EVolution EMC

E-Mobility cable glands
Installation manual (I00175-16)

Important installation instructions: EVolution EMC

AGRO
... your quality-connection

Table of contents

1. Scope and intended applications

This document describes the application and use of the AGRO E-Mobility EVolution EMC cable gland, including its installation and maintenance (replacement of sealing insert if ever necessary).

The instructions are suitable for manual hand tools or fixed machines that are used to prepare cables for installation. The use of components (such as cables, cable lugs, etc.) that are not as specified in this document may impact on the product's functionality and performance and must not be used without appropriate checking.

If you have any questions, please contact AGRO AG. Please use the current, approved version of the applicable documentation in relation to any correspondence.

AGRO's E-Mobility EVolution EMC cable gland is designed for use in high-voltage systems of hybrid and electric vehicles and other components that require high-voltage cables. These include, for example, inverters, motors, DC/DC converters, air compressors, cooler motors, high-voltage braking resistors, high-voltage air-conditioning compressors, PDUs, charging systems, low-voltage distributors and fuel cells. The product can also be used for other applications, provided that the applicable product specifications and instructions are complied with. If in doubt or if anything is unclear, please contact AGRO AG.

2. Assembly and processing instructions

2.1 Safety instructions

	**Important note:** **High-voltage application** The cable and its shield braiding must not be damaged.
	**Important note:** **High-voltage application** Safety rules: 1. Switch off power, de-energise 2. Secure against being switched on again 3. Check that there is no voltage 4. Grounding and short-circuiting 5. Place safe protective cover over any part that could become live
	**Achtung!** The AXI PRESS compression/crimping tool for EVolution EMC cable glands may not be used for live work / on cables that are not current-free.

2.2 Components of the EVolution EMC cable gland

The cable gland consists of a compression nut, a sealing insert and a so-called lower part (including O-ring and contact spring). The supporting ring and the contact sleeve are axially crimped onto the cable using a special crimping tool, establishing the shield connection. The supporting ring, the contact sleeve and the sealing insert must be matched to the cable (see product data sheets I00175-17-1, I00175-17-2 and I00175-17-3) in order to be able to ensure compliance with the technical specifications.

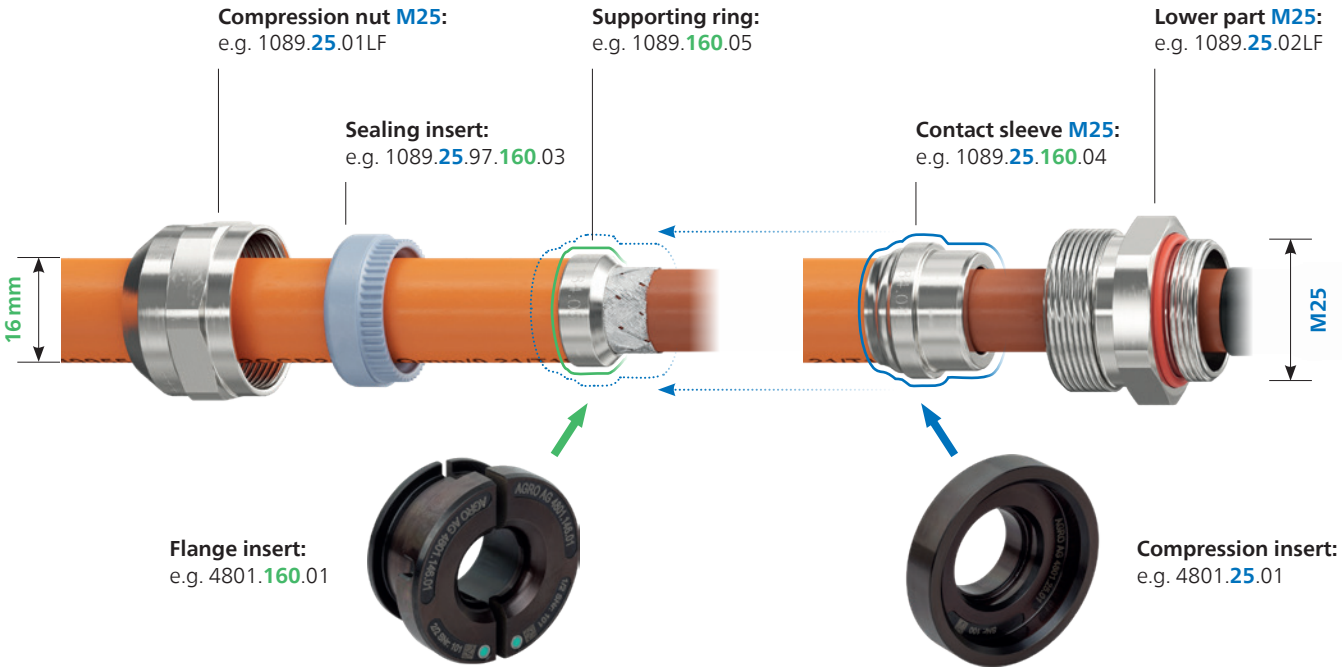
Important note:

It is not permitted to make technical changes to the components.

EVolution EMC

Structure of components and part number

Example with a thread **M25** and cable diameter of 16mm (**160**)



All 5 parts in order of the part number

1089.25.01LF	Compression nut
1089.25.02LF	Lower part (short thread) / 1189.25.02LF lower part (long threat)
1089.25.97.160.03	Sealing insert
1089.25.160.04	Contact sleeve
1089.160.05	Supporting ring

EVolution EMC Tool insert parts

4801.160.01	▸ **Flange insert** (fitting for the size of the cable)
1089.25.01	▸ **Compression insert** (fitting for the size of the thread)

Legend

25	thread **M25**
160	size of the part and the **outer diameter of the cable** (nominal diameter 16.0mm)

EVolution EMC Tool

▸ **AXI PRESS flange device**
4801.00.02

EVolution EMC Tool

▸ **AXI PRESS compression device**
4801.00.01

3. Installation instructions

3.1 General information

The dimension "A" is important for the correct installation of the EVolution EMC cable gland. This is the distance from the centre of the hole in the cable lug to the reference plane of the sealing point on the lower part (outer surface of the housing), and must be dimensioned to suit the circumstances. For dimension "A", any possible longitudinal expansion of the cable lug must be taken into account. The following possibilities may be considered and applied as appropriate to make the system less tolerance-sensitive

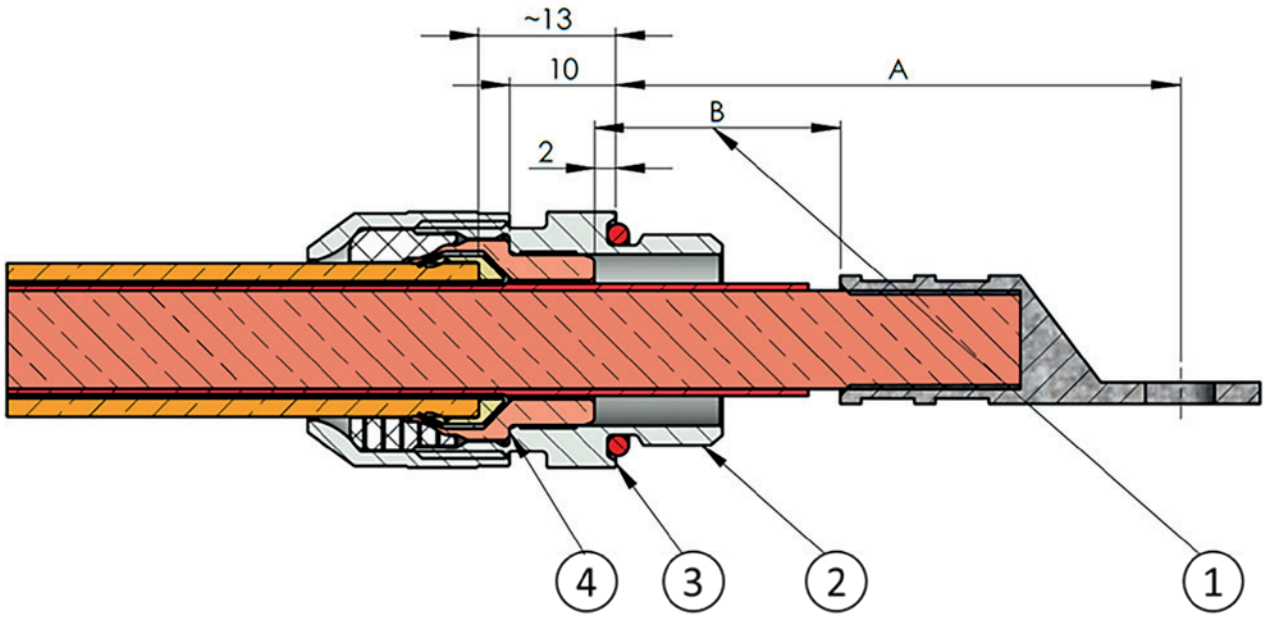
- Use of a cable lug with a slotted (elongated) hole can enable the cable lug's position to be adjusted.
- Empirical determination of the change in length of the cable lug during crimping onto the cable.
- The cable's axis may be designed to be slightly offset from the cable lug's connection bolt, enabling tolerances to be compensated for by a bend in the cable.

To determine the length of cable jacket that should be stripped back, we recommend referring to the Excel table „AGRO calculation dismantling EVolution EMC".

The minimum insertion length of the cable's inner conductor into the cable lug must always be complied with in accordance with the cable lug manufacturer's recommendations, and may not be used for compensation of tolerances.

Determining the clearance and creepage distance, "B", is the responsibility of the cable fabricator (assembler) or the designer of the high-voltage vehicle electrical system, and thus a matter of overall system responsibility for the appropriate party. The minimum clearance and creepage distances must be selected according to DIN EN 60664-1.01/2008, or to the norms and standards designated for the intended use.

The cable lug is not included in the scope of delivery of the cable gland. In relation to the cable lugs, only recommendations are given here. The choice of cable lug is the responsibility of the cable fabricator (assembler) or the designer of the high-voltage vehicle electrical system, and thus a matter of overall system responsibility for the appropriate party. Ensuring the suitability and quality of the inner conductor crimping process is the responsibility of the cable fabricator (assembler).



1) Consider clearance and creepage distance "B"
2) Interface specification 1X89.XX.0.01 and 1X89.XX.0.02
3) Reference plane – housing wall
4) Reference plane after the crimping process. Use this reference for positioning the cable lug. The change of length during connection of the cable lug to the cable must be considered.

Only original tools from AGRO AG of the series AXI PRESS for EVolution EMC are to be used to create the crimped shield connection.

Operating Instruction HE.19176 for AXI PRESS must be observed.

Preparations relating to cable routing

In the case of complex cable routing or difficult installations with little space, it is recommended to carry out trials on sample pieces before assembly work is carried out on the cable that will actually be used.

For the cable routing, the applicable specifications of the cable itself must be taken into account.

The minimum bending radius, R, of the cable must not be less than that specified by the cable specification. The point at which the cable starts bending must not be in the area of the cable gland. Bending around the compression nut's rim (X) is not permitted.

The distance "L" to the next fixing point of the cable is ideally 100mm. No torsional, tensile or compressive forces are permitted from the cable to the cable gland.

Figure 2 – Where the cable connected to the cable gland has a curve

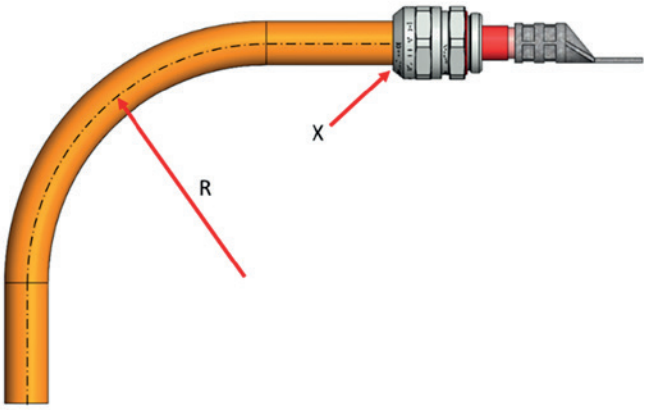
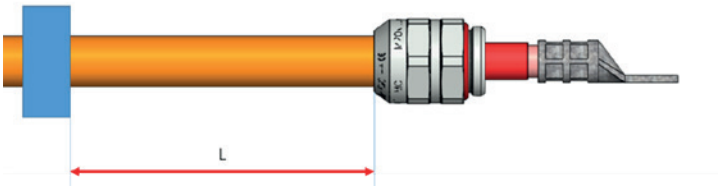


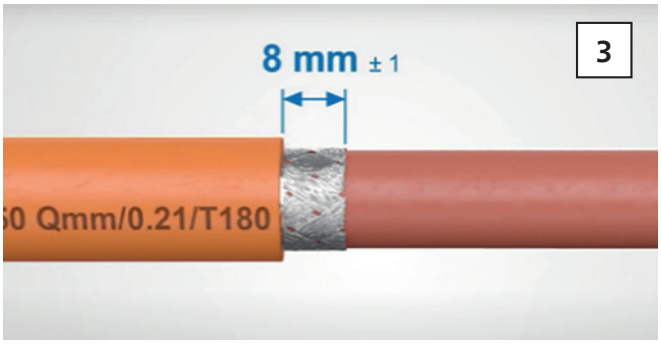
Figure 3 – Where the cable connected to the cable gland is straight



3.2 Pre-assembly on cable

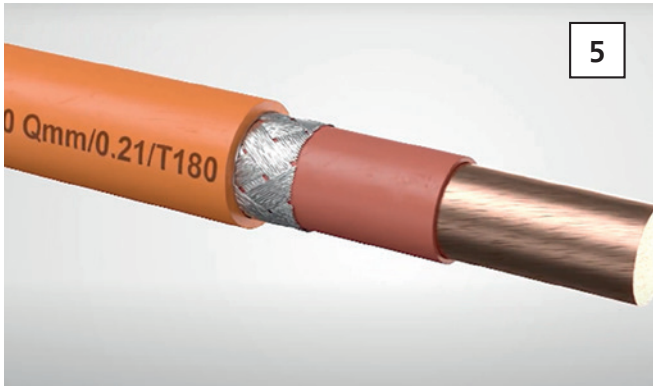
If the cable has a foil layer covering its braided shield, this must be completely removed where the shield is exposed.

If there is a foil layer beneath the braiding, it must be cut back to the cut end of the cable jacket.



The braided shield is exposed to a distance of 8mm +/-1mm from the cut end of the cable jacket.

Any material that separates the braided shield from the cable jacket must be completely removed in the area of the exposed braided shield.



The inner conductor is exposed according to the specifications of the cable lug manufacturer.

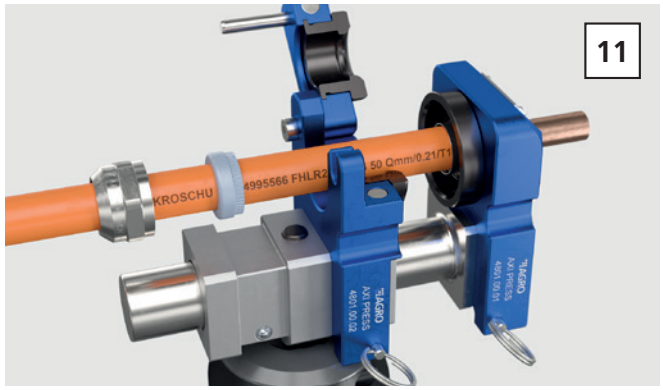
The compression nut and the sealing insert are placed on the cable as shown. Tip: The sealing insert is split and can also be placed on the cable at a later stage when no longer possible to slide onto the cable from one end.

Push the supporting ring onto the cable.
Tip: Using a short strip of thin foil as an assembly aid, the supporting ring can be more easily pushed over the braided shield without damaging the braided shield. Push the supporting ring into position until it can go no further. The supporting ring must be tight against the end of the cable jacket.

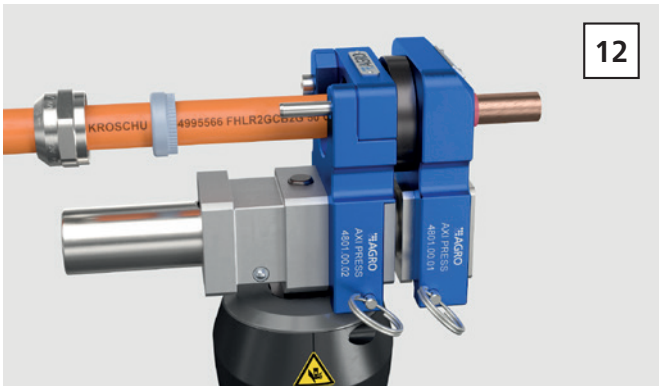
Fold the braided shield back evenly onto the supporting ring. If any foil layer beneath the braided shield has not yet been removed, this can be done now. Such a foil layer must not be wrapped around the supporting ring.

Push the contact sleeve towards the supporting ring until it will go no further. Any protruding wire strands from the braided shield must be removed. The braided shield must not extend beyond the end of the contact sleeve.

The AXI PRESS tool is required for the next step.

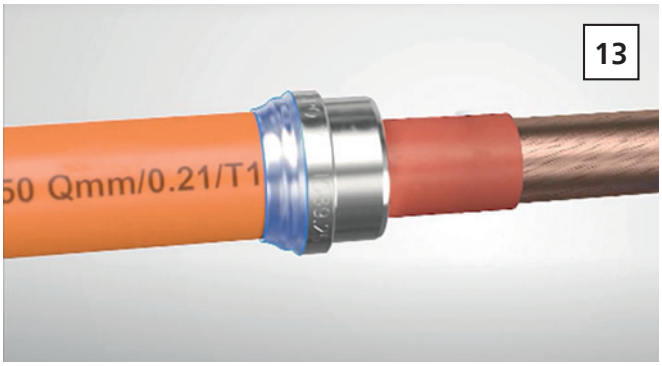


For the crimping work, please follow the instructions of Manual HE.19176.



During crimping, the trigger of the AXI PRESS tool must be continuously pressed. When completed, the AXI PRESS tool will open by itself.

3.3 Installation on vehicle/equipment



A form-fit connection has been created.

Now the cable lug can be crimped onto the cable.

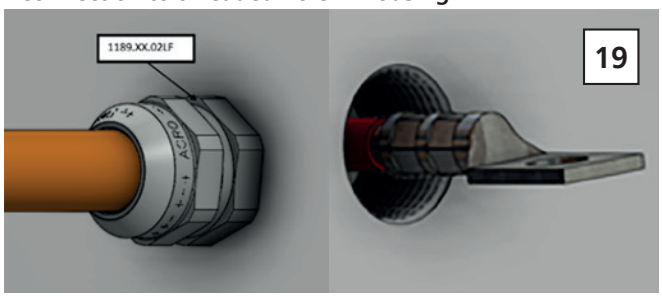
Screw the lower part into the housing with a torque of 25 Nm. Insert the cable with the contact sleeve as far as it will go.

Push the sealing insert (with its anti-twist design) into position.

Tighten the pressure nut to fully stop, with a torque of 20 Nm.

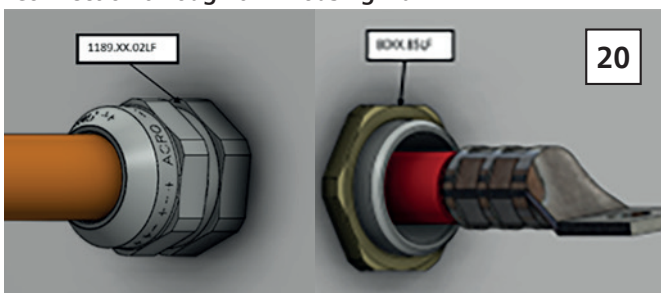
The cable gland is now ready for use.

Connection to threaded hole in housing:



In a thick-walled housing the hole can be threaded, eliminating the need for a locknut.

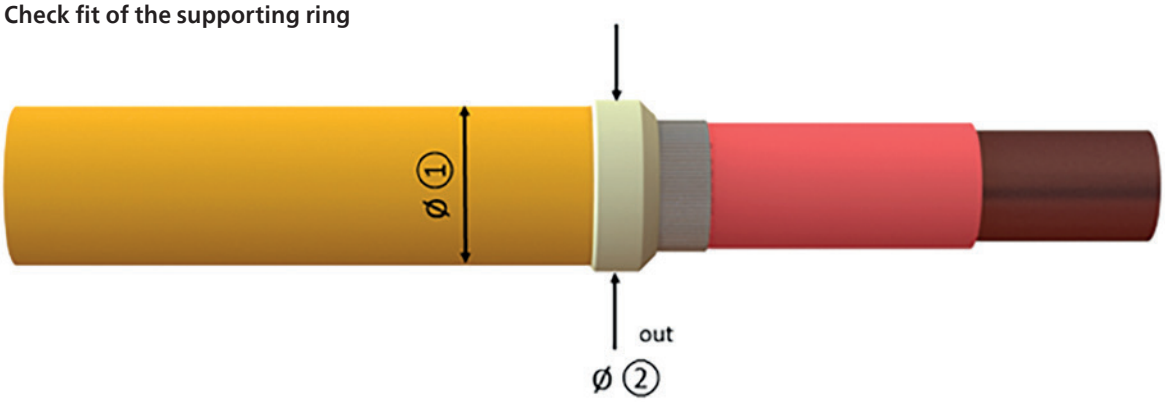
Connection through thin housing wall:



Alternatively the unit can be passed through a sheet metal wall (min. 1.5 mm thick) and secured using a locknut.

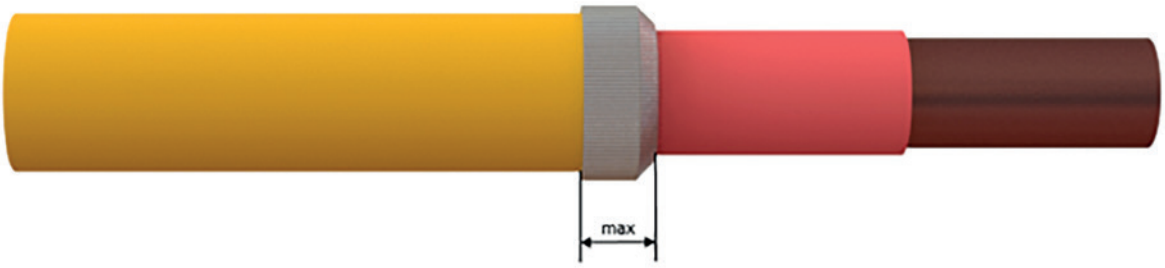
3.4 Checks

Check fit of the supporting ring



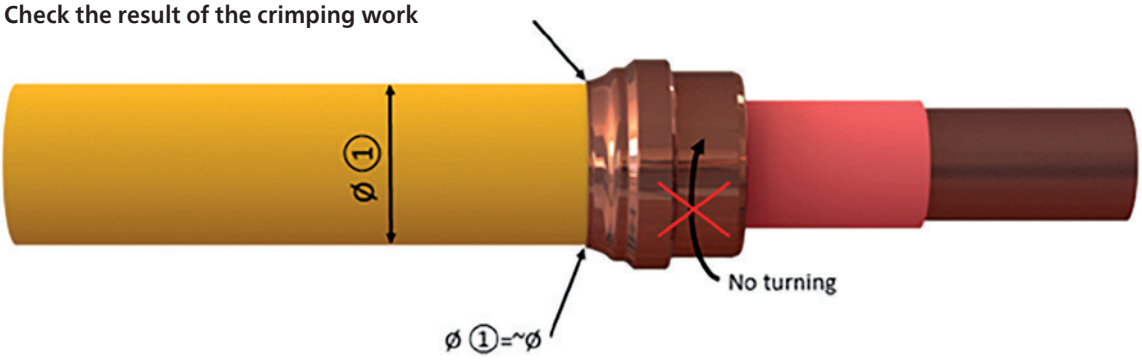
Ø ② max. 2,2mm> Ø ①

Check length of exposed shield



Check compatibility of contact sleeve

Check the result of the crimping work



4. Maintenance

Replacement of the sealing insert
If required, e.g. due to damage or deterioration, the sealing insert can be replaced on the assembled cable. It is not necessary to disconnect the cable at the cable lug. The same safety rules apply as for installation.

Important note:
High-voltage application

Safety rules:
1. Switch off power, de-energise
2. Secure against being switched on again
3. Check that there is no voltage
4. Carry out grounding and short-circuiting
5. Place safe protective cover over any part that could become live

To do this, the pressure nut is unscrewed and the old sealing insert is removed. The new sealing insert (split accordingly) can then be “wrapped around” the cable. Steps 16 and 17 from the installation process are then carried out as described above.

5. Applicable technical documentation

The following technical documents are also part of this installation manual. In the event of any contradiction between this installation manual and a product drawing or any of the listed documents, this installation manual shall take precedence.

5.1 AGRO AG – EVolution EMC documentation

Drawing no.	Description
1089.20.XXX	Technical datasheet – M20x1.5 with short entry thread • Drawing • Simplified 3D model
1189.20.XXX	Technical datasheet – M20x1.5 with long entry thread • Drawing • Simplified 3D model
1089.25.XXX	Technical datasheet – M25x1.5 with short entry thread • Drawing • Simplified 3D model
1189.25.XXX	Technical datasheet – M25x1.5 with long entry thread • Drawing • Simplified 3D model
1089.32.XXX	Technical datasheet – M32x1.5 with short entry thread • Drawing • Simplified 3D model
1189.32.XXX	Technical datasheet – M32x1.5 with long entry thread • Drawing • Simplified 3D model
1Z89.XX.02LF	Drawing – Lower part
1089.XX.01LF	Drawing – Compression nut
1089.XX.97.YYY.03	Drawing – Sealing insert
1089.XX.YYY.04	Drawing – Contact sleeve
1089.YYY.05	Drawing – Supporting ring

Specifications and instructions

Specification / Doc. No.	Description
I00175-16	Installation manual (this document)
I00175-0	Product Specification & Technical Datasheet
I00175-17-1	Product datasheet – EVolution EMC M20
I00175-17-2	Product datasheet – EVolution EMC M25
I00175-17-3	Product datasheet – EVolution EMC M32
HE.19176	Operating Instructions: AXI PRESS tool for EVolution EMC cable glands

5.2 General documentation

Compatible cables
Compatible cables for the EVolution EMC cable gland are listed in the applicable cable verification list.

If the cable you are looking for is not listed, or if none of the cables meet your needs, please contact AGRO AG.

AGRO AG
Korbackerweg 7
CH-5502 Hunzenschwil
info@agro.ch

Compatible cable lugs
In developing the EVolution EMC cable gland, a strong focus was placed on the importance of compatible cable lugs. The main criterion is that the clear width of the cable gland's connection fitting should exceed the width of the cable lug, ensuring that the cable with its pre-connected cable lug can be passed through the EVolution EMC cable gland during installation.

Ensuring electrical and mechanical integrity/compatibility with other components (apart from the cable gland) is the responsibility of the manufacturer or the user.

6. General requirements and considerations

Installation tools
The installation tools may only be used by competent specialists. Instructions for the use of tools are provided with the tools or may be requested separately.

The applicable commonly recognised rules of engineering, and all relevant laws and regulations, must be observed at all times during installation.

Degree of protection (IP classification)
The specified degrees of protection can only be achieved when the installation is carried out correctly and only when the specified cable types are used.

EMC requirements

	**Important!** Correct EMC functioning can only be achieved and ensured with the use of tools and devices that have been specified by AGRO AG.

Maintenance and inspection recommendations
The tool inserts are made of high-quality materials that allow a service life of at least 50,000 crimping cycles. A regular check for mechanical damage caused by transport or external influences, and for dirt or corrosion, is recommended.

The AXI PRESS installation tool for EVolution EMC cable glands has an integrated crimping cycle counter. It is recommended to have maintenance carried out after every 10,000 crimping cycles, and latest after three years, at the authorised Klauke Service Center. Details of authorised service centres can be found in the operating instruction HE.19176.

If you have any questions, please contact the responsible member of staff at AGRO AG.

AGRO AG
Korbackerweg 7
CH-5502 Hunzenschwil
info@agro.ch

7. Troubleshooting

Problem	Solution / Check / Support
Error message on "AXI PRESS for EVolution EMC" tool	The error messages of the "AXI PRESS for EVolution EMC" tool are explained in the tool's manual, HE.19176
Compression/crimping is asymmetrical	Check that the two flange inserts have identical identification markings
The cable's jacket is damaged following the crimping process	• Check cable compatibility → Refer to EVolution EMC product datasheet • Check that the crimping process was carried out using the correct flange inserts → Refer to EVolution EMC product datasheet • Check for use of wrong supporting ring or contact sleeve → Refer to EVolution EMC product datasheet
Placing supporting ring or contact sleeve in position on the cable requires significant force	• Check cable compatibility → Refer to EVolution EMC product datasheet • If the cable has been deformed (e.g. during the preparation work) and is no longer round, apply pressure as required to make it round again • Check for use of wrong supporting ring or contact sleeve → Refer to EVolution EMC product datasheet
Wire strands from the braided shield can be seen following the crimping process	• Shield braiding was not cut back far enough during preparation → Check if properly cut to length as specified
Cable lug cannot pass through the cable gland	• Check cable lug compatibility → Refer to EVolution EMC product datasheet
Cable gland's connection tightness is not adequate (loose connection)	• Check that the pressure nut was correctly tightened • Check that the cable is compatible with the sealing insert → Refer to EVolution EMC product datasheet

Related products.
for professional solutions in the electric vehicle sector.

Pressure balance elements and accessories

An extensive range of accessories such as locknuts, reducers and expansion fittings or screw-in sealing caps, as well as pressure balance elements and drainage elements of brass and plastic are completing our product range.

AGROflex

Braided sleeving in polyester and polyamide for bundling and sheathing electrical cables, as well as orange-coloured braided sleeving for high-voltage applications in vehicles.

Progress® EMC cable glands

of brass ensure a low-impedance connection between the shield braiding and the metal housing while at the same time ensuring safe and reliable cable entry.

E-mobility applications:

Public transport | Goods transport | Mobile machinery | Agricultural vehicles | Special vehicles | Yachts / ships

Technical information and advice

For more information about our products, system solutions and communication media, please visit our website: **www.agro.ch**

Our team of technical advisors will be happy to answer any questions you may have or provide further information, and looks forward to speaking with you **+41 (0)62 889 47 47**

AGRO AG
CH-5502 Hunzenschwil
Tel. +41 (0) 62 889 47 47 · Fax +41 (0) 62 889 47 50
www.agro.ch · info@agro.ch
Member of KAISER GROUP

AGRO
... your quality-connection