

## Table 31-1: EPIC® rectangular connectors



① **1. Cable Gland:**  
The Cable Gland provides a seal between the cable and the connector housing. It may also be used to offer additional functions like strain relief and braid continuity for EMC protection.



② **2. Upper housing: Hood**



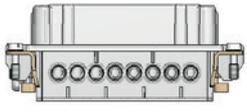
③ **3. Male insert:**  
Types of contact termination

- Screw
- Crimp\*
- Cage clamp
- Push-In



④ **4. Female insert:**  
Types of contact termination

- Screw
- Crimp\*
- Cage clamp
- Push-In



⑤ **5. Lower housing:**

- Panel mounting (cable entry through cut out in panel)
- Surface mounting (cable entry through a gland into the side of the connector base)
- Cable Connector Hood, cable to cable connection

\* contacts must be ordered separately

Please pay attention on the EPIC® Selection table A10, this table is a great guide in helping you to find the right insert and suitable housings. It is particularly convenient using the connector with the connectorfinder in the internet ([www.lappgroup.com/connectorfinder](http://www.lappgroup.com/connectorfinder)) and the connector housing configurator for customized solutions ([www.lappgroup.com/connector-housing](http://www.lappgroup.com/connector-housing)). You will also find configured connector kits in our webcatalogue.

### High variety of applications with EPIC® rectangular connectors:

- Number of pins from 1 up to 216
- Currents up to 220A
- Voltage up to 1.000V
- Modular system with inserts for power supply, signal and data transmission, fiber optics, coax connection and compressed air
- Termination technologies: Screw, crimp, cage clamp, solder, Push-In
- Housings for cable connection and for the assembly on devices
- **Degree of protection** (depends on the type of housing and the cable gland. Therefore we recommend to use a brass gland with integrated sealing ring for example SKINTOP® MS-M.)
- **EMC protection** (For applications with EMC requirements, we recommend the EPIC® ULTRA in combination with the SKINTOP® BRUSH.)

**TIP:** Only use tools recommended and approved by LAPP. This ensures the safe and long-term operation of the connector. An assurance of the technical characteristics, as well as the validity of the certificates can only be given if all components are used exclusively by LAPP.

**WARNING:** EPIC® industrial connectors may not be connected or disconnected under load.

## Table 31-2: EPIC® housings and inserts

### Hood (fig. 1):

It may have a top or angle (side) entry of different PG sizes to accommodate a wide range of cable diameters. The hood can be mated with either a surface or panel mounting base, or a cable coupler hood (for cable to cable connection).



### Panel mount base (fig. 2):

It is wired from below through a hole cut in a panel. The panel base is attached to the surface of a control panel for connection of control or power cables.



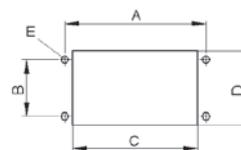
### Surface mount base (fig. 3):

The surface base is a complete enclosure only offering cable entry through a cable gland mounted either on one or both sides of the base.



### Cable Coupler (fig. 4):

The cable connector hood mates with a top entry hood to offer cable to cable connection. This is frequently used to extend cables.



Panel cut out for panel mount base (mm)					
Panel mount base	A	B	C	D	E
H-A 3	30	—	21	21	3.3
H-A 10	70	17.5	57.5	24	3.6
H-A 16	86	17.5	73.7	24	3.6
H-A 32	92	42	74.2	48.4	4.3
H-A 48	110	65	85.5	71	5.5
H-B 6	70	32	52.2	35	4.3
H-B 10	83	32	65.2	35	4.3
H-B 16	103	32	85.5	35	4.3
H-B 24	130	32	112.2	35	4.3
H-B 32	110	65	85.5	71	5.5
H-B 48	148	70	117	82	7

Screw connection technology (as DIN EN 60999)				
Screw thread	M3	M4	M5	M6
Starting torque Nm	0.5	1.2	2.0	2.5
Clamping screw: H-A, H-BE, H-BVE	●			
Clamping screw: H-BS		●		
Grounding screw: H-A, H-BE, H-BVE		●		
Grounding screw: H-BS			●	
Clamping screw: Module High-Current				●
Fixing screw: Inserts and Module frames	●			

All EPIC® connectors refer to IEC 61984.

**Table 31-2: EPIC® – definitions and instructions for use**

**General information**

Connectors may not be connected or disconnected under load. The temperature range for connectors can be found in the catalog data. The degree of contamination is given in the technical data of the connector. The rated voltage and rated current are based on a power system with DC or AC (rms) at a frequency of 50 or 60 Hz at 0 ... 2000 m above sea level, and are given in the technical data of the connector. For other applications, the additional loads (e.g. electrical, chemical, climatic, biological, mechanical or radioactive) can mean for the connector, or request mateability with competitive products the user is responsible for the review and approval.

**Connectors**

Connectors are devices that are not for connection or disconnection under load.

**Application Note:** This distinguishes these kind of connectors from plug devices that may be connected or disconnected under load. When connecting or disconnecting a connector under load, sparks and at short-term high temperatures that can cause damage to the contact surface and finally a total failure of the connector.

**Types of connection**

For EPIC® Industrial Connectors different connection types of wire to the electrical contact are available. There is the classic screw, crimping, soldering and the spring-loaded terminals and Push-In.

**Application Note:** Each of these connection types has advantages and disadvantages. Screw is the simplest and a very common practice. Crimping gives with the appropriate crimping tool 100% process-reliable results, but it requires special tools. Spring loaded terminals also allows quick and easy connection and is vibration resistant. Soldering requires little space and is often used with small connector systems. Push-In is ideal for massive conductors and cores with wire end sleeves.

**Rated voltage**

The rated voltage is the voltage according to which the connectors are designed and related to the relevant operating characteristics.

**Application Note:** The rated voltage is defined depending on the environmental degree of contamination for which the connector it is developed and tested. If the same connector is tested for pollution degree 1, the rated voltage given in the catalogue is significantly higher than when he was tested for pollution degree 2. EPIC® connectors are generally designed for pollution degree 3 and therefore have high safety reserves, even if the plug moist inside or should be dirty.

**Rated current**

A current value assigned by the manufacturer, which the connector or PSD can carry continuously (without interruption) and simultaneously through all its contacts wired with the largest conductor preferably at an ambient temperature of 40°C without the upper temperature being exceeded. The rated current is specified for the largest conductor cross-section.

**Rated impulse withstand voltage**

The test voltage is the maximum voltage at which a connector will not be subjected to flashover under the set conditions.

**Application Note:** In this specified voltage there will be no spark damage to the connector.

**EMC (electromagnetic compatibility)**

The capacity of an electrical installation to function satisfactorily in its electromagnetic environment without an unacceptable influence to the environment which also includes other installations (DIN/VDE 0870, Section 1).

**Application Note:** For good EMC shielding, there is a diagram that describes the behavior for different frequencies. This serves as an evaluation criterion to compare different components. In the industrial sector, the interfering frequencies are in the lower frequency range. Typically less than 100kHz. In this frequency range, it depends mainly on a low impedance, high crosssection, 360° shielding. When evaluating the different EMC concepts such qualitative parameters can be recognized easily. The EPIC® ULTRA housing convinces with a highly sophisticated sealing and contact technology. The innovative design allows safe EMC contact and allows the current on the cable screen to flow to the ground. The 360° shield connection is done via the cable gland SKINTOP® BRUSH.

**Coding**

Coding is a system by which it is possible to prevent interfacing confusion between adjacent connectors which are of the same configuration. This is useful if two or more connectors of the same type are mounted on the same unit

**Application Note:** So plugging errors and incorrect wiring is prevented. When coding the rectangular connector with guide pin and guide bushing in addition the plug insert is centered. Uncentred connection is prevented resulting in an increased service life of the contacts. For every EPIC® connectors exists the right coding element.

### Table 31-3: EPIC® – definitions and instructions for use

#### Contact

The coating of the base material with a precious metal is necessary to guarantee a long lasting and good connection. The contacts are plated normally by galvanic processes. To reach a long-lasting plating, there are some requirements for the contact and the plating material.

LAPP uses mainly silver (Ag) and gold (Au) for surface coating,

- Silver has the highest electrical conductivity of all metals and is the most cost effective precious metal. By sulfur or sulfur-containing substances in the ambient air rapidly forms a brownish to black oxide layer of silver sulfide (Ag<sub>2</sub>S). This layer, however, can break during mating or is broken at high currents, so that the required electrical conductivity is maintained. Passivation of the silver surface reduces the formation of the oxide layer and reduces the plug and pulling forces.
- Gold is the most stable precious metal. The oxide and sulfide formation can be neglected. Gold contacts are characterized by low insertion and extraction forces. They are mainly used in the transmission of signals with low current and voltage values. Due to high-precision manufacturing of contacts and selection of the contact materials is the lifetime of the EPIC® connector very high.

#### Mating cycles

Mating cycles are mechanical operations of connectors by insertion and removal.

**Application Note:** The maximum number of mating cycles resulting from the increase in the resistance of the connection after X-time insertion and removal. This must not be more than 50% increase in-or exceed 5mOhm. Another soft factor is the condition of the contacts or the locking elements. There should be no harmful abrasion inside the connector. EPIC® has for the soft factors extremely high internal standards. This internal review can vary widely depending on the manufacturer.

#### Temperature range

The temperature range is determined by the upper and lower limit temperature. These temperatures are the highest and lowest allowable temperatures at which a connector must still be operated.

**Application Note:** The higher temperature limit includes the heating of contacts and the ambient temperature. It is always measured at the hottest point. These are either the transition of the crimp area or the contacts in general. The temperature of the protective housing is usually much lower than the hottest point of contact.

The lower limit temperature is the lowest permissible temperature at which a connector may be operated. In particular, the sealing materials get stiff at low temperatures and lose elasticity. Is the connector mated or unmated under in this temperature range, separated or assembled, it may cause damage to the seals. At static use depending on the connector system and application can be used at a lower temperature range. Due to the used materials and the design of the housing the temperature range of the EPIC® connectors is very wide.

#### Degree of pollution

Numerical value which states the anticipated pollution in the micro-environment.

The pollution degree 3 is typical for industrial environments, whilst pollution degree 2 is typical for households.

#### Pollution degree 1:

No pollution or only dry, non-conductive pollution occurs. This pollution has no influence.

**Example for environment:** Open, unprotected insulation in air-conditioned or clean, dry rooms.

#### Pollution degree 2:

Only non-conductive pollution occurs. Occasionally, however, it may be anticipated that transient conductivity arises due to condensation.

**Example for environment:** Open unprotected insulations in residential, commercial or business premises (fine mechanical engineering workshops, laboratories, test areas, rooms used for medical purposes).

#### Pollution degree 3:

Conductive pollution arises, or dry, non-conductive pollution which becomes conductive because condensation has to be anticipated.

**Example for environment:** Example: Open unprotected insulations in rooms of industrial, commercial and agricultural companies, unheated storage rooms, boilerhouses and workshops.

#### Pollution degree 4:

The pollution generates persistent conductivity caused by conductive dust, rain or snow.

#### Pre-mating contact

If the construction of the circuit requires that for safety reasons, e.g. for neutral conductors, one or several contacts of a connector have to make contact first upon mating, or have to be separated last upon unmating, then connectors with switch (extended) contacts are used.

#### Safety note:

In the case of EPIC® inserts such as H-BE or H-BS, the protective conductor connection can be changed. When connecting the protective conductor, the low-resistance connection to the protective conductor of the counter piece must not be interrupted. Terminal screw changes must be performed on both sides to ensure that the protective function is maintained.

Otherwise, the relevant specifications apply in accordance with: DIN EN 50110-1 (VDE 0105-1) – Operation of electrical installations.

It is up to the user to assess whether, in specific areas of application not covered by us, the components listed in this catalogue comply with regulations other than those specified here. We reserve the right to make constructional and design modifications due to quality improvements, enhancements or manufacturing requirements. The information in this catalogue serves to specify the components and does not guarantee properties.

Assurance of the technical properties can only be given if all components are supplied by LAPP. Otherwise, any testing and approval is the responsibility of the operator.

#### Certificates:

VDE, certificate number 40016270, 40011894, 40013251, 40019264  
 UL, file number: E75770, E249137, E192484  
 CSA files: E75770, E249137, E192484  
 TÜV

#### For further information on the topic of this appendix, see:

Table T22: Definition of protection according to EN 60529 and DIN 40050

Table T23-1: PG/Metric: Connection thread of EPIC® housing