

# Safety Breakaway Coupling ABML

Operating Instruction



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**Table of Contents**

<b>1</b>	<b>Introduction</b> .....	<b>1</b>
1.1	Validity.....	1
1.2	Target Group.....	1
1.3	Warnings, symbols and markings.....	2
1.3.1	Warnings in this documentation.....	2
1.3.2	Symbols and markings.....	3
1.4	Fields of application.....	4
1.4.1	Industries.....	4
1.4.2	Media.....	4
<b>2</b>	<b>Safety instructions</b> .....	<b>5</b>
2.1	Intended use.....	5
2.2	Safety regulations.....	6
2.3	Personnel qualification.....	8
2.4	Safe handling.....	9
2.5	Special note for use in hazardous areas.....	10
<b>3</b>	<b>Storage and transport</b> .....	<b>11</b>
<b>4</b>	<b>Scope of delivery</b> .....	<b>12</b>
<b>5</b>	<b>Tools</b> .....	<b>12</b>
<b>6</b>	<b>Design and mode of operation</b> .....	<b>13</b>
6.1	Mode of operation.....	14
6.2	Marking.....	15
6.3	Nominal widths and pressure stages.....	16
6.4	Temperature range.....	17
6.5	Release angle.....	17
6.6	Technical data.....	18
6.6.1	Materials.....	18
6.6.2	Release force and residual amounts.....	19
<b>7</b>	<b>Installation/assembly</b> .....	<b>20</b>
7.1	Fitting the breakaway coupling.....	21
<b>8</b>	<b>Commissioning</b> .....	<b>23</b>
<b>9</b>	<b>Operation</b> .....	<b>24</b>
<b>10</b>	<b>Procedure after release of the breakaway coupling</b> .....	<b>25</b>
<b>11</b>	<b>Removing</b> .....	<b>26</b>
<b>12</b>	<b>Cleaning</b> .....	<b>27</b>
<b>13</b>	<b>Maintenance/repair</b> .....	<b>28</b>
<b>14</b>	<b>Disposal</b> .....	<b>29</b>
<b>15</b>	<b>Warranty</b> .....	<b>29</b>

## 1 Introduction

These operating instructions describe how to safely assemble and operate the ABML breakaway coupling.

- Read these operating instructions carefully prior to assembling and operating the product.
- These operating instructions must be retained for the entire service life of the breakaway coupling.
- Make sure that this instruction manual is accessible to the operator at all times.
- These operating instructions must be passed on to each subsequent owner or user of the breakaway coupling.
- Insert every supplement issued by the manufacturer.
- Note the other applicable documents.

### 1.1 Validity

These operating instructions apply exclusively to the assembly and operation of ABML breakaway couplings manufactured by Stäubli Hamburg GmbH.

### 1.2 Target Group

These operating instructions for the ABML breakaway coupling are aimed at the operators and planners of filling systems. The breakaway coupling is a safety component in a hose line/pipeline, which leads from a ship tank to a mobile delivery and disposal unit.

## 1 Introduction

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### 1.3 Warnings, symbols and markings

#### 1.3.1 Warnings in this documentation

These operating instructions use warnings to prevent injuries to persons or damage to equipment.

→ Read and observe all warnings.

The warnings are identified by the following symbols and signal words:

 <b>DANGER</b>
<b>Imminent danger!</b> Failure to observe this warning may result in serious injury or death.
 <b>WARNING</b>
<b>Possible danger!</b> Failure to observe this warning may result in serious injury or death.
 <b>CAUTION</b>
<b>Hazardous situation!</b> Failure to observe this warning may result in minor injuries or damage to equipment.

### 1.3.2 Symbols and markings

These operating instructions use symbols and markings to ensure easy and quick comprehension.

Symbol	Description
✓	A prerequisite that must be fulfilled before you begin an action.
→	An action involving one or more steps, the sequence of which is not relevant.
1. 2. 3. ...	An action involving multiple steps, the sequence of which is relevant and therefore specified.
•	First level list
(see Chapter xx, p. xx)	Cross reference to a specific location in these operating instructions

*Tabelle 1-1: Symbols and signs*

<b>! NOTE</b>
Important information for understanding or optimising the assembly sequences.

## 1 Introduction

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### 1.4 Fields of application

The breakaway coupling is designed for use on hose lines, specially designed for marine and offshore applications, as well as the use between two hose lines.

The ABML is characterized by its high stability against transverse forces which act on the clutch and which they can unintentionally trigger. This is achieved by a cylindrical overlap of the two housing halves, the so-called mounting.

#### 1.4.1 Industries

- Loading processes by means of hose lines
- Loading processes by means of pipe joint arm
- hose stations
- filling processes
- Mobile refueling systems

#### 1.4.2 Media

- Lyes and acids
- Fuels and oils
- Gases
- Materials hazardous to the environment and water
- others on request

## **2 Safety instructions**

### **2.1 Intended use**

ABML series breakaway couplings are intended for use on hoses and pipelines as a piece of equipment with a safety function in accordance with the Pressure Equipment Directive.

They are provided to allow a hose line whose mechanical tensile stress limit is exceeded to separate in a defined manner and to seal both line ends to prevent any leakage of hazardous media.

To ensure the safe separation of the breakaway coupling, you must select the correct breaking pins. The selection is based on the maximum permissible tensile stress of the product line used, see Section 6.6.2.

The breakaway coupling is provided exclusively to convey the approved media.

Any other use shall be regarded as improper use. Examples of misuse include:

- Use outside the specified pressure and temperature ranges, see Chapter 6.6,1, Table 6-3.
- Use for unauthorized media.
- Incorrect breaking pin configuration, see Table 6-4.

The standard breakaway coupling version described here is not suitable for permanent installation on a transportable pressure unit in accordance with TPED Directive 2010/35/EU.

The breakaway coupling shall not be used as a safety fitting for pressure-limiting.

## 2 Safety instructions

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### 2.2 Safety regulations

The operator of the breakaway coupling is responsible for complying with all relevant legal regulations and directives.

- ➔ Breakaway couplings must only be commissioned, operated and maintained in accordance with the following regulations and standards.
  - Operating Instructions
  - Other applicable documents (country-specific ordinances on pressure equipment, operational safety, hazardous goods and environmental protection)
  - Regulations regarding hazardous substances and highly inflammable or combustible fluids
  - Regulations for systems in areas where there is a risk of explosion  
This applies in particular to the prevention of sparking caused by static electricity, to the earthing of system components and the volume resistivity of the conductive hose line
  - Use in explosive atmospheres only with undamaged impact ring
  - System-specific regulations and requirements
  - Equipment and product safety legislation for pressure equipment
  - Valid international, national and regional regulations
  - Accident prevention regulations
- ➔ Ensure that the breakaway coupling, tank and product line is accepted by suitably qualified personnel (experts, trained personnel, professional training, professional experience) and that acceptance is documented by these persons.
- ➔ Observe all approval procedures, required test regulations and test periods.
- ➔ For the intended use of the ABML breakaway coupling, it is essential to comply with the national occupational health and safety guidelines applicable to this area of application.
- ➔ Pre-commissioning and post-maintenance inspections must only be carried out by suitably qualified personnel (experts, trained personnel, professional training,

professional experience). Take account of the certified specialist requirement in accordance with §62 WHG.

- Check the breakaway coupling at least once monthly to ensure that it is in proper condition and free of leaks. Document the results of the inspections.
- If the breakaway coupling is part of a system that requires testing, have the breakaway coupling checked by the expert during the first and all subsequent inspections.
- Implement all the necessary measures for inspection, maintenance and repair in accordance with the national regulations in the country of use.
- Make sure that the breakaway coupling is suitable for the medium to be transported.

## 2 Safety instructions

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### 2.3 Personnel qualification

The operator is responsible for ensuring that assembly, maintenance, commissioning is only carried out by educated and trained specialists.

At this point, we would like to draw your attention to the certified specialist requirement in accordance with §62 WHG.

The operator must provide competent and trained personnel, who can demonstrate in their dealings with hose lines, breakaway couplings, a familiarity with the respective required

medium and its potential hazards, the relevant safety regulations and the regulations of the relevant professional associations.

- ➔ Make sure that the personnel have understood and can implement these operating instructions.
- ➔ Make sure that the personnel have read, understood and be able to implement these repair and maintenance instructions.
- ➔ Make sure that the personnel know and comply with the relevant accident prevention and safety regulations.
- ➔ Make sure that the personnel are using suitable protective clothing/equipment.
- ➔ Make sure that the personnel have special qualifications in handling approved couplings in the Ex area.

### 2.4 Safe handling

- Before operating the breakaway coupling, check it to ensure that it functions properly and is free of leaks.
- When using the breakaway coupling in an elevated position, make certain that people cannot be injured by falling parts of the breakaway coupling.

## 2 Safety instructions

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### 2.5 Special note for use in hazardous areas

The heating of the dry clutch takes place if, exclusively by the medium flowing through, for this reason there is no division into a temperature class. Through the use of constructive measures is a strong

Warming the outer shell counteracted and thus ensures a high level of security.

The operator is responsible for the safe use of the device according to the specified temperature characteristics (see chapter 6.4) in the EX zones designated by him.

The current explosion protection guidelines must be adhered to at all times.

The operator is responsible for ensuring that the operating temperatures are never exceeded.

The appropriate use of the device in an EX zone specified by the operator must be checked in accordance with the requirements set out in this chapter above.

Furthermore, constructive measures to protect against the generation of a spark by striking or shocks were made.

  **DANGER**

**Use in the EX area!**

Attention is drawn to compliance with the specific directives, laws, regulations and requirements for use, dry coupling, in classified EX areas.

### **3 Storage and transport**

- Only transport or store the breakaway coupling in the cleaned condition.
- Cover openings with screw-on caps to prevent any impairment of the surfaces/mating surfaces and to protect these against contamination.
- Make sure that no damage can occur at the storage location as a result of corrosion or extreme temperatures.

## 4 Scope of delivery

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### 4 Scope of delivery

The ABML breakaway coupling is delivered read to use.

### 5 Tools

For assembling the breakaway coupling:

- Wrench with suitable width across flats (see Table 6-3).  
Wrench is not included in scope of delivery.

6 Design and mode of operation

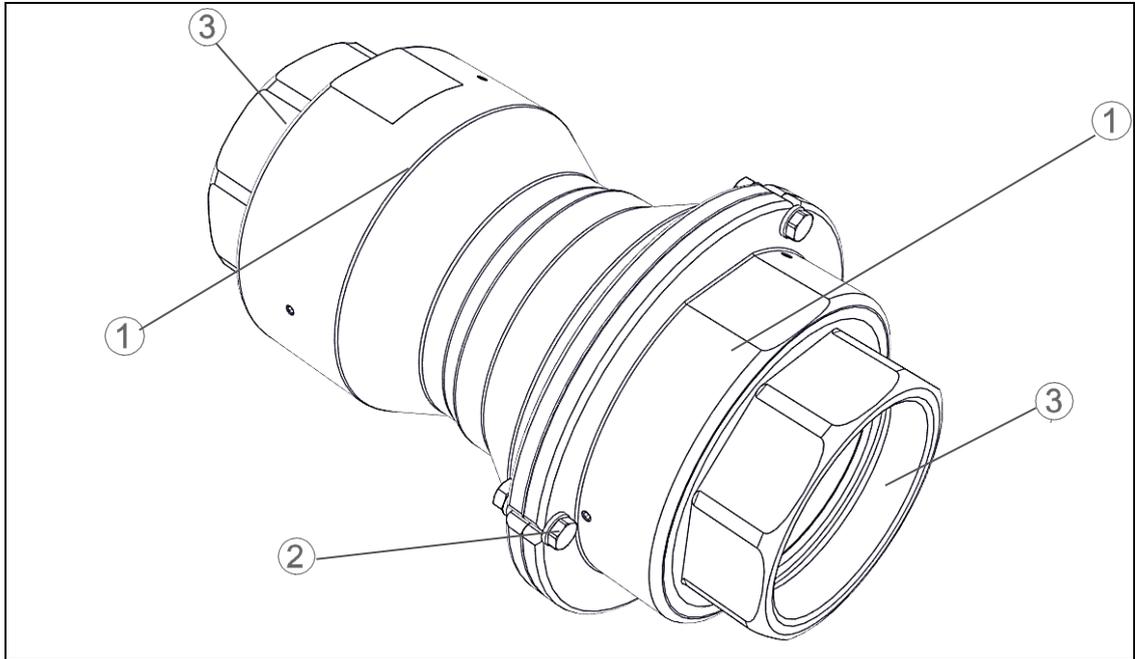


Figure 6-1: Part of ABML breakaway coupling

- 1 Coupling halves
- 2 Breaking pins

- 3 Connection to product line

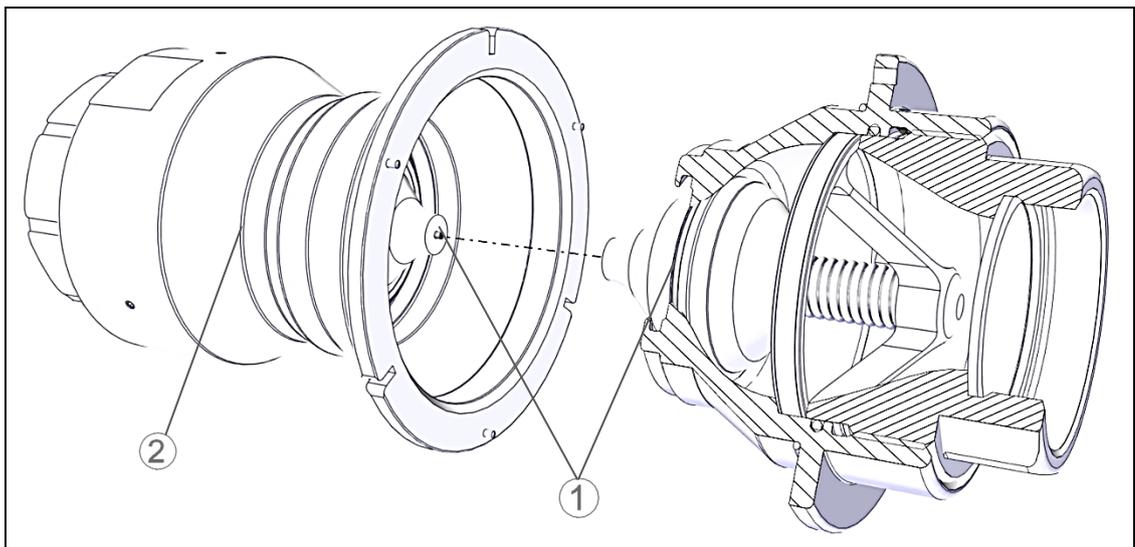


Figure 6-2: Coupling halves following an emergency breakaway

- 1 Closed non-return valves

- 2 Separated coupling halves

## 6 Design and mode of operation

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### 6.1 Mode of operation

The ABML breakaway coupling consists of two coupling halves, each of which is equipped with a non-return valve. The coupling halves are held together in the operating state by breaking pins. The two non-return valves brace each other in the operating state and keep the flow cross-section open.

Separation of the breakaway coupling is initiated, for example, if the refueling systems for the ship tank to be loaded drifts or the loading arm swings in before the product line has been separated. The two coupling halves are separated from one another as soon as the product line is subjected to an impermissible action of force. In this process, the three break bolts, which are provided with predetermined breaking points, break. The separation takes place only with axial stress.

The action of force that must be applied to separate the breakaway coupling is significantly lower than the force required to tear the hose or pull it free of its connection. The coupling offers a high stability against lateral forces, e.g. may occur with floating hoses during heavy waves or when hose lines are being drummed

In the event of a separation, the spring-loaded non-return valves abruptly close both line ends. The coupling halves remain firmly at the respective ends of the product line.

Uncontrolled leakage of fluids or gases from the two product-conveying line ends is prevented.

## 6.2 Marking

Each coupling half is provided with a marking.

The marking contains the following information:

Marking	Meaning
TÜ AGG 214-94	Component marking
CE 0575 II 2G c TX	CE marking with the ID number of the certification body, Ex marking
Manufacturer code: Stäubli Hamburg	Manufacturer identification
ABML.080300.xxxxx-xx	Item number to identify the product
No.1038/19	Serial number/year of manufacture
Consecutive Nr. 74865/1.4571	Consecutive no. / material name (housing)
Ü	Conformity identifier for construction products according to the building inspection approval certificate Nr. Z-38.4-255
DN PN	Nominal width, pressure stage

Table 6-1: Marking on the casing

## 6 Design and mode of operation

### 6.3 Nominal widths and pressure stages

Nominal width	Connection variant	Pressure stage	Width across flats
DN 50	Weld end G2" IG/AG 2" NPT IG/AG Flange ASA/EN 1092-1	PN 16 PN 25	70
DN 80	Weld end G3" IG/AG 3" NPT IG/AG Flange ASA/EN 1092-1		100
DN 100	Weld end G4" IG/AG 4" NPT IG/AG Flange ASA/EN 1092-1		125
DN 150	Flange ASA 150 Flange ASA 300 Flange EN 1092-1		–

Table 6-2: Nominal widths and pressure stages

### 6.4 Temperature range

The breakaway coupling is approved for a temperature range of  $-40\text{ °C}$  to  $+150\text{ °C}$ . For AL couplings  $-40\text{ °C}$  to  $60\text{ °C}$ . The permissible temperature range is dependent on the sealing material used and the medium conveyed and must be tested for the specific application.

### 6.5 Release angle

The separation takes place only with axial stress

## 6 Design and mode of operation

### 6.6 Technical data

#### 6.6.1 Materials

Component	Material no./ short description	Material identifier <sup>1</sup>	Temperature
body, pressure-loaded parts	1.4571	X6CrNiMoTi17122 (AISI 316 Ti)	-40/150°C
	2.4602	NiCr21Mo14W (Hastelloy C22)	-40/150°C
	2.4610	NiMo16Cr16Ti Hastelloy C4)	-40/150°C
	3.3547	Aluminium	-40/60°C
Spring	1.4401	X12CrNi177	-40/150°C
	2.4602, 2.4600	NiCr21Mo14W	
O-ring seals	FKM	Viton™	-20/150°C
	Ethylene-propylene-diene monomer EPDM	Sodium-butadiene AP	-40/150°C
	NBR	Perbunan	-20/100°C
	Perfluorelastomer FFKM	Kalrez™, Chemraz™	-40/150°C
Threaded seals	PTFE	Teflon™	-40/150°C

Table 6-3: Materials

<sup>1</sup> Kalrez™, Viton™, Teflon™ = registered trademarks of DuPont

<b>! NOTE</b>
Other materials for casing and seals available on request.

6.6.2 Release force and residual amounts

Size	Pressure	Pressureless <sup>2</sup> kN	break force kN	Hose break force kN	Residual amount cm <sup>3</sup>
DN 50	PN 16	12	8,8	18	140
	PN 25	15	10	22,5	
DN 80	PN 16	22	14,7	33	450
	PN 25	30	19	52,5	
DN 100	PN 16	30	19,5	45	830
	PN 25	44	28	69	
DN 150	PN 16	60	38,6	92	1000
	PN 25	90	57	138	

Table 6-4: Release force and residual amounts

<sup>2</sup> Werte für die Auswahl der Bruchbolzen

The release force is determined by the choice of breaking pin.

➔ Choose breaking pins that comply with the release force in the unpressurised state

The breaking pins are marked with the release force value in KN. The respective marking applies to the total number of breaking pins used per coupling.

The release force may vary by a maximum of +/- 10%.

The residual amount includes a 2 time safety factor

### 7 Installation/assembly

- ➔ Before commissioning/assembly, read and follow the instructions in Chapter 2.
- ➔ Make sure that the tensile strength of the hose used is at least 1.3 times the value of the coupling release force. Breaking pins are marked with the release force value.
  - For the release force in Table 6,6,2.

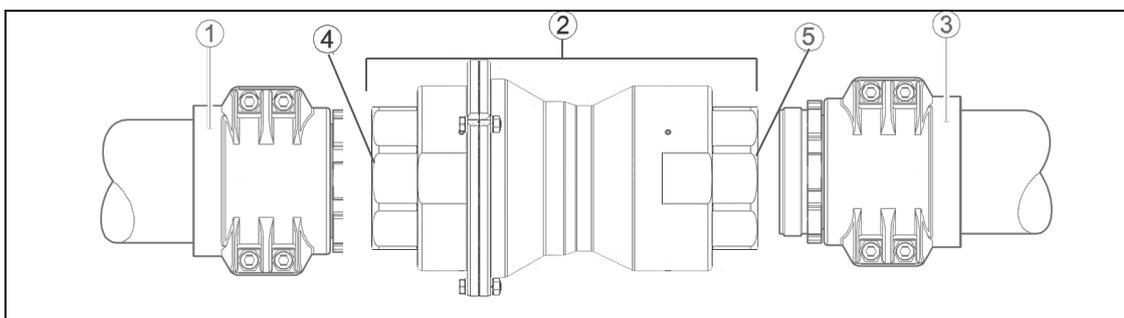
Tools required for assembly:

- ➔ Use a suitable tool for the wrench flats provided on the breakaway coupling.
- ➔ For the thread sizes of Table 6-3.

The breakaway coupling is attached to the product line.

Recommendation:

- ➔ Fit the breakaway coupling directly between the hose line and the coupling on the product line.
- ➔ Fit the breakaway coupling as close as possible to the mobile unit (e.g. ship tank, jointed arm etc.).



*Figure 7-1 Assembling the breakaway coupling*

- |                                |                             |
|--------------------------------|-----------------------------|
| 1 Hose line/ tank connection 1 | 4 Connection 1              |
| 2 Breakaway coupling ABML      | 5 Connection 2              |
| 3 Hose line/ tank connection 2 | 6 Screw-on caps (not shown) |

#### **NOTE**

The existence and the integrity of the impact protection must be ensured by the operator at all times

## 7.1 Fitting the breakaway coupling

### CAUTION

**Risk of injury from sharp edges and burrs!**

→ Wear protective gloves.

### CAUTION

**Risk of injury due to escaping fluids and danger of environmental damage!**

→ Wear protective clothing.

→ Completely drain the product-conveying lines.

→ Use a suitable collecting vessel.

### CAUTION

**Risk of injury with wider nominal widths of the breakaway coupling!**

→ Use suitable lifting equipment.

→ Carry out the assembly with a second person.

→ Wear protective clothing.

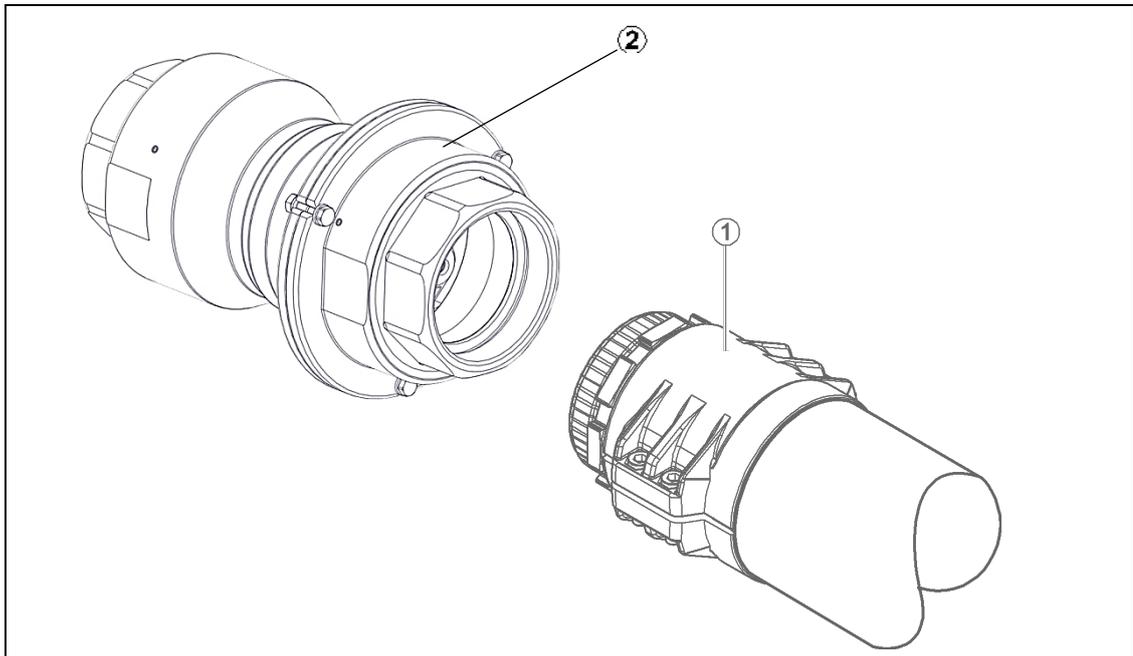
### CAUTION

**Damage to the breakaway coupling due to uncontrolled release!**

→ Make sure that no excessive lateral and longitudinal forces act on the coupling halves during the assembly process.

#### **For the operator:**

Only the qualified person may be commissioned with the assembly of the breakaway coupling. Qualified persons are experts and specialists after vocational training / with professional experience.



*Fig 7-2: Attaching the hose line*

1. Remove all packaging and screw-on caps.
2. Check the breakaway coupling for signs of damage.
3. Hose line end 1 onto the coupling end 2.
4. Tightly screw the connection side from the ship to the second coupling side.
5. Check pipe / hose / tank according to plant-specific requirements.
6. Check that the connections are free of leaks.

**⚠ CAUTION**

**Risk of injury due to falling coupling parts!**

High external loads can cause the breakaway coupling to release.

→ Do not allow persons or objects to support or lean against the coupling.

## 8 Commissioning

** WARNING****Risk of injury due to escaping fluids and danger of environmental damage!**

- Make sure that the tensile strength of the hose used is at least 1.3 times the value of the coupling release force.
  - For the release force in Table 6,6,2.
- 
- Only commence commissioning after the breakaway coupling is properly assembled and attached to the product lines.
  - Observe the operating instructions for the filling system.
  - Always check the following points before commissioning:
    - Check that the breakaway coupling is free of leaks.
    - Check that the connection from the system to the breakaway coupling is free of leaks.
    - Check the breaking pins for signs of damage.  
Damaged breaking pins must be replaced immediately, see Chapter 13.
  - If there are signs of damage or if you are aware of pre-existing damage which could lead to a malfunction, do not use the breakaway coupling.
  - Start up the system, start conveying and/or pump operation.  
Observe the operating instructions for the system.

## 9 Operation

### **WARNING**

#### **Risk of injury due to falling coupling casing!**

If using the breakaway coupling in an elevated position, persons may be injured if part of the casing falls.

- Make sure that no persons are standing directly beneath the breakaway coupling.

### **WARNING**

#### **When released, the breakaway coupling separates abruptly!**

The conveyed medium may spray into the eyes.

- Wear protective goggles.

### **CAUTION**

#### **Emergency separation cannot be guaranteed if the release angle is exceeded!**

- Do not exceed the maximum release angle of 90°.

- ✓ Both product line ends properly connected and ready for use
- ✓ Breakaway coupling closed
- ✓ Breaking pins undamaged

The breakaway coupling separates abruptly if the specified breakaway force is applied.

## 10 Procedure after release of the breakaway coupling

### **WARNING**

#### **Risk of injury due to escaping fluids and danger of environmental damage!**

Fluids may escape when the breakaway coupling is released or if closures are opened.

- Wear suitable personal protective equipment.
- Make sure that the coupling halves are unpressurised and that the product line is completely drained.
- Use suitable tools.

### **NOTE**

#### **Once released, the breakaway coupling cannot be reused.**

The coupling must be repaired by the manufacturer or an authorised service agent.

- Clean the breakaway coupling of product residues.
- Send the breakaway coupling for repair to Stäubli Hamburg GmbH or to an authorised service agent.

### 11 Removing

 **WARNING**

**Danger caused by release volume of dangerous fluids!**

Fluid can escape when removing the breakaway coupling.

→ Take fluid-specific safety precautions and comply with the safety regulations.

1. Make sure that the coupling halves are depressurized and free of fluids.
2. Clean the coupling with a lint-free cloth and dishwashing liquid before removal.  
Only use compressed air in the absence of any fluids.
3. Screw off the hose line with a suitable open-end wrench.
4. After disassembly, carry out the cleaning in accordance with chapter 12 and observe the note on sending in chapter 13.

## 12 Cleaning

- Each time before cleaning, check the breakaway coupling and connections for leaks.
- Only use suitable cleaning agents for cleaning.
- When adhesive or setting products are used, produce residues must be cleaned from the breakaway coupling after each use.
- Clean the breakaway coupling (regardless of the conveyed medium) prior to disassembly.

### 13 Maintenance/repair

- Do not use a damaged breakaway coupling.
- Carry out regular maintenance, at the latest after one year.
- Do not reuse the breakaway coupling once it has released.  
Repair by the manufacturer is required in every case.
- Have maintenance and repairs to the breakaway coupling carried out by Stäubli Hamburg GmbH or by companies/persons authorised by Stäubli Hamburg GmbH.
- Perform visual inspections at regular intervals.
  - Check the breakaway coupling for signs of damage or defects.
  - Check that the breakaway coupling is in a functional state and free of leaks.
- Adhere to and document the specified maintenance intervals.

#### NOTE

##### **Damage to the breakaway coupling caused by repairs carried out by unauthorised persons.**

- Do not attempt to carry out repairs yourself.
- A defective breakaway coupling may only be repaired by Stäubli Hamburg GmbH or companies/persons authorised by Stäubli Hamburg GmbH.
- Prior to returning the coupling, the service need to be notified in advance and the Contamination Sheet "Checklist for the repair and maintenance of dry and emergency disconnect couplings" to be completed. This must be enclosed when the coupling is returned. Further information can be found in the information sheet attached.

## 14 Disposal

- Observe the relevant national and regional regulations when disposing of or recycling the breakaway coupling or its components.
- Should you have any questions on how to dispose of the breakaway coupling, please contact the manufacturer or an authorised specialist.

## 15 Warranty

Stäubli Hamburg GmbH accepts no responsibility for damages due to faulty installation, faulty handling, as well as negligent or incorrect maintenance.

The operator is solely responsible for the installation, operation, and maintenance of the breakaway coupling.



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