

## Electrically heated SCR hose lines Installation guide

Document number 100000446007



Fig. 1: VOSS quick connect system SV241



Fig. 2: VOSS quick connect system SV246 NX

Hose dimensions [mm]: Inner diameter / nominal size corrugated tube / outer diameter	Min. bending radius (free installation) [mm]
3,2 / NS13 / OD 15.8	R 30
4 / NS14 / OD 18.4	R 30

Table 1: Minimum bending radii

### 1. General

Electrically heated SCR (Selective Catalytic Reduction) hose line with an inner hose made from EPDM and couplings / plugs (male) VOSS SV241 and SV246 NX.

The SV241 connectors mate with SAE J2044 style connectors and the SV246 NX mate to a special connecting port. The couplings can be released without tools and are suitable for reassembly. For this, please refer to assembly / handling instructions 9177182202/201406 , 9177001402/201009 and 9177185202/201407.

The line serves to convey DEF (Diesel Exhaust Fluid) respectively AdBlue® (DIN 70070) between SCR components, e.g. tank and dosing unit.

The line is electrically heated in order to maintain fluid flow of DEF / AdBlue® or to restore the line's ability to convey DEF / AdBlue® after starting the vehicle with frozen DEF / AdBlue®.

For this, the electrical heating must be activated by the vehicle control unit in an ambient temperature range from -40 °C to +5 °C. Electrical heating of the SCR line is not necessary at ambient temperatures higher than +5 °C and should be avoided to save energy.

#### 2.1. Minimum bending radius requirement

Refer to table 1 for the minimum bending radius for free installations. A smaller bend radius is not allowed. The bending radius is to be measured to the centerline of the hose.

The bending radius can be analyzed in CAD by creating an arc or bridge curve that is tangent to the centerline of the hose at the clipping or restraint points and analyzing that curve for the minimum radius.

#### 2.2 Electrical connectors

The electrical connectors should be fixed on the mating connector or the line itself.

The electrical harness must be protected against mechanical loads and abrasive surfaces.

#### 2.3 Electrical operation

The maximal allowed ambient temperature for electrical operation is +5 °C for the allowed voltage range.

## 2.4. Routing and clipping

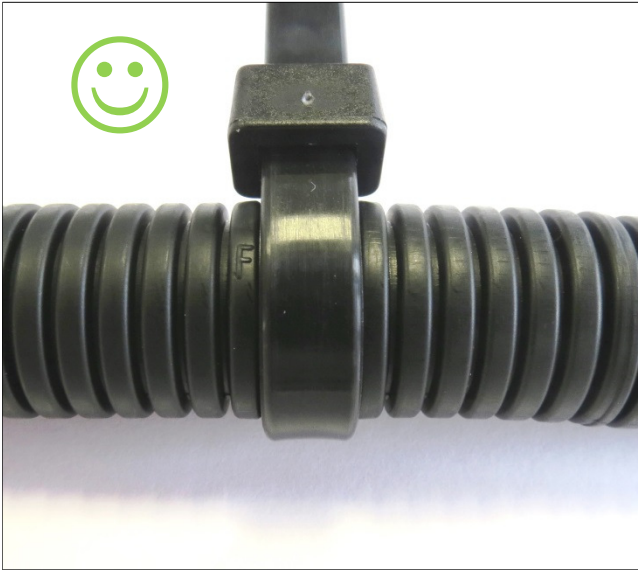


Fig. 3: Correct use of a plastic zip tie

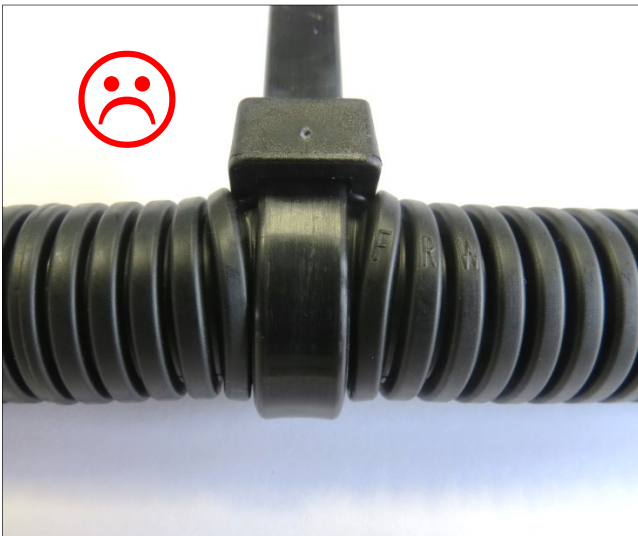


Fig. 4: Incorrect use of a plastic zip tie

The line assemblies must have additional clipping or support points. The line should be supported every 250 mm along the length. The recommended means of clipping is a metal P-clamp that has a rubber protective coating on it. The clamp should not be allowed to damage the corrugated tube.

Plastic zip ties may also be used to support the line assemblies. Caution should be used if this is the method of support as they can crush or kink the line. Crushing and kinking the corrugated tube with the zip tie is not allowed. The assembly force depends on the dimension and material of the zip tie. From our experience the approximate value for the assembly is 30 N. This is only a reference and must be checked for each different zip tie.

Lines must be routed in such a way as to provide protection against damage. The lines must not contact sharp edges or abrasive surfaces. It is recommended that clamping/tie down methods be used to avoid these situations. Grommets or other protective pass-through devices are recommended when routing through sheet metal. It is required that lines be kept away from moving parts when at the limit of travel.

The lines must be kept far enough away from heat sources to insure that the lines do not exceed their maximum tube temperatures of 120°C. If temperatures are exceeded, a protective shield may need to be added to the line. The vehicle designer/ manufacturer is often best suited to apply heat shielding to the lines to meet their application specific requirements and insure the lines meet this application guide.

The routing of the SCR lines immediately next to coolant lines (with constant coolant flow) for long runs or other higher temperature components may negatively affect the intended performance of the DEF (it should not exceed 80 °C). It is good practice to route the lines away from the heat source or with a large gap between the items. Higher temperature environments may also negatively impact DEF performance.

SCR lines must not be routed so that they are pinched between vehicle components.

Lines must not be kinked during the routing on the vehicle, this can occur by routing the line over an edge or small diameter surface and pulling the line tight. Or if a loop is in the line it can kink as it is pulled tight (similar to what can happen with a garden hose).

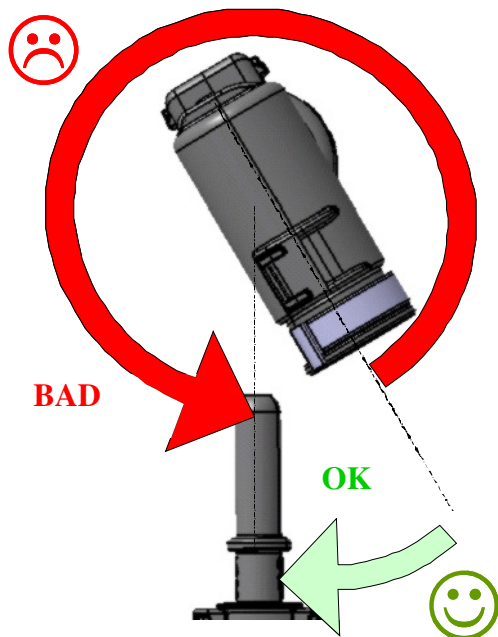


Fig. 5: The line has to be mounted free from mechanical constraints in the vehicle

Line length	Max torsion angle
≤ 1,5 m	90°
> 1,5 m	180°

Table 2: Maximum amount of torsion angle that can be applied to the line during assembly

### 3. Installation requirements and guidelines

The following information must be communicated to the assembly facility that will be installing the SCR lines.

#### 3.1. Protective plugs

Lines are shipped with protective plugs on the fluid connectors. These must remain on until final assembly. This insures the cleanliness of the lines to prevent possible damage or contamination entering the DEF / AdBlue® fluid system. It is the customer's responsibility to ensure that this requirement is followed during the material handling and assembly process.

#### 3.2. Installation process

Please refer to the Appendix A for the detailed installation and disassembly process for the connectors. Lines must not be stepped on or pinched between other parts during the assembly process.

1. Remove protective plugs
2. Align fluid connector on fitting
3. Press firmly until a click is heard
4. Pull back on connector to check that connection was made, and this will also seat the connector

5. Repeat steps 1 to 4 at the other connector; note that the maximum amount of twist has not been exceeded (Fig. 5 and Table 2).

6. Install clipping to constrain the line.

The line has to be positioned free of tension in the vehicle.

During the connection process the maximum torsion angle must not be exceeded (see Table 2).

Both hydraulic connections need to be complete before adding clips or zip ties to retain the line.

### 4. Other applicable documents

VOSS specification "Electrically heated SCR lines made from EPDM hoses" (latest revision)

Handling instructions 9177182202/201406 (Appendix A)

Assembly instructions 9177001402/201009 Part2 (Appendix B)

Assembly instructions 9177185202/201407 (Appendix C)

## Handling instructions for electrically heated SCR hose lines



Keep quick connectors and lines clean!  
Do not remove protection caps until final assembly!



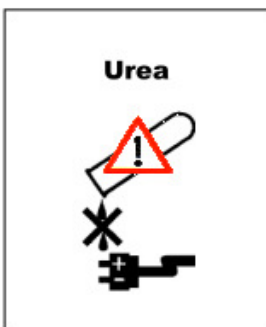
Do not squeeze or kink the lines!



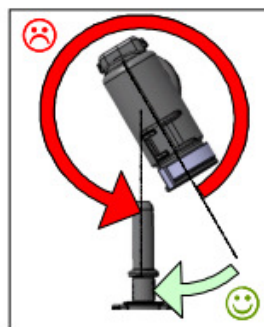
Protect quick connectors against dirt during assembly/disassembly!



Take care of proper electrical connections!



Contact of electrical plug with urea not allowed!



The line has to be positioned free of tension in the vehicle.

In the connecting process the maximum torsion angle must not be exceeded.

A fixing of lines, e. g. with cable binders, has not to be carried out until the hydraulic connection is made.



Protect the line and connectors against damages especially during assembly/disassembly!  
e.g.:  
- crushing with zip ties  
- disassembly with screwdriver

### Maximum torsion

Line length	Maximum torsion angle
≤ 1,5 m	90°
> 1,5 m	180°

## Assembly instructions VOSS quick connect system 241 Part 2: Applications in electrically heated SCR systems



Fig. 3: Coupling and male connection before assembly



Fig. 5: Pushing the coupling as far as it will go onto the male connector; in the process the holding clip engages



Fig. 6: Pulling back the coupling to the locked position



Fig. 7: Pushing the coupling out of the locked position for disconnecting



Fig. 8: Compressing the lugs of the holding clip and pulling the coupling off

### 4. Assembly instructions

#### 4.1. Assembly

Before assembly the components have to be checked. They must be clean and should not show any signs of damage.

During the assembly process the holding clip has to be in a centered position (fig. 4).

The coupling is pushed onto the male connector to the limit stop. The holding clip of the coupling engages behind the bead of the male connector.

By pulling back the coupling manually against the pushing direction, the holding clip reaches the locking position. In this position the system cannot be opened.

#### 4.2. Disassembly

Before disconnecting the line must be free of pressure and the area of the holding clip free from dirt.

Moving the coupling in the initial pushing direction causes the holding clip to leave the locked position. The lugs of the holding clip can be compressed and the coupling can be pulled off the male connector.

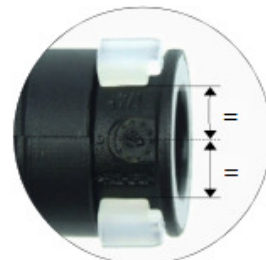


Fig. 4: Holding clip in centered position



Fig. 9: System not locked (see also figs. 5 and 7); pull the coupling back in the indicated direction for locking the system.



Fig. 10: System locked (see also fig. 6)

### Assembly instructions VOSS quick connect system 246 NX Application in electrically heated SCR systems



Fig. 1: Plug and connecting profile before assembly



Fig. 2: Pushing the plug as far as it will go onto the connecting profile; in the process the snap-in and release element engages



Fig. 3: Checking the correct locking by pulling back the plug

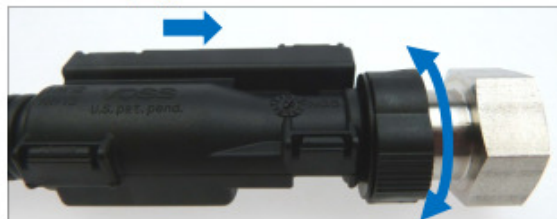


Fig. 4: Pushing the plug in the connection direction for disconnecting



Fig. 5: Pressing the snap-in and release element and pulling off the plug

#### 1. Assembly

Prior to assembly all components have to be checked. They must be clean and should not show any signs of damage.

The plug has to be pushed as far as it will go onto the connecting profile. The snap-in and release element of the plug engages behind the bead of the connecting profile (fig. 2).

The correct locking has to be checked by manually pulling back the plug (fig. 3).

#### 2. Disassembly

Prior to disassembly the line must be pressure less and the area of the snap-in and release element must be free of dirt.

Pushing the plug in the connecting direction makes operating and unlocking easier (fig. 4).

For setting a preferred actuation direction the position of the snap-in and release element is freely rotatable on the plug (fig. 4).

Pressing the serrated area of the snap-in and release element as far as it will go spreads the locking element and the plug can be pulled off the connecting profile (fig. 5).

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