TODO® Safety
Break Away Couplings

TODO®
A Gardner Denver Product

Better by Design

Eliminate spillage

The TODO® Safety Break Away couplings are designed to eliminate spillage and damage associated with drive / pull away incidents.

The consequences of such incidents can be very serious without breakaway protection and occur more frequently than you would think. The effectiveness of alternative protection systems is often compromised by human error.

Measures such as brake interlocks, barriers and even removing the keys from a tanker driver can all be defeated, either intentionally or otherwise. The TODO® Safety Break Away coupling system removes the human error element in this area of product transfer.

The TODO® Safety Break Away coupling uses a double valve arrangement that ensures closure of both halves before the main seal release to atmosphere. The coupling halves seal automatically as soon as a movement greater than 1.5 mm is detected between the halves. This important feature removes the possibility of incomplete closure in partial break away or excessive strain conditions.

How it works

The coupling (1, normal operating condition) automatically reacts to an excessive load, closes its valves (2) and then permits disconnection (3).
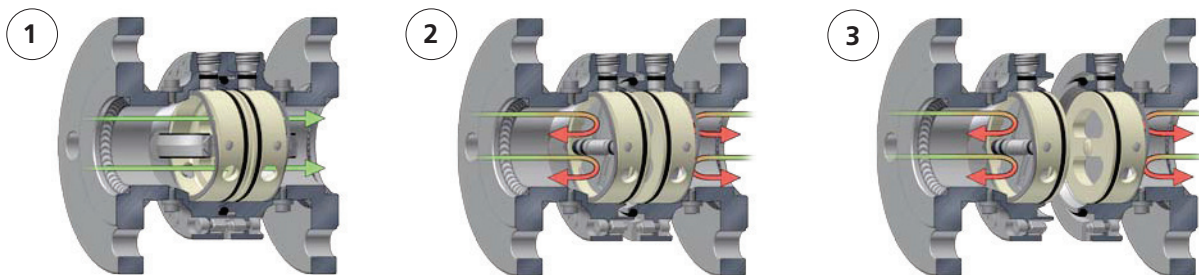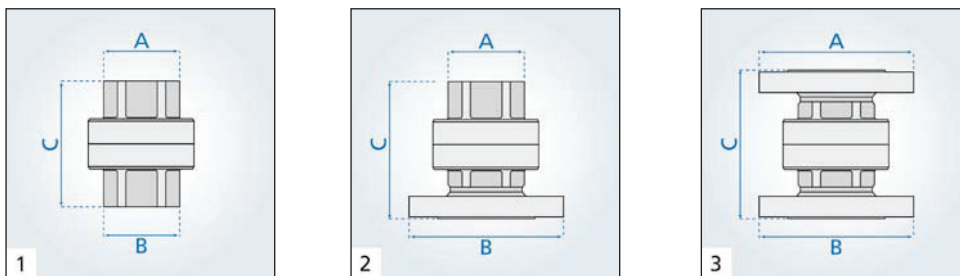
Features

- Exceptionally high flow rate / low pressure drop.
- Valves in both halves close automatically before the main fluid seal releases to atmosphere.
- Ultra compact design.
- Encapsulated shear bolts.
- Operates independently of shut off other safety systems and does not require an external power source.
- Marine midhose versions available.
- Easy to reset on site with one person.

Technical Details

Sizes:	2" (DN50) to 3" (DN80).
Materials:	Stainless Steel AISI 316L.
Seals:	FKM (Viton®) as standard, NBR, EPDM and FFKM on request.
Working pressure:	See table in break pins
Test pressure:	37,5 bar each coupling half
Possible break angle:	0-90°, all directions
End connections:	BSP- and NPT-threads, different kind of flanges.

Closing time of internal flaps: 0,03 s

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Dimensions examples (others available)

		Connections		Dimensions (mm)			Weight
Size	Picture	One side	Other side	A	B	C**	Kg
DN 50	1	2" BSP or NPT FT	2" BSP or NPT FT	76	76	142	4.90
DN 50	2	2" BSP or NPT FT	Flange DN 50	76	A.S.*	152	7.55
DN 50	3	Flange DN 50	Flange DN 50	A.S.*	A.S.*	162	10.25
DN 80	1	3" BSP or NPT FT	3" BSP or NPT FT	104	104	171	8.45
DN 80	2	3" BSP or NPT FT	Flange DN 80	104	A.S.*	181	12.05
DN 80	3	Flange DN 80	Flange DN 80	A.S.*	A.S.*	190	15.65

* According to standard.

** Dimensions of the units with flanges can vary because of different flange-standards.

Flow capacity

TODO® Safety Break Away couplings offer exceptionally high flow capacity for their size.
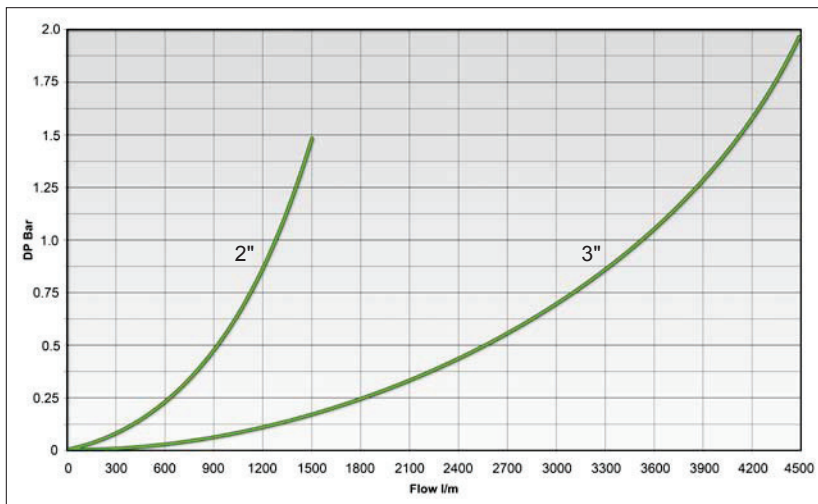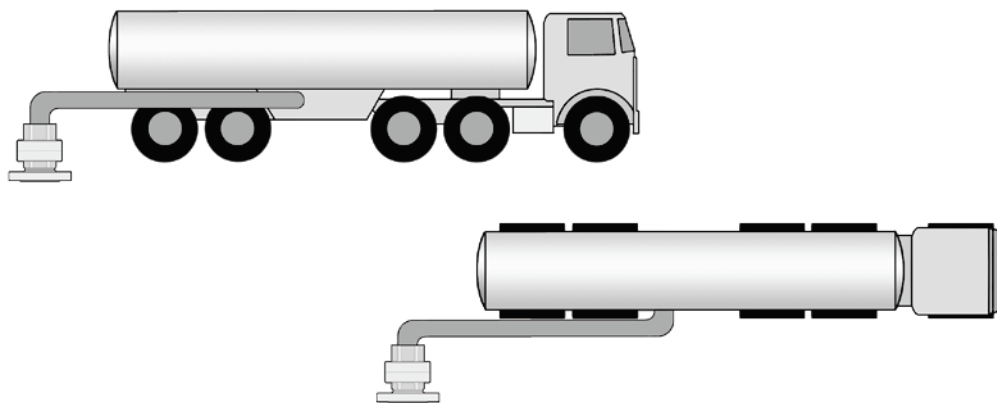

Alternative designs of coupling often need to step up at least one size to achieve comparable flow rates.

Media: water.
Temperature: 20°C.

Installation

The valve is designed to be the weakest link for pulling forces and it is recommended that it is installed so that the pulling force is perpendicular (90°) to the coupling. See two exampels below.


Certificates / Approvals

- CE-marked, European directives 97/23/EC (PED) and 94/9/EC (ATEX) compliant.
- TDT approval, mark TDT-UW-30/09 towards ADR/RID in Poland.
- Manufactured under EN ISO 9001:2000.
- Certified towards ISO 14001:2004 and OHSAS 18001:2007.
- Manufactured towards EN 13480 and EN 13445.

Break pins

The TODO Safety Break-Away coupling contains 3 break pins of stainless steel, available in various sizes. The size of the break pins coresponds to the diameter of the "waist" of the bolt.
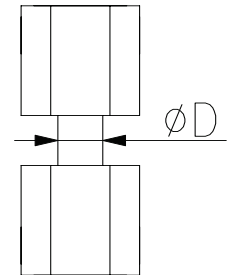
Break Forces at Straight Pull

Measured pull forces	
pin Ø (mm)	kN
2.5	12.5
3.0	18.5
3.5	24.9
4.0	33.0
4.5	44.0

The table shows the straight pull force that is needed to break 3 break pins without internal pressure and external loads.

Internal pressurized area		
Size	cm²	m²
2"	62.2	0.00622
3"	107.5	0.01075

In order to calculate the straight force created by the internal pressure please use the following example.

Force (F) = Pressure (P) x Area (A)

Example
3", 12 bar = 1,2 MPa
$Fp = 1,2 \times 10^6$ (Pa) x 0,01075 (m2) = 12900 N = 12,9 kN

Maximum allowed working pressure

Disconnect pressure reduced 20 %		
pin Ø	2"	3"
(mm)	p (bar)	p (bar)
2.5	17	9
3.0	24	14
3.5	25	18
4.0	25	24
4.5	25	25

Maximum allowed working pressure is depending on break pins size.

The figures in the table is without any external load.
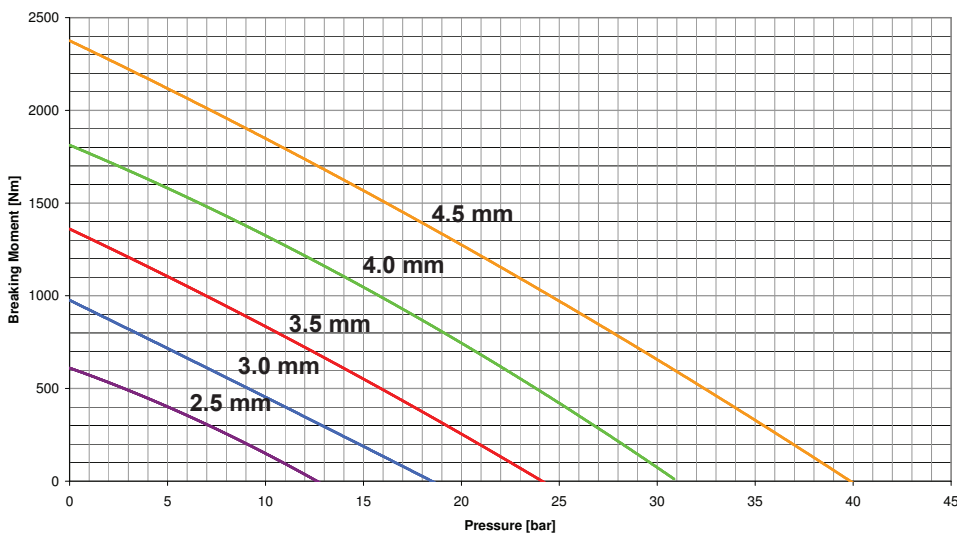
Breaking Moment (90°)

Beneath are break load charts of bending moments on the Y-axis and internal pressure on the X-axis for the 2″ and 3″ Safety Break Away coupling respectively. The curves represent a bending moment with the force acting perpendicular to the coupling.

The sizes of the break pins are 2.5 mm, 3.0 mm, 3.5 mm, 4.0 mm and 4.5 mm.

Breaking moment 2″ Safety Break-Away
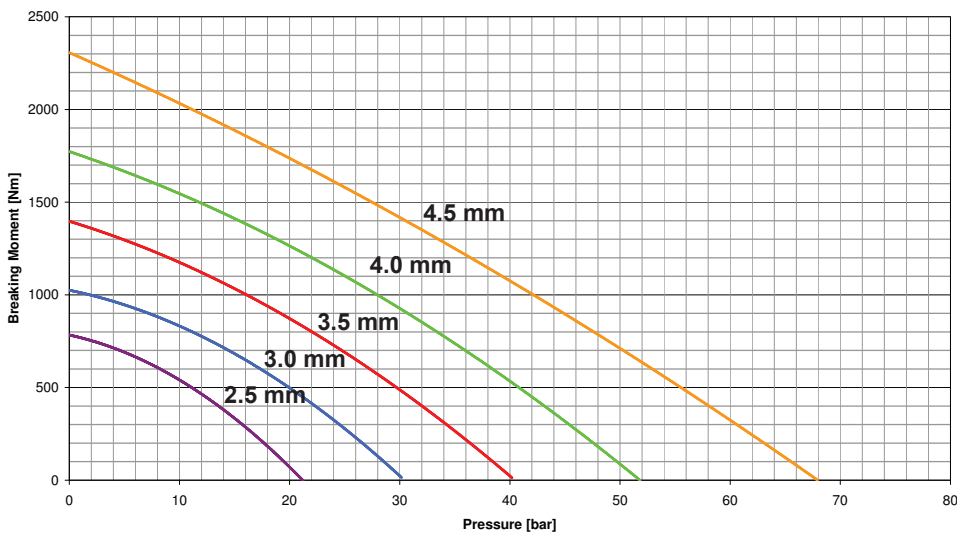
Breaking moment 3″ Safety Break-Away

Application examples