

**SIEMENS**



Document No: 0075

# SpecTRON 8 Connector Operations Manual

Protection, Storage, Shipment, Unpacking, Deployment  
& Maintenance Instructions

[www.siemens.com/energy/connector-operations-manual](http://www.siemens.com/energy/connector-operations-manual)

<b>SIEMENS</b>	<b>SIEMENS SpectRON 8 PRODUCTS – OPERATIONS MANUAL</b>	Doc No:	0075
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		Created By:	W.Barrett

## SIEMENS SpectRON 8 PRODUCTS - PROTECTION, STORAGE, SHIPMENT, UNPACKING, DEPLOYMENT & MAINTENANCE INSTRUCTIONS

### General

Thank you for purchasing a Siemens Subsea SpectRON 8 product. The information that follows is an overview of the protection, storage, shipment, unpacking, deployment and maintenance instructions for Siemens Subsea SpectRON products.

Siemens Subsea recommends the termination of all equipment must only be undertaken by suitably trained and qualified personnel.

### Revision Control:

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1	W. Barrett	M. Simmonds	27/03/13	
	First Issue			
2	S. Roberts	D. Church	22/07/2013	
	Section 2.3.1 - Outside Pressurised Diameter for AquaTRON 200 added to document. Section 2.3.2 - Details of AquaTRON 50 added to Operations Manual. Section 2.3.3 - Details of internal cables added Section 4 - Minimum Bend Radius of AquaTRON 50 added to document. Section 7.4 - Figure 14 updated to show up to date Receptacle Shroud.			
3	W. Barrett	S. Spencer	23/08/2013	
	Section 7.1 – Amended 60 day exposure time to be only applicable from Jan 2013. 30 days before this date.			
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	Section 4.1 - Slinging instruction added for ROV connectors with locking mechanism. Section 7.4 - Figure 14 updated to show connectors with locking mechanism. Section 7.6 - Figure 17 updated to show connectors with locking mechanism. Section 7.6 - Figures 18 & 19 added showing 3 finger jaw for fishtail ROV handle Section 8.3 & 8.4 - Mate & De-mate procedures added for ROV connectors with locking mechanism. Section 8.7 – Emergency De-mate procedure added for ROV connectors with locking mechanism. Section 8 - Figures 23, 24, 25, 26 & 27 added Section 9 - Manual Mate & De-Mate procedures added for connectors with locking mechanism. Section 9 - Figures 30 & 31 added New Corporate cover added.			
5	J. Ronald	W. Barrett	14/05/2014	
	Section 2 – Health and Safety notes added with contact email address. Added Section 12 – Information & Notes / Health & Safety Feedback.			
6	M. Gretton	B. Leach	04/06/2014	
	Section 2 – Health and Safety note added for Receptacle connectors.			
7	S. Roberts	P. Edmondson	15/07/2014	
	Section 5 – Note added to ensure hose is protected from direct sunlight to avoid the maximum temperature being exceeded.			
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	Updated visual representations Section 5.1 - Note added for lifting precaution over coating components. Section 8.4 - Note added for flushing port adaptor.			

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	Section 1 – Note added to include the Dual Penetrator as an included connector type. Section 5.1 – Figure 8 added for the recommended lifting positions for the Dual Penetrator Assembly.			
12	S.Hargreaves	M.Earnshaw	04/07/2019	
	Section 3.3.1 - Updated Hose weight to match current calculated weight Section 8.6 - Added in weight restrictions for EFLs			
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	Section 5.1 - Figure 8 updated to include central slinging position on the Dual Penetrator Assembly and added note about inboard termination. Updated whole document to latest Siemens template format. Section 3.3.3 – Added cable OD, MBR, Weight in Air and Weight in Water for both 35mm <sup>2</sup> and 4mm <sup>2</sup> . Created Section 3.3.4 to include test connector cable information. Changed Rev 12 Sections 10.2, 10.3, 10.5 and 10.6 into sub sections of 10.1 and 10.2 as 10.1 and 10.2 didn't have any content underneath their titles. Created Section 11 to describe connection points etc. for test connectors. Section 5.1 Figures 4, 5, 6 & 7 – Corrected positions of arrows. Document Control Page – Removed Tronic reference and replaced with Siemens.			

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## 1. SCOPE

This procedure includes information on the following connector types:

- SpecTRON 8 ROV Plugs
- SpecTRON 8 ROV Receptacles
- SpecTRON 8 Penetrators
- SpecTRON 8 Dual Penetrator
- SpecTRON 8 Tree Cap Plug (TCP)
- SpecTRON 8 Tubing Hanger Receptacle (THR)
- SpecTRON 8 ROV Dummy Connectors (Plugs & Receptacles)
- SpecTRON 8 ROV Parking Receptacle

## 2. HEALTH & SAFETY

- Manual Handling, Lifting and Carrying are known to be the largest contributors to occupational ill-health.
- Ensure that mechanical handling aids are used whenever possible to avoid manual handling.
- Where manual handling is considered appropriate for the task safe lifting guidelines must be followed, e.g. adopt correct posture, consider team lifting, employ safe lifting technique, etc.
- Only competent persons are permitted to perform tasks without supervision, if in doubt ask.
- Good Housekeeping avoids Slips Trips and Falls, keep your area clean and tidy.
- It is the operator's responsibility to comply with current Company & regional health and safety legislation.
- Caution shall be exercised during assembly to ensure that fittings and hydraulic / pneumatic equipment are properly installed.

In the event of a safety incident or any safety improvement suggestions, please contact the Health & Safety Department at [prodsafe.gb@siemens.com](mailto:prodsafe.gb@siemens.com) and/or complete and return the punch list in section 13.

**Note:** All receptacle's (male pins) must be mated to its correct mating half before it is energised (this includes the correct Test, Dummy and Wet Mate Pair).

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### 3. SPECIFICATION

The following is a basic specification for SpectRON 8 connectors. Actual product may vary. Please refer to product specific data sheet or Project specific Design Input Document for more detailed information.

#### 3.1 ELECTRICAL

Rated Voltage:	5/8.7(10) kV
Rated Frequency:	1-200Hz
Rated Current:	335 A (@25°C, 50Hz) 220 A (@110°C, 50Hz THR only) 220 A (@90°C, 50Hz TCP only)

#### 3.2 ENVIRONMENTAL

Storage Temperature:	-30°C to + 60°C
Handling Temperature:	-25°C to +70°C
Operating temperature:	+4°C to + 40°C ROV +4°C to + 110°C THR +4°C to + 90°C TCP
Max Deployment Rate:	20bar / min
Max Water Depth:	3000 m

#### 3.3 HOSE & CABLE

##### 3.3.1 AQUATRON 200 (2" BORE)

Outside Diameter:	64.4 mm Nom
Outside Pressurised Diameter:	66 mm Nom
Minimum Bend Radius:	375 mm
Weight in Air (Inc cable and oil):	4.8 kg/m
Weight in Water (Inc cable and oil):	1.45 kg/m

##### 3.3.2 AQUATRON 50 (1/2" BORE)

Outside Diameter:	25.2 ± 0.6 mm
Minimum Bend Radius:	125 mm
Weight in Air (Inc cable and oil):	0.66 kg/m
Weight in Water (Inc cable and oil):	0.14 kg/m

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### 3.3.3 CABLE SPECIFICATION (EXCLUDING THR + UMBILICAL RECEPTACLES)

#### Cable for Phase: 35mm<sup>2</sup> Flexible Cable (Unscreened)

Outside Diameter:	18.10 ± 0.40 mm
Minimum Bend Radius:	110 mm
Weight in Air:	0.55 kg/m
Weight in Water:	0.29 kg/m

#### Cable for Signal Return: 4mm<sup>2</sup> Flexible Cable (Unscreened)

Outside Diameter:	8.95 ± 0.20 mm
Minimum Bend Radius:	55 mm
Weight in Air:	0.11 kg/m
Weight in Water:	0.04 kg/m

**Note:** When performing terminations (e.g. inboard) involving exposed unscreened cable (i.e. no hose), consideration should be given to proximity to “sharp/point” earths.

### 3.3.4 TEST CONNECTOR CABLE SPECIFICATION

#### Cable for Phase: 35mm<sup>2</sup> Flexible Cable (Screened)

Outside Diameter:	24.5 mm
Minimum Bend Radius:	125 mm
Weight in Air:	1.04 kg/m
Weight in Water:	0.56 kg/m

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#### 4. MARKING

Siemens Subsea Connectors and Penetrators are marked with the Siemens Subsea part number and unique serial number. Marking locations are typically on the Plug Nose and Receptacle Shroud for Wet Mate Connectors and on the Flange of Penetrators. Figure 1 shows the typical marking locations for a Plug and Receptacle. Marking is typically by laser etching.

Harnesses are also marked with the Siemens Subsea part number and unique serial number for the harness as shown in Figure 2. Client and project specific information is also usually added to these labels. Labels are typically black text on a yellow background underneath clear heat shrink. Typically, labels are located at each end of the harness and also centrally.

Marking of Siemens Subsea Part No and Serial No for individual



Figure 1 – Marking of Connectors

Marking of Siemens Subsea Part No, Serial No and client information on harnesses.



Figure 2 – Marking of Hoses

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## 5. PROTECTION, HANDLING AND SHIPMENT

Siemens Subsea electrical connectors are manufactured primarily from materials such as 316L stainless steel (UNS S31603), and Super Duplex stainless steel (UNS S32550). Stainless steel 316L (UNS S31603) connectors and penetrators must be connected to a CP (Cathodic Protection) system at all times in order to withstand harsh saliferous environments. Super Duplex stainless steel (UNS S32550 / UNS S32760) ROV connectors may be isolated from the CP system to reduce the possibility of hydrogen embrittlement and calcareous deposits. ROV Connectors are designed with isolation bushes and discs in order to isolate them from the structure as standard. Tree Cap Plugs, Tubing Hanger Receptacles and Penetrators cannot be isolated from the structure and thus may be connected to the CP system.

The connector insert and exposed parts are susceptible to mechanical damage if not adequately protected. Dust caps or Protective caps are fitted to all Siemens Subsea connectors before transport. Caps are recommended to remain in place until connectors are deployed subsea.

The connectors 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. If large numbers are shipped in one consignment a suitably reinforced box will be necessary to withstand the weight. Protection caps must be fitted at all times during transport.

**Note:** Maximum storage temperature takes into account solar gain. Skin temperature must not exceed 70°C. Suitable protection i.e. a tarpaulin or material with similar properties must be used to ensure maximum storage temperature is not exceeded.

If storage is carried out in saline conditions, e.g. on a ship's deck or hold, then full dummy connectors should be used.

Bulkhead type connectors with exposed tailing wires should be packed and shipped in a suitably sized box to allow adequate space for the tailing wires without bending or kinking.

If the connectors are assembled onto hoses these must be suitably coiled and secured with tape to prevent uncoiling during transit. The following bend radii are recommended for storage/transport of hose.

- AquaTRON 2" NB (AquaTRON 200) - Minimum bend radii - 375mm
- AquaTRON 0.5" NB (AquaTRON 50) - Minimum bend radii - 125mm

Connectors are designed to withstand vibration that occurs during transportation and to withstand being dropped from a height of 1m whilst in packaging.

Figure 3A shows how a SpectRON 8 harness is packaged. The connectors on either end of the harness have a transportation cap fitted and are surrounded in bubble wrap. The base of the shipping crate is lined with protective packaging and the harness is positioned so that the hose can be coiled without kinking. Any loose items are placed in a box inside the crate. Protective packaging is then placed on top of the harness and secured in place with a wooden baton, before the lid of the crate is screwed down.

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**Figure 3A – Standard Packaging.**

Figure 3B shows a different type of optionally purchased packaging the harness could be supplied in. This crate is manufactured from polyethylene plastic and is dust, oil, chemical and water resistant. The connectors on either end will have a transportation cap and will sit within a foam insert which will be sized to the connector. Any loose items will be placed in a box inside the crate.

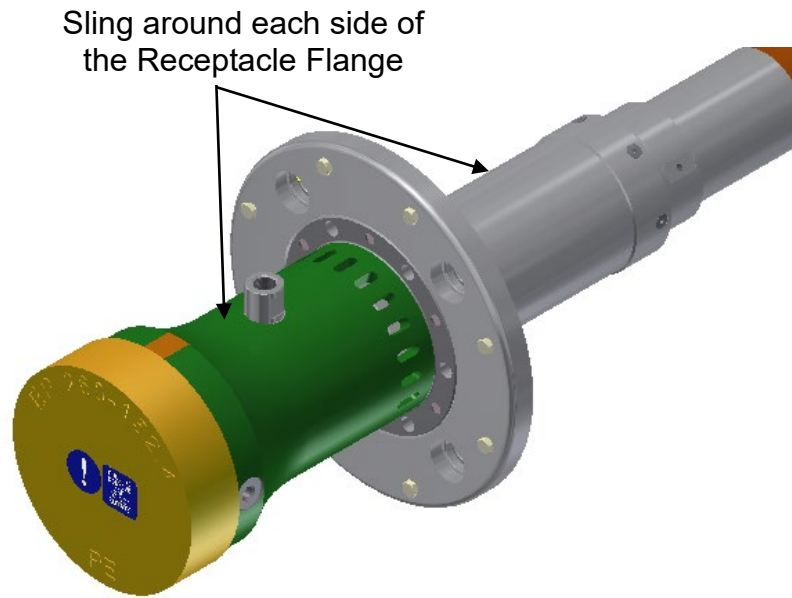


**Figure 3B – Optional Packaging**

### 5.1 LIFTING OF JUMPERS & CONNECTORS

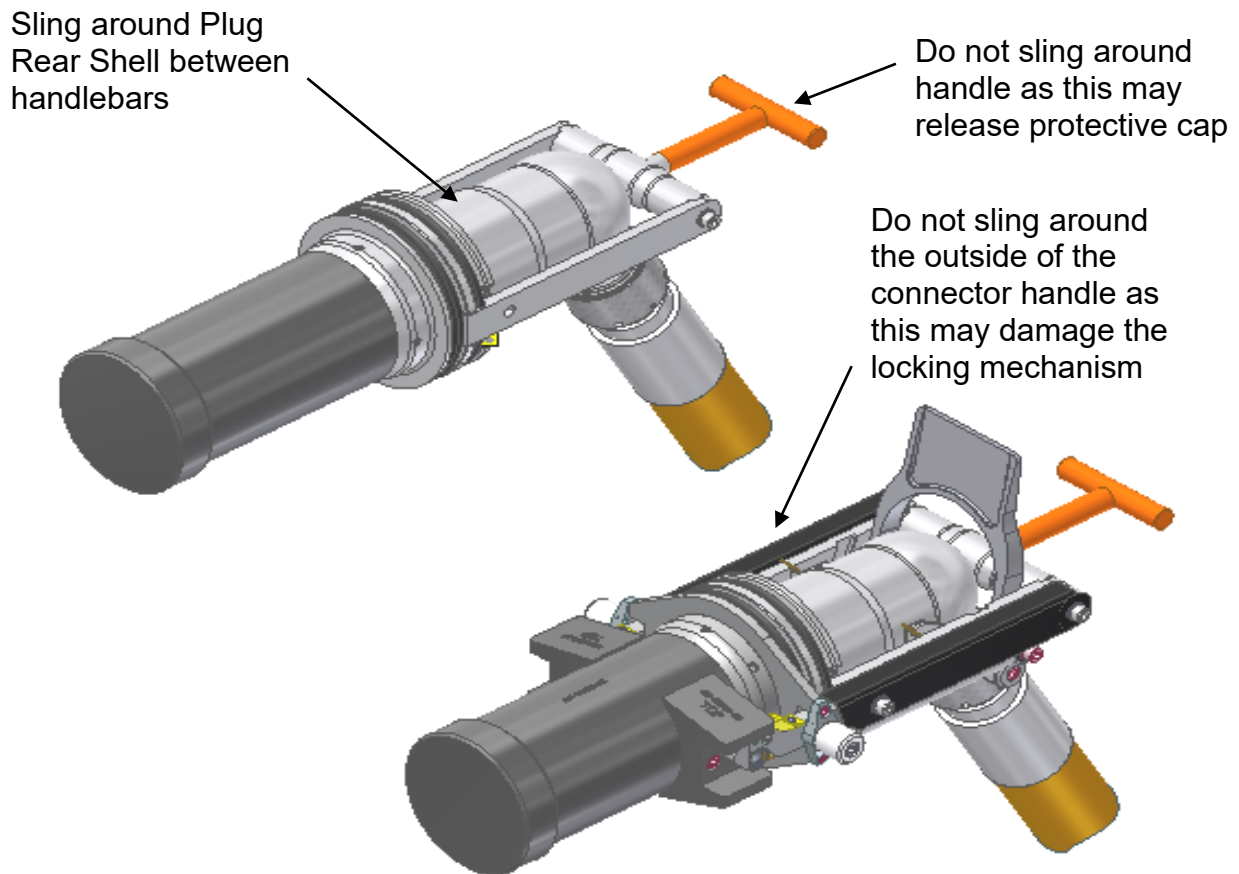
SpectRON 8 harnesses typically weigh in excess of 30 kg and hence should not be manually handled. Refer to the specific harness drawing for weight and length details. The connectors can be safely slung around the locations shown in, Figure 4 , Figure 5, Figure 6 and Figure 7. The centre of gravity for the Connector or Penetrator is usually marked on the outline drawing (supplied in documentation pack) but must be verified at low level before commencing any lift.

**Note:** Ensure that all coated components are handled with care during lifting to avoid damaging the coating.



**ROV Receptacle**

**Figure 4 - Recommended lift position - ROV Receptacle**

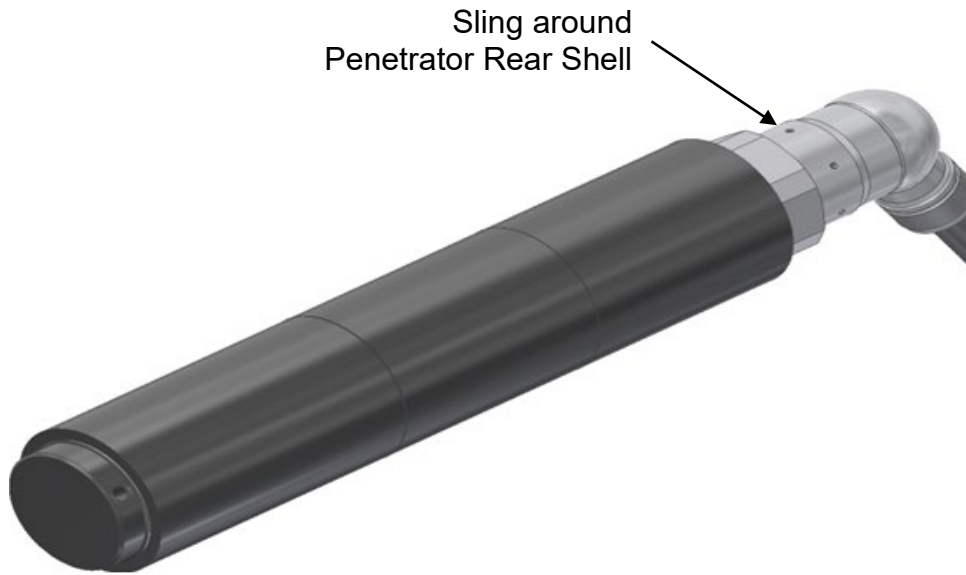


**ROV Plug (With / Without locking mechanism)**

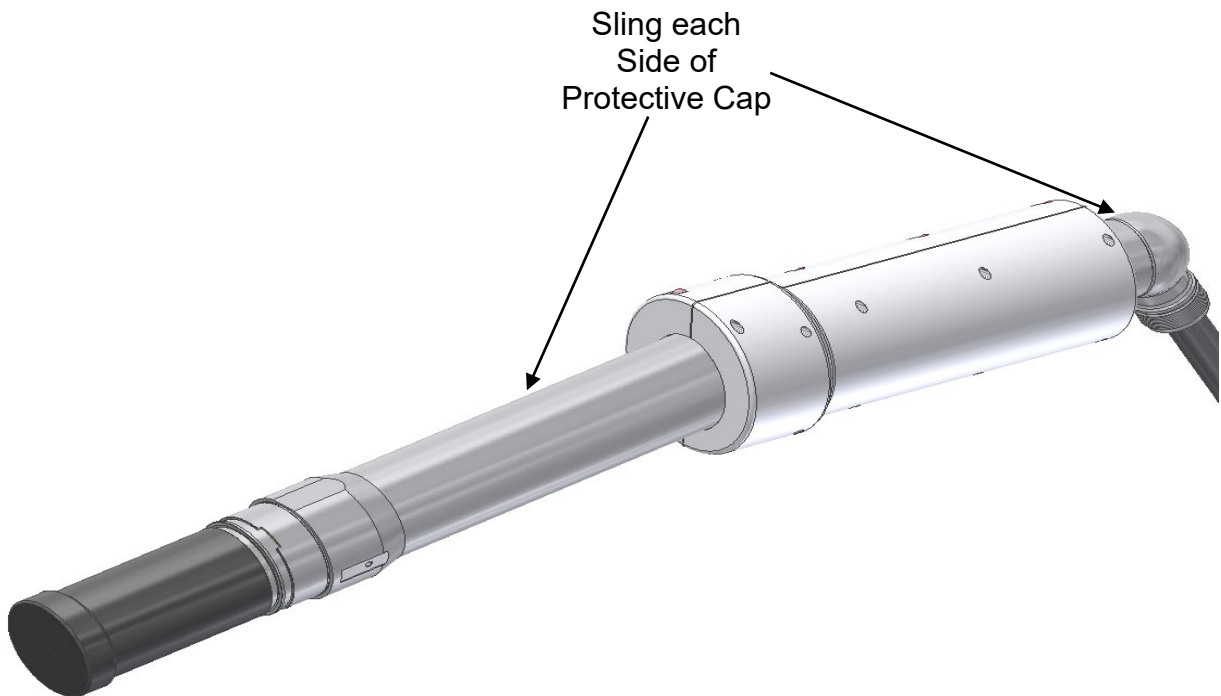
**Figure 5 - Recommended lift positions - ROV Plug**

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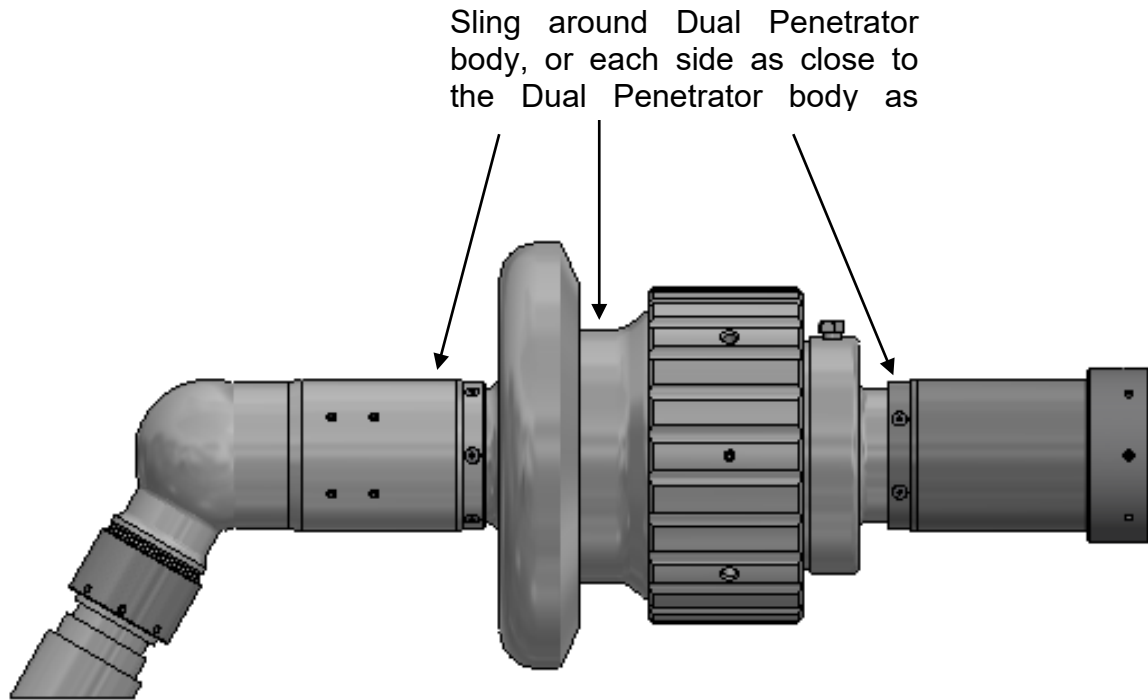
Dummy, or parking connectors weigh less than 20 kg and can be lifted by hand, however correct lifting practice should be observed at all times.



**Figure 6 - Tree Cap Penetrator / Plug**



**Figure 7 - Tree Cap Penetrator / Plug**



**Figure 8 - Recommended Lift Positions - Dual Penetrator**

For dual penetrator inboard termination details refer to project documentation.

**Important Note:** Connectors / Penetrators should **NEVER** be lifted by the hose or cable, as this places unnecessary strain on the connector internals and may result in loss of continuity.

Connector / Penetrator. The maximum recommended length of hose which can be unsupported during a lifting operation is 5 meters.

Protective caps should remain on wherever possible during lifting operations to minimise the risk of damage to connector sealing or electrical components.

## 6. 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' 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 protection caps until connectors are ready for installation. On removal do not allow the hoses to drag over the edges of the packing crate.

### 6.1 PROTECTIVE CAPS

All SpectRON 8 Connectors/Penetrators come supplied with a protective cap. These can either be dust caps or protective caps. Dust caps (typically yellow in colour) can be simply removed by twisting or pulling them off. Protective caps (typically black in colour) can be removed as detailed below.

#### 6.1.1 ROV PLUG CAP

The ROV Plug cap is latched onto the Plug connector via the connector latching mechanism. In order to remove the cap, it is recommended that the operator stand the Plug vertically on the cap, stand on the flange of the cap and pull on the ROV handle of the Plug connector. This will disengage the latching mechanism of the Plug. Do not try to pull the cap directly off the plug as this may damage the latching mechanism of the Plug. Use the same method when engaging and disengaging the ROV plug cap on the Plug connectors with the locking mechanism.

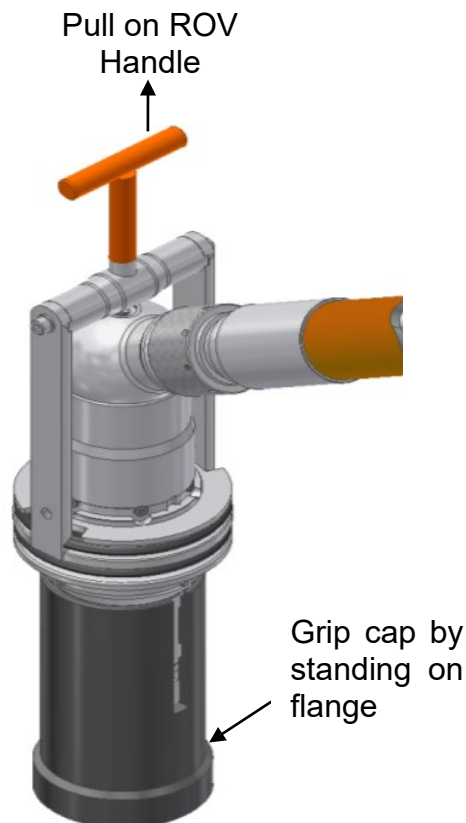


Figure 9 - ROV Plug Cap

Refitting the Plug cap can be done by simply pushing the cap back onto the nose of the plug until the latching mechanism of the plug engages.



### 6.1.2 ROV RECEPTACLE CAP

The ROV Receptacle Cap can be removed by pulling on the cap. Refitting the Receptacle cap can be done by simply pushing the cap back onto the Receptacle shroud.

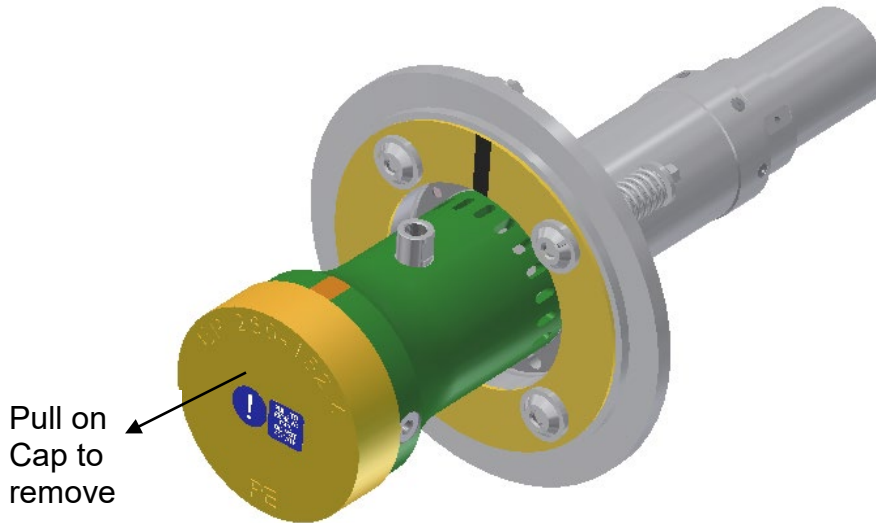


Figure 10 - ROV Receptacle Cap

### 6.1.3 TREE CAP PENETRATOR CAP – VERSION 1

Penetrator caps would usually be removed by Siemens Subsea site engineers during the termination of the Penetrator to the module. It is recommended that only trained personnel remove Penetrator caps though details are provided here for information only. The Tree Cap Penetrator version 1 consists of modular parts to protect the entire length of the connector. Carefully position the Plug & Penetrator on a suitable bench and remove the protective cap taking care not to bend the compliant gland between plug and penetrator.

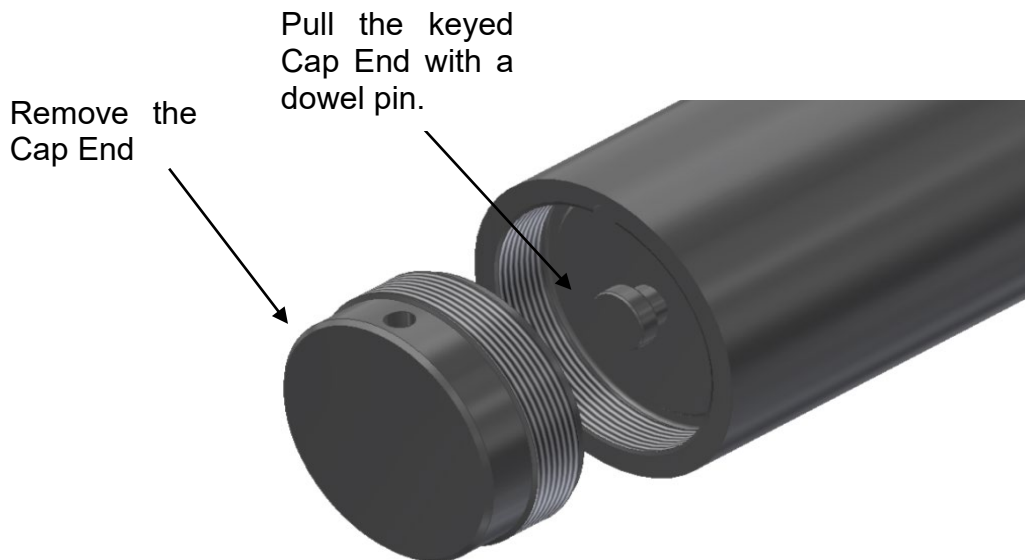
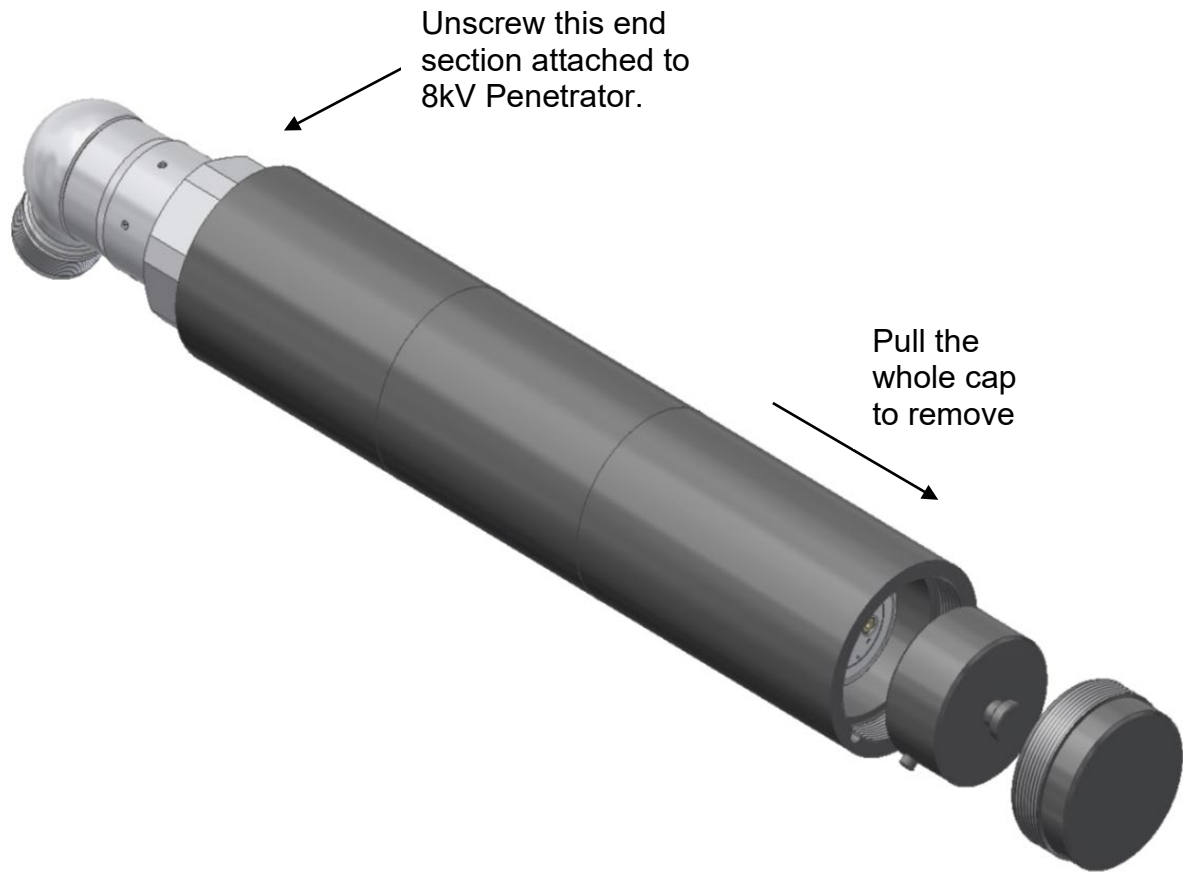
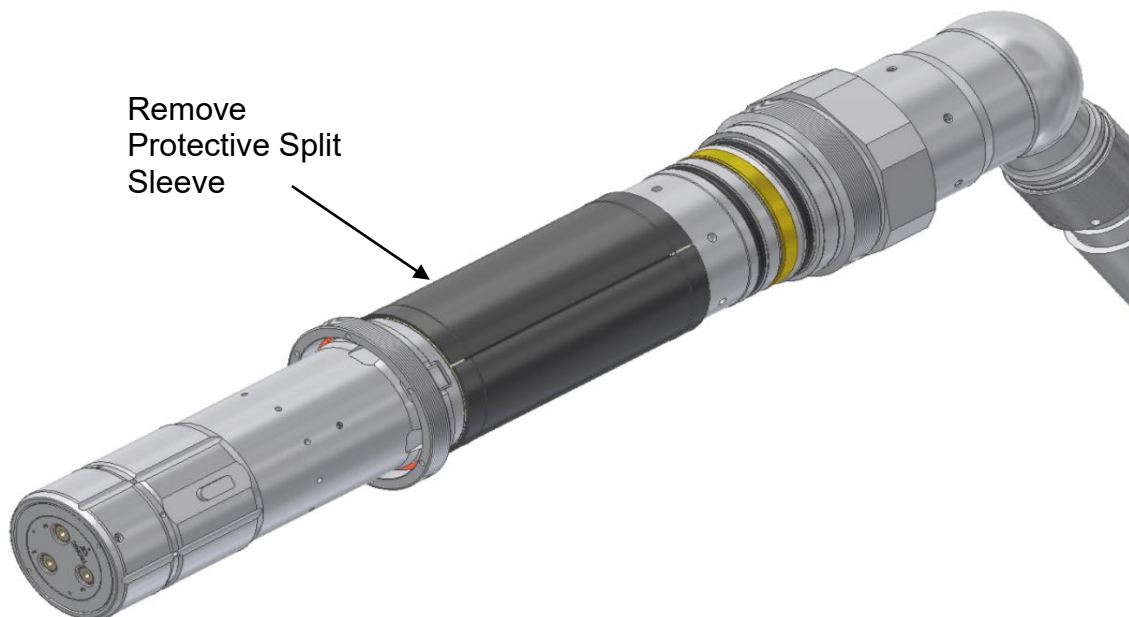


Figure 11 - Tree Cap Penetrator / Plug Removal of Keyed Cap



**Figure 12 - Tree Cap Penetrator / Plug Protective Cap Removal**



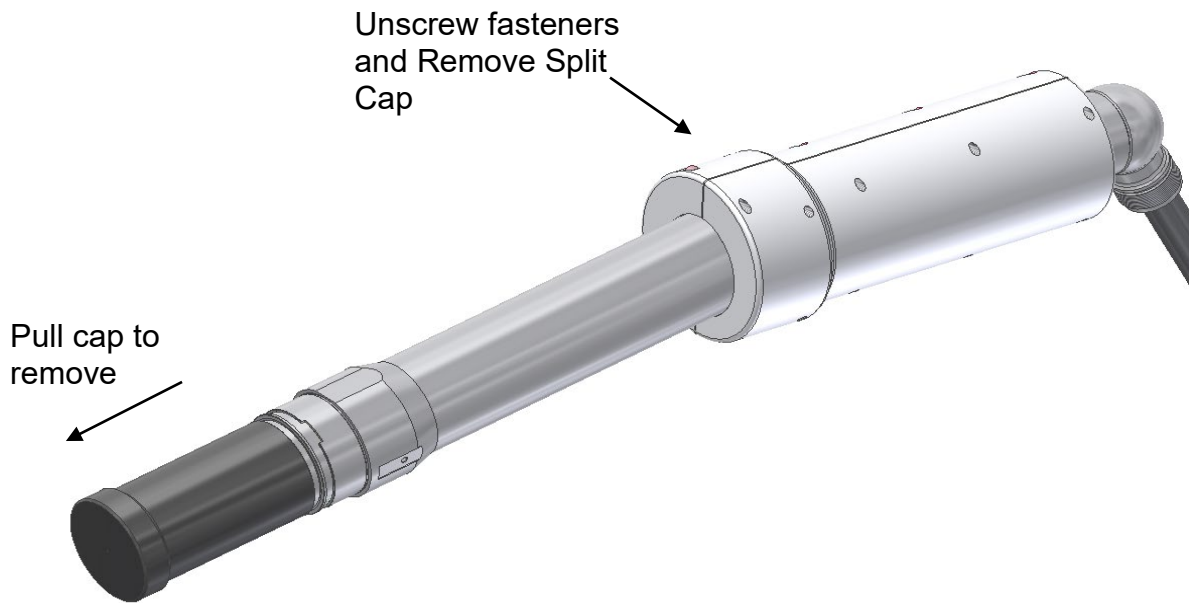
**Figure 13 - Tree Cap Penetrator / Plug Split Sleeve Removal**

Refitting the Penetrator cap is a reversal of the removal procedure.

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#### 6.1.4 TREE CAP PENETRATOR CAP – VERSION 2

Penetrator caps would usually be removed by Siemens Subsea site engineers during the termination of the Penetrator to the module. It is recommended that only trained personnel remove Penetrator caps though details are provided here for information only. The Tree Cap Penetrator version 2 consists of split halves to protect the compliant gland. Carefully position the Plug & Penetrator on a suitable bench and remove the protective cap taking care not to bend the compliant gland between plug and penetrator.



**Figure 14 - ROV Receptacle - Penetrator - Tree Cap Plug Jumper**

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## 7. STORAGE

The connectors must be stored in a clean dry area and be protected by bubble wrap or similar. Suitable protection caps must be fitted and the storage temperature should be between -30°C and 60°C (Project Specific Connectors storage Temperature may vary). Humidity of the store room should be below 75%. Very moist or very dry conditions should be avoided. The Plug connector and hoses should be protected from strong sunlight and strong 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 glanded connectors are to be stored bolted into their interfaces prior to cable termination, then ensure the cable entry point into the gland is covered to prevent water ingress.

## 8. DEPLOYMENT & MAINTENANCE

The following section details deployment and maintenance instructions for SpecTRON 8 connectors & hose.

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.

**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.

### 8.1 GENERAL

The SpecTRON 8 range of Power connectors has been developed for long term reliable high power system applications associated with offshore installations. The underwater mateable capacity of these connectors is achieved using pressure compensated electrical inserts employing the CE principle.

Connectors are usually supplied with protective caps. The protective caps must be removed prior to mating the connectors. Refer to section 6.1 for instructions for removal of protective caps.

All mild steel sealing interfaces shall be inlaid with Inconel 625, or similar, where no additional protection (e.g. CP, Paint etc.) can be provided. This is to prevent localised pitting of the interface.

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

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Plug connectors may be left unmated, in seawater, for an indefinite period of time. However it is recommended that the Plug connectors are mated into a Parking Receptacle during this time in order to protect the socket contacts and latching mechanism. It is good practice to always fit the protective cap when a connector is unmated topside prior to deployment to provide mechanical protection.

**Important Note:** 60 days\* is the maximum cumulative allowable exposure of unprotected contact pins (receptacle connectors only) to seawater over the life of the connector. This only applies with power off.

\*60 days applicable to Receptacle connectors supplied from January 2013. Connectors supplied before this date may be limited to 30 days. Contact Siemens Subsea for further information on specific connector serial numbers.

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.

Guide pins must never be removed from test connectors as this can lead to damage and will invalidate the connector warranty.

**Important Note:** Under **NO** circumstances must connectors be demated whilst live. Neither should connectors be partially mated with power applied.

Refer to project specific data sheets and scope of supply drawings for performance specifications and detailed deployment instructions.

**Important Note:** **NO** part of the connectors should be dismantled prior to or during deployment, apart from the removal of protective caps, since there are no user serviceable parts inside.

## 8.2 PROTECTION OF RECEPTACLE CONTACT PINS

Under no circumstances must the contact pins in the receptacle connector be exposed to seawater with power on. 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 within the plug connector.

## 8.3 OVER CURRENT CAPACITY

Over current capacity varies for each product. Please refer to the product datasheet.

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#### 8.4 REMOVAL OF MARINE GROWTH AND CALCAREOUS DEPOSITS

To remove calcite growth from Siemens Subsea connectors, a solution of 50% Citric Acid is recommended. All Seawater exposed elastomeric materials in Siemens Subsea 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.

It is recommended the solution is introduced through the flushing port adaptor (as per Figure 15) to provide maximum saturation within the Plug/Receptacle annulus. Others cavities on the receptacle shroud can be utilised to introduce the solution dependant on access capability.

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. Wiping with a soft, clean cloth is acceptable providing care is taken inside the Receptacle shroud to avoid imparting a bending load on the power pin/s. Use of water jetting for the removal of sand/silt is acceptable given the following limitations:

- All forms of water jet cleaning of connectors in air must be avoided. The likelihood of damage to connectors is great, given the high localised impact velocities of the water jet.
- Submerged water jet cleaning of connectors is acceptable, providing the critical areas identified in Figure 14 & Figure 15 are avoided. Particularly, the jet should not be directed at the Plug front face / shuttle pins as this could result in a risk of water being forced through the primary seals and/or front seal. Remaining areas indicated below are suitable for submerged water jet cleaning.

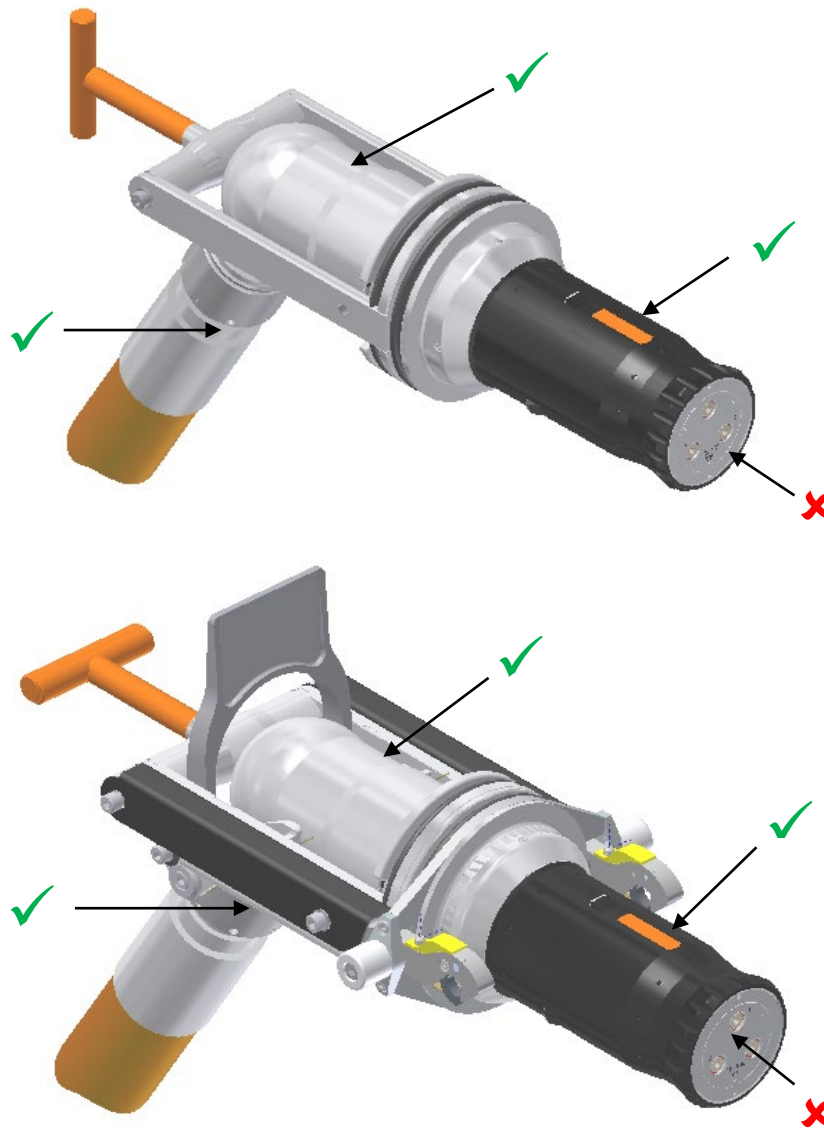
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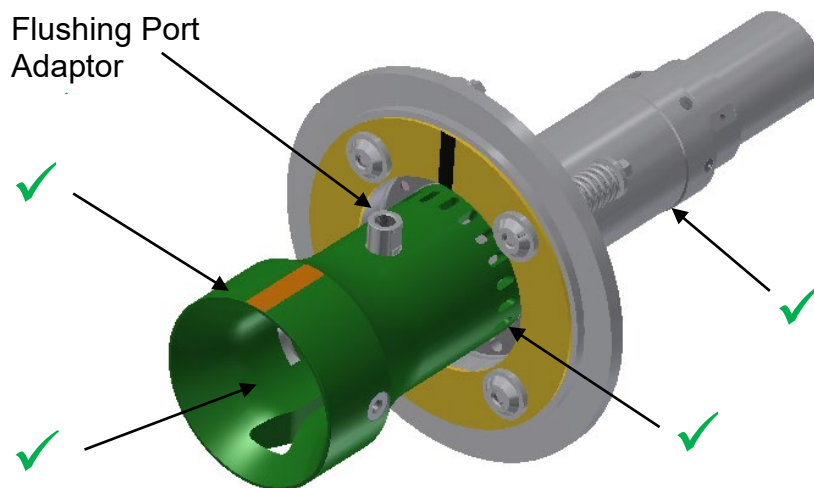
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**Figure 15 - Connector Power Washing Precautions**



**Figure 16 - Connector Power Washing Precautions**

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## 8.5 STAB PLATE CONNECTORS

### Compliance

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

### Mate/De-Mate 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 de-mated, however as a guide:

Mating speed should not exceed 1 m/s.

De-mating speed should not exceed 5 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.

### Partial Disconnection

Partial disconnection with the contact pin remaining between the primary and secondary diaphragms is not recommended. In this condition the level of insulation between the contact pin and socket contact is reduced and the connector is relying on the primary seals within the plug. There is also an increased risk of insulation break down at increased voltages.

### Interrupted Connection

Interrupted connection (i.e. Partial mate to full de-mate) can be carried out without any adverse affect to connectors, as long as the power is off.

### Cathodic Protection:

Stainless steel 316L (UNS S31603) connectors must be connected to the CP (Cathodic Protection) system at all times. Super Duplex stainless steel (UNS S32550 / UNS S32760) connectors may be isolated from the CP system through the design of the structure to which they are connected to reduce the possibility of hydrogen embrittlement and calcareous deposits. However, it should be noted that Tree Cap Plugs, Tubing Hanger Receptacles and Penetrators cannot be isolated from the structure as they do not utilise isolation discs and bushes due to their mechanical and pressure retaining requirements.

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## 8.6 ROV CONNECTORS

### ROV Manipulator

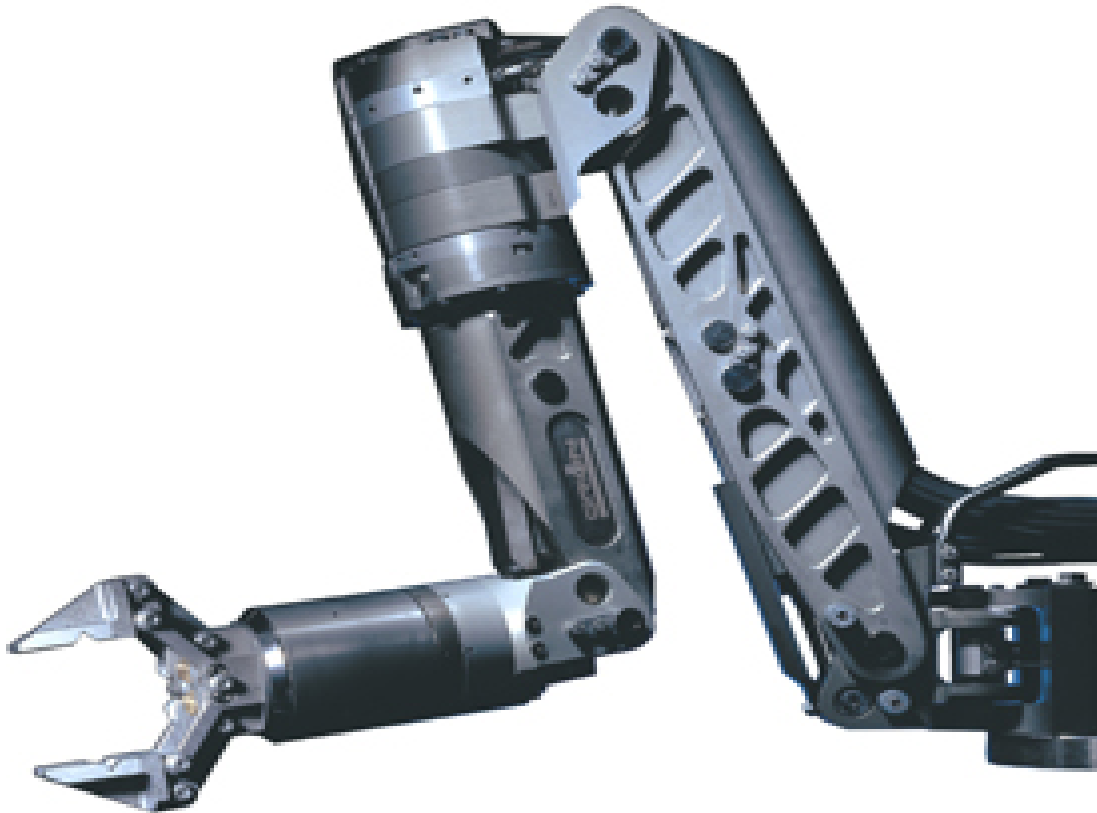
SpecTRON 8 connectors are fitted with either an ISO 13628 T-bar handle or an ISO 13628 Fish Tail Handle.

ROV EFLs under or equal to 30m require no buoyancy aids for subsea deployment.

ROV EFLs over 30m require buoyancy aids which must be placed at reasonable positions along the harness and are suitable to support 1.45kg (See 3.3.1) per metre length in excess of 30m e.g. a 50m EFL requires buoyancy aids to cover  $20 \times 1.45 = 29\text{kg}$  worth of additional hose weight in water.

### T Bar Handle

T-bar handle connectors must be manipulated using a Parallel Jaw ROV manipulator similar to that shown in Figure 17.



**Figure 17 - Recommended ROV Manipulator Jaw for T Bar Handle**

The T bar should be held by the crossbar of the T as shown in Figure 18 and not by the shaft. If the T bar is held incorrectly there is a risk that the latch mechanism of the connector will not engage correctly.

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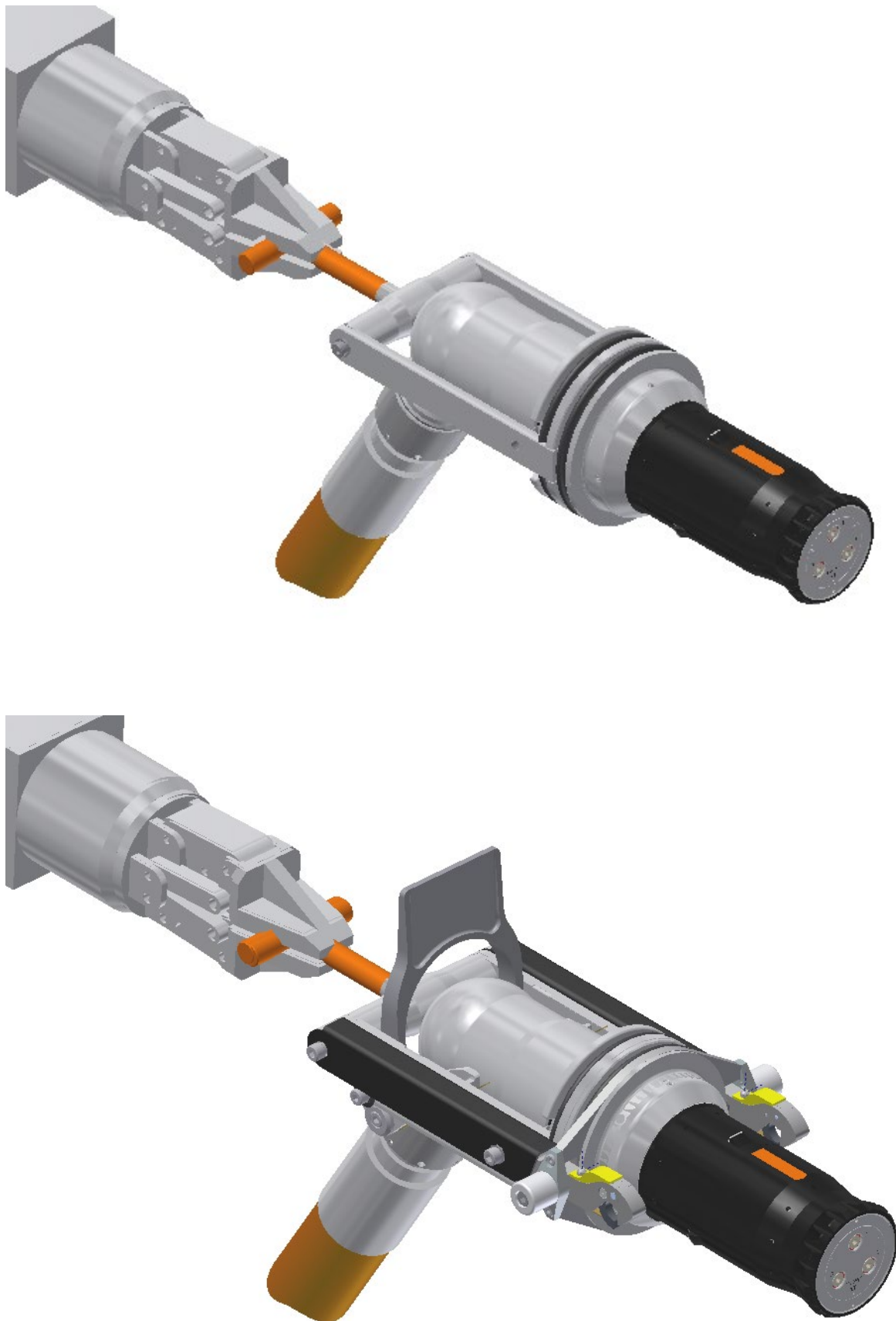


Figure 18 - ROV Connector Handling

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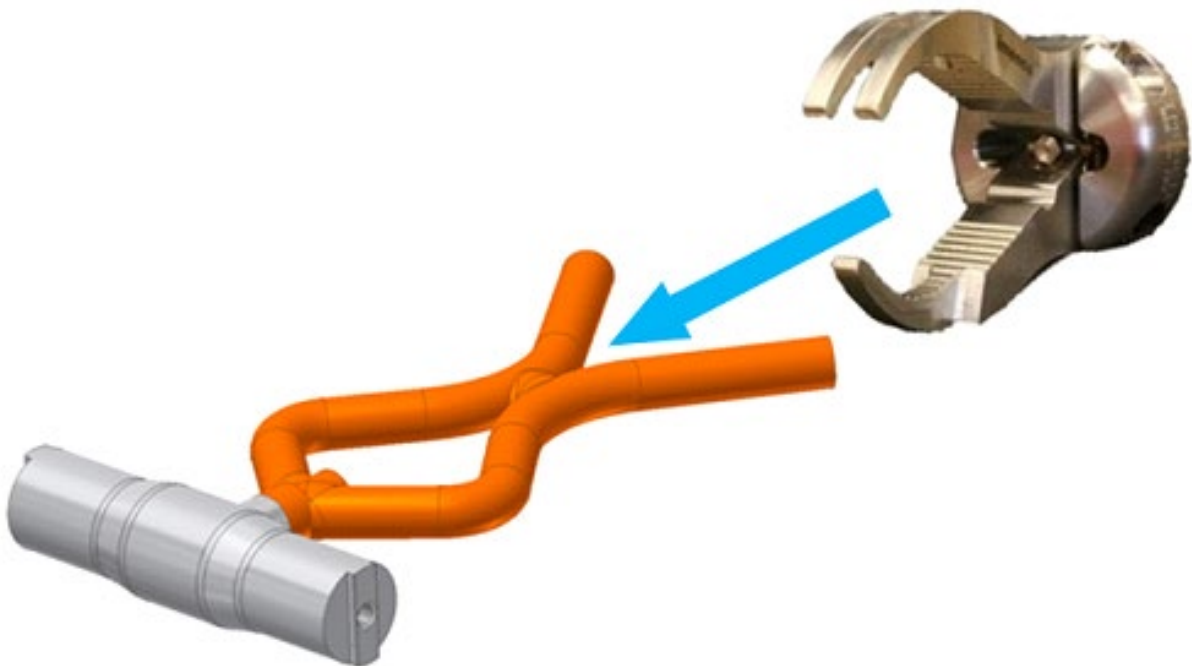
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### Fish Tail Handle

Fish Tail Handle connectors must be manipulated using a 3-finger ROV manipulator jaw similar to that shown in Figure 19. The handle should be held in the ROV jaw as shown in Figure 20.



**Figure 19 - Recommended ROV Manipulator Jaw for Fishtail Handle**



**Figure 20 - ROV Connector Handling**

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## 9. ROV MATE / DE-MATE PROCEDURES

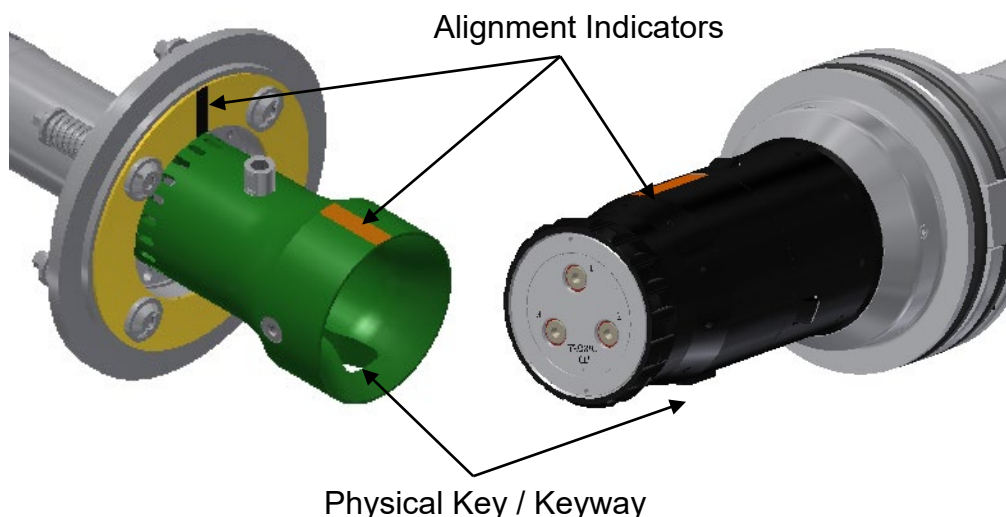
### 9.1 ROV MATING PROCEDURE

#### Pre Mating Checks

Before mating, the receptacle shroud should be checked for debris. The connectors have been designed to accommodate sand and silt contamination. However, large pieces of debris should be removed.

### 9.2 ALIGNMENT AND MATING PROCEDURE – CONNECTORS WITHOUT LOCKING MECHANISM

- The connectors have been designed to self align during mating, however they must be roughly aligned using the alignment marks on the top of the Connector body & Alignment flange / Receptacle shroud prior to mating. (Figure 21A & Figure 21B).
- Note the location of the alignment key/keyway on the underside of the Connectors. (Figure 21A & Figure 21B).
- Compliance is built into the connector handle, and the receptacle mount. This flexibility accommodates misalignment and allows fine adjustments during the final approach prior to connector engagement.
- The mating stroke should be as close as possible to one smooth movement, i.e. avoid 'pumping'. Using the ROV manipulator jaw, the pilot should grip the ROV handle as shown in Figure 18 or Figure 20.
- The internal latch mechanism is activated by pushing the connectors together until the flanges of the plug and receptacle are fully home (Figure 23).
- To ensure correct engagement, the ROV pilot should open the jaw and operate a final push operation before withdrawing from the T bar with a fully open jaw (Figure 22). This ensures that the internal latch mechanism is not accidentally disengaged as the ROV pulls away from the connector.
- As dictated by Industry best practice, all ROV operations are to be recorded on video. The video is to be retained and made available to Siemens Subsea as and when required.



**Figure 21A - Alignment Indicators Coated (Connectors without Locking Mechanism)**

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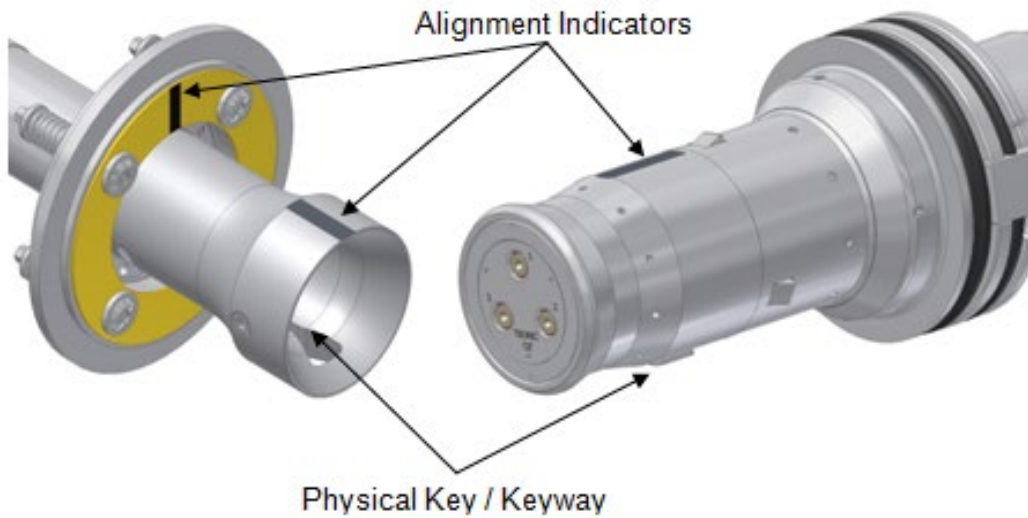


Figure 21B – Alignment Indicators Uncoated (Connectors without Locking Mechanism)

**Important Note:** Siemens Subsea reserves the right to reject any investigation where there are suspected unsuccessful ROV operations and no video can be provided.

**WARNING NOTE: DO NOT** pull on the ROV handle to check the connector is correctly mated as this will disengage the internal latch mechanism and de-mate the connector.

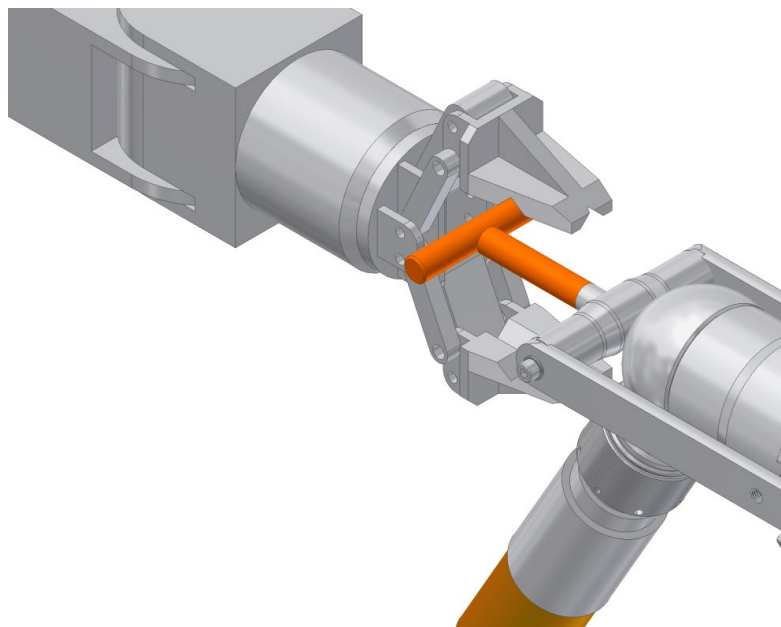


Figure 22 - Final Push with Open Jaw

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**Post-Mating checks:**

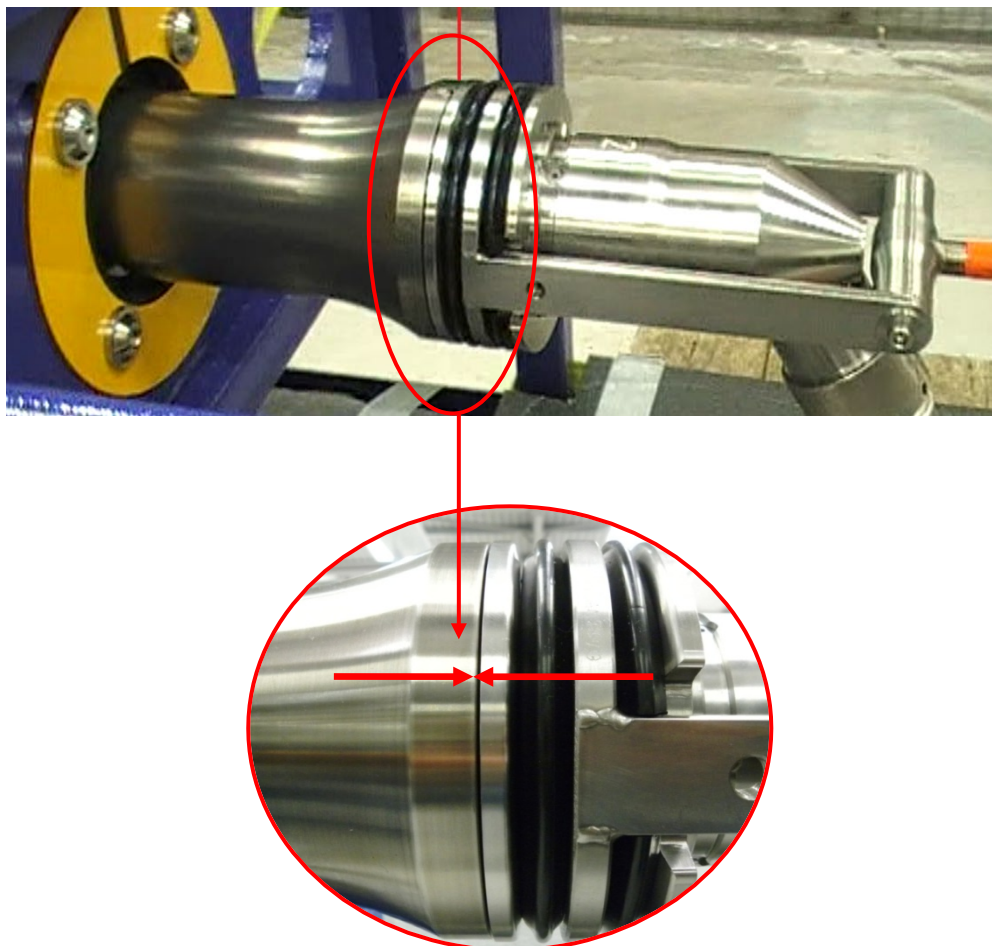
- Correct mating of the connector must be determined by visual inspection only (Figure 23).
- The shoulder on the Plug should butt up against the shroud of the Receptacle.

**Note:** When relaxed there may be a small gap between the two (due to the springs in the Plug pushing against the Receptacle pins).

**Important Note:** A pull-check on the handle should **NEVER** be made as this will release the internal latching mechanism causing the connectors to separate.

**Mechanical Forces & Misalignment during Mating / De-Mating:**

If mate / de-mate forces, maximum misalignment or over stroking forces have been defined, these will be specified in the product datasheet or design input document.



**Figure 23 - Mating Check - Fully Mated. Note Small Gap between Flanges.**

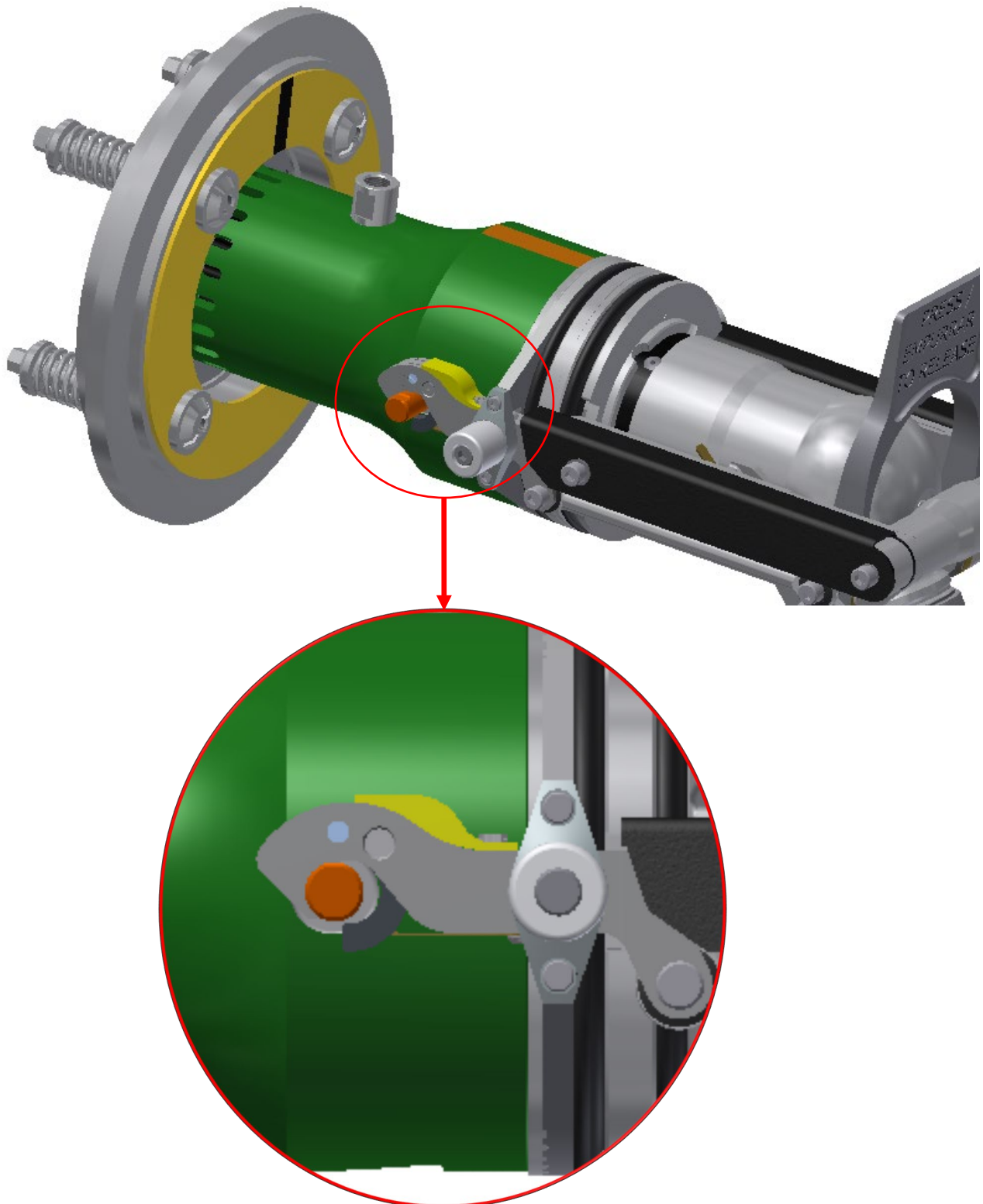


Figure 24 - Mating Check - Locking Mechanism Engaged.

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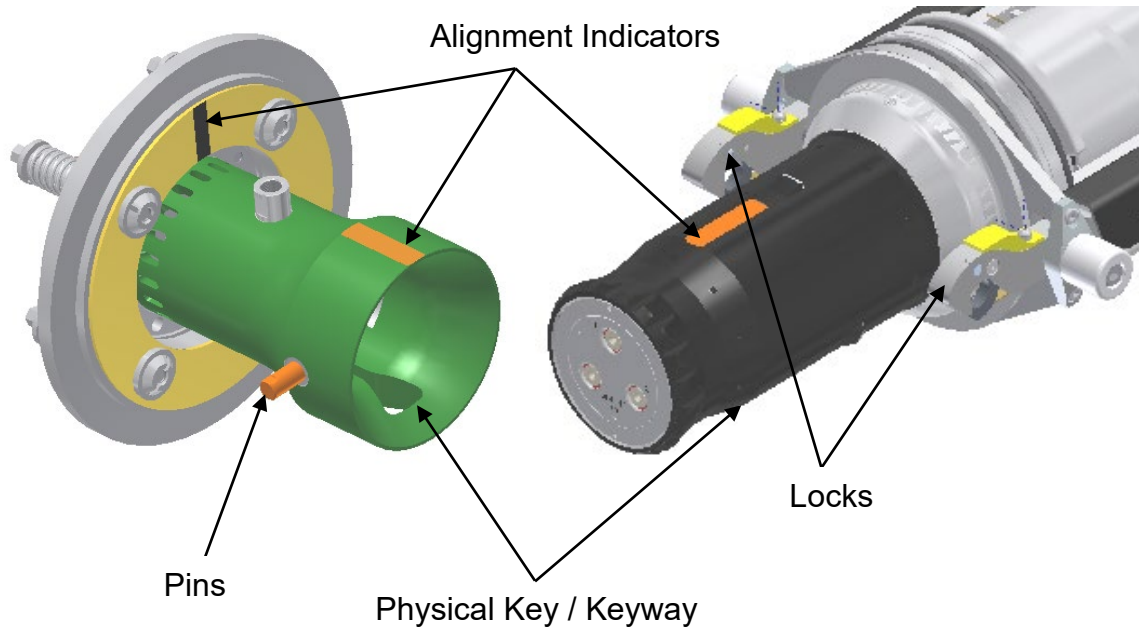
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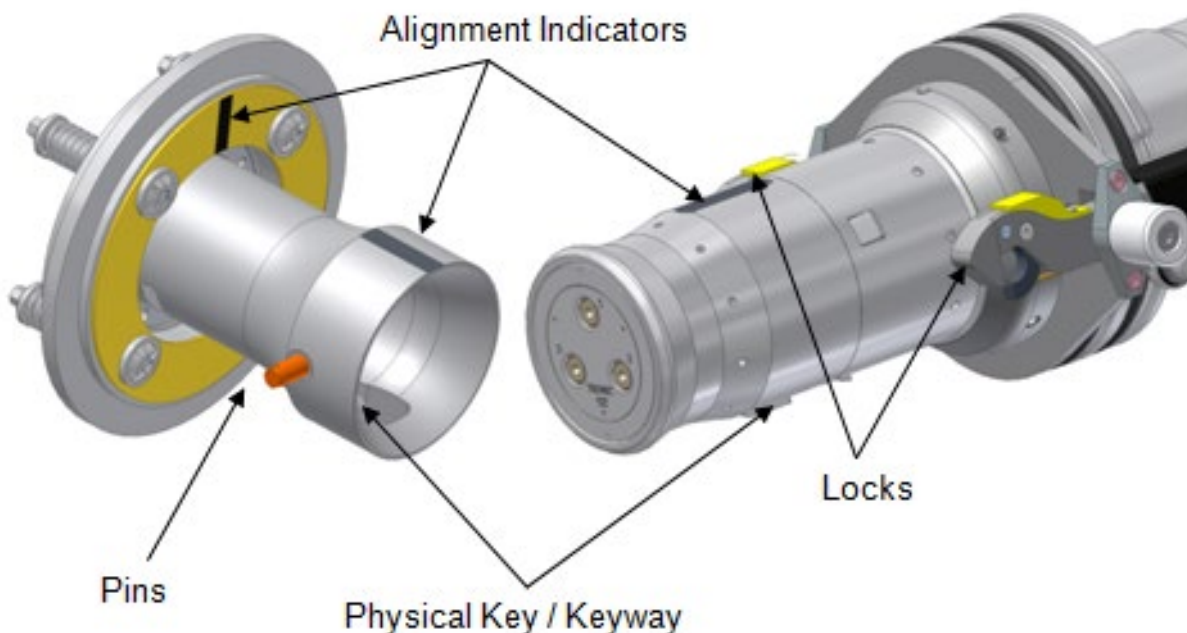
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### 9.3 ALIGNMENT AND MATING PROCEDURE – CONNECTORS WITH LOCKING MECHANISM

- The procedure for mating a connector with Locking Mechanism is identical to the standard ROV connector without Locking Mechanism (refer to Section 9.2).
- The locking mechanism engages automatically during mating and requires no additional action from the ROV pilot.



**Figure 25A - Alignment Indicators Coated (Connectors with Locking Mechanism)**



**Figure 25B – Alignment Indicators Uncoated (Connectors with Locking Mechanism)**

**Important Note:** Siemens Subsea reserve the right to reject any investigation where there are suspected unsuccessful ROV operations and no video can be provided.

**WARNING NOTE: DO NOT** pull on the ROV handle to check the connector is correctly mated as this may result in damage to the locking mechanism.

**NEVER** pull on the ROV handle without first disengaging the locking mechanism as this may result in damage to the locking mechanism.

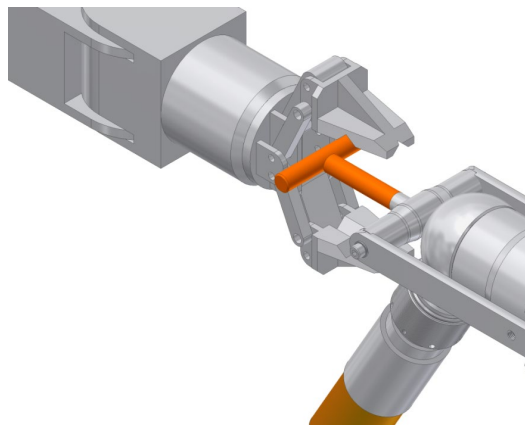


Figure 26 - Final Push with Open Jaw

#### Post-Mating checks:

- Correct engagement of the locking mechanism must be confirmed by visual inspection (Figure 24).
- The shoulder on the Plug should also butt up against the shroud of the Receptacle.

**Note:** When relaxed there may be a small gap between the two (due to the springs in the Plug pushing against the Receptacle pins).(Figure 23)

- Use Figure 23 as guidance for correct engagement of the locking mechanism. If the post mating checks show the locking mechanism is not correctly engaged then the plug must be de-mated (following the procedure in section 9.6) then re-mated.

**Important Note:** A pull-check on the handle should **NEVER** be made as this could shear the emergency release shear pins and release the internal latching mechanism causing the connectors to separate.

#### Mechanical Forces & Misalignment during Mating / De-Mating

If the mate / de-mate forces, maximum misalignment or over stroking forces are defined, these will be specified in the product datasheet or design input document.

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## 9.4 ROV DE-MATING PROCEDURE

### 9.5 DE-MATING PROCEDURE - CONNECTORS WITHOUT LOCKING MECHANISM

- To De-mate the connector, Grip the ROV handle (T-handle or fishtail) correctly with the ROV jaw (Figure 18 or Figure 20)
- De-mating is achieved by a straight pull on the ROV handle sufficient to release the internal latching mechanism. Do not pull on the gland or hose.

**Note:** If the ROV handle is held incorrectly there is a risk that the internal latch mechanism of the connector will not disengage properly.

### 9.6 DE-MATING PROCEDURE - CONNECTORS WITH LOCKING MECHANISM

- Before De-mating the connector the ROV pilot must first release the locking mechanism.
- The locking mechanism is released by pushing forward the release paddle using the nose of the ROV manipulator jaw. (Figure 27)
- The locks will disengage from the receptacle pins when the paddle is pushed fully forward. (Figure 27)
- When this action has been performed correctly the release paddle will remain in the forward position after the ROV jaw is retracted.
- Figure 26 Detail view shows the locks in the disengaged position.
- To De-mate the connector, Grip the ROV handle (T-handle or fishtail) correctly with the ROV jaw (Figure 18 or Figure 20).
- De-mating is achieved by a pull on the ROV handle sufficient to release the internal latching mechanism. Do not pull on the gland or hose.
- As the connector is de-mated the release paddle will automatically return to the default position. No ROV pilot action is required.
- On de-mating, the locking mechanism re-sets automatically and can be immediately re-mated if required. No ROV pilot action is required prior to re-mating.

**Note:** If the ROV handle is held incorrectly there is a risk that the internal latch mechanism of the connector will not disengage properly.

## Manual Mating / De-Mating of ROV connectors

Refer to Section 10 for manual Mating / De-mating procedure.

## Cathodic Protection

The ROV connectors are designed to operate when isolated from the CP [Cathodic Protection] system. The ROV connectors will not suffer damage by being connected to the CP system; however there may be a tendency for increased calcareous deposits on metal surfaces, and the possibility of hydrogen embrittlement.

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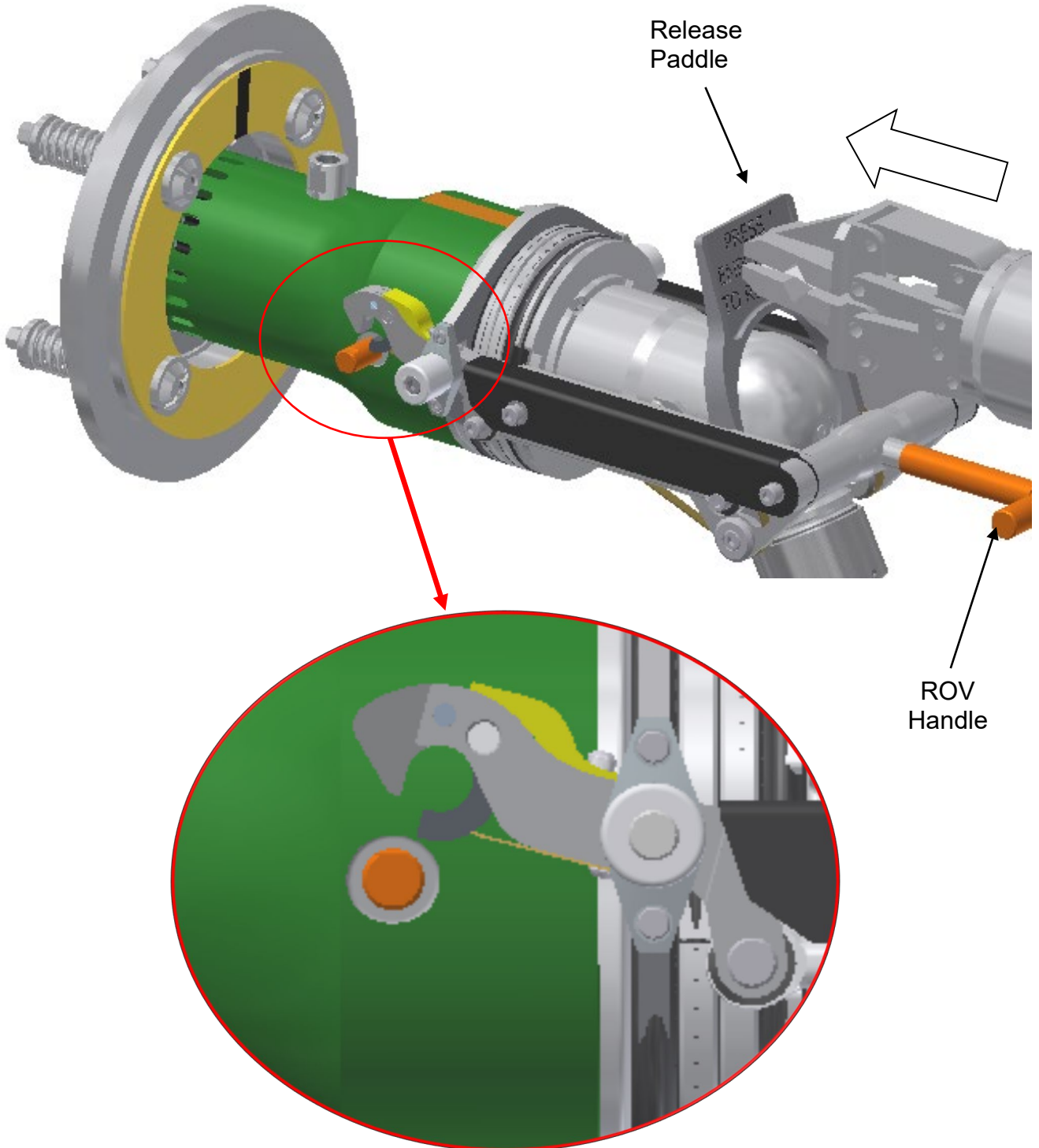


Figure 27 - Locking Mechanism Disengaged

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## 9.7 EMERGENCY DE-MATE PROCEDURE – CONNECTORS WITH LOCKING MECHANISM ONLY

The emergency De-mate procedure is to be used in the event of a malfunction or failure of the locking mechanism which is preventing normal operation.

- To De-mate the connector Grip the T-handle or fishtail handle correctly with the ROV jaw (Figure 18 or Figure 20).
- De-mating is achieved by pulling on the ROV handle (Do not pull on the gland or hose). A pull force of 3 to 4kN is required to break the internal shear pins and release the mechanism allowing the connector to de-mate.

**Note:** Following an emergency de-mate the connector is still functional and can be safely re-mated if required. Continued operation is possible due to the internal latches which remain fully functional.

The locking mechanism will be inoperable following the emergency release and the connector must be recovered to the surface in order to repair the mechanism.

Figure 28 shows the appearance of a lock following an emergency release



**Figure 28 - Lock after Emergency Release**

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## 10. MANUAL MATE/ DE-MATE PROCEDURES

This section summarises the procedure to be followed for a diver or topside operator to mate/de-mate the ROV connectors manually (as opposed to mating/de-mating using an ROV).

### 10.1 MANUAL MATING PROCEDURE

#### 10.1.1 ALIGNMENT AND MATING PROCEDURE – CONNECTORS WITHOUT LOCKING MECHANISM

Prior to commencing the mating of the connector pair it is assumed that the Receptacle connector is mounted to its associated mounting plate, and that the Plug connector is in the near vicinity. Grab bars or other interfaces should be present on the Receptacle mounting structure. These should provide the diver with purchase and allow him to address the connector square-on with the connector at chest height.

- Remove protective cap from Plug connector, or if Plug connector is mated to a Parking/Dummy Receptacle remove as detailed in the manual de-mating procedure below.
- If a Dummy Plug connector is mated to the Receptacle, remove using the manual de-mating procedure detailed below.
- Inspect the Receptacle pins and shroud, and ensure they are clean and free from debris, etc. If any debris is present remove using a water jet.

**Note:** This operation **MUST NOT** be performed in air.

- Insert the Plug Connector nose into the shroud of the Receptacle, and initially locate the key on the Plug nose into the slot of the Receptacle shroud using the alignment indicators, as shown in Figure 21A and Figure 21B. It should be noted that the physical key/keyway are located on the underside of the connectors.
- The operator should now get into a comfortable position, square on, ready to fully mate the connectors. The connector should be at chest height, with the grab bars or other provided interfaces on the mounting structure being within easy reach. Using the grab bars or other means to brace himself (i.e. tied to structure), the operator should mate the connector by holding the ROV handle (Figure 29) and using one smooth single stroke to push the Plug connector until it butts up against the Receptacle. A maximum force of 76.5kgf (750N) will be required to mate the connectors. Ensure the mating stroke is level, and the operator is able to complete the stroke in one smooth consistent movement. Confirm that no bounce-back and failure to latch home has occurred.

**WARNING NOTE: DO NOT** pull on the ROV handle to check the connector is correctly mated as this will disengage the internal latch mechanism and de-mate the connector.

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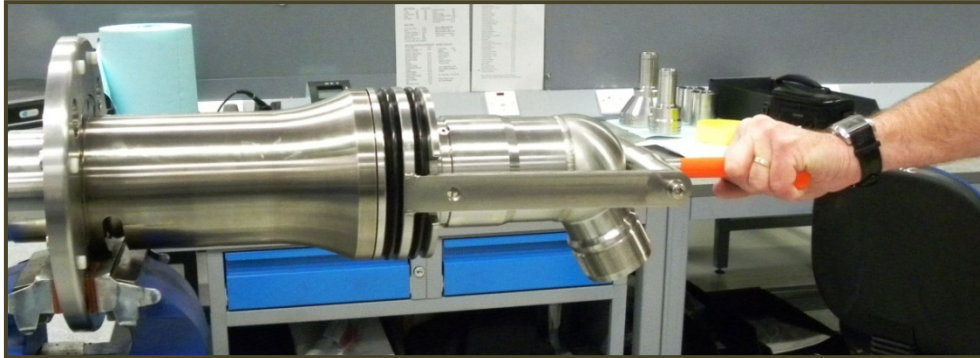
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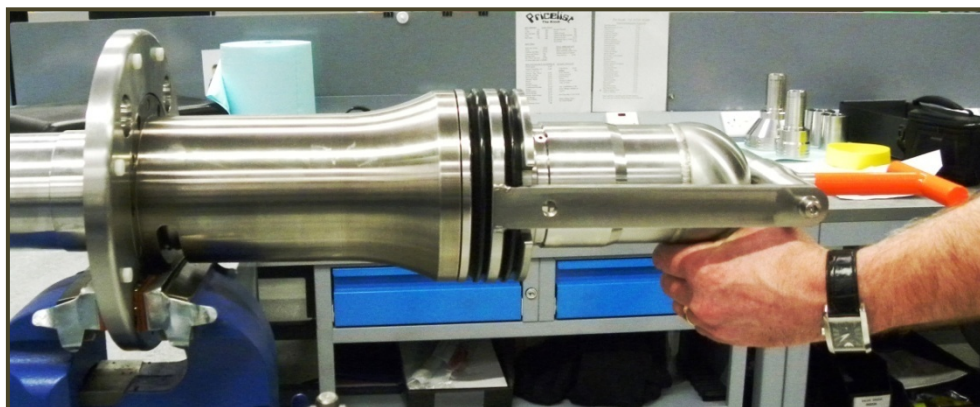
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- When the plug connector end stops abut to the receptacle this activates the internal spring loaded internal latch mechanism, which prevents the connectors de-mating. Pulling on the ROV Handle will de-activate this latch and hence will de-mate the connector.



**Figure 29 - Mate using ROV Handle**

- To confirm that connectors are fully mated and the Plug is correctly latched home, gently pull the Plug connector by holding the angled downward section of the Plug gland near to the hose termination, as shown in Figure 20. If the connectors are correctly latched and mated no axial movement in the Plug connector should be present. As a visual inspection, the shoulder on the Plug should butt up against the shroud of the Receptacle. However, when relaxed there may be a small gap between the receptacle and connector (due to the springs in the Plug pushing against the Receptacle pins), as shown in Figure 23.



**Figure 30 - Check Connectors are Mated**

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### 10.1.2 ALIGNMENT AND MATING PROCEDURE – CONNECTORS WITH LOCKING MECHANISM

- The procedure for mating a connector with Locking Mechanism is identical to the standard ROV connector without Locking Mechanism (refer to Section 10.1.1).
- The locking mechanism engages automatically during mating and requires no additional action from the operator.

#### Post-Mating checks:

- Correct engagement of the locking mechanism must be determined by visual inspection (Figure 24).
- If the post mating checks show the locking mechanism is not correctly engaged (Figure 24) the plug must be de-mated following the procedure in section 10.2.2 and then re-mated following the procedure in section 10.1.2
- The shoulder on the Plug should butt up against the shroud of the Receptacle.

**Note:** When relaxed there may be a small gap between the two (due to the springs in the Plug pushing against the Receptacle pins). (Figure 23)

- As an additional confirmation that connectors are fully mated and the Plug is correctly latched home, gently pull the Plug connector by holding the angled downward section of the Plug gland near to the hose termination, as shown in Figure 30. If the connectors are correctly latched and mated no axial movement in the Plug connector should be present.

## 10.2 MANUAL DE-MATING PROCEDURE

### 10.2.1 DE-MATING PROCEDURE – CONNECTORS WITHOUT LOCKING MECHANISM

Prior to commencing the de-mating of the connector pair it is assumed that the Receptacle connector is mounted in its associated structure, and a Plug connector is mated to it.

- The operator should brace himself using the grab bars or other provided interfaces, and ensure the connector is at chest height. By gripping the ROV handle (as shown in Figure 8), the connector can be de-mated from the Receptacle using one smooth pulling movement along the axis of the connectors. Pulling the ROV handle automatically releases the internal latching mechanism. A force of 40kgf (392N) is required to de-mate the connectors.
- Once the Plug connector is fully separated from the receptacle connector, if appropriate it can then be mated to the parking Receptacle, using the steps described in the mating procedure in section 10.1.1. A dummy plug should also be mated to the remaining Receptacle, again using the mating procedure in section 10.1.1

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### 10.2.2 DE-MATING PROCEDURE – CONNECTORS WITH LOCKING MECHANISM

- Before De-mating the connector the operator must first release the locking mechanism.
- The locking mechanism is released by pushing the release paddle fully forward.
- The locks will disengage from the receptacle pins when the paddle is pushed fully forward. (Figure 27)
- When this action has been performed correctly the release paddle will remain in the forward position after the operators hand is removed.
- The operator should brace himself using the grab bars or other provided interfaces, and ensure the connector is at chest height. By gripping the ROV handle (as shown in Figure 29), the connector can be de-mated from the Receptacle using one smooth pulling movement along the axis of the connectors. Pulling the ROV handle automatically releases the internal latching mechanism. A force of 40kgf (392N) is required to de-mate the connectors.

**Note:** Once the connector is de-mated the locking mechanism will re-set automatically and can immediately be re-mated. The release paddle will automatically return to the default position. This can be confirmed by a quick visual inspection

- Once the connector is fully separated from the receptacle connector, if appropriate it can then be mated to a parking receptacle, using the steps described in the mating procedure in section 10.1.2. A dummy plug should also be mated into the remaining Receptacle, again using the mating procedure in section 10.1.2



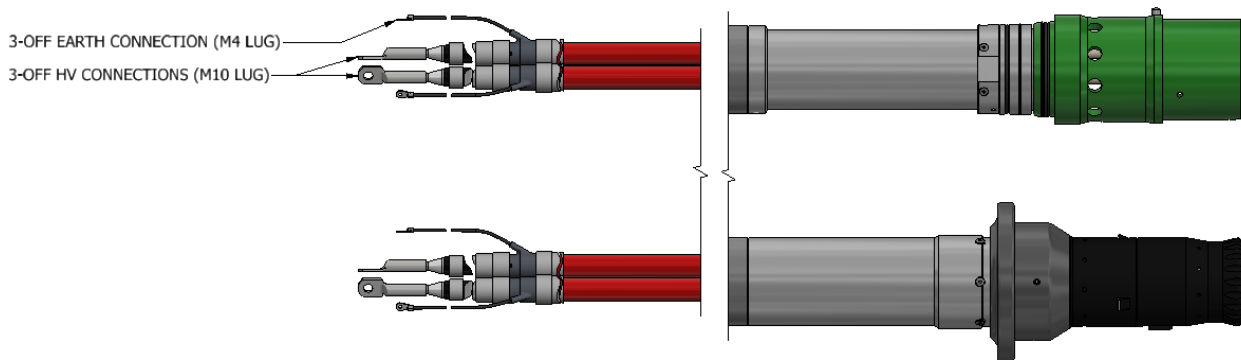
## 11. TOPSIDE TEST CONNECTORS

SpecTRON 8 connectors can be electrically tested with the use of SpecTRON 8 plug and receptacle topside test connector tailed harnesses as shown below in Figure 31.

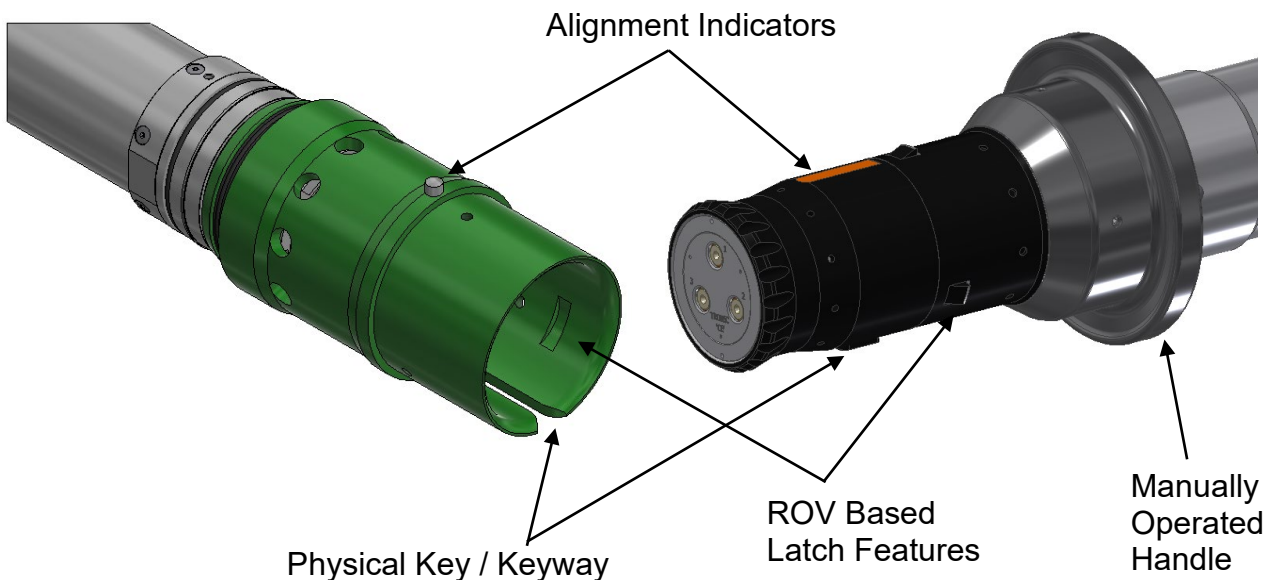
These connector harnesses are terminated with 3-off M10 lugs for connection to a HV supply and 3-off M4 lugs for connection to an earth source. Cable management must be considered to ensure that the HV and earth connections are kept separated by the largest reasonable distance possible to ensure no electrical shortages.

The design of these connectors is based on the ROV mating mechanism as described in previous sections, therefore no additional mating / retaining equipment required.

Cleaning should be performed with “safe wipes” only. “Safe wipes” are available on the internet and are lint-free, non-static, IPA based wipes for electronics. Consideration should also be given to guidance in Section 8.4 on marine growth and calcareous deposit removal.



**Figure 31 - Tailed Test Harness Connection Points**



**Figure 32 - Alignment Indicators Coated (Topside Test Connectors)**

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## 12. INSTALLATION

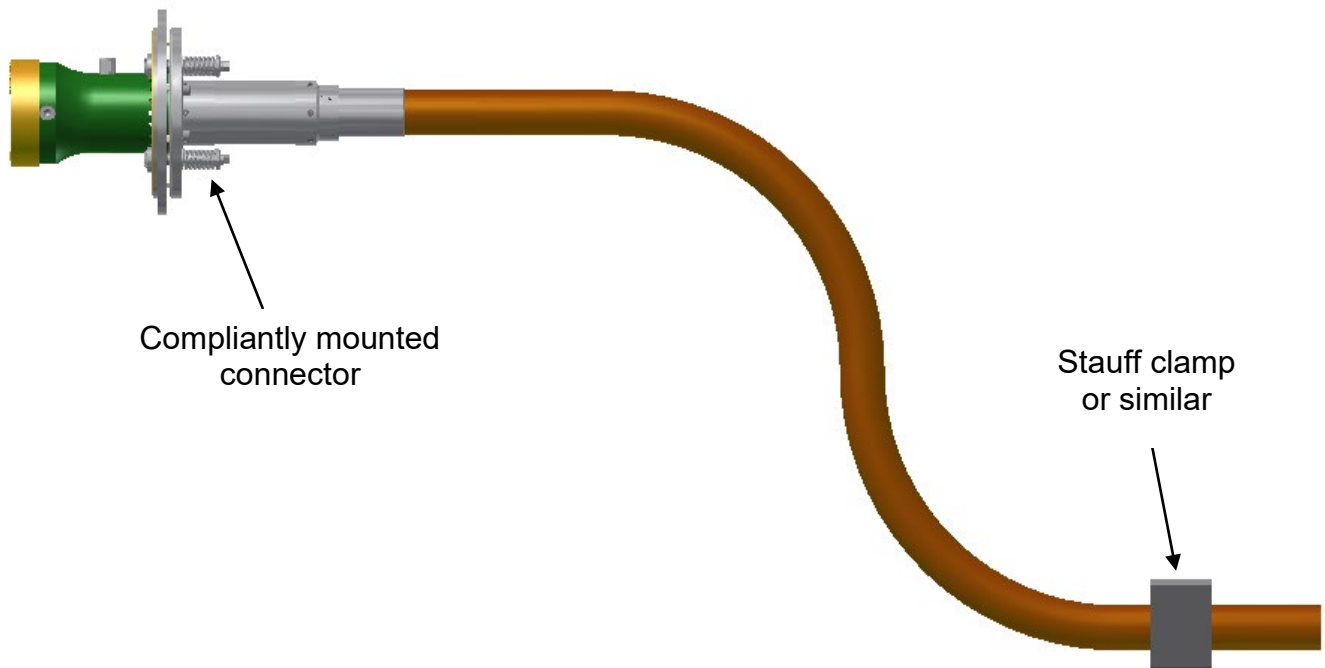
### 12.1 CONNECTOR & PENETRATOR INSTALLATION

It is recommended that the installation of all SpecTRON Penetrators and Mounted Connectors is undertaken by Siemens Subsea site engineers or trained personnel.

### 12.2 HOSE ROUTING AND SUPPORT

Hose should be routed in a manner to avoid bending beyond the MBR (375mm) or kinking of the hose. Siemens Subsea recommend that rubber inlayed plastic clamps are used to secure the hose (such as a Stauff pipe clamp with the correct inside diameter, refer to section 3.3 for hose diameters) and manage the routing of the jumpers.

Careful consideration should be given to the placement of the first clamp on a compliant mount connector so as not to restrict the compliancy of the connector or impart stresses into the hose and cable. Where clamping is required on compliantly mounted connectors, It is recommended that an 'S' type arrangement or similar as shown in Figure 33 is utilised to take up the potential movement of the connector.



**Figure 33 - Potential Clamping of Hose on Compliant Connector**

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