



MONTAGEANLEITUNG  
**FRIALEN® XL KEILMUFFE KM XL**

ASSEMBLY INSTRUCTION  
**FRIALEN® XL CONICAL RING COUPLER KM XL**

[www.frialen-xl.de](http://www.frialen-xl.de)

# Contents

Page

1.	Preliminary remarks	27
1.1	Safety instructions	27
2.	Required equipment and components	28
3.	Installing the conical ring coupler	29
3.1	Conical ring coupler setup	29
3.2	Cutting to length of pipes	31
3.3	Preparing the joining surfaces	31
3.4	Deburring the cut edge on the outside and inside	33
3.5	Cleaning	34
3.6	Restoration of irregular and oval pipes	35
3.7	Installing the conical ring coupler	36
3.7.1	Installing the conical ring coupler in the preassembled state	36
3.7.2	Conical ring activation	38
3.8	Carrying out of fusion	41
3.9	Cooling times	45
3.10	Installing the conical ring and coupler body separately	45
4.	Updates to these assembly instructions	49

**For further information on the processing of FRIALEN® Safety Fittings, please contact:**




FRIATEC Aktiengesellschaft  
 Technical Plastics Division  
 P.O.B. 710261 · D-68222 Mannheim  
 Phone +49 621 486-1431  
 Fax +49 621 479196  
 Internet: [www.frialen-xl.com](http://www.frialen-xl.com)  
 Email: [info-frialen@friatec.de](mailto:info-frialen@friatec.de)  
 Hotline +49 621 486-1431

For easier reading, the assembly instruction dispenses with the symbol ® in continuous text.  
 The following trademarks are registered: FRIALEN, FRIAMAT and FRIATOOLS.

# 1. Preliminary remarks

## 1.1 Safety instructions

The following warnings and warning symbols are used in these assembly instructions:

Symbol	Meaning
 <b>DANGER!</b>	Danger to persons. Failing to observe this will cause death or serious injury.
 <b>WARNING!</b>	Danger to persons. Failing to observe this can cause death or serious injury.
 <b>CAUTION!</b>	Danger to persons. Failing to observe this can cause low to medium severity injuries.
<b>NOTICE</b>	Danger to property. Failing to observe this can cause damage to property.
<b>INFORMATION</b>	Application tips and other useful information. Failing to observe this cannot cause injury or damage to property.

## 2. Required equipment and components

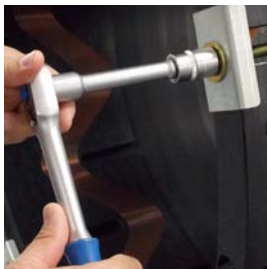
- Scraper tools, like FWSG XL, FWSG 710 L or FWSG 900 L and manual scraper FWZXL



- Fusion unit FRIAMAT XL and generator



- Pneumatic screwdriver, ratchet or cordless screwdriver

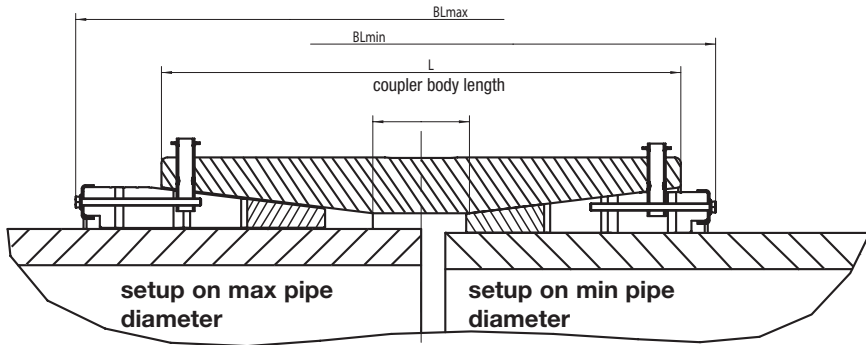


- Compressor

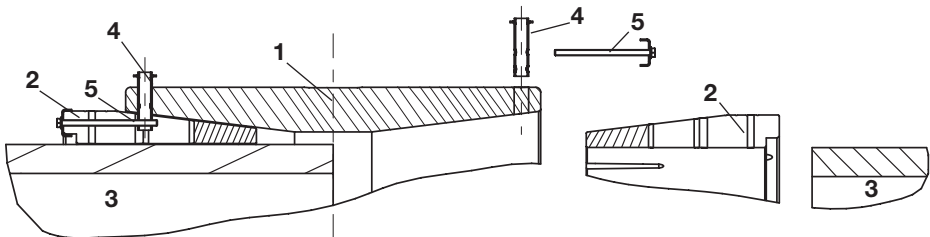


### 3. Installing the conical ring coupler

#### 3.1 Conical ring coupler setup



**Diagram 1:** Setup and installed state of the conical ring coupler



**Diagram 2:** The components of the conical ring coupler

1. coupler body
2. conical ring
3. pipe
4. locking bar
5. tightening screw with retaining plate

Section	Specifications	Conical ring coupler KM XL								
		d 355	d 400	d 450	d 560	d 630	d 800	d 1000	d 1200	
<b>Specifications for the pipe to be processed</b>										
3.7.2	Max tolerance range for the pipe diameter $d_{em}$ [mm]	0/+8	0/+8	0/+8	0/+10	0/+11	0/+13	-4/+9	0/+12	
3.6	Processed section $d_{max}$ up to 2% ovality (conical ring coupler not dismantled) [mm]	363	408	458	571	642	813	1011	1213	
3.6	Processed section $d_{max}$ up to 6% ovality (conical ring coupler dismantled) [mm]	370	416	468	580	657	824	1030	1236	
3.6	Max ovality $d_{max}$ [%]	8	8	8	7	6	6	6	6	
<b>Specifications for the conical ring coupler KM XL to be processed</b>										
3.3	Installed length $L_{max}$ [mm]	705	730	750	850	940	1065	1145	1290	
3.3	Processed length $L_B$ [mm]	350	370	380	430	470	530	570	640	
3.7	Reference marking R [mm]	1000	1000	1000	1000	1000	1000	1000	1000	
3.7.2	Assembly screw W/F	SW17	SW17	SW17	SW17	SW19	SW19	SW19	SW19	
3.7.2	Assembly check measurement <sup>a</sup> [mm]	min.	1000	1000	1000	1000	1000	1000	1000	1000
		max.	1015	1020	1020	1020	1030	1035	1040	1040
3.8	Fusion time at 20 °C [s]	645	690	750	1000	1070	1370	2400	3100*	
3.9	Cooling time until movement CT <sup>b</sup> [min]	10	10	10	10	10	10	25	25	
3.9	Cooling time until pressure up to 8 bar STP <sup>c</sup> [min]	15	20	20	40	50	70	95	95	
3.9	Cooling time until pressure > 8 bar STP <sup>c</sup> [min]	25	30	35	65	80	115	150	150	

\* For the KM XL d 1200 two fusion processes are required. The specified fusion time is the total fusion time per coupler side.

**Table 1 – Key processing data**

- <sup>a</sup> Min/max distance between centre of coupler and reference marking when reference marking is 1000 mm from cut edge.  
<sup>b</sup> CT: cooling time until the connection may be moved  
<sup>c</sup> STP: cooling time until pressure test

### 3.2 Cutting to length of pipes

The ends of the pipe must be at right angles to the pipe's longitudinal axis, and the cut edges even and offset free. On pipe diameters considerably less than the nominal value (Pipe  $d < \text{nominal } d$ ), the ends of the pipe may have to be shortened.

If necessary, part off the ends of the pipes you want to connect.

In the case of pipes that are considerably less in diameter than the nominal values or whose ends are heavily deflected, call our hotline +49 621 486-1431.

### 3.3 Preparing the joining surfaces

First, the whole circumference of the pipe surface covered by the conical ring coupler must be cleaned of coarse dirt (**see Figure 1**).

Starting from the end, mark the area for cleaning on the pipe.

- When using the conical ring coupler as a straight sleeve, mark for cleaning at least the installed length  $L_{\text{max}}$  in Table 1.
- For installations on one side only, mark for cleaning at the least the processed length  $L_{\text{B}}$  in Table 1.



Figure 1

#### **INFORMATION**

Remove foreign bodies from the pipe surface, e.g. dirt, sand, or small stones, that could unduly abrade the scraping blade.



Figure 2

### INFORMATION

The marking on the pipe surface (see Figure 2) shows where the oxide layer has not been removed completely.

Directly before installing the conical ring coupler **KM XL**, use the **FRIATOOLS** scraper tools **FWSG XL**, **FWSG 710 L** or **FWSG 900 L** to scrape the pipe surface completely over the minimum length  $L_B$  in Table 1 (see Figure 3).



Figure 3

### INFORMATION

Note the **FRIATOOLS** operating instructions for **FWSG XL**, **FWSG 710 L** and **FWSG 900 L**.



The rotating cutting arm can cause injury! Keep clear! Make sure when using the scraper tool that there is nobody inside its working range.



Damage on the pipe surface, e.g. axial scoring or scratching, may not lie inside the fusion zone.

### NOTICE

**An incompletely removed oxide layer can cause leaks in the fusion weld.**

The processed zone must be protected against dirt, soap, grease, discharging water, and adverse weather conditions, e.g. against the effects of moisture and frost. After scraping, the fusion zone may no longer be touched.

### INFORMATION

**Check regularly the state of the blade on the scraper tool. Worn blades must be replaced!**

KM XL	Scraper tool	Nom chip thickness [mm]	Wear limit [mm]
d 355/d 400/ d 450/d 560/d 630	FWSG 710 L	0.30 – 0.40	≤ 0.50
d 630/d 800	FWSG 900 L	0.30 – 0.40	≤ 0.50
d 1000/d 1200	FWSG XL	0.40 – 0.60	≤ 0.80

**Table 2: Wear limit for scraping blades**

### 3.4 Deburring the cut edge on the outside and inside

A suitable aid here is the **FWZXL** manual scraper (see **Figure 4**). The chips may then have to be removed from inside the pipe.



**Figure 4**

### 3.5 Cleaning

The surfaces for joining must be absolutely clean, dry, and free of grease.

Directly before installing the fitting, clean the surfaces to be joined with a suitable cleaning agent and **exclusively absorbent, lintfree and undyed paper** (see Figure 5). **When alcohol based cleaning agents are used, the alcohol content must be at least 99.8% in accordance with DVGW-VP 603.**



**Figure 5**

We recommend a PE cleaning agent that has been certified on the basis of DVGW-VP 603, e.g. AHK cleaner.

Prevent dirt from the unscraped pipe surface from being rubbed into the fusion zone. The dosed cleaning agent must slightly wet the paper. Avoid contact with the skin. Observe the safety instructions issued by the manufacturer! The **cleaning agent must have evaporated completely** before the fusion process.

**The joining surfaces on the conical ring coupler KM XL were cleaned prior to delivery. It is therefore ready to install.**

Check the packaging for damage. When wet or soiled, the conical ring coupler **KM XL** must be dismantled (see Section 3.10), and the fusion areas cleaned on each of the components.

### 3.6 Restoration of irregular and oval pipes

#### **INFORMATION**

The conical ring coupler KM XL can be installed without further measures on pipes exhibiting up to 2% ovality. When the conical ring and coupler body are installed separately (Section 3.10), pipe ovality up to 6% is restored automatically without further equipment.

Alternatively, the **FRIATOOLS** rounding clamp **FWXRB** (see **Figure 6**) or the hydraulic rounding clamp **FWXRH** can be used to restore the pipe.



**Figure 6**

#### **INFORMATION**

Please observe the **FRIATOOLS** operating instructions for the hydraulic rounding clamp **FWXRH** and rounding clamp **FWXRB**.

### 3.7 Installing the conical ring coupler

Using the **FRIALEN** marker, mark the processing area depicted in Diagram 1 around both end of the pipes (about 120°), and make an additional reference marking, Table 1, one metre from the cut edge (**see Figure 7**).



Figure 7

#### **INFORMATION**

**This reference marking is to ensure that the conical ring coupler KM XL is installed at the centre of the pipe fusion site.**

Make sure when installing that the joining surfaces are clean and dry. Avoid touching the cleaned fusion zone with your hand. If necessary, the fusion zone may have to be cleaned again. Moisture, e.g. dew or frost on the joining surface, must be removed with suitable aids.

#### 3.7.1 Installing the conical ring coupler in the preassembled state

When the conical ring coupler **KM XL** has to be dismantled, proceed as described in Section 3.10.

Position the coupler directly in front of the pipe end.

Make sure it is deposited on a stable and clean surface.

#### **NOTICE**

**To prevent contamination, the plastic sheet should first be removed on the installation side only.**

The coupler is handled with suitable hoisting gear.



**Do not enter or stay in areas directly under suspended loads! Danger of death from falling components! Wear a safety helmet!**



**Figure 8**

Position the conical ring coupler **KM XL** flush to the end of the pipe, and push it to the marked processed length  $L_B$  on the pipe (**see Figure 8**).

Make sure when positioning the conical ring coupler that the fusion contacts, barcode and the tightening screws can be accessed without hindrance.

Inline installation:

Push the second pipe into the other side of the conical ring coupler **KM XL** (**see Figure 9**), observing the check measurements in Table 1.

Straight sleeve installation:

Push the conical ring coupler **KM XL** completely on the first pipe, and align the second pipe end with as small a gap as possible flush to the first pipe.

Secure this position, and push half of the installed length of the conical ring coupler **KM XL** on the second pipe. Check that the position is correct and complies with the check measurement in Table 1.



**Figure 9**

### 3.7.2 Conical ring activation

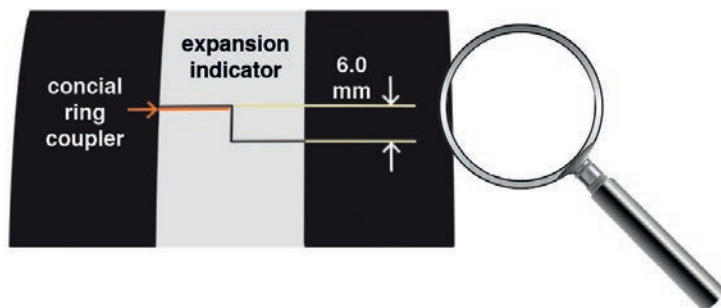
A correctly installed conical ring causes the coupler body to expand in circumference. A belt indicates this expansion when the conical ring is installed correctly.



**Figure 10**

The pre-installed belt is magnetic and stay in position (see **Figure 10**). When activating the conical ring, keep tightening the belt by hand.

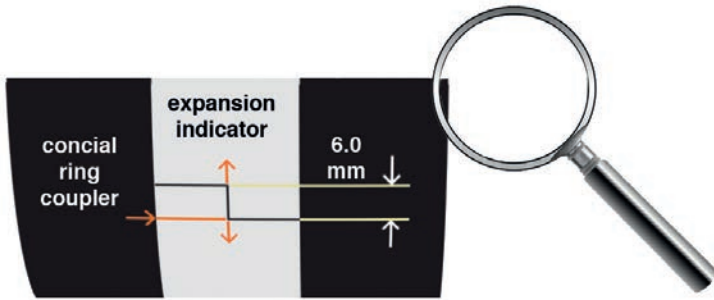
At the taper on the top edge, make a reference mark over the whole width of the belt (see **arrow on Figure 11**).



**Figure 11**

The taper or recess at the belt is offset by 6 mm.

Activate the conical ring as described in the following until the reference mark is congruent with the recess's bottom shoulder (**see Figure 12**).



**Figure 12**

Using a suitable ratchet, pneumatic or cordless screwdriver (wrench size 17 for d 355 - d 560 or wrench size 19 for d 630 - d 1200) to tighten the screws around the circumference uniformly over several cycles, pushing together the conical ring and coupler body (**see Figure 13**).



**Figure 13**

When tightening the screws, observe the markings on the conical ring's circumference (**see Figure 14**) to avoid misalignment and jamming between the coupler body and conical ring.



**Figure 14**

Whenever necessary, correct the axial installed position of the coupler with respect to the reference mark as long as the components can still be moved. Tighten the screws uniformly over several cycles until the indicator belt shows the correct expansion of the coupler body (**see Figure 12**).

The distance between the centre of the coupler and the reference mark must lie within the assembly check range in Table 1.

When activating the conical ring, you can shorten the installation time by striking the fusion conical rings with a plastic hammer (**see Figure 15**).



**Figure 15**



**NOTICE**

The marks (rings) around the circumference of the conical ring show the conical ring's min and max positions to the external coupler. When the installation fails to insert the first ring (to the outer edge of the coupler body) or conceals the last ring, fusion may not start. The pipe diameter is then outside of the permitted tolerance in Table 1.

In the event of any deviations from the specifications, the conical ring coupler must be dismantled and realigned. Check the cause (e.g. the pipe's dimensional accuracy).

Contact us on our hotline +49 621 486-1431.

**3.8 Carrying out of fusion**

Keep the fusion site secured in place for the whole duration of the process until after the cooling time CT.

If necessary, the pipe section or the conical ring coupler must be shimmed or secured with suitable alignment clamps.

**INFORMATION**

The fusion unit FRIAMAT XL with Y adapter cable must be used for the FRIALEN conical ring coupler KM XL. Note the requirements for the generator's power range.

**INFORMATION**

The Y adapter cable (Y-ADAPT) is not part of the FRIAMAT XL fusion unit and must be ordered separately (Order.-No. 624801).

**INFORMATION**

Before starting fusion, check the supply voltage for your FRIAMAT XL fusion unit. Your FRIAMAT XL fusion unit is supplied with three phase alternating voltage (400 Vac / > 10 kW).  
Observe the FRIATOOLS operating instructions for the FRIAMAT XL fusion unit.

## INFORMATION

**Exclusively generators with a min rated power output of 15 kVA must be used for processing the conical ring coupler KM XL. Furthermore, make sure that the generators you use can handle heavy currents (min 23 A / 400 V). Please contact our application engineering department with any questions you may have.**

First verify that the fusion unit is in perfect working order. In particular, make sure that the current carrying cables and the plug are in perfect condition. Note the guidelines issued by the professional association for the use of electrical equipment (BGI 594) and the DVGW regulations or the rules applying in your country.



**Danger! Electric shock!**  
**Defect equipment may not be put into operation!**  
**Equipment with damaged connecting cables or lines may not be put into operation and must be replaced by authorised service stations!**  
**Before all care and maintenance work, pull out the plug connecting the equipment!**  
**Never open the FRIAMAT XL fusion unit when it is supplied with operating voltage!**

Connect the **FRIAMAT XL** fusion unit to the power supply, and switch it ON at the main switch.

Connect the **FRIAMAT XL** fusion unit to the fusion contacts on the conical ring (**see Figure 16**). The two sides of the conical ring coupler **KM XL** are named Side A and Side B on the barcode label.

**KM XL ≤ d 1000** – Both fusion zones on the conical ring are fused at the same time in the one operation. Use the Y adapter cable (Y-ADAPT) for the **FRIAMAT XL** fusion unit (**see Figure 16**).



**Figure 16**

**KM XL d 1200** - Each fusion zone on the conical ring must be **fused sequentially** (two fusion operations per coupler side). Use the Y adapter cable (Y-ADAPT) of the FRIAMAT XL fusion unit.

Each fusion zone has a separate barcode (barcode 1 and barcode 2), which is positioned on the conical ring (**see Figure 17**).

Barcode 1 (first fusion process) conical ring to the pipe

Barcode 2 (second fusion process) conical ring to the coupler body

The fusion contact pins on the conical ring are marked with numbers 1 and 2.

### NOTICE

**The sequence of the fusion process must be adhered. Directly after the first fusion is to start the second fusion.**



**Figure 17**

Use the scanner to read in the fusion parameters on the fusion unit's barcode label (**see Figure 18**).

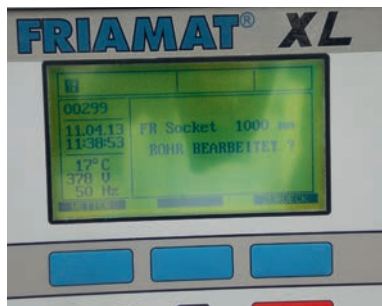
### INFORMATION

**In the event of an illegible or missing barcode label, please consult our hotline.**



**Figure 18**

Compare the details on the **FRIAMAT XL** display with the fitting's specifications (see **Figure 19**).



**Figure 19**

### **INFORMATION**

When the fusion process is interrupted, please contact our hotline  
+49 621 486-1431.



### **WARNING!**

**Caution! Plastic can discharge during the fusion process!  
Contact with the eyes or skin can cause burning injuries!  
For your general safety, always keep a distance of one metre from the fusion site during the fusion process.**

After fusion, use a **FRIALEN** marker to note the following on the pipe or conical ring coupler **KM XL**:

- fusion parameters (compare the actual fusion time on the display with the nominal fusion time)
- name / ID of the fusion unit operator
- time of day as a basis for the cooling time

These notes are to ensure also that no fusion site is overlooked.

Perform fusion analogously on the second coupler side B.

### 3.9 Cooling times

The cooling time (Table 1) is understood to be:

- a.) the time needed for the component to cool to the temperature at which the connection can be moved; this time is given on the barcodes and is marked with “CT” (cooling time).
- b.) the time needed for the component to cool to the temperature at which the assembly can be pressurised with the full test or operating pressure (STP).

#### **NOTICE**

A pipe may not be put into operation until after it has passed the pressure test (see EN 805, EN 12007 or DVGW G 469, W 400). The guidelines in the DVGW work sheets for pressure tests, the European standards, and/or the corresponding national regulations must be observed.

### 3.10 Installing the conical ring and coupler body separately

It may be necessary to dismantle the conical ring coupler **KM XL** when the pipe exhibits large ovality (Section 3.6) or for cleaning purposes (Section 3.5). Remove the packaging.

#### **NOTICE**

Provide stable and clean surfaces for depositing the individual components (see Figure 20). Avoid damage to the components, and keep the tensioning screws and locking bars in a safe place for later use.



**Figure 20**

To dismantle the assembly, loosen the tensioning screws (1), and remove the locking bars (2) and the conical rings (see Figure 21).

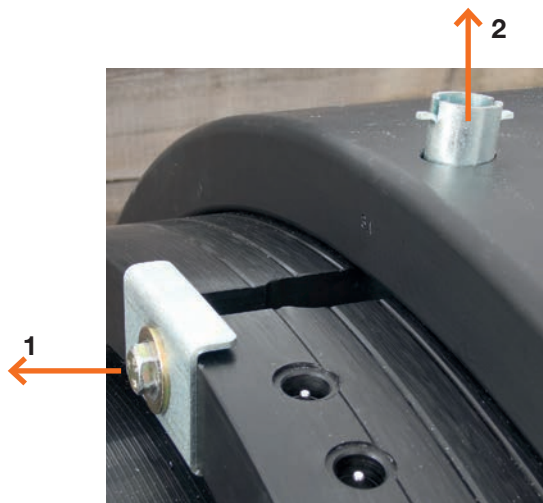


Figure 21

### INFORMATION

When the conical ring cannot be detached, take the locking bars out of the coupler body and insert them through the holes (see Figure 22) on the conical ring. You can now use the tensioning screws to press the conical ring out of the coupler body (see Figure 23).

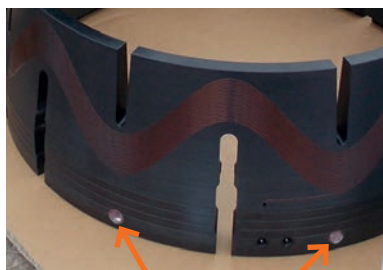


Figure 22



**Figure 23**

If necessary, clean the components as described in Section 3.5.

After dismantling the conical ring coupler **KM XL**, push the conical ring over the scraped area on the pipe to the marking so that the conical ring points towards the end of the pipe (**see Figure 24**). The diameter of the conical ring is flexible and can be adjusted to the ovality while it is being pushed over the pipe.



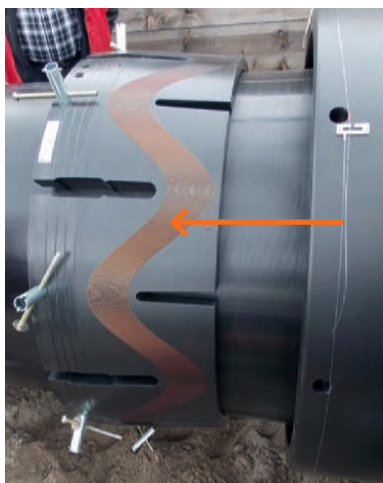
**Figure 24**

**NOTICE**

Avoid contacting the joining surfaces. If necessary, these sites must be cleaned with a suitable PE agent (see Figure 25). How the components are cleaned is described in Section 3.5.

**Figure 25**

Afterwards, push the coupler body on the pipe (see Figure 26). Take care not to jam the components when joining them together. Align the conical ring on the coupler body so that the slots on the conical ring lie flush with the holes in the coupler body.

**Figure 26**

Make sure after installation that the fusion contacts, the barcode and the tightening screws can be accessed without hindrance.



If necessary, installation can be made easier with strikes from a plastic hammer distributed evenly around the face side (see **Figure 27**).



**Figure 27**

Now push the second pipe with installed conical ring into the coupler body from the opposite side of the conical ring coupler **KM XL**. Make sure that the components do not jam during installation.

Continue as described in Section 3.8.

## 4. Updates to these assembly instructions

Please feel free to send us your orders for other assembly and operating instructions:

- FRIALEN® XL large pipe technique and pipe system relining
- FRIALEN® safety fittings for domestic service and distribution lines up to d 225
- FRIAMAT® fusion units
- FRIATOOLS® scraper tools
- FWXRB rounding clamp
- FWXRH hydraulic rounding clamp

The technical information contained in these operating instructions is examined regularly for currency. The date of the last revision is specified on the document. You will find other operating- and assembly instructions on our homepage at [www.friatec.com](http://www.friatec.com).

The latest assembly instruction can be found on the internet at [www.frialen-xl.com](http://www.frialen-xl.com). We also would be pleased to send them to you.

**Aliaxis**  
UTILITIES & INDUSTRY

FRIATEC Aktiengesellschaft  
Division Technische Kunststoffe  
Postfach 7102 61 – 68222 Mannheim – Germany  
Tel +49 621 486 2828 – Fax +49 621 486 1598  
info-frialen@friatec.de

[www.frialen-xl.de](http://www.frialen-xl.de)

FRIATEC Aktiengesellschaft  
Technical Plastics Division  
P.O.B. 7102 61 – 68222 Mannheim – Germany  
Tel +49 621 486 1431 – Fax +49 621 479196  
info-frialen@friatec.de

[www.frialen-xl.com](http://www.frialen-xl.com)

