

# Quick Guide D-Line

## High-current connectors

Read this manual before starting to work!



Mere information about our products, accessories and spare parts and the detailed operating instructions can be found on our website.  
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### 1 Safety

#### 1.1 Explanation of symbols

Safety instructions

Safety instructions are indicated by symbols and signal words.



DANGER!

This combination of symbol and signal word indicates a potentially hazardous situation by electricity. If a so labelled warning is ignored, serious injury or death will result.



CAUTION!

This combination of symbol and signal word indicates a potentially hazardous situation that may result in minor injury if not avoided.

#### 1.2 Intended use

The high-current connectors are used for connecting non-stationary consumers in accordance with the technical specifications (→Technical specifications section 3).

Any other use exceeding or deviating from the scope of intended use is considered to be incorrect.

- Do not use the high-current connectors in explosive or combustible atmospheres.
- Do not plug in or pull out the high-current connectors under voltage and/or load.
- Do not use force when plugging in or pulling out the high-current connectors.
- Do not plug in or switch on high-current connectors that are damaged.
- Risk of corrosion during use in corrosive atmospheres provide for hard anodization of the high-current connectors.

#### 1.3 Safety instructions

Electric current



DANGER!  
Danger to life from electric current!

There is danger to life from flashover and electric shock in case of damage to insulators and other components.

- Cut off the power supply and initiate repairs immediately after you have detected damage to the insulation.
- Have all work on the electrical system performed by qualified electricians.
- Before commencing any work on the live components of electrical systems and equipment, cut off the power supply and make sure it cannot be switched back on for the duration of the work

#### 1.4 Qualifications

Have all work performed by qualified personnel only.

**Qualified electrician**

The qualified electrician has been trained for the specific conditions present in his or her work environment and is familiar with all applicable standards and regulations.

**Operator**

The operator is capable of operating electrical equipment and systems properly and detecting potential hazards.

### 1.5 Interlocks

Electrical interlock

The high-current connectors are fitted with pilot contacts which are supposed to monitor all insertion and removal operations. When the male connector is inserted, the electric circuit will not be closed until the connection of the main contacts between male and female connector has been established (inductive closing). When the male connector is pulled, the electric circuit will be interrupted before the connection of the main contacts between male and female connectors has been cut (capacitive pulling). The schematic of the electrical interlock is illustrated in Fig.1.

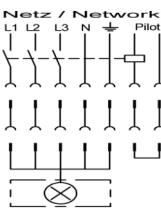


Fig.1: Schematic of the electrical interlock

#### Mechanical interlock contact cover discs

The female contacts on the female connectors are locked in a touch-proof manner. The contact cover discs of the conductors (Fig.2/2) will open when the contact pin of the connectors earth return engages in the female contact of the female connectors earth return (Fig.2/1).



Fig.2: Contact cover discs

#### Connector Unit

The circuit breaker cannot be moved to position 0 unless a male connector has been inserted into Connector CUMI (Fig.3). When a male connector has been inserted, the mechanical interlock will release the circuit breaker so that it can be moved to position I (Fig.4). The mechanical interlock prevents the plug from being pulled as long as the circuit breaker is set to position I.

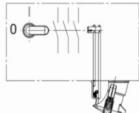


Fig.3: Circuit breaker set to position 0, switching not possible

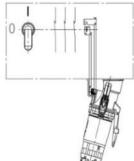


Fig.4: Circuit breaker set to position I, pulling not possible

#### Securing against restarting

Personnel: ■ Qualified electrician

1. Turn the circuit breaker to position 0.
2. Push up the safety clip on the bottom of the circuit breaker
3. Use a lock to secure the safety clip (Fig.5/1).



Fig.5: Securing the safety clip

### 1.6 Labels

Electric current

There is danger to life from electric current at the high-current connectors.

Earth return

The symbol indicates the contact point designated for the earth return.

Rating plate

Attached to all high-current connectors is a rating plate which contains the following information:

- Manufacturer
- Device type
- Voltage code
- Protection category
- Year of manufacture
- CE mark

On the product are additional labels that give information for the correct use!



## 2 Transport and storage

#### Transport inspection

Check the shipment for completeness and transport damage immediately upon receipt.

#### Storing packed pieces

Store packed pieces in the following conditions:

- Do not store outdoors.
- Avoid mechanical vibrations.
- Store in a dry and dust-free area.

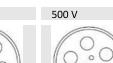
## 3 Technical specifications

#### Amperage

All high-current connectors are available with nominal currents amounting from 160 A - 600 A. The respective amperage is specified on the rating plate.

#### Voltage code

The voltage code indicates the position of the earth return and the voltage of the high-current connectors.

Voltage	230 V	400 V	500 V	690 V	1000 V
Position of the earth contact					
Voltage code	9 h	6 h	7 h	5 h	1 h

#### Screw tightening torques - contact screws

Screw	Line	Maximum torque
M8	160 A D-Line	8 Nm
M4	Pilot contacts	1,4 Nm

#### Screw tightening torques – cable lugs

Screw	Torque
M8	15...22 Nm
M10	30...44 Nm
M12	50...75 Nm

### 3.1 Technical specifications of the male connectors

Size	160 A D-Line
Nominal current	160 A
Rated current	185 A
Rated voltage	1000 V
Rated frequency	50/60 Hz
Test voltage: 1 minute at 50 Hz	4000 V
Protection category, tested	IP 67
Ambient temperature	-40...+100 °C
Insulation resistance (Phase-phase and phase-earth)	> 500 MΩ
Creep resistance of the insert	> 600 CTI
min. terminal cross-section EN 60228 Class 5	35 mm²
max. terminal cross-section EN 60228 Class 5	150 mm²
max. terminal cross-section pilot EN 60228 Class 5	4 mm²
Cable diameter Stecker MC and MCW	34...66 mm
Cable diameter separate pilot cable	5...10 mm
Rated voltage for pilot	500V

### 3.2 Technical specifications of the female connectors

Size	160 A D-Line
Nominal current	160 A
Rated current	185 A
Rated voltage	1000 V
Rated frequency	50/60 Hz
Test voltage: 1 minute at 50 Hz	4000 V
Protection category, tested	IP 67
Ambient temperature	-40...+100 °C
Insulation resistance (Phase-phase and phase-earth)	> 500 MΩ
Creep resistance of the insert	> 600 CTI
min. terminal cross-section EN 60228 Class 1 + 2	35 mm²
max. terminal cross-section EN 60228 Class 1 + 2	150 mm²
max. terminal cross-section pilot EN 60228 Class 1	4 mm²
Cable diameter Stecker FC and FCW	34...66 mm
Cable diameter separate pilot cable	5...10 mm
Rated voltage for pilot	500V

### 3.3 Technical specifications of Connector Units

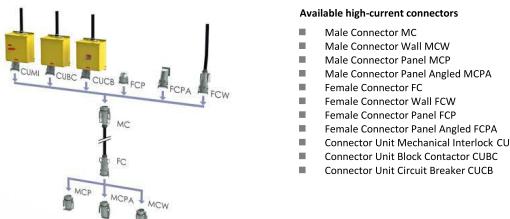
Size	160 A D-Line
Nominal current	160 A
Rated current	185 A
Rated voltage	1000 V
Rated frequency	50/60 Hz
Rated short-circuit limit breaking capacity Icu (400 V)	36 kA
Thermomagnetic release type CUCB	to 250 A
Test voltage	4000 V
1 minute at 50 Hz	4000 V
Type CUCB	3000 V
Protection category, tested	IP 55
Type CUCB	IP 54
Type CUCB	IP 54
Insulation resistance (Phase-phase and phase-earth)	> 500 MΩ
Creep resistance of the insert	> 600 CTI
Type CUCB	M8
Bolt plug for cable lugs	M8
Type CUCB	M10
Maximum terminal cross-section pilot, wire EN 60228 Class 1	4 mm²
Cable diameter	20...70 mm
Rated voltage for pilot	500V

### 3.4 Dimensions

Information about the dimensions refer to our data sheets (→ [www.the-rsgroup.com](http://www.the-rsgroup.com)).

## 4 Combination options

The following illustration shows an overview of the possible combinations of the high-current connectors.



## 5 Installation

### Electric current



#### DANGER!

##### Danger of life due to electric current

- Before commencing any work, ensure that the cable you want to connect is not live.
- Have all work on electrical components performed by qualified electricians.
- Secure the Connector Units, to prevent accidental restoration of power (→ *Securing against accidental restoration of power*).
- The electrical safety is only guaranteed if the high voltage test has been carried out after the installation
- Earth all equipment.

### Pilot contacts



#### DANGER!

##### Risk of injury from non-operational pilot contacts!

Pilot contacts ensure the operation of the electrical interlock. There is danger to life if pilot contacts are missing or connected incorrectly.

- When using extension cords, include the pilot contacts in the extension cord connection.
- Ensure that the pilot contacts have been properly connected prior to start-up.

### 5.1 Mounting and connecting the devices

Installing Personnel: **Qualified electrician**

Mount the device on the provided mounting holes.

#### Removing the insulation

- Proceed as specified in Fig.6 if no pilot contacts are present. Control pilot loop (Fig.6/2).
- Proceed as specified in Fig.7 if pilot contacts have been integrated.
- Proceed as specified in Fig.8 if the pilot contacts are separate.

#### For all cable

1. Pull the cable gland (Fig.6/1, Fig.7/1, Fig.8/1) over the cable. Strip off the exterior insulation along length B (Fig.6, Fig.7, Fig.8).
2. Strip the insulation off each individual line along length A (Fig.6, Fig.7, Fig.8).

Length	160 A D-line
A	30 mm
B	150 mm
C	200 mm

#### For all cable

1. Cable gland 2. Female contacts

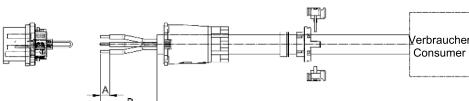


Fig.6: Schematic for cables without pilot contacts

#### Cables with integrated pilot contacts

1. Cable gland 2. Female contacts

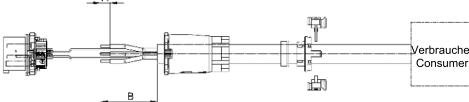


Fig.7: Schematic for cables with integrated pilot contacts

- Length C (Fig.7) represents the length of the integrated pilot contact

#### Cables with separate pilot contacts

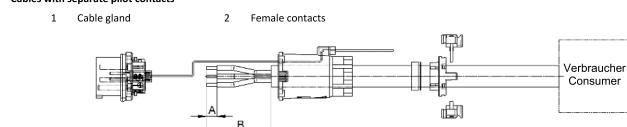


Fig.8: Schematic for cables with separate pilot contacts

4. For the pilot cable, fit cable gland

#### Screwing in place

5. Screw the female contact (Fig.6/2, Fig.7/2, Fig.8/2) to the cable.
6. Connect the cable using the cage clamps.
7. Tighten all screws.
8. Screw housing and insert.
- If necessary, tighten the screws of the strain relief to fix the cable in place.

### 5.2 Tests prior to start-up

**Inspection by a qualified electrician** Personnel: **Qualified electrician**

1. Check if the electrical interlock functions properly.
2. Check if the mechanical interlock functions properly.
3. Make sure that conductor and earth return are properly connected in accordance with the labelling on the connecting terminals.
4. Make sure the pilot contacts are properly connected.
5. Make sure the contact screws are properly connected and tightened to the specified screw tightening torque (→ *section 3 technical specifications* on page 1).

**Inspection by the operator**

Personnel: **Operator**

1. Make sure the technical specifications given on the rating plate correspond to the necessary operating data.
2. If applicable, ensure that the screws of the strain relief have been tightened.

## 6 Powering up and powering down

#### Insertion and removal

Personnel: **Operator**

Protective equipment: **Safety gloves**



#### DANGER!

##### Danger of life due to electric current!

- Never plug in or pull out the devices under load.



#### CAUTION!

##### Crushing hazard when inserting and withdrawing devices!

- Use the locking levers on connectors at the same time on both sides when inserting and removing these devices.

#### Insertion

The functional principle is explained by means of male connector 160 A D-line.

1. Push the male contact into the female contact.
2. Hook the locking levers of the male contact into the groove of the female contact. (Fig.9/1)
3. Pull both locking levers towards your body at the same time in order to close the locking levers (Fig.10/arrows).
4. Use a padlock to secure the locking levers (Fig.11/1).

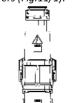
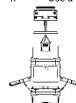


Fig.9: Hooking in the locking levers

Fig.10: Closing the locking levers

Fig.11: Securing the locking levers

#### Removal

1. Remove the padlock.
2. Push the locking levers up (Fig.12/arrows) to open the locking levers.
3. Remove the male connector from the female connectors.
4. If necessary, close cover cap and cap (Fig.13).

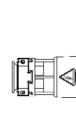


Fig.12: Opening the locking levers

Fig.13: Cover cap

#### Connector Units

Connector Units have a circuit breaker or are equipped with a power switch that can be switched on and off.

#### Connector Units powering up

1. Plug in the male contact as described in → *Insertion and removal* on page 2.
2. Turn the circuit breaker or power switch to position I → Connector Unit CUMI is switched on. The male connector is locked.

#### Connector Units powering down

1. Turn the circuit breaker or power switch to position 0.
2. Pull the male connector → Connector unit is switched off. The interlock is removed.

## 7 Maintenance

### DANGER!

#### Danger of life due to electric current!

- Before commencing any work, ensure that the cable you want to connect is not live.
- Have all work on electrical components performed by qualified electricians.
- Secure the connector unit mechanically switched and interlocked, to prevent accidental restoration of power (→ *Securing against accidental restoration of power* on page 1).
- When reinstalling previously removed components, refit all fasteners and tighten all screws to the specified torque.

### 7.1 Maintenance schedule

Interval	Maintenance step	Personnel
monthly	Check if the screws are firmly seated. Tighten them as necessary to specified screw tightening torque (→ <i>Technical specifications</i> on page 1).	Operator
	Check the strain relief for damage. Replace if necessary.	Operator
before and after use	Perform a visual inspection of the high-current connectors exterior to look for any damage. Replace damaged components as necessary.	Operator
	Check if contact pins and female contacts have become fouled. Clean them as necessary with a cloth or a soft brush.	Operator
	Check contact pins and female contacts for wear and damage. Replace if necessary (→ <i>Replacing contact pins and female contacts</i> on page 2).	Qualified electrician
	Check if the rubber seals on the connectors and covers have become brittle. Replace if necessary.	Operator

### 7.2 Replacing contact pins and female contacts

160 A D-line connectors

Personnel: **Qualified electrician**

Replace complete inserts with contact pins (Fig.14/1) and female contacts (Fig.14/2) for 200 A and 250 A C-line connectors.

1. Loosen the screws on the plug collar. Use a screwdriver or a sharp object to remove the insert from the male connector or the female connector.
2. Slide a new insert into the male connector or the female connector and tighten screws

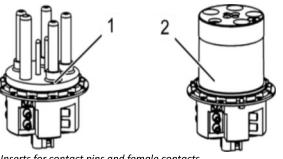


Fig.14: Inserts for contact pins and female contacts

## 8 Disposal

#### Decommissioning

1. Take device out of operation unplug it, switch off electrical outlets.
2. Dismantling the device.
3. Dispose of the device properly.

When it has reached the end of its useful life, the device must be disassembled and disposed of in an environmentally safe manner. High-current connectors can be returned to the manufacturer when they have reached the end of their useful life.