



# CBCouplings

Cryogenic Break-Away Couplings



## Operating Manual

### 1" – 6"

Subject to design changes

Art. nr: PR-101131-0121 Version: 140217



## Foreword

This operating manual applies to the person or persons using the Cryogenic Break-Away Couplings.

It is very important to read and understand this operation manual before use of this coupling. Become familiar with the unit's operation, applications and limitations. Be particularly aware of its specific hazards. Store this manual in a clean area and always at a readily available location. Additional copies at no charge can be obtained through written requests.

## **IMPORTANT!! READ THE COMPLETE DOCUMENTATION**

The base for this manual follows the EC-Directive:

Pressure Equipment Directive  
97/23/EG of the 29<sup>th</sup> of May 1997

- Do not make modifications that are not authorized by the manufacturer.
- Read and respect all warnings and instructions provided to you.
- Use only original Mann Teknik spare parts for maintenance.

## Summary of revisions

<b>Date of change</b>	<b>Description</b>
2013-04-24	1. Edition
2014-02-17	Modified service instructions

## Table of Content

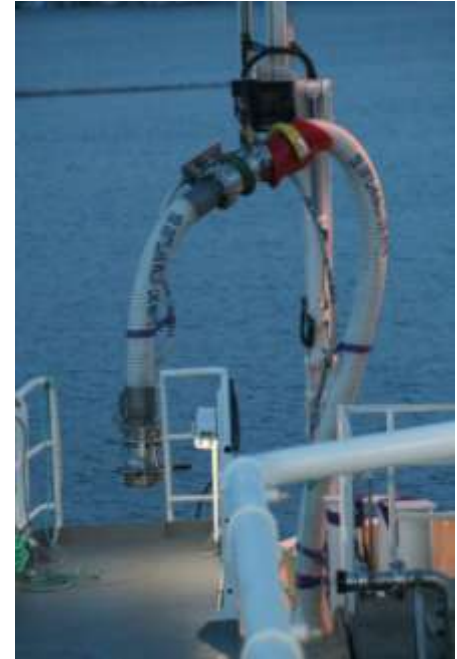
<b>Foreword</b> .....	2
<b>Summary of revisions</b> .....	2
<b>Table of Content</b> .....	3
<b>1 INTRODUCTION</b> .....	4
1.1 Intended use .....	4
1.2 Product specification .....	5
1.3 Technical data .....	5
1.4 Breaking Pins .....	6
1.5 Identification plate e.g. for SBC 3"-3"BSP .....	7
1.6 Scope of delivery .....	7
<b>2 GENERAL SAFETY RULES</b> .....	7
2.1 Safety Instructions .....	7
<b>3 TRANSPORT AND STORAGE</b> .....	8
3.1 Delivery Check .....	8
3.2 Complaints / Return of goods .....	8
3.3 Storage .....	8
<b>4 INSTALLATION</b> .....	9
4.1 Initial Operation .....	9
4.2 Installation .....	9
<b>5 OPERATION</b> .....	10
5.1 General notes .....	10
5.2 Daily visual inspection .....	10
5.3 Disassembly .....	10
5.4 Improper use .....	11
<b>6 MAINTENANCE AND REPAIR</b> .....	11
6.1 General information .....	11
6.2 Maintenance and service instruction .....	12
6.3 Spare parts and tools .....	12
6.4 Assembly .....	12
6.5 Pressure and tightness test .....	15
<b>7 APPLICABLE DOCUMENTS</b> .....	16
7.1 Declaration of Conformity .....	16

## 1 INTRODUCTION

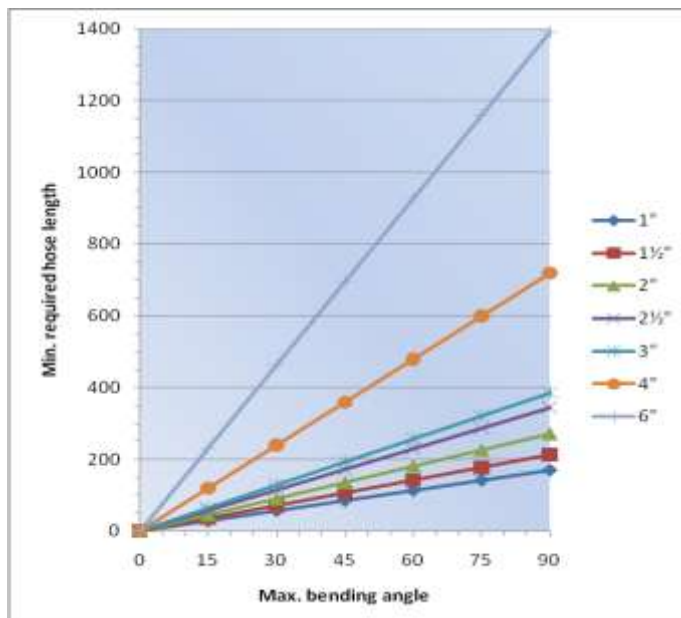
### 1.1 INTENDED USE

The Cryogenic Break-Away Coupling (CBC) acts as a safety component in the supply line of mobile systems, preventing damage to personnel and environment, instead of a supply hose or pipe rupture during filling or emptying due to a change in location of the tank. The coupling valves on the tank and on the supply line immediately close whenever the CBC halves separates.

The CBC is specially designed for trouble free operation in cryogenic service conditions down to -196°C. Reliable and safe operation is dependent upon the correct installation and handling of the equipment. Regular and appropriate maintenance is essential to ensure both safety and reliability over the life of the equipment. Take care that the product is only used inside the limits of the following product specification.



There are two kinds of CBCs available. A marine type version is designed for offshore applications. The specific design requires an installation between two hoses. It is only possible to release the coupling by axial force.



The length of the hose segments should not be less than  $L = a/57,3 \times (r+d/2)$ .

L = min. required hose length

a = max. bending angle

r = min. bending radius

d = outer hose diameter

Figure 1: min. required hose length depending on bending angle shown for hoses according to EN12115

The second CBC type is an industrial version. Regularly it is connected to a tank or a fix connection point inside a loading station on one side and a hose or a loading arm on the other side. This makes that the CBC can be released under a pull force angle up to 90°.

# Operating Manual

## Cryogenic Break-Away Couplings

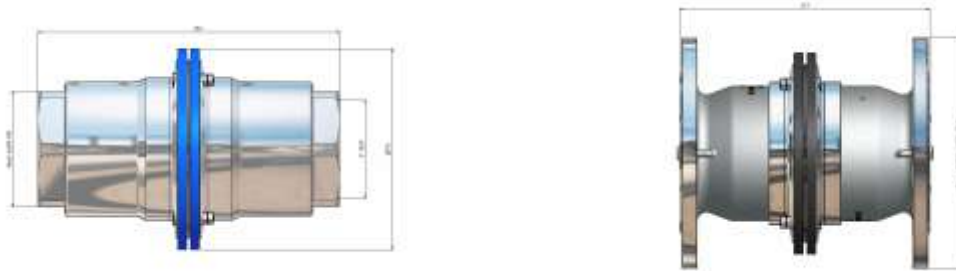


### 1.2 PRODUCT SPECIFICATION

Product name:	Cryogenic Break-Away Coupling
Sizes:	1", 2", 2½", 3", 4" and 6"
Thread Connection:	NPT-Thread ANSI B1.20.1
Flange Connection:	Flange EN 1092, ANSI B16.5
Other Connection:	On request
Material:	EN 10272 – 1.4401/1.4404+AT ASTM A479 – S31603 (316L)
Working pressure:	10 bar / 16 bar / 25 bar / 150 psi / 300 psi
Max test pressure:	16 bar / 25 bar / 40 bar / 240 psi / 450 psi
Temperature range:	-196°C to +80°C

### 1.3 TECHNICAL DATA

Table 1: Nominal Widths, Weight and Dimensions [mm]



Nominal width	Breaking force	Connection	kg (stainless)	D [mm]	L [mm]
1"	3,2 kN	1" Thread	1,7	74	126
		1" Flange	4,2	115	132
2"	13 kN	2" Thread	2,6	114	178
		2" Flange	7,3	165	178
2½"	22 kN	2½" Thread	7,4	140	251
		2½" Flange	13,2	191	214
3"	33 kN	3" Thread	8,5	174	279
		3" Flange	15,1	210	222
4"	52 kN	4" Thread	15,5	211	320
		4" Flange	20,7	254	239
5"	81 kN	5" NPT male	32,0	269	362
		5" Victaulic	31,0	269	341
6"	92 kN	6" Thread	46,8	304	400
		6" Flange	57,6	318	384

Table 2: Materials

Component	Material no.	Standard	Operating temperature
Housing	1.4401	EN 10272 – 1.4401+AT	-200°C to 250°C
Check valve	1.4404	EN 10272 – 1.4404+AT	
Spring	1.4401	EN 10270 – 1.4401	-200°C to 250°C

### 1.4 BREAKING PINS

Mann Technik AB delivers breaking pins according to customer specification. The breaking force should be specified for the weakest component.

Without any specification we supply our couplings with bolts according to the following table.

Example: On the ID-plate of the coupling the mentioned pressure rate is 25 bar. If the minimum burst pressure of the hose is 4 times 25 bar = 100 bar. For a DN65 (2½") coupling the standard breaking bolts are **22 kN**.

Table 4: Recommended breaking force for different hose burst pressures:

Burst pressure hose	DN 25	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
30 bar		4 kN	7 kN	11 kN	18 kN	28 kN	40 kN
40 bar		6 kN	10 kN	15 kN	24 kN	37 kN	54 kN
48 bar		7 kN	12 kN	18 kN	28 kN	45 kN	65 kN
60 bar		9 kN	15 kN	23 kN	36 kN	56 kN	81 kN
68 bar							92 kN
80 bar	3,0 kN	12 kN	20 kN	30 kN	48 kN	75 kN	108 kN
100 bar	3,2 kN	13 kN	<b>22 kN</b>	33 kN	52 kN	81 kN	117 kN
600 psi		6 kN	10 kN	15 kN	24 kN	39 kN	56 kN
1200 psi	3,1 kN	12 kN	21 kN	31 kN	49 kN	78 kN	112 kN

For your special application you can specify the breaking force depending on the burst pressure of your hose or depending on another weak point in your installation.

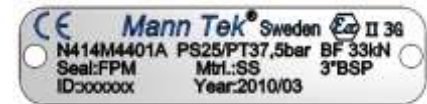
The breaking forces become reduced by increasing internal pressure. The influence per nominal diameter is independent from the breaking bolts. The following table shows the influence.

Table 5: Reduced force to release the coupling because of internal pressure

Breaking Force at	DN 25	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
0 bar	3,2 kN	13 kN	22 kN	33 kN	52 kN	81 kN	92 kN
6 bar	2,5 kN	11,9 kN	19,4 kN	29,2 kN	46,3 kN	73,1 kN	80,9 kN
10 bar	2,1 kN	11,1 kN	17,6 kN	26,7 kN	42,5 kN	67,8 kN	73,4 kN
16 bar	1,3 kN	9,9 kN	15,0 kN	22,9 kN	36,8 kN	59,8 kN	62,2 kN
25 bar		8,1 kN	11,0 kN	17,1 kN	28,3 kN	47,9 kN	45,5 kN
37,5 bar		5,7 kN	5,5 kN	9,2 kN	16,4 kN	31,3 kN	22,2 kN
40 bar		5,2 kN	4,4 kN	7,6 kN	14,0 kN	28,0 kN	17,5 kN
150 psi	2,0 kN	11,0 kN	17,5 kN	26,5 kN	42,2 kN	67,3 kN	72,8 kN
300 psi		9,0 kN	12,9 kN	19,9 kN	32,4 kN	53,6 kN	53,5 kN

### 1.5 IDENTIFICATION PLATE e.g. for CBC 3"-3"BSP

	Industrial Type	Marine Type
Article no:	NC313D44*	NC313M44*
Working Pressure PS:	25 bar	25 bar
Max Test Pressure PT:	37,5 bar	37,5 bar
Breaking force BF:	22 kN	22 kN
Seal:	PTFE	PTFE
Mtrl:	Stainless Steel	Stainless steel
Size:	DN65 – 2½"	DN65 – 2½"



\*For key of article no. please ask for explanation list.

### 1.6 SCOPE OF DELIVERY

1 pcs                                      NC313D44                                      Cryogenic Break-Away Coupling

In case of flange connection gaskets and bolts to mount the coupling into the application is not part of the delivery. For NPT thread use PTFE tape for sealing (see chapter 4.2).

## 2 GENERAL SAFETY RULES

**For a safe operation, read this manual completely before operating this product.**

Failure to follow the warnings may result in serious personal injury, property damage, leakage or unexpected separation.

Before you install any Mann Tek equipment it is essential to check that the material and performance specifications are acceptable for your specific application. The pressure ratings and primary materials of the couplings are clearly indicated on the identification plate of each Mann Tek product. A drawing showing the materials of construction relating to each individual component is available upon request. Specification checks should always be carried out before the product is supplied, but if unsure, ask!

As with all equipment, a check should be made to ensure that the installation fulfils the requirements of applicable prevailing industry, local, national and international standards. Particular attention should be paid to pressure ratings, safety factors and the position of upstream and downstream affiliated closures.

### 2.1 SAFETY INSTRUCTIONS



Wear proper safety clothing consists of thermal gloves, full face shield approved for cryogenic use and solid shoes capable to withstand cryogenic

spill whenever operating Cryogenic Break-Away Couplings.



Make sure the operating space is clear to avoid accidental contact with others and the coupling interface is clean and dry. Use dry air or nitrogen to blow out the coupling interface.



Do not use the CBCoupling in any way, not described in the specification. The user is responsible to comply with all applicable federal, state and local laws and regulations.



Do not operate the CBCoupling if there is any visible damage. Stop immediately if leakage occurs.



Make sure that there is no trapped liquid or excessive pressure.



Authorized and qualified personnel must carry out all assembly and maintenance operations as described in this operating manual.

### 3 TRANSPORT AND STORAGE

The product may only be transported or stored absolutely clean. Suitable protection must be used for both openings to ensure no damage occurs to the surfaces/sealed areas. The storage location must guarantee adequate protection from corrosion or extreme temperatures.

#### 3.1 DELIVERY CHECK

- Check for any transportation damage. If so report this immediately to the forwarder.
- Check that the products and quantities are in accordance with the delivery note.

#### 3.2 COMPLAINTS / RETURN OF GOODS

- If returning goods please contact Mann Teknik AB to receive a Complaint Report form.
- Complete the form with as much details as possible.
- Return the goods with the Complaint Report attached on the outside of the package!

#### 3.3 STORAGE

Store coupling in a dry, dust free, dark place, in ambient temperature.



## 4 INSTALLATION

### 4.1 INITIAL OPERATION

The correct installation of all Mann Tek products is essential to ensure safe and satisfactory operation. Checks should be made to ensure that the fitting of Mann Tek products does not interfere with the correct operation of affiliated equipment (i.e. isolation valve, excess flow valves, etc). Before securing the flange or thread connections to mating equipment (i.e. hose, loading arm and storage tank) ensure that no foreign objects, dirt, grit, water (moisture) etc. are present in the coupling.

All flange and thread connections should be made without imparting excessive strain to the equipment. All gaskets and sealing materials used to make the permanent connection should be of suitable material.

Each Mann Tek product is designed to take reasonable axial loads associated with good handling practice but is not designed to accept continuous excessive load values associated with maladjustment or poor installation. Continuous excessive strain will equate to increased component wear and possibly premature failure if not corrected.

When Mann Tek equipment is used with hoses, attention should be paid to hose length to ensure correct handling characteristics. The hose assembly should be designed such that the minimum hose length is supported by the coupling or the operator. Hoses should be of sufficient length to ensure operation well within the stipulated hose minimum bend radius up to the maximum operation envelope.

### 4.2 INSTALLATION

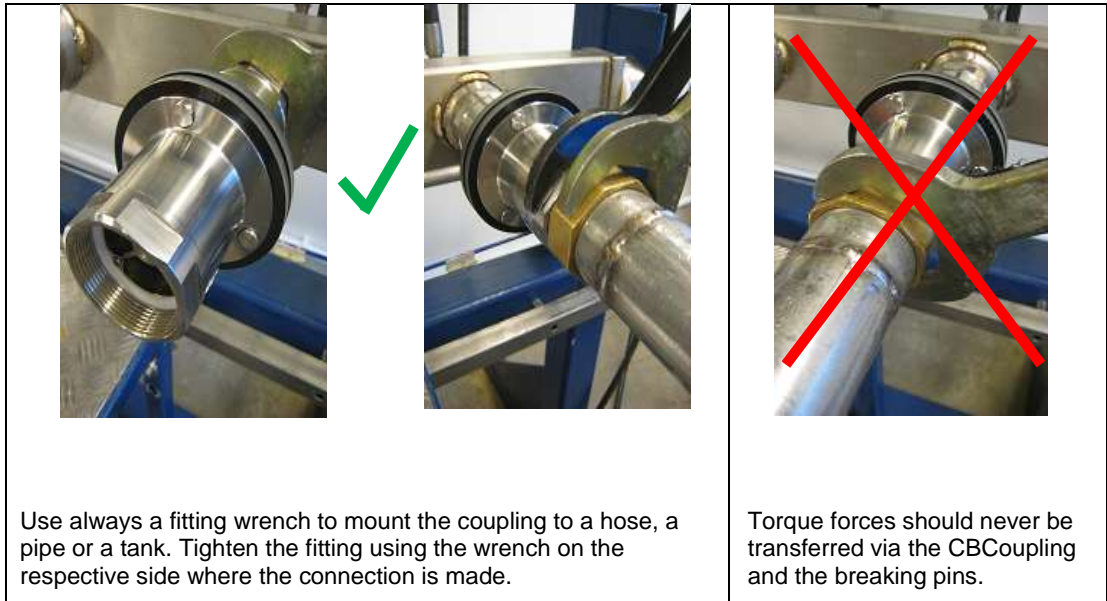
When installing Mann Tek equipment to new pipe work, tanks, etc. ensure the system is free from debris that may be transferred through the coupling. Where the hose or loading arm assembly is the primary static dissipation or earth route, the electrical continuity value of the assembly shall be checked to ensure regulatory compliance. Special attention should be paid to the balancing of loading arms. It is usual for loading arm balance settings to account of weight variations due to differences in the full / empty cycle. The loading arm should be set to balance in the condition present at the time of connection.

Before mounting the CBCouplings ensure that trapped liquid never can occur in the installation. In combination with a Dry Cryogenic Coupling or Emergency Shut Down Valve measures shall be taken to ensure that no liquid can be trapped in any operating mode.

Then the CBCoupling can be installed directly in the product line and is ready for use after removing the transport protection.

The installation is as follows:

- Remove the packaging.
- Check the coupling for damages before mounting.
- Ensure that the product line is empty and all valves are closed before you assemble the coupling into the line.
- To prevent damages during mounting a suitable wrench should be used for the intended nut flats on the coupling (threaded connection) or the bolts (flanged connection).



The start-up may take place only when the CBCouplings has been mounted as instructed and the necessary function tests and leak tests have been conducted by the approved authorities.

## 5 OPERATION

### 5.1 GENERAL NOTES

Operators are obliged to provide qualified and trained personnel familiar with the handling of supply pipes, safety couplings, any fluid being pumped as well as its danger potential. Such staff must also be familiar with the applicable safety regulations and the regulations of the employer's liability association.

### 5.2 DAILY VISUAL INSPECTION

All couplings should be inspected at the start of each day's operation. Check for leakage and any obvious physical damage (such as impacts, etc.).

### 5.3 DISMANTLING

When the DCCoupling are taken out of service, the risk of liquid or gas spurting out should be taken into consideration. Special protective measures such as personal protection equipment must therefore be adopted.





Maintenance tasks, to put the released coupling back into service, may be performed only by trained personnel from an authorised professional workshop. All measures necessary for inspection, maintenance and repair must be carried out in accordance with the national regulations of the country where the system is installed.

### 6.2 MAINTENANCE AND SERVICE INSTRUCTION



Always depressurise the system and rinse off the parts before beginning any maintenance work. Use protective goggles. Do not handle O-ring seals if the material appears charred, gummy or sticky.



Use tweezers; wear gloves and protective goggles in appropriate material, consult the material safety data sheet (MSDS) of your product. Do not touch adjacent parts with unprotected hands. Rinse off the parts once again before starting the “daily inspection”

### 6.3 SPARE PARTS AND TOOLS

#### Breaking-bolt-kit

3 Breaking bolts.

In case of failure or break away order the CBC-BOLT SET and carry out repairs according to the assembly instructions.

**Attention:** Do not forget to specify the proper size and breaking force! Please check with the information on the ID-plate and the head of the bolt.



#### Outer body sealing ring

### 6.4 RESETTING AFTER RELEASE

#### Dismantling

When the coupling are taken out of service and dismantled there is a danger that the fluid will spurt out. Special protective measures such as personal protection equipment must therefore be adopted.



- Wear suitable personal safety equipment.
- Make sure that the coupling is depressurized and empty.



# Operating Manual

Cryogenic Break-Away Couplings



## Visual inspection

Screw out the destroyed parts of the breaking bolts.

Check for dirt, seal damage and any obvious physical damage (such as impacts, etc.).



## Outer body sealing ring

Replace the sealing ring on the body with a new one.



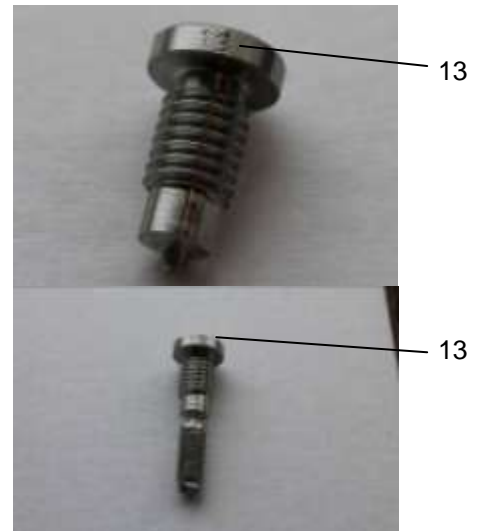
Make sure that the seal doesn't get scratched when mounting. The open profile should be in the direction which is shown in the picture.



## Breaking bolts

Replace the bolts only by original spare parts from Mann Tek with the same breaking force.

Example shows 13 kN breaking bolts



## Breaking bolts

Screw in the bolts into the intended position.





# Operating Manual

Cryogenic Break-Away Couplings



## Breaking bolts

If necessary tighten the bolt with a wrench.



## Fix breaking bolts

Screw on the nuts by hand until stop when halves are pressed together.



Do not use force for tightening! Risk of destroying bolts.



## Fix breaking bolts

Fasten it a little bit with a wrench, max 45 degrees.

Tool: Standard wrench 10mm



It is important that all 3 bolts are mounted in the same way. Risk that 1 bolt will be destroyed before the others.



## Fix breaking bolts

Screw on the second nut and lock the first one. Hold the first one with a wrench to avoid forces on the breaking bolt.

After the coupling is completely reassembled provide a pressure test according to test procedure on page 10.



### 6.5 PRESSURE AND TIGHTNESS TEST

After each service a pressure and tightness test of each coupling is mandatory. Test each half separately before you connect both halves with the breaking pins. The following test parameters are in accordance with EN12266 and ISO5208:

Shell tightness test:	1,5 x Working Pressure	stop time 1 min.
Seat tightness test:	6 bar +/- 1bar	stop time 15 s.
	0,1 x Working Pressure	stop time 15 s.



Instead of water we recommend to make the tightness test with gas, e.g. N<sub>2</sub>. If water is used as testing media, after testing all water must be removed from the couplings to avoid freezing under low temperature service.

If a pressure test should be achieved for the coupling mounted in an assembly follow the respective test instructions for the equipment but do not exceed our recommended maximum test pressure of the coupling which you will find in the following table. If testing with higher pressure is necessary please ask our sales department for a special test bolt kit.

DN 25		DN 50		DN 65		DN 80		DN 100		DN 125		DN 150	
kN	bar	kN	bar	kN	bar	kN	bar	kN	bar	kN	bar	kN	bar
		4	10	7	10	11	10	18	10	28	10	40	10
		6	16	10	16	15	16	24	16	37	16	54	16
		7	20	12	20	18	20	28	20	45	20	65	20
		9	25	15	20	23	25	36	25	56	25	81	25
4,8	25											92	25
3	16	12	50	20	30	30	35	48	35	75	40	108	40
3,2	16	13	37,5	22	37,5	33	37,5	52	37,5	81	37,5	117	37,5

Table 8: Maximum Test Pressure depending on size and breaking force:

