HANDLING INSTRUCTIONS

GISMA
STECKVERBINDER
GMBH

HANDHABUNGSANWEISUNG
FÜR BAUREIHE 10, 16, 22, 34, 35, 40, 42, 48, 80

HANDLING INSTRUCTIONS
FOR SERIES 10, 16, 22, 34, 35, 40, 42, 48, 80



QUALITY SYSTEM CERTIFICATION
DNV
ISO 9001

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GISMA ELECTRICAL & FIBRE OPTIC CONNECTORS - PROTECTION, STORAGE, SHIPMENT, UNPACKING, DEPLOYMENT & MAINTENANCE INSTRUCTIONS

1. GENERAL

Thank you for purchasing a GISMA product. The information that follows is an overview of the protection, storage, shipment, unpacking, deployment and maintenance instructions for GISMA electrical and fibre optic products.

GISMA recommend the termination and handling of all equipment only be undertaken by suitably trained and qualified personnel.

2. SCOPE

This procedure includes information on the following connector types:

- GISMA series 10
- GISMA series 16
- GISMA series 22
- GISMA series 34
- GISMA series 35
- GISMA series 40
- GISMA series 42
- GISMA series 80

Sections 3, 4, 5 and 6 handle general information applicable to all GISMA connectors. Section 7 then provides specific information relevant to each connector series.

3. PROTECTION, HANDLING AND SHIPMENT

GISMA electrical, fibre and hybrid connectors are manufactured primarily from materials such as stainless steel 1.4404 / 1.4571 (316L / 316Ti), marine bronze (CW307G) and titanium Grade 5, and as such are designed to withstand harsh saliferous environments. However, the connector insulator and exposed parts are susceptible to mechanical damage if not adequately protected. Dust caps are fitted to all GISMA connectors before transport, but can be fitted with POM protective caps or pressure watertight protective caps, if specified by the customer. Pressure watertight caps must remain in place until the connectors are ready for the underwater mating process.

The connectors are generally relatively small items of equipment, and therefore, can be shipped singularly or in multiples. Care should be taken to protect the connector with bubble wrap or similar wrapping materials to avoid surface damage during transit. Dust caps or POM protective caps must be fitted at all times during transport.

If the connectors are assembled onto cables these must be suitably coiled and secured with appropriate material (tape, cable strap) to prevent uncoiling during transit. Recommended bend radius for storage/transport of cables, refer to cable specification or jumper drawing.

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Any connector-specific handling and transport advice is contained within the appropriate section further on in this document.

4. UNPACKING

Remove wrapping material taking care to inspect for any surface damage or items that may have become separated from the connector, such as 'O-ring' seals. Do not use a knife to cut the wrapping material, as this may cause damage to any elastomeric parts of the connector. Do not remove any kind of protection caps until connectors are ready for installation. On removal do not allow the cables to drag over the edges of the packing crate.

5. STORAGE

5.1. Short Term Connector Storage

Prior to installation the connectors are sensitive to environments where grit and dirt are present. To prevent ingress of the above, they should be stored in a clean dry area and be protected by bubble wrap or similar wrapping and packing material. Protective caps must be fitted if supplied.

5.2. Long Term Connector Storage

The connectors must be stored in a clean dry area and be protected by bubble wrap or similar. Suitable protective caps must be fitted, and the storage temperature should be ideally between +5°C and +20°C. For short times and during transport storage temperature can be between -40°C and +70°C. Regarding the series 80, the connectors should be stored between -18°C and +50°C. Humidity of the store room should be below 75%. Very moist or very dry conditions should be avoided. The connectors should be protected from sunlight and artificial light with a high ultra violet content.
The connectors should not be allowed to come into contact with solvents, oil, greases or any other semi-solid materials.

If storage time is longer than 2 years, outer o-rings have to be replaced prior to installation.

After a storage period of 7 years, GISMA recommends for connectors and cable assemblies a detailed inspection by the connector manufacturer.

6. Jumper handling and mounting

6.1. Jumper handling

GISMA connectors can be delivered as part of the jumper assembly. All terminated connectors are delivered with dust caps for protecting the contacts and the insulator against damage and dust. **These caps have to be removed before subsea usage.**

Before mounting inspect the jumper and especially the cable for damages and debris.

Lightly grease the locking threads of the receptacles, pressure hull penetrators and the through bulkhead receptacles e.g. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

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After mounting the cable has to be fixed closed to the structure (first fix point 500 mm behind the connector's endbell and then every 500 mm) to prevent movement and turning of the jumper cable.

Take care that all connectors are correctly mated and locked with the correct mounting torque or protected by pressure watertight protective caps before going subsea. For defined mounting instructions refer to the different connector series and special jumper drawings.

Prior to installation the connectors are sensitive to environments where grit and dirt are.

7. DEPLOYMENT & MAINTENANCE

The following section details deployment and maintenance instructions for all GISMA connectors & cables, categorised by product type. Please refer to the appropriate section as listed below:

7.1. - Subsea connectors' series 10
7.2. - Subsea connectors' series 16
7.3. - Subsea connectors' series 22
7.4. - Subsea connectors' series 34
7.5. - Subsea connectors' series 35
7.6. - Subsea connectors' series 40
7.7. - Subsea connectors' series 42
7.8. - Subsea connectors' series 80

All information contained within this section is generic. Where customer or project-specific information is required, please refer to the relevant project specification or scope of supply.

For further technical information refer to the catalogues of the different series or special drawings.

Note: It is important to isolate and earth prior to disconnect in order to remove any stray charges in the system. If left, this can induce corrosion on the exposed pins once the plug is removed.

The connector shall have the following periodic maintenance checks:

- Examine the connector for signs of damage.
- Check the locking sleeve, these shall be tight, if loose refer to assembly instruction for torque values, where appropriate.

7.1. SUBSEA CONNECTORS SERIES 10

7.1.1. General

The series 10 sizes 1 to 7 range of connectors has been developed for long term reliable signal and low power control system applications associated with offshore installations. The underwater mateability of the range of signal connectors series 10 (contact-Ø 1mm and 1,5mm) is achieved by using a patented, conical sealing system at each contact and a lip gasket.

For further technical information refer to the catalogue of series 10 or special drawings.

The connector range series 10 comprises standard **power connectors** for high voltage and high current application as well. **NOTE!** These connectors are not underwater pluggable. Please ask for detailed product information.

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Connectors are usually supplied with dust caps. The dust caps need to be removed prior to mating the connectors.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 stab plate connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

If the connectors are to be left unmated in seawater for any length of time, pressure watertight protective caps must be used to protect the contacts. Over exposure will increase the risk of corrosion damage or marine growth on the contact surfaces of the pin contacts. This could lead to damage to the seals and insulation within the socket contacts.

The appropriate test connector must always be used to make electrical contact during testing. **UNDER NO CIRCUMSTANCES** should a foreign object (such as a screwdriver, test probe or crocodile clip) be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the warranty of the connector.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

The series 10 range of connectors can be supplied either singularly or as part of a harness assembly. All series 10 connectors require the following acceptance tests during termination:

- Mating test
- Insulation Resistance test
- High Voltage test
- Continuity test

Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each series 10 connector has been mated, hydrostatically tested (applies to receptacles only) and electrically proven prior to despatch. Termination of these connectors should only be undertaken by trained personnel.

7.1.2. Live Mate / Demate

The series 10 range of connectors are designed to be mated / de-mated with **POWER OFF**.

7.1.3. Protection of receptacle’s pin contacts

Under no circumstances the contacts should be exposed to seawater with power on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic

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action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.1.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.
Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the pins at the front and onto any elastomer part like insulators and boot seals.

NOTE: Keep the connector mated at any cleaning operation!

7.1.5. Connector Handling

Installation instruction for jam nut receptacles and flange receptacles according MV 2004-034 or customer design.

The mounting hole and the supporting surface must be clean and without any damages.

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter. Coaxial- and fibre-optic inserts must be protected against moisture.

- Insulator greasing

  Before the initial coupling the front side of the socket connectors must be greased with GISMA-grease EK2 (part no.: GISMA-FETT EK2), to fill the conical seal cavities with grease (see drawing below). Greasing ensures that the two elastomer Insulators in the conical seals can slide perfectly into its final position and thus best seal. After 5 underwater matings the connector must be greased again (applies only to series 10).

  For greasing the GISMA connectors - Grease EK2 is specified. The corresponding compatibility of this Grease is with all elastomers used in GISMA (insulating, sealing elements) given. At the same time, this product has excellent properties.
  The grease EK2 is not conductive. By mating the GISMA connector the contact forces applied mean the grease is completely displaced from the contact area, so that the grease does not affect the contact resistance. At the same time this ensures a high Insulation resistance - even with insertions in moist environments.

  Typical properties

  - reduced friction and wear
  - prevents leakage
  - contact oxidation resistance
  - neutral against plastics

  Amount of grease to be used

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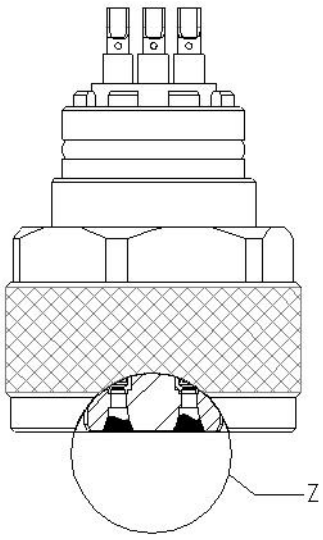
The Insulator should be greased so that the insulating sealing cone is 70-100 % filled with grease.

Attention

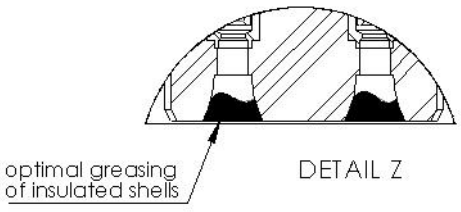
For hybrid connectors (eg fibre optic and coax combined) it is necessary to ensure that only the region of the insulating elastomer must be greased. Fibre-optic and coaxial contacts must be kept absolutely free from grease to prevent losses.

Left: Ungreased insulator, Right: greased insulator





Picture: grease filling of plug



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Lightly grease the locking threads of the receptacles, pressure hull penetrators and the through bulkhead receptacles e.g. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

Check to see if the plugs locking sleeve runs smoothly.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA-FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place.
  While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it into the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview”.

- Cathodic Protection

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti), marine bronze (CW307G) or titanium grade 5 diver mate connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Pressure testing

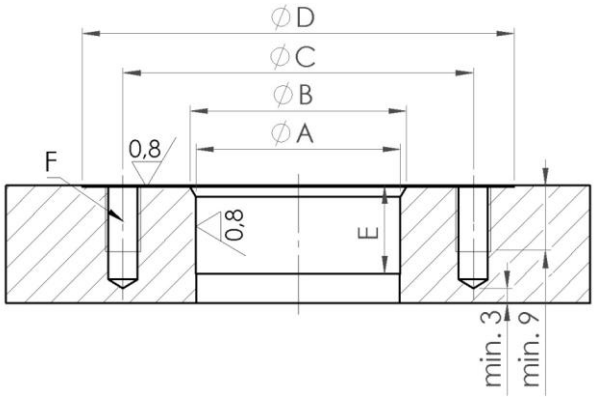
  Series 10 plugs and receptacles are longitudinal watertight up to the specified pressure range (see dimensional drawings). Every receptacles and terminated plug for underwater applications will be pressure tested acc. Customer or GISMA specification.
  Hybrid connectors with coaxial and fibre optic contacts have to be tested with protective caps to prevent deposits from decreasing the connectors performance!

- Safety

  Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

7.1.6. Mounting dimensions

- Mounting hole for flange-receptacle

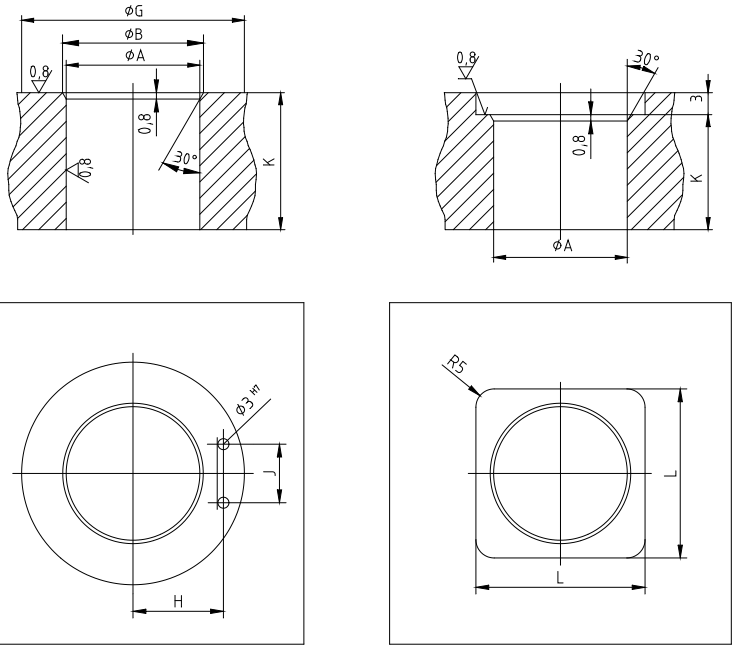


Size	Ø A	Ø $B_{max.}$	Ø $C^{\pm 0,1}$	Ø $D_{min.}$	Ø $E_{min.}$	Ø F	Ø G	$H^{\pm 0,1}$	$J^{\pm 0,2}$	$K_{max.}$	L
1	$23,5^{H8}$	$24,5_{-0,3}$	37,5	50	12	M5 (4x90°)	36	17,7	11	28	32,6
2	$26,5^{H8}$	$27,5_{-0,3}$	40	51	12	M5 (6x60°)	39	19,2	11	28	35,6
3	32^{H8}	$33,5_{-0,3}$	48	59	12	M5 (6x60°)	46	22,2	15	26	41,6
4	$36,5^{H8}$	$37,5_{-0,3}$	52	63	12	M5 (6x60°)	51	24,7	16	26	46,6
5	47^{H8}	$49,5_{-0,3}$	67	78	12	M5 (6x60°)	69	32,7	24	25	62,6
6	56^{H8}	$59,5_{-0,3}$	77	88	17	M5 (6x60°)	78	39,2	14	25	75,6
7	85^{H8}	$88_{-0,3}$	112	126	28	M8 (6x60°)					
71	91^{H8}	$94_{-0,3}$	122	142	17	M8 (6x60°)					

Mounting holes for standard flange and jam nut receptacles. Please, contact our design department for special ones!

ATTENTION: for application more than 600 bars Ø $A^{H7.}$

- Mounting hole for jam nut receptacle



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7.2. SUBSEA TITANIUM CONNECTORS SERIES 16

7.2.1. General

The series 16 sizes 3,4,5,6 ranges of connectors has been developed for long term reliable signal and low power control system applications associated with offshore installations.
The long term watertightness of the mating area at the signal connectors series 16 (contact-Ø 1,5 mm) is achieved by using a patented, conical sealing system at each contact, a lip gasket and an O-ring seal.

NOTE! These connectors are **not underwater mateable**.

A part of series 16 connectors are especially designed for oil compensated systems and are pressure proof from both sides.

NOTE! Please make sure to use the appropriate connector in your system.

For further technical information refer to the catalogue series 16 or special drawings.

Connectors are usually supplied with dust caps. The dust caps need to be removed prior to mating the connectors.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

If the connectors are to be left unmated in seawater for any length of time, pressure watertight protective caps must be used to protect the contacts. Over exposure will increase the risk of corrosion damage or marine growth on the contact surfaces of the pin contacts. This could lead to damage to the seals and insulation within the socket contacts.

The appropriate test connector must always be used to make electrical contact during testing. **UNDER NO CIRCUMSTANCES** should a foreign object (such as a screwdriver, test probe or crocodile clip) be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the warranty of the connector.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

The series 16 range of connectors can be supplied either singularly or as part of a harness assembly. All series 16 connectors require the following acceptance tests during termination:

- Mating test
- Insulation Resistance test
- High Voltage test
- Continuity test

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Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each series 16 connector has been mated, hydrostatically tested (applies to receptacles only) and electrically proven prior to despatch. Termination of these connectors should only be undertaken by trained personnel.

7.2.2. Live Mate / Demate

The series 16 range of connectors are designed to be mated / de-mated with **POWER OFF**.

7.2.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power off or on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.2.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the pins at the front and onto any elastomer part like insulators and boot seals.

NOTE: Keep the connector mated at any cleaning operation!

7.2.5. Connector Handling

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter.

  Prior to mating a series 16 connector, each conical seal of the socket insert should be filled with a small amount of GISMA grease EK-2 (part.no.: GISMA-FETT EK-2) dielectric grease.

- Thread greasing

  Lightly grease the locking threads of the receptacles GISMA-FETT LP 430.

  Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

  Check to see if the plugs locking sleeve runs smoothly.

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- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place.
  While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it into the receptacle fitting using corresponding wrenches. For defined clamping torque refer to GISMA document “Torque overview”.

- Cathodic Protection

  For titanium grade 5 connectors the cathodic protection is to be considered by the customer.

7.2.6. Test Port

Series 16 receptacles are equipped with test ports according to API specification 16D. The integrity of the sealing of the mating and flange area could be tested.

The test ports should be sealed by the provided test port sealing plugs at all times.
For testing the sealing plugs will be replaced by a test port adapter and a test pressure pump will be connected via Minimess hose. A pressure drop test according to customer specifications will show the integrity of the sealing.

After the test, the sealing plugs must be carefully installed with clean and greased o-rings.

7.2.7. Pressure Balanced Oil Filled Hose (PBOF)

Series 16 plugs and receptacles are pressure proof from mating side as well as termination side. This enables the usage of pressure balanced oil filled hose adapters and hoses (PBOF).

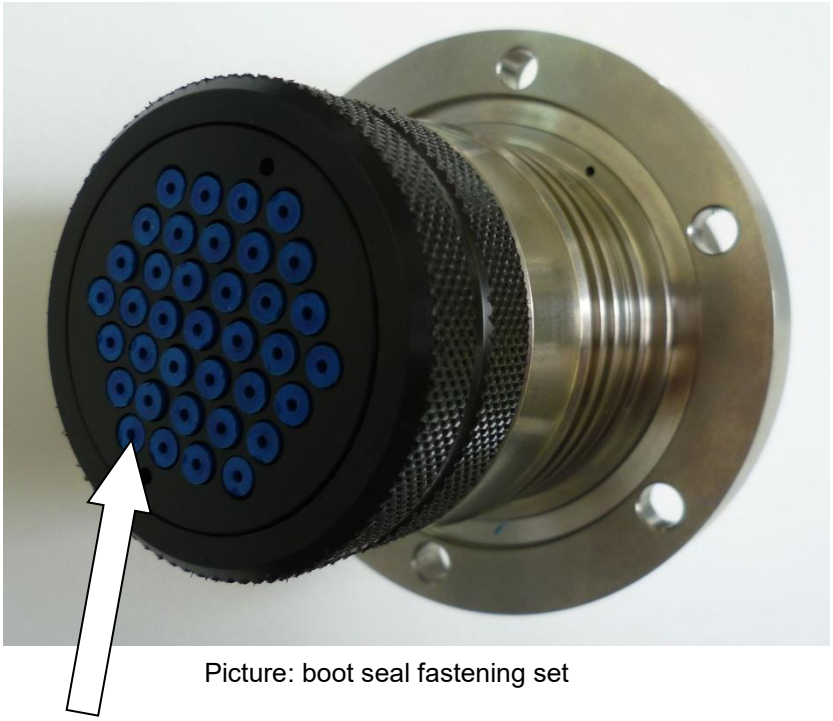
NOTE! There are also receptacles for atmospheric junction boxes. Please make sure to use the appropriate connector in your system.

API specifications require boot seals as additional sealing system for PBOF. Boot seals must match the wire diameter. Before applying the boot seal, a portion of GISMA grease EK-2 must be applied inside the boot seal by use of a syringe.

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GISMA highly recommends the usage of a boot seal fastening set. This fastening set keeps the boot seals in place, restricts the bending radius and forms an extra oil reservoir.



Picture: boot seal fastening set

Fill the oil reservoir entirely with oil by a syringe. Make sure the oil can't drain until the hose system is completely filled with oil.
GISMA will supply boot seal material specimen (Viton) for oil compatibility check on request.

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7.3. SUBSEA CONNECTORS SERIES 22

7.3.1. General

The connector range series 22 is especially designed for long term subsea use under harsh conditions, e. g. submarines. It can be supplied either singularly or as part of a harness assembly.

Series 22 connectors are only dry pluggable.

All GISMA connectors require the following acceptance tests during the terminations:

- Mating test
- Insulation Resistance test
- High Voltage test
- Continuity test

Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each GISMA connector is fitted with a pin or socket insulator which has been tested prior to despatch.

Termination of series 22 connectors should only be undertaken by trained personnel.

All series 22 connectors must be fitted with a mating connector or a pressure watertight protective cap prior to subsea installations. Connectors must not be energised subsea unless coupled with a mating connector or fitted with a pressure watertight protective cap, in order to prevent electrolytic damage to the contacts when exposed to sea water.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 stab plate connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

NOTE: Series 22 cannot be used for oil compensated systems or oil compensate hose terminations.

For further technical information refer to the catalogue of series 22 or special drawings.

7.3.2. Live Mate / Demate

The series 22 range of connectors are designed to be mated / de-mated with **POWER OFF**.

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7.3.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power off or on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.3.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the pins at the front and onto any elastomer part like insulators and bootseals.

NOTE: Keep the connector mated at any cleaning operation!

7.3.5. Connector Handling

- Installation instruction for jam nut receptacles, bulkheads and pressure hull penetrators

  The flange and mounting hole has to be manufactures according VG 85 519 or customer design.

  The mounting hole and the supporting surface must be clean and without any damages.

  Grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film).

  Push the pressure hull penetrator into mounting hole and locate the penetrator with the centering pin according to your installation drawing. The connector keyway must be in the right position.

  For easy handling we recommend the GISMA pipe spanners: 22.94.001 / 22.94.002 and 22.94.003. If castellated nuts are used, the Mounting tool 22.94.020, 22.94.021 or 22.94.022 is necessary.

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter. Coaxial- and fibre-optic inserts must be protected against moisture.

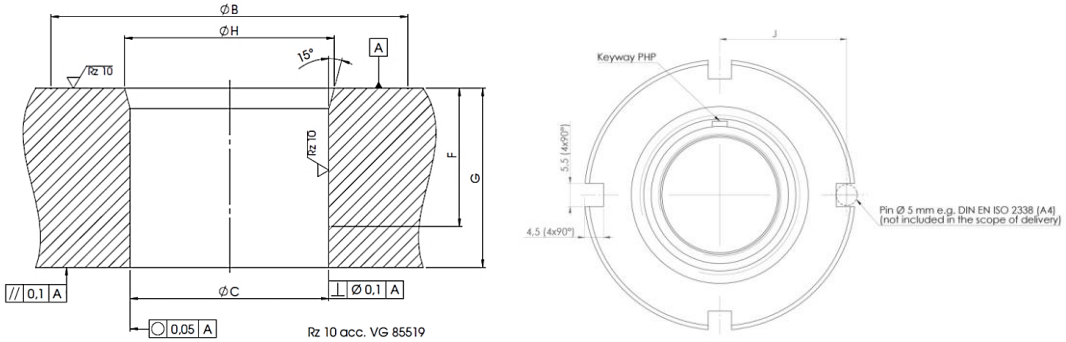
  Prior to mating an series 22 connector, each conical seal of the socket insert should be filled with a small amount of GISMA grease EK2 (part no.: GISMA-FETT EK-2) dielectric grease.

- Installation conditions for 90° PUR moulding endbells

  Plugs with 90° PUR moulding endbells have to be mounted without bending forces at the PUR moulding.

7.3.6. Mounting dimension

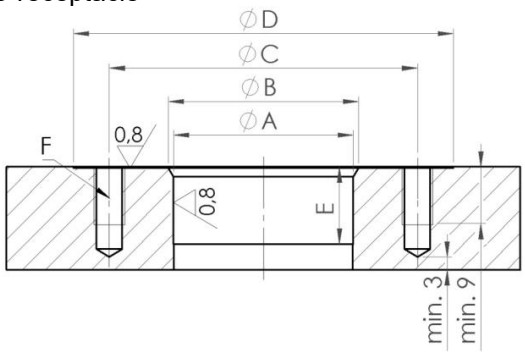
- Mounting hole for pressure hull penetrator



Size	Ø $B_{min.}$	Ø C O-ring sealing (acc VG 85519 old)	Ø C O-ring sealing (acc VG 85519)	Ø C Profile sealing ring	Ø C Alternatives tolerances for profile sealing	$F_{min.}$	G Standard PHP 20.04.x...	G Bothsides pressure watertight PHP 20.54.x...	G Bothsides pressure watertight PHP 20.64.x...	Ø H	J DIN 7168 middle
1	70	$39_{\pm 0,05}$	39_{H7}	$39^{+0,25}_{+0,05}$	39_{H8}	27	40-85	40-90	/	$41,1^{+1}$	30,4
2	70	$39_{\pm 0,05}$	39_{H7}	$39^{+0,25}_{+0,05}$	39_{H8}	27	40-85	40-90	/	$41,1^{+1}$	30,4
3	70	$39_{\pm 0,05}$	39_{H7}	$39^{+0,25}_{+0,05}$	39_{H8}	27	40-85	40-90	26-43	$41,1^{+1}$	30,4
4	85	$54_{\pm 0,05}$	54_{H7}	$54^{+0,25}_{+0,05}$	54_{H8}	26,5	40-85	/	27-43	$56,1^{+1}$	37,9
5	85	$54_{\pm 0,05}$	54_{H7}	$54^{+0,25}_{+0,05}$	54_{H8}	28	40-85	/	27-43	$56,1^{+1}$	37,9
6	105	$72_{\pm 0,05}$	72_{H7}	$72^{+0,25}_{+0,05}$	72_{H8}	33,7	40-85	/	/	$74,1^{+1}$	47,4
7	105	$72_{\pm 0,05}$	72_{H7}	$72^{+0,25}_{+0,05}$	72_{H8}	33,7	40-85	/	/	$74,1^{+1}$	47,4
7+	105	$74_{\pm 0,05}$	74_{H7}	$74^{+0,25}_{+0,05}$	74_{H8}	33,7	40-85	/	/	$76,1^{+1}$	48

Mounting holes for standard pressure hull penetrators. Please, contact our design department for special ones!

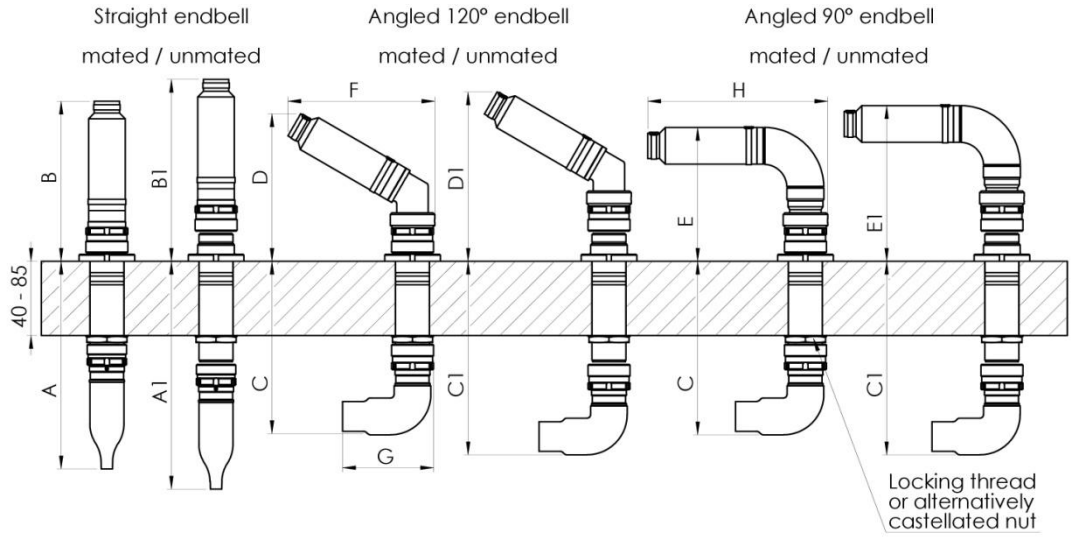
- Mounting hole for flange-receptacle



Size	Ø A	Ø B	Ø C ±0,1	Ø D_{min}	E_{min}	Ø F
0	$22_{\pm 0,05}$	$23^{-0,3}$	38,5	49	12	M5 (4x90°)
1	$26_{\pm 0,05}$	$28^{-0,3}$	50	63	11	M6 (6x60°)
2	$32_{\pm 0,05}$	$34^{-0,3}$	56	69	9	
3	$35_{\pm 0,05}$	$37^{-0,3}$	60	73	9	
4	$47_{\pm 0,05}$	$49^{-0,3}$	71	84	9	
5	$56_{\pm 0,05}$	$57^{-0,3}$	74	87	11	
6	$64_{\pm 0,05}$	$66^{-0,3}$	91	105	16	
7	$72_{\pm 0,05}$	$74^{-0,3}$	102	115	16	

Mounting holes for standard flange receptacles. Please, contact our design department for special ones!

- Mounting dimensions of connector assembly (plugs, PHP and Endbells)



Size	A	A1	B	B1	C	C1	D	D1	E	E1	F	G	H
1	196	219	172	197	196	219	158	183	112	137	148	66	198
2	196	219	172	197	196	219	158	183	112	137	148	67	198
3	208	231	180	205	208	231	164	189	145	170	162	78	205
4	276	302	215	240	276	302	181	206	183	208	182	110	244
5	284	309	215	240	284	309	191	216	193	218	204	112	266
7	291	323	250	280	241	268	255	285	199	227	250	147	280

ATTENTION: all details are approximately measurements

7.3.7. Sealing spare parts

- Replaceable O-rings and profile sealing rings on pressure hull penetrator

  We offer a customised sealing package to our customers. Please contact our sales department for suitable selection. Based on the part number you will get information and a quotation about the right set immediately. Only with proper maintenance the extraordinary longevity of our pressure hull penetrator can be guaranteed.

  The tools in the following list are necessary for mounting O-rings and profile sealing rings. The document MB BR22-2177 provides detailed information about the mounting.

Pressure hull penetrator	Tool kit
Size 1-3	22.94.014
Size 4-5	22.94.015
Size 7	22.94.016
Size 5 hybrid	22.94.026

The dismounting tool 22.90.006 for o-rings and profile sealing rings is necessary to remove the O-ring in the mating area.

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- Insulator greasing

  Before the initial coupling the front side of the socket connectors must be greased with GISMA-grease EK2 (part no.: GISMA-FETT EK2), to fill the conical seal cavities with grease (see drawing below). Greasing ensures that the two elastomer Insulators in the conical seals can slide perfectly into its final position and thus best seal. After 20 matings the connector should be greased again.

  For greasing the GISMA connectors - Grease EK2 is specified. The corresponding compatibility of this Grease is with all elastomers used in GISMA (insulating, sealing elements) given. At the same time, this product has excellent properties.
  The grease EK2 is not conductive. By mating the GISMA connector the contact forces applied mean the grease is completely displaced from the contact area, so that the grease does not affect the contact resistance. At the same time this ensures a high Insulation resistance - even with insertions in moist environments.

  Typical properties

  - reduced friction and wear
  - prevents leakage
  - contact oxidation resistance
  - neutral against plastics

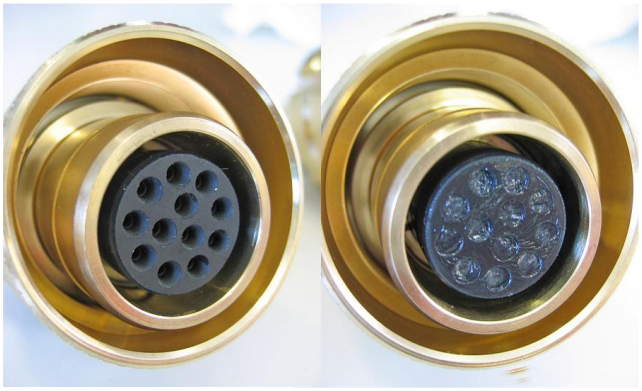
  Amount of grease to be used

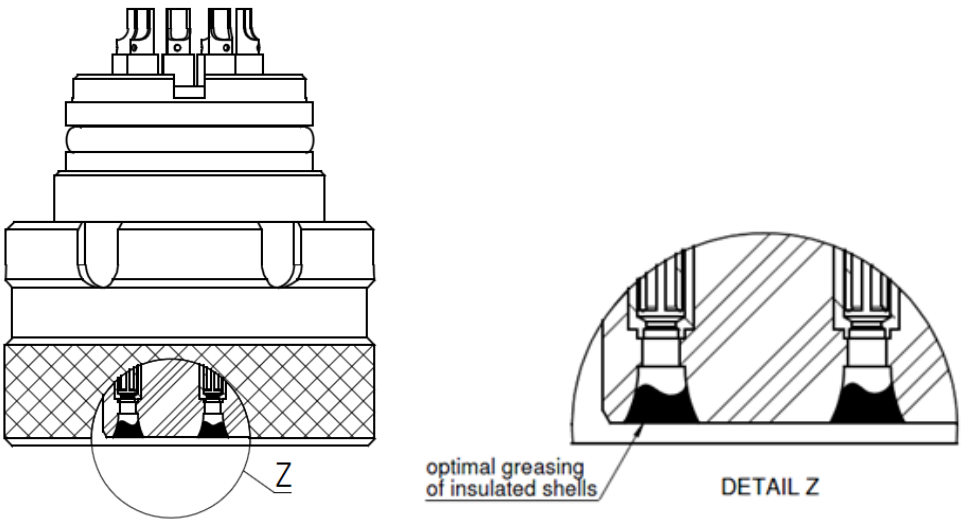
  The Insulator should be greased so that the insulating sealing cone is 70-100 % filled with grease.

Attention

For hybrid connectors (eg fibre optic and coax combined) it is necessary to ensure that only the region of the insulating elastomer must be greased. Fibre-optic and coaxial contacts must be kept absolutely free from grease to prevent losses.

Left: Ungreased insulator **Right:** greased insulator





Picture: grease filling of plug

Lightly grease the locking threads of the receptacles, pressure hull penetrators and the through bulkhead receptacles e.c. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

Check to see if the plugs locking sleeve runs smoothly.

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- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place. While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it onto the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview”.

- Cathodic Protection

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti), marine bronze (CW307G) or titanium grade 5 diver mate connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

  The GISMA coaxial contacts must be protected to any pollution especially water / water pressure.

- Pressure testing

  Series 22 plugs, receptacles and pressure hull penetrators are longitudinal watertight up to the specified pressure range (see dimensional drawings). Every receptacles and terminated plug for underwater applications will be pressure tested acc. Customer or GISMA specification.
  Hybrid connectors with coaxial and fibre optic contacts have to be tested with protective caps to prevent deposits from decreasing the connectors performance!

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7.4. SUBSEA CONNECTORS SERIES 34

7.4.1. General

The series 34 range of connectors has been developed for long term reliable signal and low power control system applications. The watertightness of the dry mateable connectors series 34 is achieved by using O-ring seals. The insulator inserts are longitudinally watertight.

For further technical information refer to the catalogue of series 34 or special drawings.

NOTE! These connectors are not underwater pluggable.

Connectors are usually supplied with dust caps. The dust caps need to be removed prior to mating the connectors.

The connnectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required.

If the connectors are to be left unmated in seawater for any length of time, pressure watertight protective caps must be used to protect the connector interface.

The appropriate test connector must always be used to make electrical contact during testing. **UNDER NO CIRCUMSTANCES** should a foreign object (such as a screwdriver, test probe or crocodile clip) be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the warranty of the connector.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

The series 34 range of connectors can be supplied either singularly or as part of a harness assembly. All series 34 connectors require the following acceptance tests during termination:

- Mating test
- Insulation Resistance test
- High Voltage test
- Continuity test

Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each series 34 connector has been mated, hydrostatically tested (applies to receptacles only) and electrically proven prior to despatch. Termination of these connectors should only be undertaken by trained personnel.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

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7.4.2. Live Mate / Demate

The series 34 range of connectors are designed to be mated / de-mated with **POWER OFF**.

7.4.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.4.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is not acceptable.

NOTE: Keep the connector mated at any cleaning operation!

7.4.5. Connector Handling

The mounting hole and the supporting surface must be clean and without any damages.

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter. Coaxial- and fibre-optic inserts must be protected against moisture.

  Attention

  For hybrid connectors (eg fibre optic and coax combined) it is necessary to ensure that only the region of the O-ring must be greased. Fibre-optic and coaxial contacts must be kept absolutely free from grease to prevent losses.

  Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

- O-ring greasing

  We recommend our grease EK2 which is well tested and for all our elastomers approved.

  Typical properties

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- reduced friction and wear
- prevents leakage
- neutral against plastics

- Thread greasing

  Lightly grease the locking threads of the receptacles, pressure hull penetrators and the through bulkhead receptacles e.g. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

  Check to see if the plugs locking sleeve runs smoothly.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA-FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place. While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it into the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview”.

- Cathodic Protection

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti), marine bronze (CW307G) or titanium grade 5 diver mate connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Pressure testing

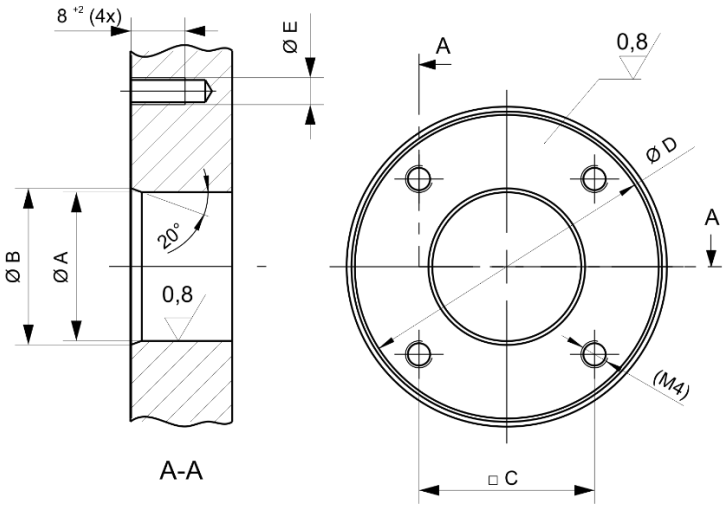
  Series 34 plugs and receptacles are longitudinal watertight up to the specified pressure range (see dimensional drawings).

- Safety

  Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

7.4.6. Mounting Dimension

- Mounting hole for flange receptacle



Size	Ø A	Ø B	□ C	Ø D min.	Ø E
1	22,05 +0,05	23,2	26	45	M4 (4x 90°)
2	25,65 +0,05	26,8	28	48	M4 (4x 90°)

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7.5. SUBSEA CONNECTORS SERIES 35

7.5.1. General

The series 35 range of connectors has been developed for long term reliable signal and low power control system applications. The watertightness of the dry mateable connectors series 35 is achieved by using O-ring seals. Only the receptacle insulator is longitudinally watertight.

For further technical information refer to the catalogue of series 35 or special drawings.

NOTE! These connectors are not underwater pluggable.

Connectors are usually supplied with dust caps. The dust caps need to be removed prior to mating the connectors.

The connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required.

If the connectors are to be left unmated in seawater for any length of time, pressure watertight protective caps must be used to protect the connector interface.

The appropriate test connector must always be used to make electrical contact during testing. **UNDER NO CIRCUMSTANCES** should a foreign object (such as a screwdriver, test probe or crocodile clip) be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the warranty of the connector.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken

Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

The series 35 range of connectors can be supplied either singularly or as part of a harness assembly. All series 35 connectors require the following acceptance tests during termination:

- Mating test
- Insulation Resistance test
- High Voltage test
- Continuity test

Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each series 35 connector has been mated, hydrostatically tested (applies to receptacles only) and electrically proven prior to despatch. Termination of these connectors should only be undertaken by trained personnel.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

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7.5.2. Live Mate / Demate

The series 35 range of connectors are designed to be mated / de-mated with **POWER OFF**.

7.5.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.5.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is not acceptable.

NOTE: Keep the connector mated at any cleaning operation!

7.5.5. Connector Handling

The mounting hole and the supporting surface must be clean and without any damages.

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter. Coaxial- and fibre-optic inserts must be protected against moisture.

  Attention

  For hybrid connectors (eg fibre optic and coax combined) it is necessary to ensure that only the region of the O-ring must be greased. Fibre-optic and coaxial contacts must be kept absolutely free from grease to prevent losses.

  Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

- O-ring greasing

  We recommend our grease EK2 which is well tested and for all our elastomers approved.

  Typical properties

  - reduced friction and wear

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- prevents leakage
- neutral against plastics

- Thread greasing

  Lightly grease the locking threads of the receptacles, pressure hull penetrators and the through bulkhead receptacles e.g. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

  Check to see if the plugs locking sleeve runs smoothly.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA-FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place. While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it into the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview”.

- Cathodic Protection

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti), marine bronze (CW307G) or titanium grade 5 diver mate connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Pressure testing

  Series 35 receptacles are longitudinal watertight up to the specified pressure range (see dimensional drawings).

- Safety

  Test connectors or free touchable connectors with metal shell must be connected to the earth conductor.

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7.6. SUBSEA CONNECTORS SERIES 40

7.6.1. General

The hybrid connector range series 40 is especially designed for long term subsea use under harsh conditions, e. g. submarines. It can be supplied either singularly or as part of a harness assembly.

Series 40 connectors are only dry pluggable.

All GISMA connectors require the following acceptance tests during the terminations:

- Mating test
- Insulation Resistance test
- High Voltage test
- Attenuation test

Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each GISMA connector is fitted with a pin or socket insulator which has been tested prior to despatch.

Termination of series 40 hybrid connectors should only be undertaken by trained personnel.

All series 40 hybrid connectors must be fitted with a mating connector or a pressure watertight protective cap prior to subsea installations. Connectors must not be energised subsea unless coupled with a mating connector or fitted with a pressure watertight protective cap, in order to prevent electrolytic damage to the contacts when exposed to sea water.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

NOTE: Series 40 hybrid connectors cannot be used generally for oil compensated systems or oil compensated hose terminations. Special versions are available, please contact our design department.

For further technical information refer to the catalogue of series 40 or special drawings.

7.6.2. Live Mate / Demate

The series 40 range of connectors are designed to be mated / de-mated with **POWER OFF**.

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7.6.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power off or on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.6.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

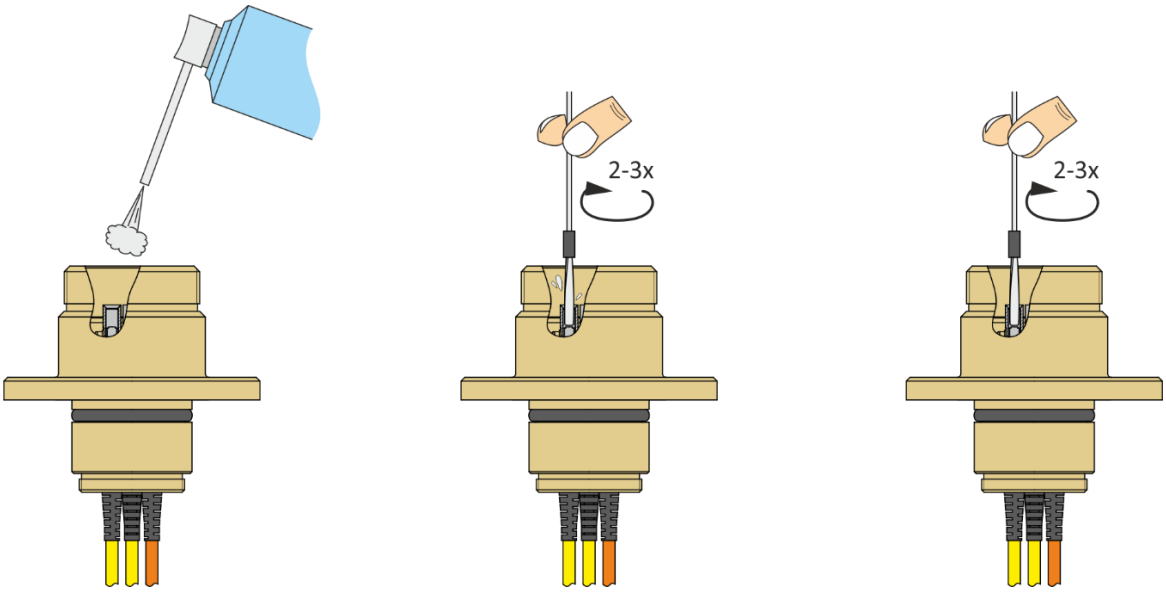
Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the pins at the front and onto any elastomer part like insulators and boot seals.

NOTE: Keep the connector mated at any cleaning operation!

7.6.5. Cleaning process for ferrules

In case of contamination of the ferrules we strongly recommend the following procedure for cleaning:

- blow out ferrules with compressed air to remove possible dust and dirt particles
- dip a cleaning stick (part-no.: 40.99.41) into alcohol (part-no.: 40.99.55) and carry it into the ferrule with rotating motions
- clean the ferrules with a further, dry stick, also under rotating movements



7.6.6. Connector Handling

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter.

  Attention

  For hybrid connectors (eg fibre optic and coax combined) it is necessary to ensure that only the region of the O-ring must be greased. Fibre-optic and coaxial contacts must be kept absolutely free from grease to prevent losses.

  Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

- O-ring greasing

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We recommend our grease EK2 which is well tested and for all our elastomers approved.

Typical properties

- reduced friction and wear
- prevents leakage
- neutral against plastics

- Thread greasing

  Lightly grease the locking threads of the receptacles and the through bulkhead receptacles e.c. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

  Check to see if the plugs locking sleeve runs smoothly.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place. While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it onto the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview for series 10 / 22 / 35 / 40”.

- Cathodic Protection

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti), marine bronze (CW307G) or titanium grade 5 diver mate connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

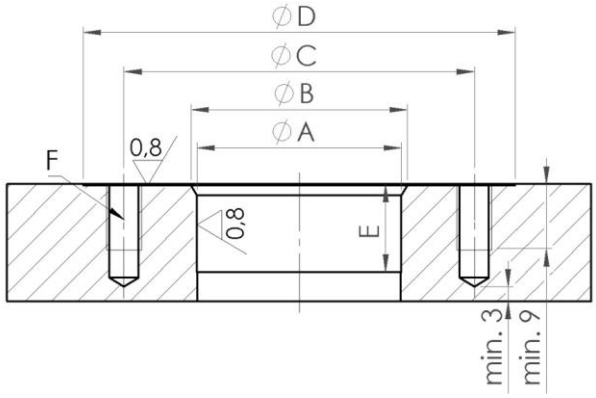
  Defective clamps to be replaced.

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7.6.7. Mounting Dimension

- Mounting hole for flange-receptacle



Size	Ø A	Ø B	Ø C ±0,1	Ø D_{min}	E_{min}	Ø F
0	$22_{\pm 0,05}$	$23^{-0,3}$	38,5	49	12	M5 (4x90°)
1	$26_{\pm 0,05}$	$28^{-0,3}$	50	63	11	M6 (6x60°)
2	$32_{\pm 0,05}$	$34^{-0,3}$	56	69	9	
3	$35_{\pm 0,05}$	$37^{-0,3}$	60	73	9	
4	$47_{\pm 0,05}$	$49^{-0,3}$	71	84	9	
5	$56_{\pm 0,05}$	$57^{-0,3}$	74	87	11	
7	$72_{\pm 0,05}$	$74^{-0,3}$	102	115	16	

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7.7. SUBSEA CONNECTORS SERIES 42

7.7.1. General

The hybrid connector range series 42 is especially designed for long term subsea use under harsh conditions. It can be supplied either singularly or as part of a harness assembly.

Series 42 connectors are only dry pluggable.

All GISMA connectors require the following acceptance tests during the terminations:

- Mating test
- Insulation Resistance test
- High Voltage test
- Attenuation test

Cable terminations can be performed on-site or offshore by GISMA trained personnel where the cable cannot easily be moved or transported. Each GISMA connector is fitted with a pin or socket insulator which has been tested prior to despatch.

Termination of series 42 hybrid connectors should only be undertaken by trained personnel.

All series 42 hybrid connectors must be fitted with a mating connector or a pressure watertight protective cap prior to subsea installations. Connectors must not be energised subsea unless coupled with a mating connector or fitted with a pressure watertight protective cap, in order to prevent electrolytic damage to the contacts when exposed to sea water.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

NOTE: Series 42 hybrid connectors cannot be used generally for oil compensated systems or oil compensated hose terminations. Special versions are available, please contact our design department.

For further technical information refer to the catalogue of series 42 or special drawings.

7.7.2. Live Mate / Demate

The series 42 range of connectors are designed to be mated / de-mated with **POWER OFF**.

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7.7.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power off or on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug.

7.7.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the pins at the front and onto any elastomer part like insulators and boot seals.

NOTE: Keep the connector mated at any cleaning operation!

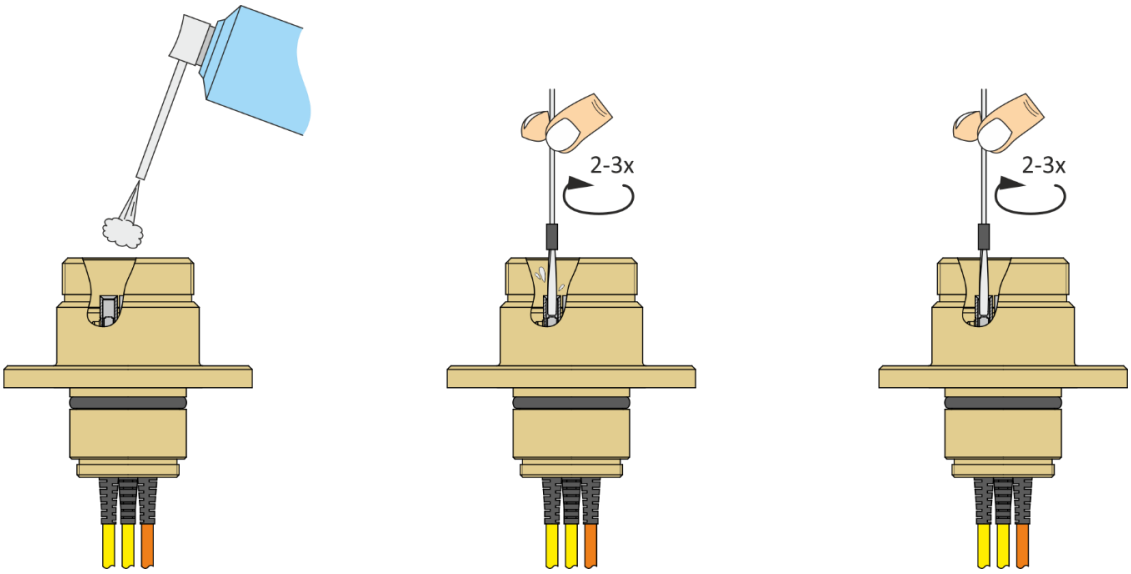
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7.7.5. Cleaning process for ferrules

In case of contamination of the ferrules we strongly recommend the following procedure for cleaning:

- blow out ferrules with compressed air to remove possible dust and dirt particles
- dip a cleaning stick (part-no.: 40.99.41) into alcohol (part-no.: 40.99.55) and carry it into the ferrule with rotating motions
- clean the ferrules with a further, dry stick, also under rotating movements



7.7.6. Connector Handling

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter.

  Attention

  For hybrid connectors (eg fibre optic and coax combined) it is necessary to ensure that only the region of the O-ring must be greased. Fibre-optic and coaxial contacts must be kept absolutely free from grease to prevent losses.

  Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

- O-ring greasing

  We recommend our grease EK2 which is well tested and for all our elastomers approved.

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Typical properties

- reduced friction and wear
- prevents leakage
- neutral against plastics

- Thread greasing

  Lightly grease the locking threads of the receptacles and the through bulkhead receptacles e.c. with GISMA-FETT LP 430 (strongly recommended at stainless steel and titanium threads).

  Check to see if the plugs locking sleeve runs smoothly.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place. While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it onto the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview for series 10 / 22 / 35 / 40”.

- Cathodic Protection

  Stainless steel (1.4404/1.4571 comparable to 316L/316Ti), marine bronze (CW307G) or titanium grade 5 diver mate connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

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7.8. SUBSEA CONNECTORS SERIES 48

7.8.1. General

The hybrid connector range series 48 is especially designed for long term subsea use under harsh conditions. It can be supplied either singularly or as part of a harness assembly.

Series 48 connectors are only dry pluggable.

All GISMA connectors require the following acceptance tests during the terminations:

- Mating test
- Insulation Resistance test
- Attenuation test

Cable terminations should be performed on-site by GISMA trained personnel where the cable cannot easily be moved or transported. Each GISMA connector is fitted with a pin / socket insulator which has been tested prior to despatch.

Termination of series 48 hybrid connectors should only be undertaken by trained personnel.

All series 48 hybrid connectors must be fitted with a mating connector or a pressure watertight protective cap prior to subsea installations. Connectors must not be energised subsea unless coupled with a mating connector or fitted with a pressure watertight protective cap, in order to prevent electrolytic damage to the contacts when exposed to sea water.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

Titanium grade 5 connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

NOTE: Series 48 hybrid connectors cannot be used for oil compensated systems or oil compensated hose terminations. If oil compensated connectors are required, please contact our design department.

For further technical information refer to the catalogue of series 48 or special drawings.

7.8.2. Live Mate / Demate

The series 48 range of connectors are designed to be mated / de-mated with **POWER OFF**.

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7.8.3. Protection of receptacle's pin contacts

Under no circumstances the contacts should be exposed to seawater with power off or on. If this situation does occur the contact surfaces of the contacts will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals within the plug / receptacle.

7.8.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth topside or subsea from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the pins at the front and onto any elastomer part like insulators and boot seals.

NOTE: Keep the connector mated at any cleaning operation!

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7.8.5. Cleaning process for ferrules

In case of contamination of the ferrules we strongly recommend the procedure for cleaning described in “Cleaning instruction for GISMA fiberoptic contacts”.

7.8.6. Connector Handling

- Pre Mating Check

  The connector that is to be joined must be free of dirt and foreign matter.

  Attention

  It is necessary to ensure that only the region of the O-ring must be greased. Fibre-optic contacts must be kept absolutely free from grease to prevent losses.

  Dirty connectors to be purged with GISMA cleaning solution (Reinigungslösung). **Allow max. three minutes to react!** In case of strong dirt repeat the procedure. Then rinse with clean water. Following rinse with the enclosed cleaning liquid (SPÜLLÖSUNG) to neutralize cleaning solution.

- O-ring greasing

  We recommend our grease EK2 which is well tested and for all our elastomers approved.

  Typical properties

  - reduced friction and wear
  - prevents leakage
  - neutral against plastics

- Thread greasing

  Lightly grease the locking threads of the receptacles and the through bulkhead receptacles e.c. with GISMA-FETT LP 430 (strongly recommended at titanium threads).

  Check to see if the plugs locking sleeve runs smoothly.

- Alignment

  Put the plug onto the receptacle. Twist the connector until the keyway locks into place. While tightening the locking sleeve with the one hand, simultaneously feed in the connector with the other.

- Mating

  After tightening the locking sleeve by hand, screw it onto the receptacle fitting using corresponding wrenches. If the locking sleeve is designed with a safety screw, tighten it. For defined clamping torque refer to GISMA document “Torque overview for series 10 / 22 / 35 / 40 / 48”.

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- Cathodic Protection

  Cathodic protection to be considered by customer.

- Maintenance

  For the installation of O-rings (in the mating and installation area) the general guidelines for O-ring assembly have to be taken into account. Mainly the correct installation (e.g. position), cleanness and greasing with GISMA FETT EK2 have to be ensured.

  In case, that the O-rings carrying assemblies are installed for more than 2 years to a structure and then will be disassembled, we generally recommend to replace the O-rings.

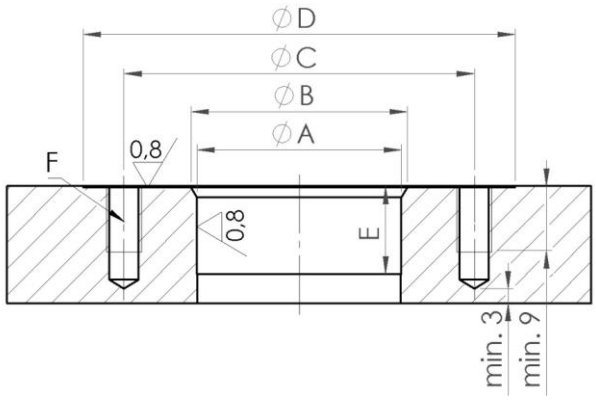
  We recommend changing the O-rings at latest after 7 years, if the O-rings are used as directed.

  For assemblies, which will only be installed once, our experience shows the estimated lifetime may be double. For operating temperatures between +5°C to +40°C, longer lifetimes can be expected.

  Defective clamps to be replaced.

7.8.7. Mounting Dimension

- Mounting hole for flange-receptacle



Size	Ø A	Ø B	Ø C ±0,1	Ø D_{min}	E_{min}	Ø F
3	$29,5_{\pm 0,05}$	$31,5^{-0,3}$	44,55 (□31,4)	54,5	7	M4 (4x90°)
4	$39,5_{\pm 0,05}$	$41,5^{-0,3}$	58,69 (□41,4)	69	7	

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7.8.8. Required special tools:

40.99.00	Mounting wrench for fibre optic contacts
22.12.50	Torque screwdriver 1,5 - 3,0Nm (required for special mounting nut)
21.11.03	Clamping pliers

7.9. SUBSEA CONNECTORS SERIES 80

7.9.1. General

The series 80 range of connectors has been developed for long term reliable signal and low power control system applications associated with offshore installations. The subsea pluggable capacity of these connectors is achieved using pressure compensated electrical inserts employing the GISMA flushing contact principle.

Connectors are usually supplied with dust caps. The dust caps must be removed prior to mating the connectors.

For further technical information refer to the catalogue of series 80 or special drawings.

All mild steel sealing interfaces shall be inlayed with Inconel 625, or similar, where no additional protection can be provided. This is to prevent localised pitting of the interface. If not possible grease the mounting hole and the supporting surface with corrosion preventing fluid (for example Fluid Film) as a minimum.

If the connectors are to be left unmated, in seawater, for any length of time pressure watertight protective cap must be used to protect the pin contacts in the receptacle. Over exposure will increase the risk of corrosion damage or marine growth on the contact surfaces of the receptacle's pin contacts. This could lead to damage to the seals and insulation within the socket contacts. Plugs do not require full pressure watertight protective cap for protection. GISMA advise the fitting of POM caps to protect plugs against marine growth. It is good practice to always fit the protective cap when a connector is unmated topside prior to deployment to provide mechanical protection.

The appropriate test connector must always be used to make electrical contact during testing. **UNDER NO CIRCUMSTANCES** a foreign object (such as a screwdriver, test probe, or crocodile clip) should be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the warranty of the connector.

Attention: The customer is responsible for the safe operation of the connectors and cable systems. All necessary protective measures must be taken.

The series 80 range of connectors can be supplied either singularly or as part of a harness assembly. All series 80 connectors require the following during termination:

- Mating test
- Insulation Resistance test
- High Voltage test
- Continuity test

Cable terminations can be performed on-site by GISMA trained personnel or partner companies where the cable cannot easily be moved or transported. Each series 80 connector has been

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hydrostatically tested and electrically proven prior to despatch. Termination of these connectors should only be undertaken by trained personnel.

7.9.2. Live Mate / Demate

The series 80 range of connectors are designed to be mated / de-mated with **POWER OFF.**

7.9.3. Protection of receptacle contact pins

Under no circumstances the pin contacts should be exposed to seawater with power on or off. If this situation does occur, the contact surfaces of the pins will very rapidly degrade by electrolytic action. If these damaged pins are subsequently mated into a socket insert there is a **very high risk** of damage to the insulation and seals in the plug.

7.9.4. Removal of Marine Growth and Calcareous Deposits

To remove calcite growth subsea or topside from GISMA connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in GISMA connectors have been fully tested against 50% Citric Acid and are compatible for a duration of 1 hour. In addition, the thermoplastic materials have good resistance to Citric Acid.

Other acid cleaners, such as >50% Acetic Acid, should **not be** used as they may cause deterioration of the elastomeric materials.

Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed onto the shuttle pins at the front of the plug as this could result in a risk of water being forced through the primary seals.

7.9.5. Diver Mate Connectors

- Alignment

  These connectors have been designed to self-align during mating. All this is required to ensure that the alignment pin of the plug is engaged in the alignment groove of the receptacle before pushing the plug in.

- Pre Mating Check

  Before mating, the receptacle connector should be checked for debris/deposits, especially on the contacts. Prior to mating a visual inspection has to be done. Pin contacts have to be straight and without any damages. The connectors have been designed to accommodate sand and silt contamination; however large pieces of debris should be removed using a water jet.

- Mating

  The diver mateable plug is assembled with GISMA locking system including 3 clamps and an over-all spring and a GISMA diver handle. For mating just push the plug into the receptacle.

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- Post Mating Checks

  Full engagement will be achieved, if the over-all spring lies back close to the outer keyway.



Full engagement will be achieved, if the over-all spring lies back close to the outer keyway locator.



Plug during mating process or not fully mated. Over-all spring is away from the outer keyway locator.

- Cathodic Protection

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 stab plate connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Mating forces (standard configuration)

Size	Contact arrangement	Mating forces for contact-Ø 3mm
1	4-way	approx. 250 N
2	7-way	approx. 430 N
3	12-way	approx. 650 N
4	19-way	approx. 900 N

Table: Mating and de-mating forces for diver mateable connectors

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7.9.6. Stab Plate Connectors

- Compliance

  One half of a stab mate connector pair must be allowed to float so that misalignment tolerances can be accommodated.

  Allowed misalignment between plug and receptacle:

  Pan/tilt: ±1°
  Rotation: ±1°
  Radial: ±0,5mm

- Mate/DeMate Speed

  The connectors have been designed to operate across a wide range of mate / de-mate speeds with **POWER OFF**. There is no practical limit to the speed at which the connectors maybe mated or demated, however as a guide: -

  a) Mating speed should not exceed 1 m/s.
  b) Demating speed should not exceed 1 m/s.

- Pre-Mating Checks

  Before mating, the receptacle connector should be checked for debris. The connectors have been designed to accommodate sand and silt contamination however large pieces of debris should be removed using a water jet. Prior to mating a visual inspection has to be done. Pin contacts have to be straight and without any damages.

- Cathodic Protection:

  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 stab plate connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Mating forces (standard configuration)

Size	Contact arrangement	Mating forces for contact-Ø 3mm
1	4-way	approx. 200 N
2	7-way	approx. 350 N
3	12-way	approx. 550 N
4	19-way	approx. 750 N

Table: Mating and de-mating forces for stab plate connectors

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7.9.7. ROV Connectors

- Alignment

  These connectors have been designed to self align during mating. The connectors must be roughly aligned using the alignment keyway on the plug's locking device and receptacle's main keyway slot. The mounting of the GISMA ROV handle has sufficient compliance to accommodate fine adjustments during the final approach prior to connector engagement.

- Pre Mating Checks

  Before mating the receptacle connector should be checked for debris. The connectors have been designed to accommodate sand and silt contamination however large pieces of debris should be removed using a water jet. Prior to mating a visual inspection has to be done. Pin contacts have to be straight and without any damages.

- Mating

  The ROV mateable plug is assembled with GISMA locking system including 3 clamps and an over-all spring and a GISMA ROV handle (e.g. T-bar, fishtail). For mating just push the plug into the receptacle.

- Post Mating Checks



Full engagement will be achieved, if the over-all spring lies back close to the outer keyway locator.



Plug during mating process or not fully mated. Over-all spring is away from the outer keyway locator.

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- De-Mating

  De-mating is achieved by a straight pull on the ROV handle sufficient to release the latching mechanism.

- Cathodic Protection

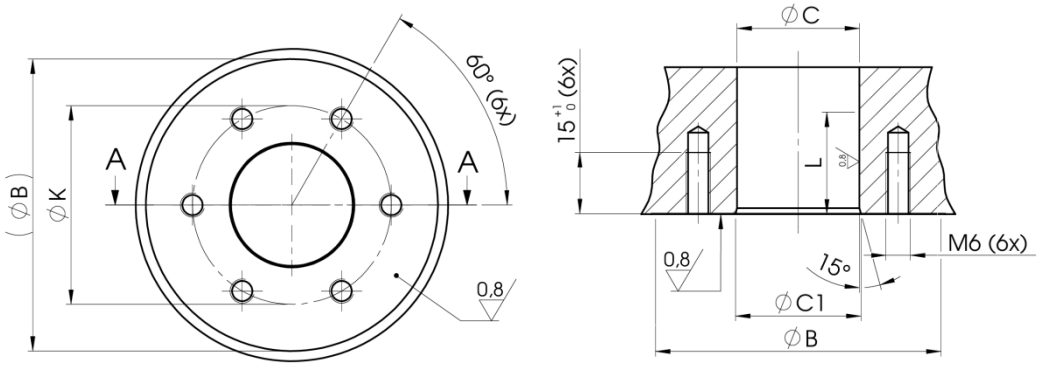
  Stainless steel (1.4404/ 1.4571 comparable to 316L/316Ti) or titanium grade 5 stab plate connectors must be connected to the CP (Cathodic Protection) system at all times. If the connector is designed with a fixed flange and screw mounting, an additional CP connecting would not be required. Super Duplex stainless steel connectors should be isolated from the CP system to reduce the possibility of hydrogen embrittlement.

- Mating forces (standard configuration)

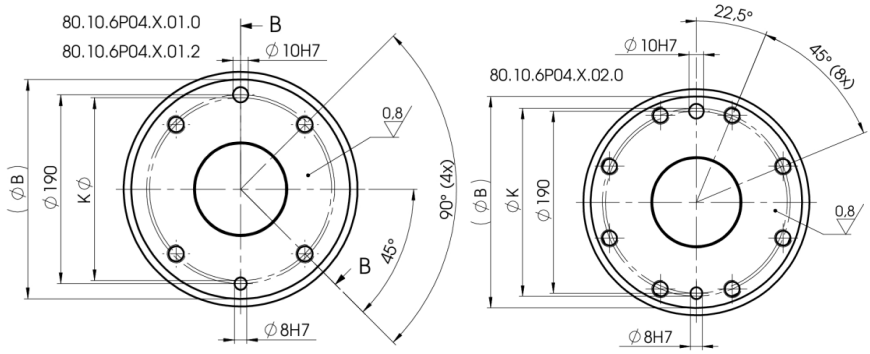
Size	Contact arrangement	Mating forces for contact-Ø 3mm
1	4-way	approx. 250 N
2	7-way	approx. 430 N
3	12-way	approx. 650 N
4	19-way	approx. 900 N

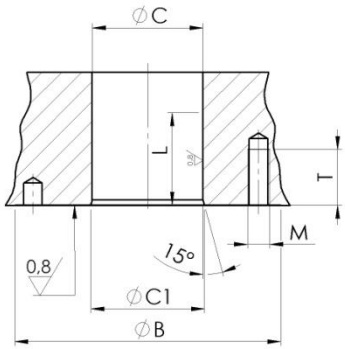
Table: Mating and de-mating forces for ROV connectors

7.9.8. Mounting hole for flange-receptacle



Typ type	Größe size	ØBmin	ØC +0,08 +0,03	ØC1	ØK	Lmin
electrical	1	91	48	49,5	76	22,5
	2	101	57	58,5	86	23
	3	108	63,5	65	93	22
	4	131,5	77	78	113	21
f/o	4F04	120	78	79,5	105,3	24





Artikel-Nummer part-no.:	Größe size	ØBmin	ØC +0,08 +0,03	ØC1	ØK	Lmin	M	Tmin
80.10.6P04.X.01.0 80.10.6P04.X.01.2	6	212	115	118	185	40	M10 (4x)	25
80.10.6P04.X.02.0	6	232	115	118	198	40	M16 (8x)	32

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