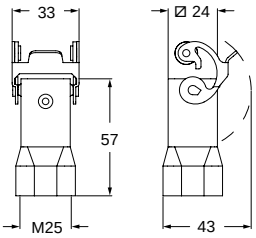
STAINLESS 3)

description	part No. (entry M25)	part No. (entry M25)
top entry	**MKAXS VG25**	
top entry 2)		**MKAS VG25**
top entry 3)		**MKAXXS VG25**
gasket and screw kit for IP66/IP67/IP69 1)	**CKR 65**	**CKR 65**
gasket and screw kit for IP66/IP67/IP69 1) for CD 08 inserts	**CKR 65 D**	**CKR 65 D**

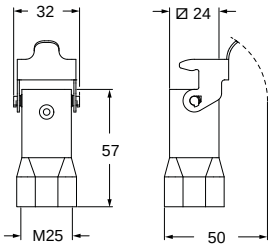
1) To obtain the IP66/IP67/IP69 degree of protection, a kit with insert fixing screw and gasket can be purchased separately.
Several inserts size “21.21” are already supplied with fixing screw and gasket, which ensures IP66/IP67/IP69 degree of protection. See list below, not including any special version:
- CQF/M 07, CQF/M 12
- CX 1/2 BDF/M
- CLK 04 SCF /SCF-H /SCM
- CXL 2/4 PF /PM /PFH /PMH, CXL PF/PM

NOTE: Housing type may vary upon specific part No.

MKAXS VG



MKAS VG - MKAXXS VG



cURus
Type 12 / Type 4/4X only with CKR 65 (D) pending

EN 60529 IP44 IEC 60529 IP66/IP67/IP69 with CKR 65 (D) 1)

CQ EMC version for electromagnetic compatibility

inserts		page:
CQ 04/2	4 poles + 2 poles + ⏚	191
CQ 08	8 poles + ⏚	192
CQ 17	17 poles + ⏚	193

metallized insulating enclosures

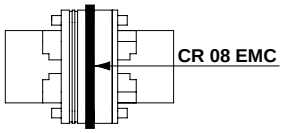
bulkhead mounting housings with single lever

angled bulkhead mounting housings with single lever

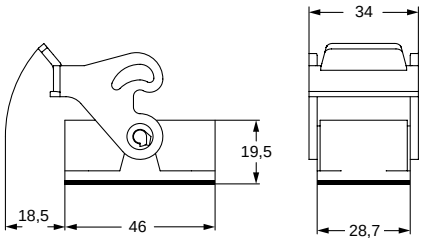
description	part No.	part No.	entry Pg
with lever and gasket	**CQS 08 I**		
without cable gland, with lever, angled		**CQS 08 IA**	
with cable entry, with lever, angled		**CQS 08 IAP**	21

ASSEMBLY INSTRUCTIONS

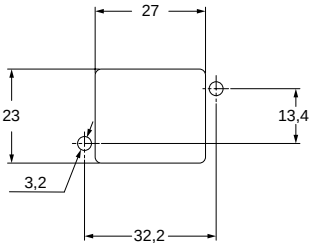
When using an EMC “CQS 08” series enclosure with a male insert, replace the standard gasket provided on the male insert with a conductive gasket CR 08 EMC, to be ordered separately (see page 575).



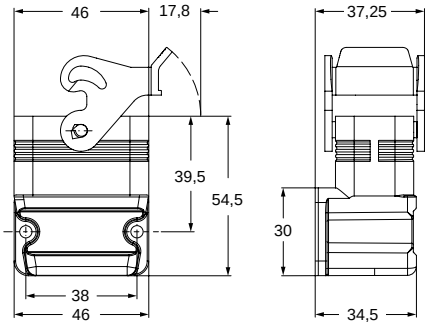
CQS I



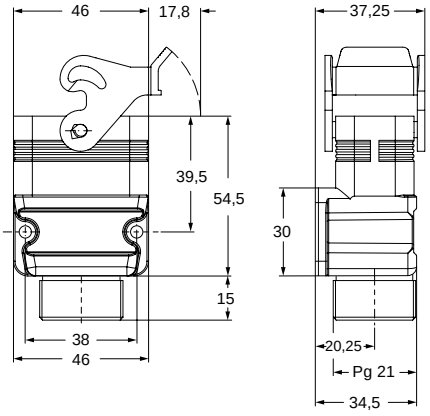
panel cut-out for CQ I enclosure



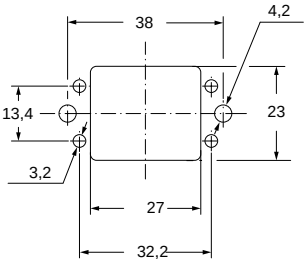
CQS IA



CQS IAP



panel cut-out for CQ IA - CQ IAP enclosure



Type 12

IP66 IP67

EMC

CQ EMC version for electromagnetic compatibility

inserts		page:
CQ 04/2	4 poles + 2 poles + ⏚	**191**
CQ 08	8 poles + ⏚	**192**
CQ 17	17 poles + ⏚	**193**

metallized insulating enclosures

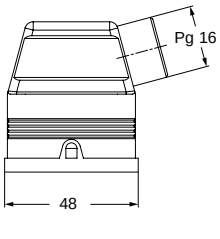
hoods with 2 pegs

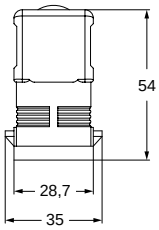
hoods with single lever

description	part No.	entry Pg	part No.	entry Pg
with pegs, side entry [1]	**CQS 08 VA**	16		
with pegs, top entry [1]	**CQS 08 V**	21		
with lever, top entry [1]			**CQS 08 VG**	21

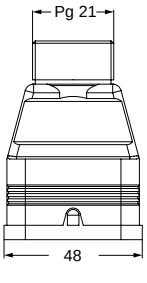
[1] Pg male thread on exterior enclosure

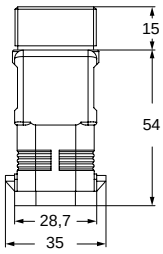
CQS VA



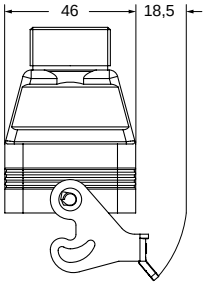


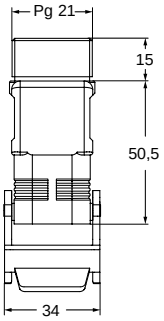
CQS V





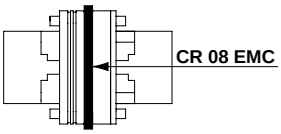
CQS VG





ASSEMBLY INSTRUCTIONS

When using an EMC “CQS 08” series enclosure with a male insert, replace the standard gasket provided on the male insert with a conductive gasket CR 08 EMC, to be ordered separately (see page 575).



Type 12

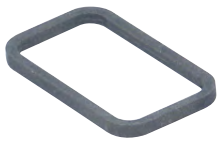
EN 60529 IP66 IP67 IEC 60529

EMC

dimensions shown in mm are not binding and may be changed without notice

CR - CRQ EMC version for electromagnetic compatibility

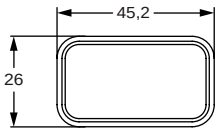
conductive gasket for CQM male inserts



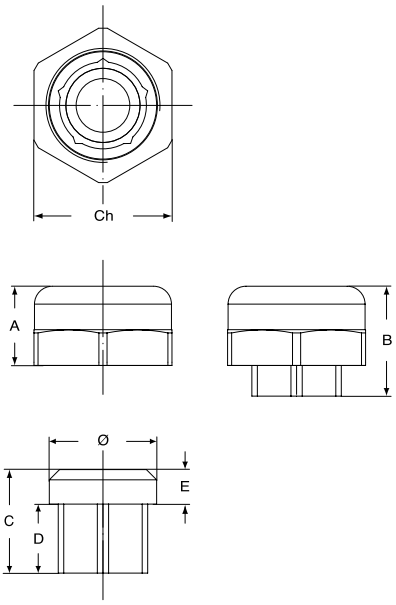
thermoplastic resin cable glands

description	part No.	part No.
conductive gasket for CQM male inserts	**CR 08 EMC**	
cable gland head and gasket for CQS 08 VA enclosure cable gland head and gasket for CQS 08 V, VG and IAP enclosure		**CRQ 16** **CRQ 21**

CR 08 EMC



CRQ 16 and **CRQ 21**

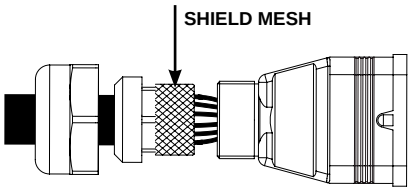


part No.	A	B	C	D	E	Ø	Ch
CRQ 16	15,5	21,5	20,25	13,5	6,75	21	27
CRQ 21	18,2	27,5	25	15,5	9	26,5	33

cable diameters for cable glands:
- **CRQ 16**: 10 - 14,5 mm (4 - 7 mm on request)
- **CRQ 21**: 14 - 18 mm (7 - 10 mm on request)

ASSEMBLY INSTRUCTIONS

Place the cable shield mesh between the CRQ cable gland gasket and the seat of the gasket itself.



CZ - MZ and CZF - MZF EMC version for electromagnetic compatibility

inserts		page:
CD	15 poles + ⏚	**68**
CDA	10 poles + ⏚	**98**
CSAH	10 poles + ⏚	**99**
CDC	10 poles + ⏚	**104**
MIXO	1 module	**264 - 316**

The covers for L, SL and LG versions cannot be used together with coding pins. If this application is required, please contact ILME S.p.A.

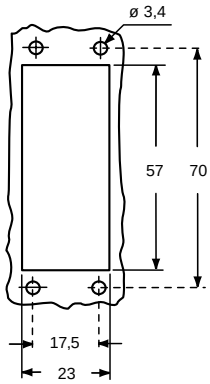
housings and cover

hoods and cover

description	part No.	entry Pg	part No	entry M	part No.	entry Pg	part No.	entry M
bulkhead mounting housing with lever and gasket	**CZ7IS 15 L**	--						
surface mounting housing with lever	**CZ7PS 15 L2**	16 x 2	**MZ7PS 15L225**	25 x 2				
cover with pegs and gasket (for 1 lever enclosures) 1)	**CZCS 15 L**							
cover with pegs and gasket (for 1 lever enclosures) 2)	**CZCS 15 SL**							
enclosure with pegs and gasket, side entry					**CZOS 15 L**	16	**MZOS 15 L20**	20
enclosure with pegs and gasket, side entry							**MZOS 15 L25**	25
enclosure with pegs and gasket, side entry, high construction, without adapter 3)					**CZFOS 15 L21**	21	**MZFOS 15 L25**	25
enclosure with pegs and gasket, top entry					**CZVS 15 L**	13,5	**MZVS 15 L20**	20
enclosure with pegs and gasket, top entry, high construction, without adapter 3)					**CZFVS 15L221**	21	**MZFVS 15 L25**	25
cover with lever (for enclosures with pegs) 2)					**CZ7CS 15 LG**			

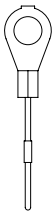
3) enclosure without adapter, threaded on the enclosure body, to be used only with a complete cable gland.

panel cut-out for bulkhead mounting housings



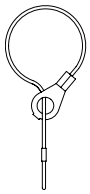
For fixing on housings

1) **eyelet**



For fixing on hoods

2) **loop**

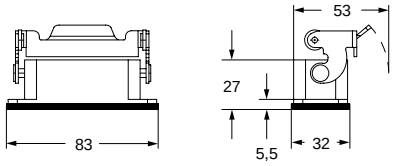


Type 4/4X/12

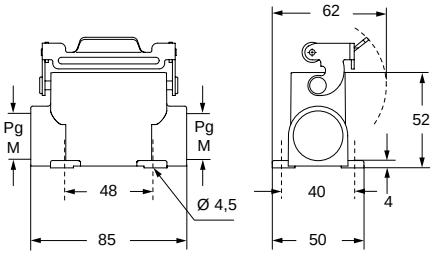
insulating cable gland or fittings without gasket

cable gland with O-Ring gasket

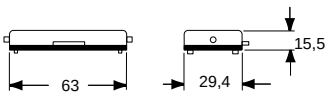
CZ7IS L



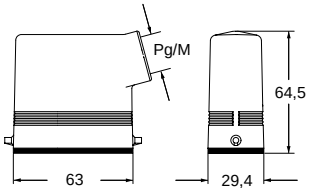
CZ7PS L and **MZ7PS L**



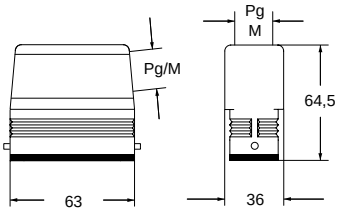
CZCS L (SL)



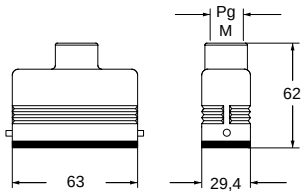
CZOS L and **MZOS L**



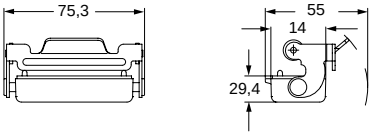
CZFOS L - MZFOS L and **CZFVS L - MZFVS L**



CZVS L and **MZVS L**



CZ7CS LG



dimensions shown in mm are not binding and may be changed without notice

CZ-CZA-CZF and MZ-MZA-MZF EMC version for electromagnetic compatibility

inserts		page:
CD	25 poles + ⏚	69
CDD	38 poles + ⏚	77
CDA	16 poles + ⏚	100
CSAH	16 poles + ⏚	101
CDC	16 poles + ⏚	105

The covers for L, SL and LG versions cannot be used together with coding pins. If this application is required, please contact ILME S.p.A.

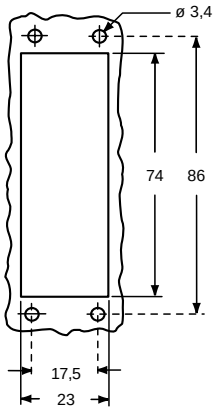
housings and cover

hoods and cover

description	part No.	entry Pg	part No	entry M	part No.	entry Pg	part No.	entry M
bulkhead mounting housing with lever and gasket	**CZ7IS 25 L**	--						
surface mounting housing, with lever, high construction	**CZ7PS 25 L2**	16 x 2	**MZ7PS 25L225**	25 x 2				
cover with pegs (for 1 lever enclosures) 1)	**CZCS 25 L**							
cover with pegs (for 1 lever enclosures) 2)	**CZCS 25 SL**							
enclosure with pegs and gasket, side entry					**CZOS 25 L**	16	**MZOS 25 L20**	20
enclosure with pegs and gasket, side entry							**MZOS 25 L25**	25
enclosure with pegs and gasket, side entry, high construction, without adapter 3)					**CZFOS 25 L21**	21	**MZFOS 25 L25**	25
enclosure with pegs and gasket, top entry					**CZVS 25 L**	16		
enclosure with pegs and gasket, top entry 4)							**MZVS 25 L20**	20
enclosure with pegs and gasket, top entry, high construction, without adapter 3)					**CZFVS 25 L21**	21	**MZFVS 25 L25**	25
cover with lever (for enclosures with pegs) 2)					**CZ7CS 25 LG**			

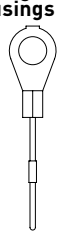
3) enclosure without adapter, threaded on the enclosure body, to be used only with a complete cable gland.
4) can only be used with a complete cable gland (to be purchased separately)

panel cut-out for bulkhead mounting housings



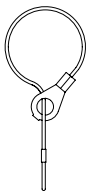
For fixing on housings

1) **eyelet**



For fixing on hoods

2) **loop**

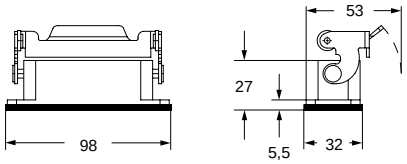


Type 4/4X/12

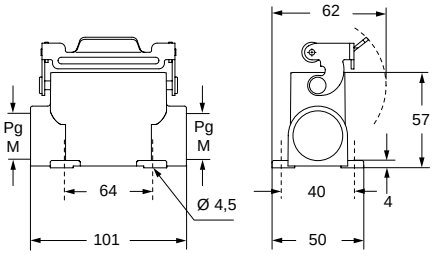
insulating cable gland or fittings without gasket

cable gland with O-Ring gasket

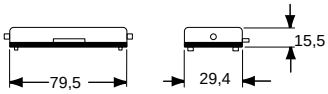
CZ7IS L



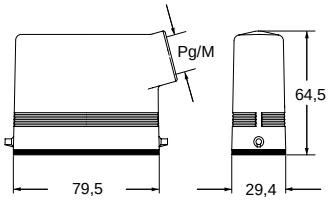
CZ7PS L and **MZ7PS L**



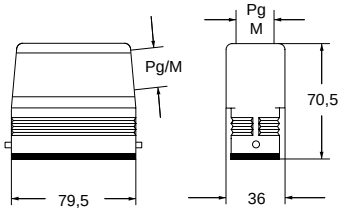
CZCS L (SL)



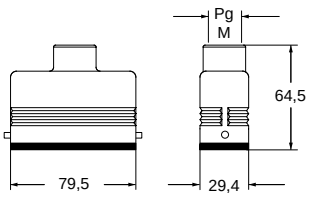
CZOS L and **MZOS L**



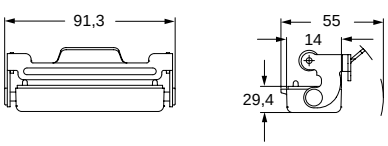
CZFOS L - MZFOS L and **CZFVS L - MZFVS L**



CZVS L and **MZVS L** 4)



CZ7CS LG



EMC

CH - CA - CF and MA - MF EMC version for electromagnetic compatibility

inserts		page:
CDD	24 poles + ⏚	**76**
CDS	9 poles + ⏚	**-**
CDSH	9 poles + ⏚	**86**
CDSH NC	6 poles + ⏚	**95**
CNE	6 poles + ⏚	**110**
CSE	6 poles + ⏚	**-**
CSH	6 poles + ⏚	**110**
CSH S	6 poles + ⏚	**122**
CCE	6 poles + ⏚	**130**
CSS	6 poles + ⏚	**148**
CT, CTSE (16A) ***)**	6 poles + ⏚	**160**
CQE	10 poles + ⏚	**168**
MIXO	2 modules	**262 - 317**

***)** only for enclosure CHIS 06 L

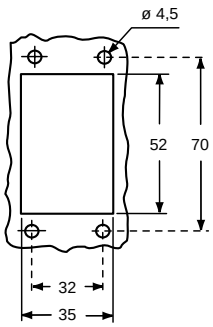
housings and cover

hoods and cover

description	part No.	entry Pg	part No	entry M	part No.	entry Pg	part No.	entry M
bulkhead mounting housing with lever and gasket	**CHIS 06 L**	--						
surface mounting housing, with lever, high construction	**CAPS 06 L**	21	**MAPS 06 L32**	32				
cover with pegs (for 1 lever enclosures) 1)	**CHCS 06 L**							
cover with pegs (for 1 lever enclosures) 2)	**CHCS 06 SL**							
enclosure with pegs, side entry, high construction, without adaptor 3)					**CFOS 06 L21**	21	**MFOS 06 L32**	32
enclosure with pegs, top entry, high construction, without adaptor 3)					**CFVS 06 L21**	21	**MFVS 06 L32**	32
cover with lever (for enclosures with pegs) 2)					**CHCS 06 LG**			

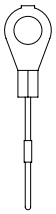
3) enclosure without adapter, threaded on the enclosure body, to be used only with a complete cable gland.

panel cut-out for bulkhead mounting housings



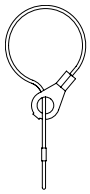
For fixing on housings

1) **eyelet**



For fixing on hoods

2) **loop**

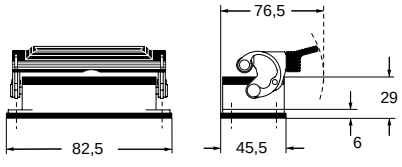


Type 4/4X/12

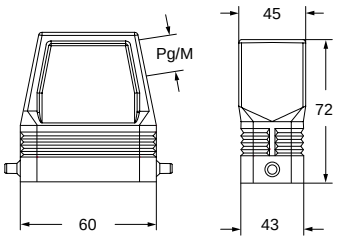
IP65 insulating cable gland or fittings without gasket

IP66 IP69 cable gland with O-Ring gasket

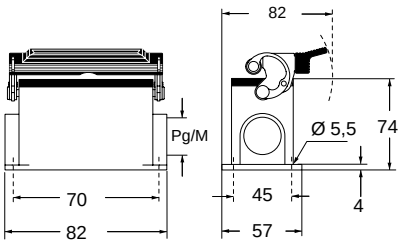
CHIS L



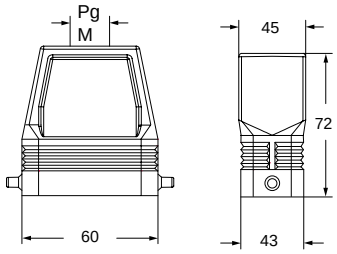
CFOS L and **MFOS L**



CAPS L and **MAPS L**

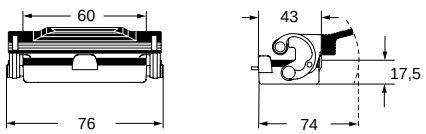


CFVS L and **MFVS L**



CHCS L (SL)

CHCS LG



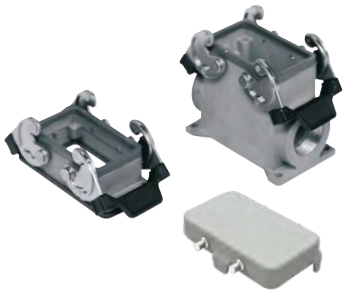
dimensions shown in mm are not binding and may be changed without notice

CH - CA and MA EMC version for electromagnetic compatibility

inserts		page:
CDD	42 poles + ⏚	**78**
CDS	18 poles + ⏚	**-**
CDSH	18 poles + ⏚	**87**
CNE	10 poles + ⏚	**111**
CSE	10 poles + ⏚	**-**
CSH	10 poles + ⏚	**111**
CSH S	10 poles + ⏚	**123**
CCE	10 poles + ⏚	**131**
CMSH	3+2 (aux) poles + ⏚	**136**
CMCE	3+2 (aux) poles + ⏚	**137**
CSS	10 poles + ⏚	**149**
CT, CTSE (16A) ***)**	10 poles + ⏚	**161**
CQE	18 poles + ⏚	**169**
CX	8/24 poles + ⏚	**194**
MIXO	3 modules	**262 - 317**

***)** only for enclosure CHIS 10

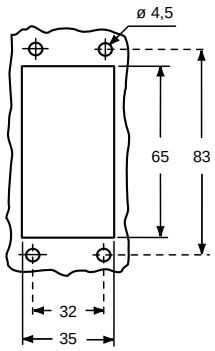
housings and cover



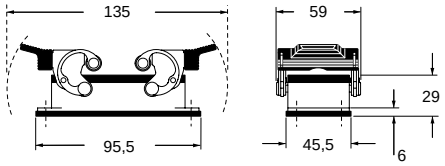
hoods and cover

description	part No.	entry Pg	part No	entry M	part No.	entry Pg	part No.	entry M
bulkhead mounting housing with levers and gasket	**CHIS 10**	--						
surface mounting housing, with levers, high construction	**CAPS 10.21**	21	**MAPS 10.32**	32				
cover with 4 pegs (for enclosures with 2 levers) 1)	**CHCS 10**							
cover with 4 pegs (for enclosures with 2 levers) 2)	**CHCS 10 S**							
enclosure with pegs, side entry, high construction					**CAOS 10.21**	21	**MAOS 10.32**	32
enclosure with pegs, top entry, high construction					**CAVS 10.21**	21	**MAVS 10.32**	32
cover with 2 levers (for enclosures with 4 pegs) 2)					**CHCS 10 G**			

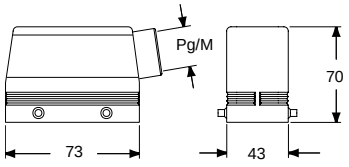
panel cut-out for bulkhead mounting housings



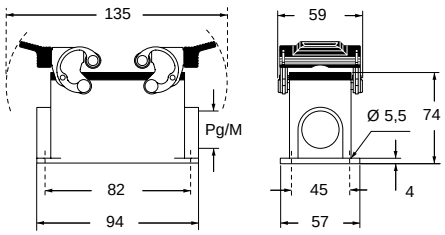
CHIS



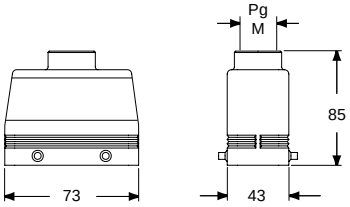
CAOS and **MAOS**



CAPS and **MAPS**

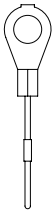


CAVS and **MAVS**



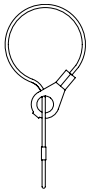
For fixing on housings

1) **eyelet**



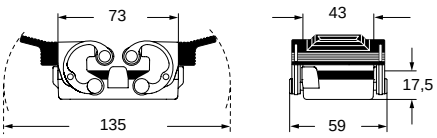
For fixing on hoods

2) **loop**



CHCS (S)

CHCS G



Type 4/4X/12

insulating cable gland or fittings without gasket

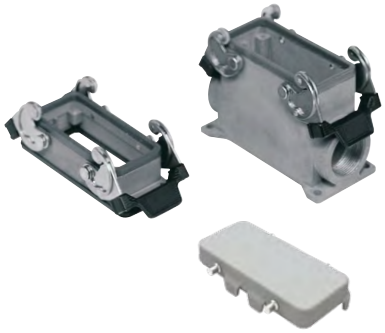
cable gland with O-Ring gasket

CH - CA and MH - MA EMC version for electromagnetic compatibility

inserts		page:
CD	40 poles + ⏚	**70**
CDD	72 poles + ⏚	**79**
CDS	27 poles + ⏚	**-**
CDSH	27 poles + ⏚	**88**
CNE	16 poles + ⏚	**112**
CSE	16 poles + ⏚	**-**
CSH	16 poles + ⏚	**112**
CSH S	16 poles + ⏚	**124**
CCE	16 poles + ⏚	**132**
CMSH, CMCE	6+2 (aux) poles + ⏚	**138 - 139**
CSS	16 poles + ⏚	**150**
CT, CTS (10A) ***)**	40 poles + ⏚	**156**
CT, CTSE (16A) ***)**	16 poles + ⏚	**162**
CQE	32 poles + ⏚	**170**
CQEE	40 poles + ⏚	**176**
CP	6 poles + ⏚	**178**
CX	6/12, 6/36 and 12/2 poles + ⏚	**197 - 199**
CX	4/0 and 4/2 poles + ⏚	**200 - 201**
MIXO	4 modules	**262 - 317**

***)** only for enclosure CHIS 16

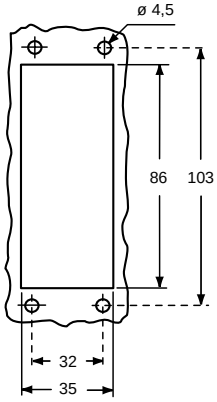
housings and cover



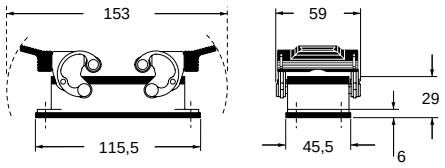
hoods and cover

description	part No.	entry Pg	part No	entry M	part No.	entry Pg	part No.	entry M
bulkhead mounting housing with levers and gasket	**CHIS 16**	--						
surface mounting housing, with levers, high construction	**CAPS 16.21**	21	**MAPS 16.32**	32				
cover with 4 pegs (for enclosures with 2 levers) 1)	**CHCS 16**							
cover with 4 pegs (for enclosures with 2 levers) 2)	**CHCS 16 S**							
enclosure with pegs, side entry					**CHOS 16**	21	**MHOS 16.25**	25
enclosure with pegs, side entry							**MHOS 16.32**	32
enclosure with pegs, side entry, high construction					**CAOS 16.29**	29	**MAOS 16.32**	32
enclosure with pegs, side entry, high construction							**MAOS 16.40**	40
enclosure with pegs, top entry					**CHVS 16**	21	**MHVS 16.25**	25
enclosure with pegs, top entry							**MHVS 16.32**	32
enclosure with pegs, top entry, high construction					**CAVS 16.29**	29	**MAVS 16.32**	32
enclosure with pegs, top entry, high construction							**MAVS 16.40**	40
cover with 2 levers (for enclosures with 4 pegs) 2)					**CHCS 16 G**			

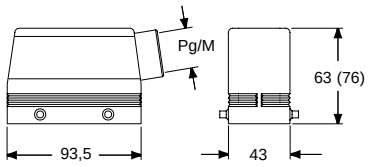
panel cut-out for bulkhead mounting housings



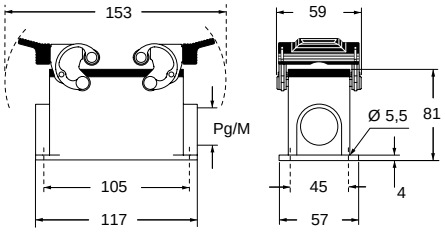
CHIS



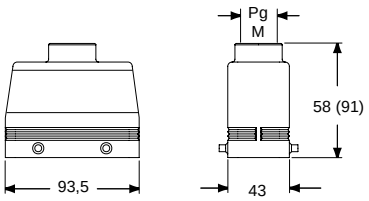
CHOS (CAOS) and **MHOS (MAOS)**



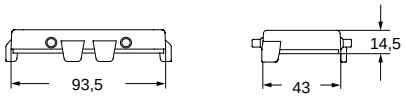
CAPS and **MAPS**



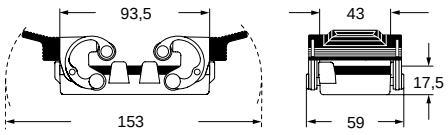
CHVS (CAVS) and **MHVS (MAVS)**



CHCS (S)

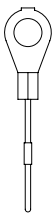


CHCS G



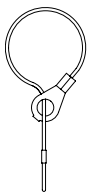
For fixing on housings

1) **eyelet**



For fixing on hoods

2) **loop**



cULus Type 4/4X/12

IP65 insulating cable gland or fittings without gasket

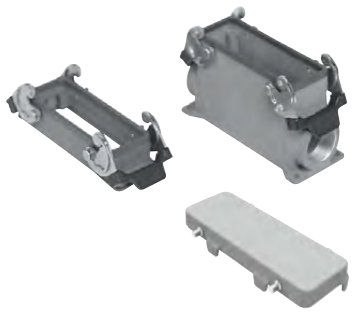
IP66 IP69 cable gland with O-Ring gasket

CH - CA and MH - MA EMC version for electromagnetic compatibility

inserts		page:
CD	64 poles + ⏚	**72**
CDD	108 poles + ⏚	**81**
CDS	42 poles + ⏚	**-**
CDSH	42 poles + ⏚	**89**
CNE	24 poles + ⏚	**113**
CSE	24 poles + ⏚	**-**
CSH	24 poles + ⏚	**113**
CSH S	24 poles + ⏚	**125**
CCE	24 poles + ⏚	**133**
CMSH	10+2 (aux) poles + ⏚	**140**
CMCE	10+2 (aux) poles + ⏚	**141**
CSS	24 poles + ⏚	**151**
CT, CTS (10A) ***)**	64 poles + ⏚	**157**
CT, CTSE (16A) ***)**	24 poles + ⏚	**163**
CQE	46 poles + ⏚	**171**
CQEE	64 poles + ⏚	**177**
CX	4/8 and 6/6 poles + ⏚	**204 and 206**
MIXO	6 modules	**262 - 317**

***)** only for enclosure CHIS 24

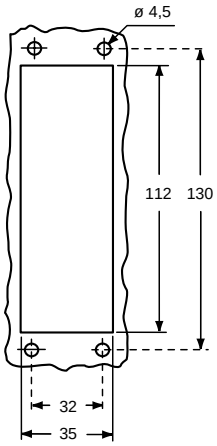
housings and cover



hoods and cover

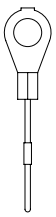
description	part No.	entry Pg	part No	entry M	part No.	entry Pg	part No.	entry M
bulkhead mounting housing with levers and gasket	**CHIS 24**	--						
surface mounting housing, with levers, high construction	**CAPS 24.21**	21	**MAPS 24.32**	32				
cover with 4 pegs (for enclosures with 2 levers) 1)	**CHCS 24**							
cover with 4 pegs (for enclosures with 2 levers) 2)	**CHCS 24 S**							
enclosure with pegs, side entry					**CHOS 24**	21	**MHOS 24.25**	25
enclosure with pegs, side entry							**MHOS 24.32**	32
enclosure with pegs, side entry, high construction					**CAOS 24.29**	29	**MAOS 24.32**	32
enclosure with pegs, side entry, high construction							**MAOS 24.40**	40
enclosure with pegs, top entry					**CHVS 24**	21	**MHVS 24.25**	25
enclosure with pegs, top entry							**MHVS 24.32**	32
enclosure with pegs, top entry, high construction					**CAVS 24.29**	29	**MAVS 24.32**	32
enclosure with pegs, top entry, high construction							**MAVS 24.40**	40
cover with 2 levers (for enclosures with 4 pegs) 2)					**CHCS 24 G**			

panel cut-out for bulkhead mounting housings



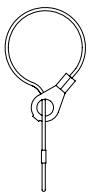
For fixing on housings

1) **eyelet**

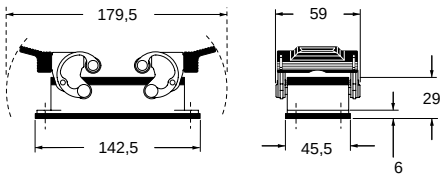


For fixing on hoods

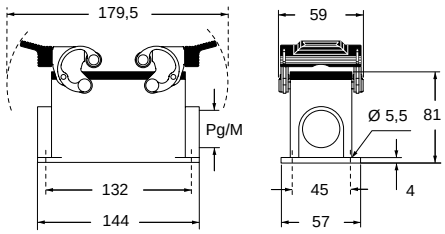
2) **loop**



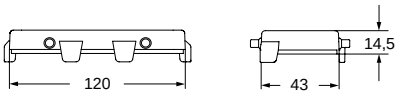
CHIS



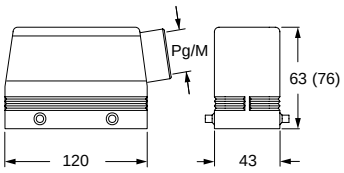
CAPS and **MAPS**



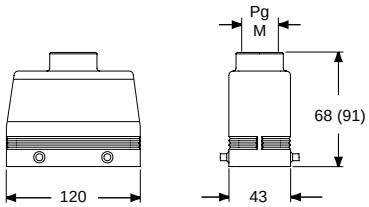
CHCS (S)



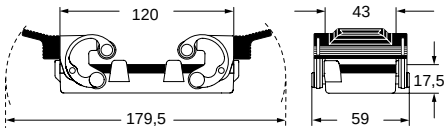
CHOS (CAOS) and **MHOS (MAOS)**



CHVS (CAVS) and **MHVS (MAVS)**



CHCS G



Type 4/4X/12

IP65 — insulating cable gland or fittings without gasket

IP66 IP69 — cable gland with O-Ring gasket