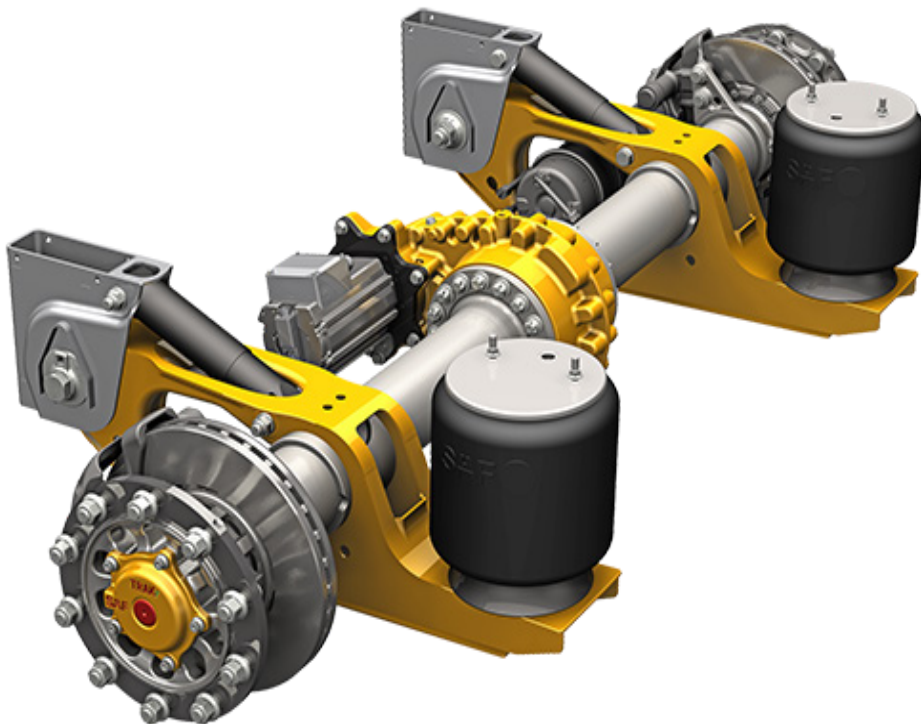


# Installation Manual

## SAF TRAKr with E-Maschine EM640023-SPL

### Pilot series



## Please note

This installation manual is intended for the exclusive use by trained persons within the commercial vehicle industry and related workshops.

The content of this manual is not all-inclusive and not legally binding. SAF-HOLLAND GmbH assumes no liability as a result of its use. All information contained in the manual does neither represent ensured characteristics of the product nor represent a guarantee. SAF-HOLLAND GmbH reserves the right to make changes in the interest of technical progress without prior notice.

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# 1. General information

## 1.1 Ordering spare parts

When ordering original spare parts from SAF-HOLLAND, make sure you accurately identify the respective product.

Non-genuine parts have a negative effect on the function of the product, have a shorter lifetime and cause risks and hazards that SAF-HOLLAND cannot estimate. It also increases the maintenance requirement.

SAF-HOLLAND operates a tight service network of partner companies for technical support of SAF-HOLLAND products and supply of parts (see [www.safholland.com](http://www.safholland.com)).

For further instructions on identifying spare parts, refer to the Aftermarket section of our home page [www.safholland.com](http://www.safholland.com).

Updates are published as necessary on the Internet at [www.safholland.com](http://www.safholland.com).

## 1.2 Liability

SAF-HOLLAND's „General Terms and Conditions“ apply. SAF-HOLLAND accepts no liability claims for personal injury or material damage with one or more of the following causes:

- Failure to observe the proper use.
- Failure to observe the installation manual and the safety instructions contained in it.
- Arbitrary changes or modifications to the product.
- Insufficient maintenance of parts that are subject to wear.
- The use of any spare parts other than original SAF-HOLLAND parts.
- Use of damaged parts.
- Disasters due to external influences or force majeure.

## 1.3 Warranty and general terms and conditions of business

Refer to the “Sales” section of our home page [www.safholland.com](http://www.safholland.com) for information on current warranties and general terms and conditions.

## 1.4 Environmental protection

All components and consumables used for maintenance and care must be disposed of in an environmentally friendly manner.

Recyclable components must be cleaned of oil and lubricants and recycled.

When doing so, you must adhere to the disposal instructions for the respective consumables and the

valid national and regional regulations.

## 1.5 Target group

The installation manual of the product is restricted exclusively to be used by trained personnel from authorised specialist workshops.

## 1.6 Proper use

The product has been constructed using state-of-the-art technology and in accordance with recognized rules of technical safety.

However, its use may result in hazards for the operator or third parties or damage to the device or other objects of material value.

Proper use also includes:

- Observance of the operating manual and the installation manual, as well as implementation of the working steps stipulated in the installation manual.
- Adherence to the performance limits of the product.
- Adherence to all repair and care instructions, as well as additional inspections.
- Use of the auxiliary and operating materials listed, as well as their environmentally-friendly disposal.

Operationally safe function can only be guaranteed if all the instructions, setting and performance limits for the product are adhered to.

## 1.7 Rescue data sheet



### Note:

The creation and provision of a rescue data sheet in accordance with ISO17840-2 is under responsibility of vehicle operator.

## 1.8 Safety instructions and symbols used

The following symbols are used to denote particularly important information and sections of the text.

It must be ensured that they are always read and observed before working with the product.

**Danger!**

This safety instruction with the exclamation mark warns of a possible safety risk or serious and fatal injuries.

**Attention!**

This safety instruction with the exclamation mark warns of possible damage to the product.

**Note:**

Marking for special user tips and other particularly useful and important information for efficient work and economical use.

**1.9 Marking used for sections of text**

- Marking for instructions for actions and information in safety instructions  
1., 2., 3., ... Marking used for working steps.

**2. Safety instructions****Danger!**

The installation of the product is restricted exclusively to trained personnel from authorised specialist workshops.

**High Voltage!**

- Only specially certified and trained personal must conduct mounting and repair work on the TRAKr, its components and the corresponding trailer.
- The personal has to be trained and certified according to the national legislation and/or regulations (e.g. DGUV 209-093 Level 2 S or E or comparable).

**3. General instructions****Danger!**

- Do not move trailer with SAF TRAKr without proper working cooling system for the e-machine! Preliminary supply of liquid cooling system with the onboard vehicle source (+24V, e.g. permanent power output) can be realized.
- The preliminary supply of the liquid cooling system for the e-machine is only permitted for transfer drives to the locations for the installation of the electric recuperation system. Make sure that the cooling system is working during the transfer drives.
- For normal use, the liquid cooling system for the e-machine must be connected to the electric recuperation system (see „7. Liquid cooling system for E-Machine“ on page 10).

**Danger!**

The TRAKr gearbox is not filled with oil on delivery. The oil for the initial gearbox filling is included in the TRAKr axle delivery. Before operation the gearbox must be filled with the supplied gearbox oil:

- Filling gearbox oil SAF Synlube SAE 70W-90 capacity: 0.45 l
- Article number: 03 387 1004 00
- Oil class: SAE 70W-90

See „6. Initial gearbox oil filling“ on page 9.

**Danger!**

The operation of the TRAKr in ADR\* vehicles is not allowed.

- \*) European agreement concerning the International carriage of dangerous goods by road.

**Note:**

The creation and provision of a rescue data sheet in accordance with ISO17840-2 is under responsibility of vehicle operator.

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### 4. Function diagram

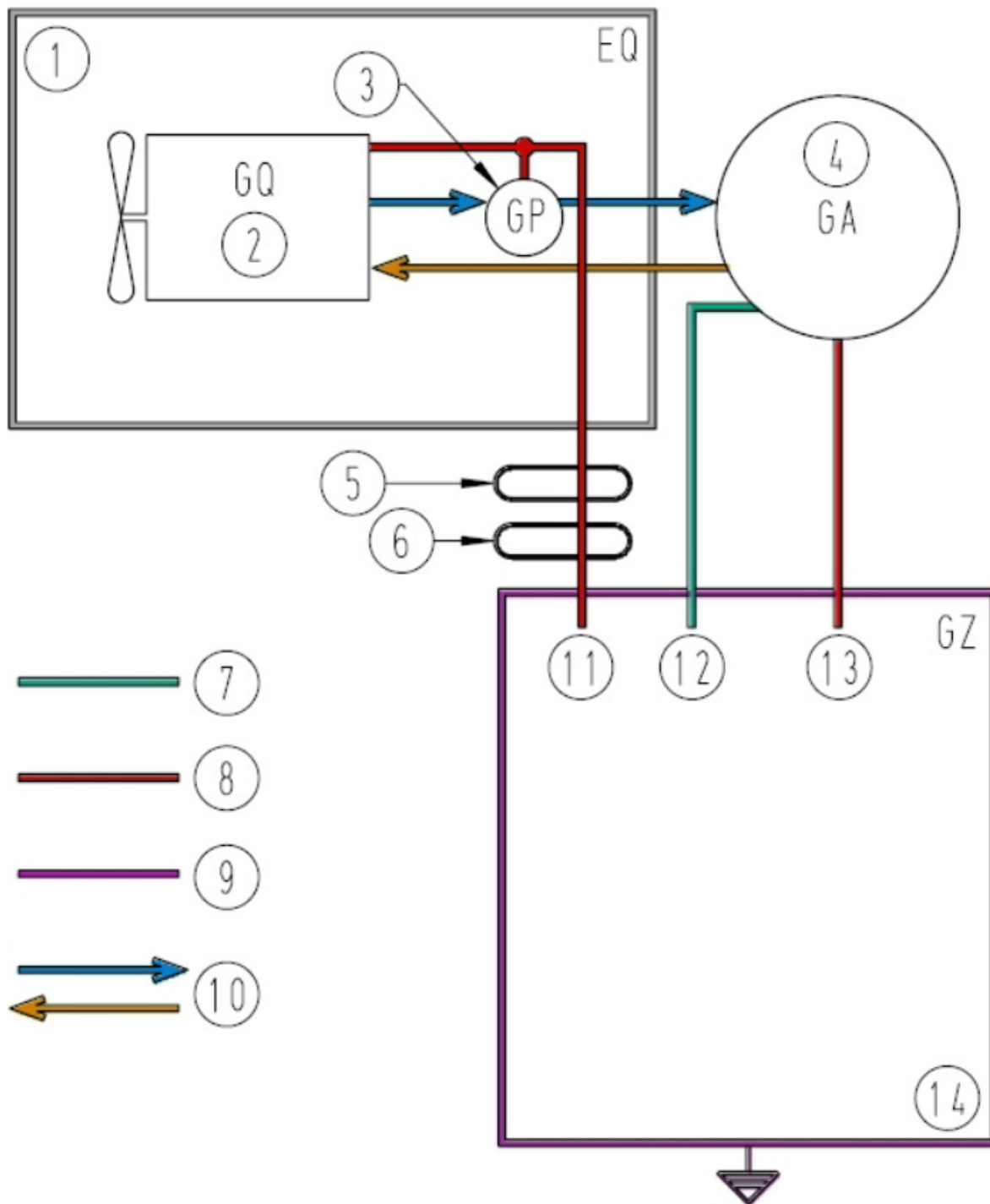


Fig. 1: Function diagram

Pos	Description
1	TRAKr electrical components
2	Radiator + fan
3	Pump
4	E-Machine
5	Superseal connector – LV_DC interface Pin 1: +24V Pin 2: 0V
6	Harting connector – LV_DC interface Pin 1: +24V Pin 2: 0V
7	Signal
8	Power
9	Ground
10	Water pipes
11	Cable: LVDC, 2 * 2.5 mm <sup>2</sup> . Included at liquid cooling system kit 03 422 5090 00.
12	Cable: E-Machine power, ADD 4 * 6mm <sup>2</sup> (12m). (not included)
13	Cable: E-Machine signal, ADDM12, 8P (10m). (not included).
14	ADDM/L R (not included)



**Note:**

The descriptions of the function diagram correspond to IEC 81346-2.

## 5. Suspension system



**Note:**

Installation of the suspension system analogous to the installation specifications and recommendations according to the INTRA construction manual (before the installation of the ground strap).

### 5.1 Driving height plate

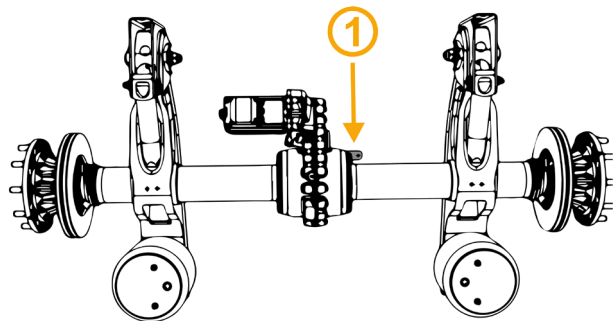


Fig. 2: Driving height plate

Pos	Description
1	Driving height plate



**Note:**

- The driving height plate is out of center.
- The dimensions are specified in the customer drawing.

### 5.2 Lifting thread



**Attention!**

The lifting thread on the gearbox is not suitable for lifting the entire axle - this will cause damage.

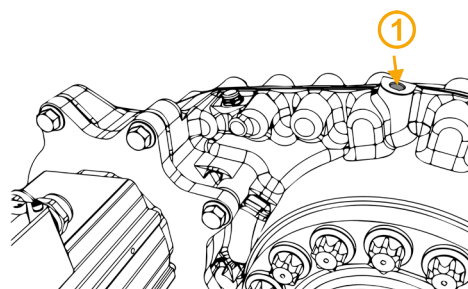


Fig. 3: Lifting thread



Pos	Description
1	Lifting thread

### 5.3 Ground strap

A ground strap has to be connected between E-Machine and chassis.

### 5.4 Ground concept - equipotential bonding

The electrical connection of all metallic surfaces that can be touched up to the screw connection at the equipotential bonding on the electrical machine is a maximum of 20mΩ.



#### Attention!

The CUSTOMER is responsible for implementing requirements for equipotential bonding between the electrical machine and ground or other HV components.



#### Attention!

The ground connection of the electrical machine to the body is absolutely necessary in terms of the HV safety concept (equipotential bonding) and is the responsibility of the customer.

According to ISO 6469-3:2001 (E) and ECE regulation no. 100, the resistance to the body must be kept <0.1 ohms over the service life. The supplied ground strap kit (item number 03 424 2050 00) should be used for this. The electrical connection is to be made between the body and the E-Machine. An electrical connection can be made via bare metallic surfaces.

## 6. Initial gearbox oil filling



#### Danger!

Before operation the gearbox unit GU051401-10 must be filled with the supplied gearbox oil SAF SynLube SAE 70W-90 (0.45 l, article no: 03 387 1004 00).



#### Attention!

We recommend to use only original SAF operating supplies.

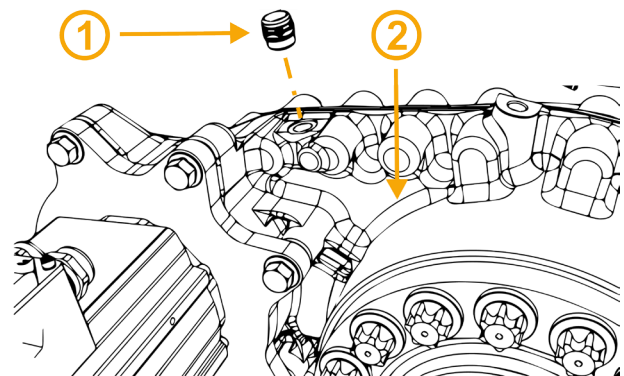


Fig. 4: Initial gear oil filling

Pos	Description
1	Pressure compensation element - oil filler opening.
2	Gearbox

### 6.1 Pressure compensation element



#### Attention!

- The proper function of the pressure compensation element is crucial for the proper function of the gearbox. The gearbox will be damaged if the pressure compensation element is replaced by an ordinary screw.
- Overpainting the pressure compensation element is not allowed. A coat of paint prevents the operation of the pressure compensation element and will result in a defect gearbox.
- The tightening torque of the pressure compensation element is 5 Nm +2/ Nm.
- The article number of the pressure compensation element is 04 337 0077 00.

## 7. Liquid cooling system for E-Machine



### Danger!

- Do not move trailer with SAF TRAKr without proper working cooling system for the e-machine! Preliminary supply of liquid cooling system with the onboard vehicle source (+24V, e.g. permanent power output) can be realized.
- The preliminary supply of the liquid cooling system for the e-machine is only permitted for transfer drives to the locations for the installation of the electric recuperation system. Make sure that the cooling system is working during the transfer drives.
- For normal use, the liquid cooling system for the e-machine must be connected to the electric recuperation system.

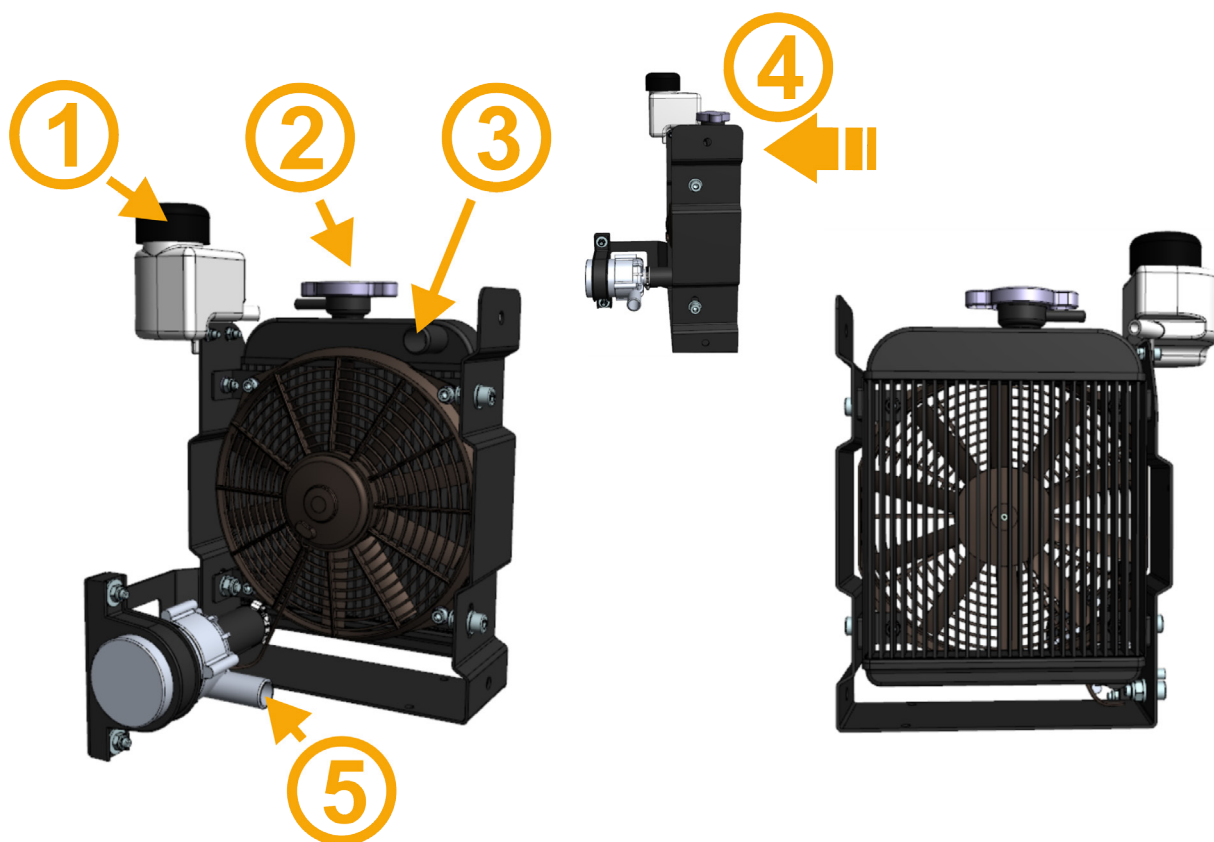


Fig. 5: Water cooler - overview

Pos	Description
1	Expansion tank
2	Radiator cap
3	Cooling inlet
4	Air flow direction
5	Cooling outlet

## 7.1 E-Machine cooling connection

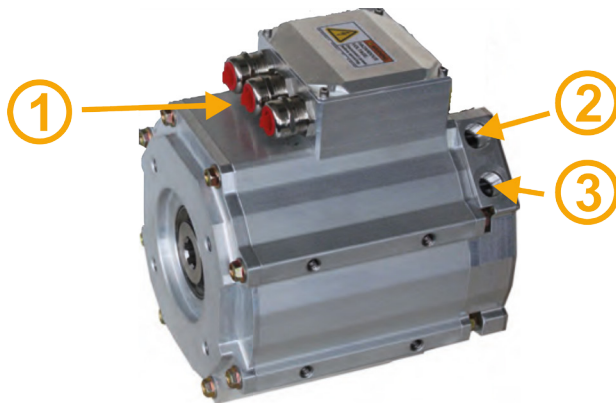


Fig. 6: E-Machine cooling connection

Pos	Description
1	U, V, W
2	Cooling Inlet and Outlet 2x 1/2" ORB-8 SAE J1926-1 with thread 3/4-16 UNF
3	Cooling Inlet and Outlet 2x 1/2" ORB-8 SAE J1926-1 with thread 3/4-16 UNF

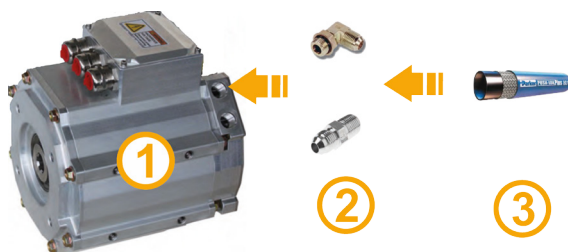


Fig. 7: Hose connection

Pos	Description
1	E-Machine
2	Stud connector or stud elbow connector
3	Hose

## 7.2 Cooling system installation



### Danger!

- The air vent valve has to be placed in the highest position of the cooling circuit.
- The air vent valve has to be placed in the return line of the cooling circuit.
- The maximum cooling hose length is 2.5 m.

The pump used in the system is a centrifugal pump, non self-priming. For this reason, the pump is mounted in the bottom side of the radiator. A 20mm pipe must be used to connect the radiator

to the E-Machine. There is no specific inlet/outlet from the E-Machine cooling connections. This means that there are flexibility to select the best pipe path.

Ideally the tubes or the E-Machine shall not rise above the radiator height. If this happens, the following component is supplied to purge the air in the higher part of the circuit:



Fig. 8: Air vent valve

To fill the liquid in the radiator please proceed as follows: With the main radiator cap off:



Fig. 9: Radiator cap OFF

1. With the pump turned off, fill the liquid until it reaches the top.
2. Run the pump for 5-10 minutes to ensure that there is no air trapped in the cooling system. Fill with coolant as the air is removed from the system.
3. While the pump is still running, purge the system in the highest spot using the purging junction.
4. When the liquid is at the top some fluid may start flowing into the expansion circuit, when this happens, please fill the tank directly with fluid until it reaches 3 quarters of the tank. Then close the main radiator cap and then the tank cap.
5. Turn off the pump.

## 8. Mounting Procedure LVDC Cooling Connector Set

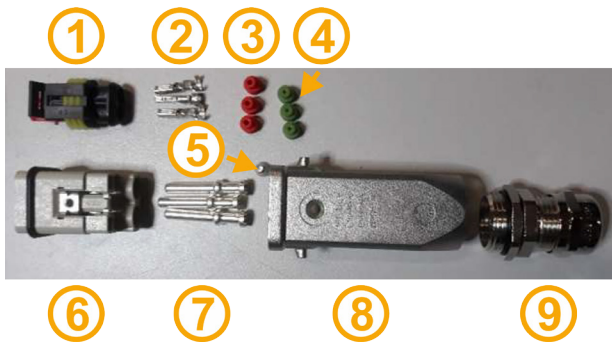


Fig. 10: LVDC overview

Pos	Description
1	Automotive Connector 1x2p 14A 60VDC FML
2	Crimp 18-15AWG FML
3	WireSeal_FML_Red
4	Wire Seal FML Green
5	HAN3_Watertight_Screw
6	HAN3_ML_Holder_2+PE_40A_830V
7	HAN3_ML_40A_4
8	HAN3_Housing_Entry_M20
9	CableGland_M16x1.5
10	Reducer_M20-M16_O-ring

### 8.1 Harting connector side

1. Remove 45mm of the cable coating and strip off 8mm of each conductor.



Fig. 11: Step 1

2. After inserting the cable gland in the cable, crimp the two terminals with the reference HAN3\_ML\_40A\_4.



Fig. 12: Step 2

3. Insert the cable in the connector housing (HAN3\_Housing\_Entry\_M20) and leave enough space to assemble the crimp holder.



Fig. 13: Step 3

4. Introduce the conductors in the crimp housing: Positive polarity goes to pin 1 and negative polarity goes to pin 2.



Fig. 14: Step 4

5. Place the watertight screw and tighten it with 0.5 Nm. Also tighten the cable gland with 10 Nm.



Fig. 15: Step 5

## 8.2 Super-seal connector side

1. Remove 40mm of the cable coating and strip off 3mm of each conductor



**Fig. 16: Step 1**

2. Insert the wire seal (WireSeal\_FML\_Red/Green) according to the cable diameter. Crimp the two terminals.



**Fig. 17: Step 2**

3. Insert three heat shrink pieces in the cable with the following dimensions

- Diameter: 6mm / Length: 20mm
  - Diameter: 9mm / Length: 20mm
  - Diameter: 12mm / Length: 80mm
- (The last one must be with glue.)

The conductors can then be introduced in the connector housing. The positive polarity goes to pin 1 and negative polarity goes to pin 2.



**Fig. 18: Step 3**

4. Heat the pieces of heat-shrink by the following order: 6mm->9mm->12mm.
  - The two first must touch the connector housing and only cover the conductors .
  - The 12mm piece must cover the back side of the connector housing.



**Fig. 19: Step 4**

## 9. E-Machine routing



### Attention!

Installation and implementation of the E-Machine routing has to be realized according to the specifications of the manufacturer.



### Attention!

Ensure proper sealing during operation and travel.



### Attention!

Close non-used cable glands.

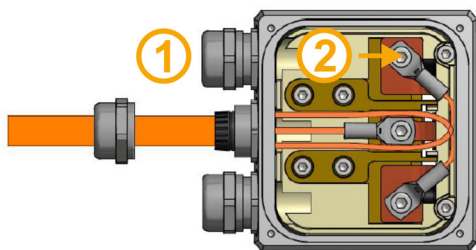


Fig. 20: E-Machine routing 1

Pos	Description
1	Cable gland
2	Terminal connection M6 x 10: tightening torque 8.5 Nm.

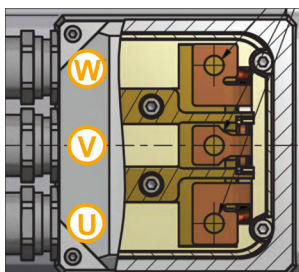


Fig. 21: E-Machine routing 2

Pos	Description
U	E-Machine winding
V	E-Machine winding
W	E-Machine winding



### Attention!

The tightening torque of the terminal connection is 8.5 Nm.

# Notes

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