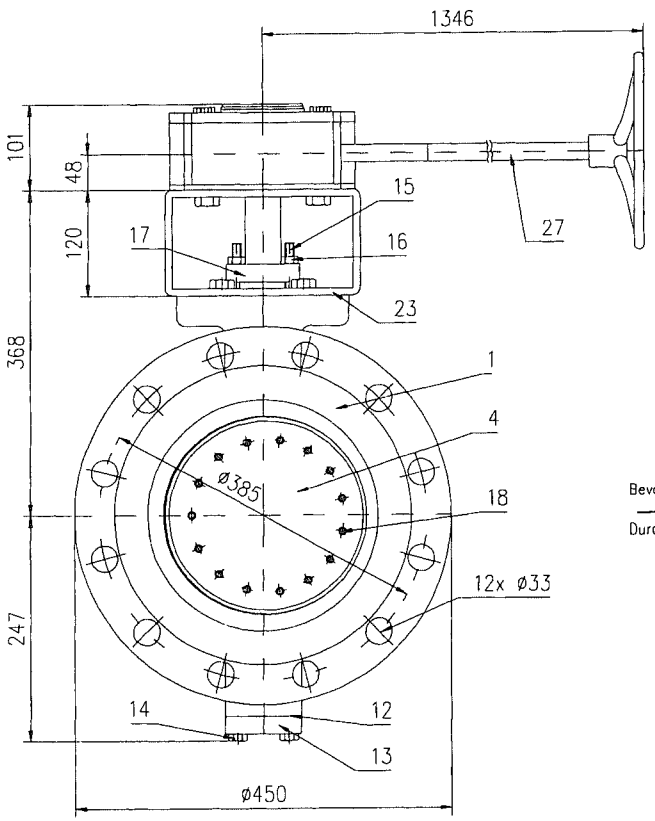
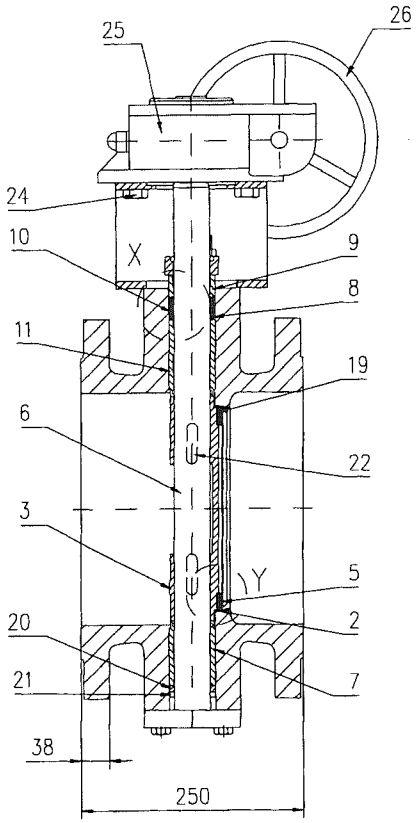
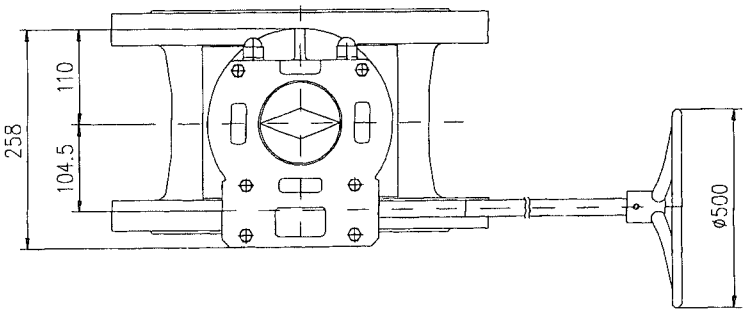


Bevorzugte Durchflußrichtung



POS.	Bezeichnung	Material
1	Gehäuse	1.4408
2	Sitz	1.4571
3	Scheibe	1.4408
4	Klemmring	1.4571
5	Lamellendichtung	1.4571 / Graphit
6	Welle	1.4571
7	Lagerbuchse	1.4571 hartverchromt
8	Kammerungsring	Kohlefasergeflecht
9	Stopfbuchse	1.4571
10	Packungsring	Graphit
11	Lagerbuchse	1.4571 hartverchromt
12	Deckeldichtung	Graphit
13	Deckel	1.4571
14	Deckelschraube	A4-70
15	Gewindebolzen	A4-70
16	Mutter	A4-70
17	Stopfbuchsbrille	1.4408
18	Klemmschraube	A4-70
19	Abschlußdichtung	Graphit
20	Haltering	1.4112 gehärtet
21	Stift	A4
22	Paßfeder	1.4571
23	Montagebrücke	ST52
24	Schrauben	A4
25	Antrieb	Rotork
26	Handrad	Rotork
27	Verlängerung	Rotork



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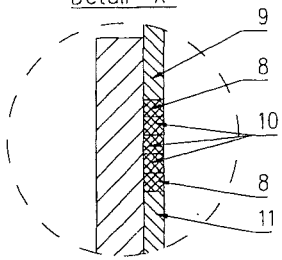

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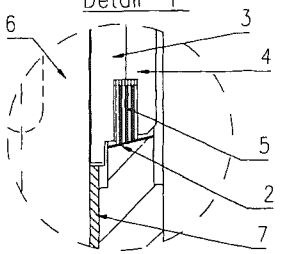


Für alle in dieser Zeichnung gemachten technischen Angaben behalten wir uns Änderungen vor

					DATUM	NAME
x						
y				BEARB.	15.07.2005	Färber
z				GEPR.		
a				NORM		
b						
c						
d						
e						
ZUST.	AENDERUNG	DATUM	NAME			

WICK ARMATUREN GMBH

BENENNUNG Serie TRI-CON

Modell F1 DN250 PN40

(mit Rotork Antrieb Typ AB1250N HR500)

ZEICHNUNGSNR. ZUSF1G28

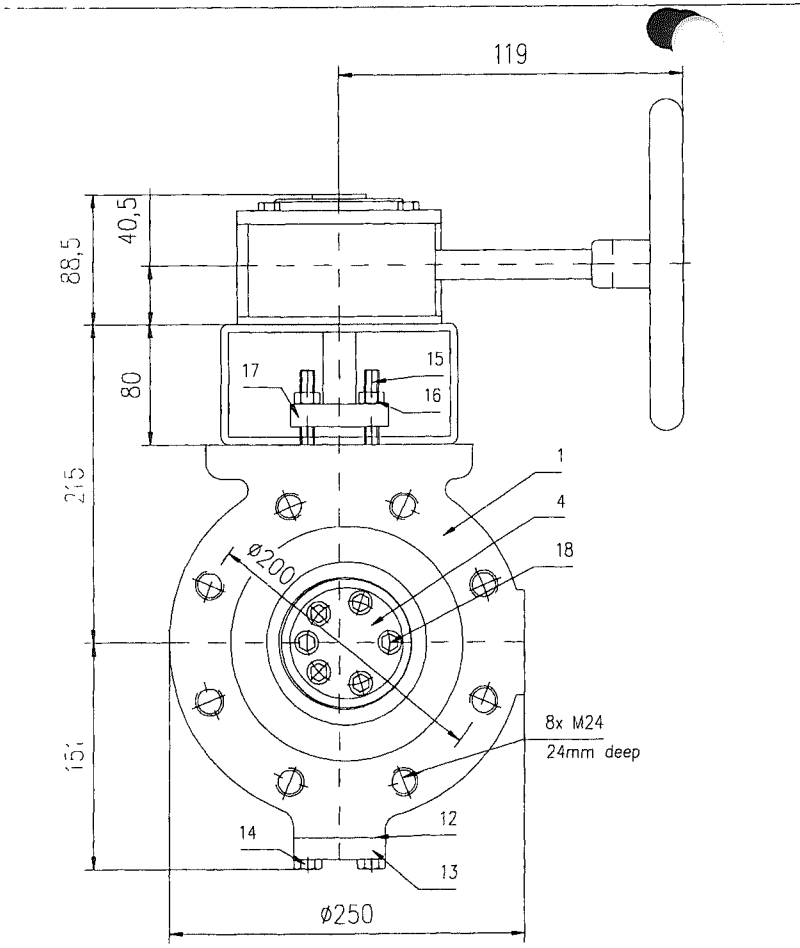
TEILENUMMER zusf1g28

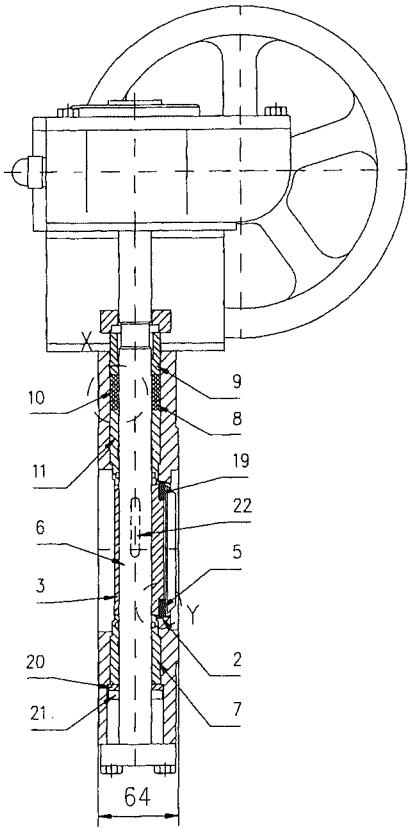
MASSTAB ohne

FORMAT A3

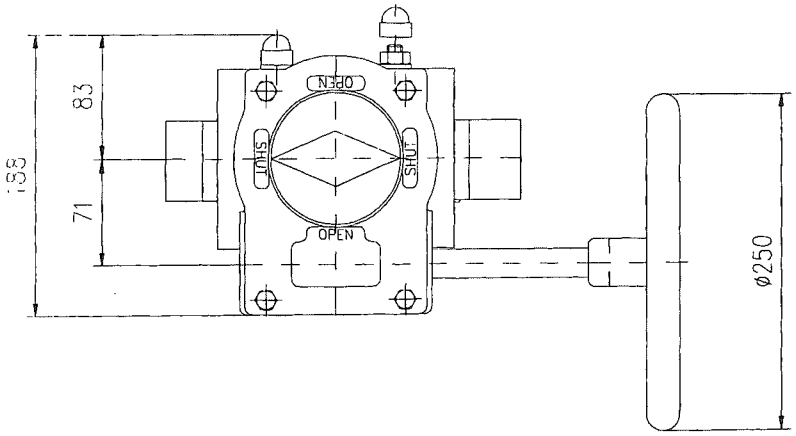
KOM. Nr.: 6468

Blatt:





POS.	Bezeichnung	Material
1	Gehäuse	1.0619
2	Sitz	1.4571
3	Scheibe	1.0460
4	Klemmring	1.0425
5	Lamellendichtung	1.4571 / Graphit
6	Welle	1.4057
7	Lagerbuchse	1.4305 hartverchromt
8	Kammerungsring	Kohlefasergeflecht
9	Stopfbuchse	1.4305
10	Packungsring	Graphit
11	Lagerbuchse	1.4305 hartverchromt
12	Deckeldichtung	Graphit
13	Deckel	1.0425
14	Deckelschraube	A2-70
15	Gewindebolzen	A2-70
16	Mutter	A2-70
17	Stopfbuchsbrille	1.4408
18	Klemmschraube	A2-70
19	Abschlußdichtung	Graphit
20	Haltering	1.4112 gehärtet
21	Stift	1.4571
22	Paßfeder	1.4571
23	Lagerring	1.4112 gehärtet
24	Montagebrücke	ST52
25	Schrauben	A2-70
26	Antrieb	Rotork
27	Handrad	Rotork



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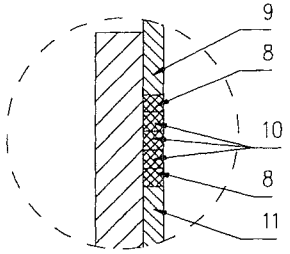

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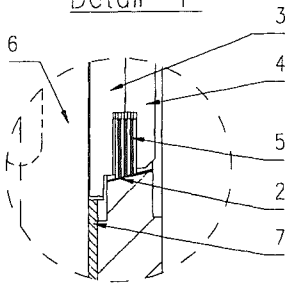


Für alle in dieser Zeichnung gemachten technischen Angaben behalten wir uns Änderungen vor

					DATUM	NAME
x				BEARB.	15.07.2005	Färber
y				GEPR.		
z				NORM		
a						
b						
c						
d						
e						
ZUST.	AENDERUNG	DATUM	NAME			

WICK ARMATUREN GMBH

BENENNUNG Serie TRI-CON
Modell L1 DN100 PN63
(mit Rozork Antrieb Typ AB550N HR250)

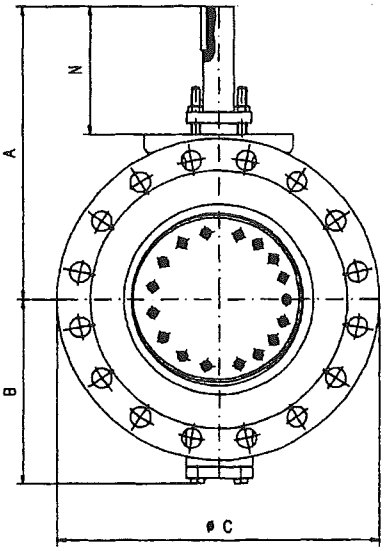
ZEICHNUNGSNR. ZUSL1G109
TEILENUMMER zusl1g109

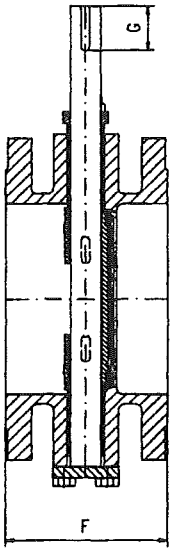
MASSTAB ohne
FORMAT A3

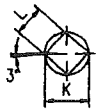
KOM. Nr.: 6468
Blatt:

TRI-CON

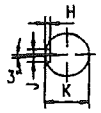
MODELL / MODEL F1 (DOPPELFLANSCH / DOUBLE FLANGE DIN 3202 F4 / EN 558 – 1 R14)
ABMESSUNGEN UND GEWICHTE / DIMENSIONS AND WEIGHT DN 80 – DN 900 / PN10 – 40
FREIES WELLENENDE / BARE SHAFT







Standard DN80–300



Standard DN350–900

Abmessungen / Dimensions in mm

DN / SIZE	80 / 3"	100 / 4"	125 / 5"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	350 / 14"	400 / 16"	500 / 20"	600 / 24"	700 / 28"	800 / 32"	900 / 36"
A	220	235	250	277	357	397	427	527	578	670	772	899	961	993
B	136	151	161	187	217	247	300	332	393	476	552	633	711	788
C (PN10)	200	225	260	292	345	400	452	516	575	670	780	895	1025	1115
C (PN16)	200	225	260	292	345	400	452	516	575	715	842	910	1025	1125
C (PN25)	200	225	260	292	367	440	502	567	620	740	842	960	1085	1185
C (PN40)	200	225	260	292	367	440	502	567	660	740	890	995	1140	1250
F	180	190	200	210	230	250	270	290	310	350	390	430	470	510
G	23	30	27	28	30	30	40	80	80	90	90	120	120	120
H	-	-	-	-	-	-	-	6	7	7,5	9	10	10	10
J	-	-	-	-	-	-	-	16	16	20	25	28	28	28
K	20	22	25	32	38	40	45	55	65	75	90	110	110	110
L	14	17	17	22	27	27	32	-	-	-	-	-	-	-
N	100	100	105	107	149	149	160	230	230	240	240	321	320	320

Gewichte / Weight in kg

DN / SIZE	80 / 3"	100 / 4"	125 / 5"	150 / 6"	200 / 8"	250 / 10"	300 / 12"	350 / 14"	400 / 16"	500 / 20"	600 / 24"	700 / 28"	800 / 32"	900 / 36"
PN10	24	37	31	43	71	109	136	172	235	345	505	675	825	946
PN16	24	27	31	43	71	111	145	188	357	391	569	724	886	1005
PN25	24	31	37	52	82	128	164	220	391	449	624	786	924	1080
PN40	24	31	37	52	91	149	201	262	566	508	**	**	**	**

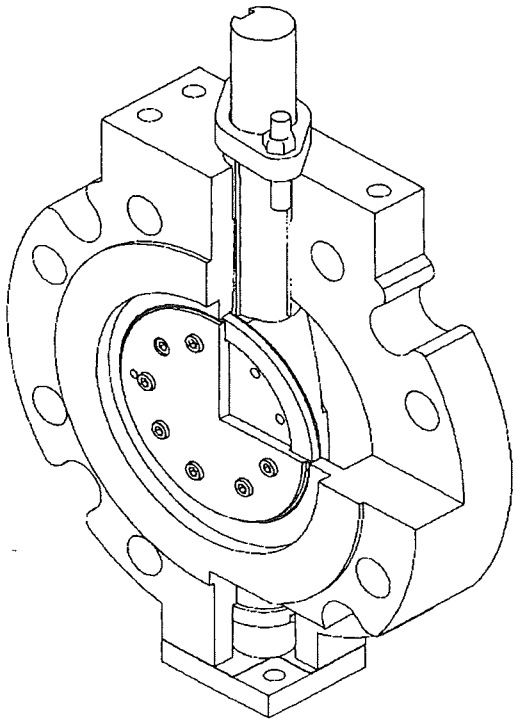
** = in Abhängigkeit von der Spezifikation / in accordance to specification

Zwick Armaturen GmbH · Egerstraße 25 · D-58256 Ennepetal · Germany ·Tel.: +49 (0)2333 / 9856-50 · Fax: +49 (0)2333 / 9856-60
E-Mail: info@zwick-gmbh.de · Internet: www.zwick-gmbh.de

ZWICK GMBH

Operating Instructions

Butterfly Valves Series TRI-CON
(with handwheel)



Declaration of Conformance acc. to:

Directive 97/23 EC CE

Directive 94/9 EC Ex

and Manufacturer's Declaration acc.to Directive 98/37 EC

The manufacturer	**ZWICK GmbH, D-58256 Ennepetal**
declares, that (for) the valves	**ZWICK butterfly valves Series TRI-CON** • **supplied with gear and handwheel,** • **supplied with bare shaft to install a gear with handwheel**
1. are a pressure equipment within the meaning of the European Directive 97/23 EC (PED) and conform to this directive, 2. the operation instruction no. Zw-TriCon-2002-A2 shall be observed.	

Technical Standards used

97/23 EC	**PED**
EN 593	**Product standard for butterfly valves**
DIN 3840	**Design of the valve shell**
94/9 EC	**"ATEX"**

Technical Specifications

ZWICK-catalogue <Butterfly Valves series TRI-CON>

Used method of conformity:

Annex II of the Pressure Equipment Directive 97/23 EC, category III, module H

Name of Independent Expert:	*Identification-no. of the Independent Expert*
Lloyd's Register	**0525**

Any modification of the valve and/or the valve gear unit, which changes the design and/or the valve application other than specified in clause 1 <valve destination>, invalidates this declaration.

Ennepetal / February 2002

Hans Zwick / General Manager

0 Introduction

This instruction may support the user to store, install, start-up, use and maintain ZWICK-butterfly valves series TRI-CON.

⚠ **Attention**	**It will be dangerous for the user if the following „attention"-, „warning"- and „danger"-notices are not observed,** and the liability of the manufacturer may become ineffective. In case of any question to the manufacturer, see addresses in clause 8 <information>.

1 Valve destination

These butterfly valves **series TRI-CON** with gear and handwheel are exclusively destined – after installation at or between flanges or butt welded into a pipe system – to let pass or shut off media in the allowable pressure and temperature range, or to control the flow.
For fluids with more than very small content of solid particulates – especially hard and/or sharp ones – this series should not be used.

Note:
The ZWICK catalogue layout-sheets <Butterfly Valves TRI-CON> specify the admissible range of p/t-rating.

Clause 2.2 < Important information for the user> shall be observed.

⚠ **Warning**	If a valve is used for permanent flow control at differential pressure more than about 0,15 bar (liquid fluids) the flow parameters shall be accepted by the manufacturer. Avoid cavitation in any case.

2 Safety information

2.1 General Safety Information

The safety requirements apply for valve units same as for the pipe system into which the valve is installed. This instruction gives such advices only, which **shall be observed additionally.**

2.2 Important information for the user

It is not the valve manufacturer's liability, and therefore it shall be observed by the user, that

⇒ the valve is only used as specified in clause 1 <valve destination>,

⚠ **Danger**	No valve shall be used, that's certified pressure/temperature range (= "rating") is not sufficient for the operating conditions: The relevant diagrams in the ZWICK catalogue <Butterfly Valves TRI-CON> specify this admissible range. See clause 8 <information>. If other materials are used or at service conditions not included in the above mentioned diagrams, the manufacturer shall be asked for release. **Ignoring these requirements could mean danger for the life or health of the user and/or cause damage in the piping system.**
⚠ **Danger**	The user shall check and ensure, that the choice of the valve's materials is suitable for the fluids used. The valve manufacturer is not liable for damage resulting from corrosion. **Ignoring these requirements could mean the danger of injury of the user and/or cause damage in the piping system.**

⇒ a gear installed at a valve supplied bare shaft has been sized and assembled according to the manufacturer's recommendations, and has been adjusted correctly for both valve end positions. Specifically in the CLOSED end position the **body seat** shall stop the stroke, **not the gear end stop**. Any stroke limitation of the gear shall be made ineffective.

⇒ the pipe system has to be installed by experts. The stiffness of the body is designed to support the usual additional pipe forces F_z equal to $\pi/4 \cdot DN^2 \cdot PS$. Wafer type butterfly

valves may support higher values of additional pipe forces F_z. Contingent lateral forces taking effects to the valve must not exceed 10% of the forces mentioned above.
(PS = design pressure at ambient temperature)

⇒ the valve – especially a valve with butt-weld ends – has been installed in the pipe system by experts,

⇒ the flow velocity in the pipe system is limited to usual values (i.e. 4 m/s for liquid fluids) and that abnormal conditions such as vibration, waterhammer, erosion (i.e. by wet steam), cavitation and a relevant content of solid – especially abrasive – particulates in the fluid are agreed by the manufacturer,

⇒ at service temperature between >+50°C and <–20°C the valve and the valve connection surfaces are protected from contact by the user,

⇒ only experts for pressurized pipe systems operate und maintain the valve.

2.3 Special dangers

⚠ **Danger**	The valve shaft is tightened by a stuffing box. Before the bolting of this stuffing box is loosened be sure, that the pipe system is **completely depressurised.**
⚠ **Danger**	Before a valve is disassembled from the pipe or before the plug (or cover) from the valve body is loosened, be sure, that the pipe system **is completely depressurised**, to prevent leakage from the pipe system. Be sure that **the valve is 5°-10° opened** and remains in this position to equalize the pressure at both sides. If the gear shall be disassembled for stuffing box repair, first open the disc to depressurise the valve completely **and let it in this position.**
⚠ **Danger**	*Valves in end-of-line-position:* For normal service, specifically at gaseous, hot or dangerous fluids, a butterfly valve shall be used only, if **a blind flange or cover is assembled downstream** or – for short-term only – if the valve is duly locked in the CLOSED position. Attention when closing such a valve: Avoid getting one's hand between body and disc.
⚠ **Warning**	If a valve is used in end-of-line-service and shall be opened under pressure, open the valve very carefully: The **fluid splashes out with high velocity!** Attention when closing: Avoid getting one's hand between body and disc.
⚠ **Warning**	*If a valve shall be disassembled from the pipe:* Take care, that the adjacent pipe system **is completely drained**, before the valve is disassembled from the pipe. Take special care to residual amounts of the fluid that **remain trapped in the valve and/or in the adjacent pipe.**

2.4 Valve marking

Each butterfly valve is marked as follows (see label, left column):

for	Marking	Remark
manufacturer	**Zwick GmbH**	Address see clause 8 <Information>
Model No.	For ex.: **C10125C-AA-11CP**	Explanation see ZWICK-catalogue <TRI-CON>
S.- No.	For ex.: **02-03-7806**	Corresponding to: year – month – order-n°
Size	**DN** (and **value**)	Value mm, for ex. DN200 or inch, for ex. 8"
PN / class	**Value** for PN or class	PN / class = dimensional standard for the flanged connection
CWP / PS	**Value** in bar or PSI	= pressure, upper limit of application at 20°C
max. T / TS	**Value** in °C or °F	= temperature, upper limit of application
Date	**year / month**	

and markings for materials of the valve parts in contact with the fluid (see label, right column):

for	Marking	Remark
Body	**Markings according to the relevant material standard**	material of the body
Disc.		material of disc and seat ring retainer
Shaft		material of shaft
Seat		material of the stainless seat surface in the body
Lamella		material of the exchangeable laminated ring in the disc
Key		material of the key for connection shaft-disc
Bolting		material of the bolting of the seat ring retainer
Bush		material of the bushes
Standards	**API 609B/ B16.34**	Standards for design and testing

To allow the valve identification the label shall not be damaged.

3 Shipment and Storage

The valve shall be handled, shipped and stored with care.

- ⇒ The valve shall be stored in the protective packaging or caps at the flanged or butt weld ends. Store and transport it on a pallet or similar even to the place of installation.
- ⇒ If the valve shall be stored before installation, store it in a closed building and protect the valve from harsh environmental conditions, such as dirt, debris and humidity.
- ⇒ Take special care to protect the metallic seat, the flange or butt weld end faces and the gear from damage at transport.
- ⇒ Butterfly valves shall be stored with the disc in closed position, do not operate the hand-wheel.

⚠ **Danger**	*Valves supplied without gear:* Handle the valve very carefully at transport: The disc is not fixed and may open by influence from outside (i.e. by shaking or vibration).

4 Installation

4.1 General

The requirements for the installation apply for the valve same as for the piping system into which the valve is installed. This instruction gives such advices only, which **shall be observed additionally.**

⚠ **Attention**	Butterfly valves – especially wafer type valves – shall be transported and installed **disc closed only.** Otherwise the disc could be damaged and the valve will no more be tight.
⚠ **Danger**	*When the valve is not yet installed: Prevent to get one's hand between body and disc:* If a butterfly valve is used in end-of-line-service, take special care to assemble a blind flange or a cover behind or to lock the valve safely in the CLOSED position.
⚠ **Attention**	*The valve has been adjusted for tight shut-off by the manufacturer:* Do not change **the end stop adjustment** of the gear unit in the CLOSED position. In this position the body seat shall stop the disc stroke. Any gear end stop has been adjusted appropriately. **This adjustment shall not be changed.**
⚠ **Danger**	*When a butterfly valve is supplied bare shaft (without gear):* You may install the valve**, but don't pressurise it!** When the gear is installed later, the nominal torque and the limit stops in the OPEN and CLOSED positions of the gear unit shall be exactly adjusted to the butterfly valve and to the service conditions. **Ignoring these requirements could mean the danger of injury of the user and cause damage in the piping system.**

4.2 Installation

⇒ Bring the valve in its protective packaging to the place of installation and do not unpack it earlier.

⇒ Check and be sure, that the valve and the gear are free from damage. Valves with visible damage shall not be installed.

⇒ Check and be sure, that the valve pressure class and the connecting type and dimensions correspond to the plant data. See markings in the valve's label.

⚠ **Danger**	No valve shall be installed, that's certified pressure/temperature range (= "rating") is not sufficient for the operating conditions: This range is defined in the catalogue <butterfly valves TRI-CON>. See section 8 < information >. If other materials are used or at service conditions not included in the above mentioned diagrams, the manufacturer shall be asked for release. **Ignoring these requirements could mean danger for the life or health of the user and/or cause damage in the piping system.** At any doubt, contact the manufacturer.

⇒ *Wafer type Butterfly valves:*
To protect damage of the valve disc at operation, be sure, that the clearance of the adjacent pipe flanges is sufficient for the disc in full open position.

⇒ Inspect and be sure, that the valve waterway and both adjacent pipe insides are free from dirt, rust, pipe scale, welding slag and any other foreign material.

⇒ *TRI-CON butterfly valves are suitable for both flow directions. But respect the "arrow"-marking of the valve body:*
The valve should be installed with this "arrow"-direction same as the direction of the pressure against the closed disc. This direction may be different from the flow direction of the opened valve!

⇒ Butterfly valves should be installed preferably in the optimal position with the valve shafts horizontal. Avoid putting the gear directly under the valve: Stuffing box leakage may damage the gear unit.

⚠ **Danger**	A gear assembled to a valve installed bare shaft shall be supported, if the mass of the gear and/or if the gear position causes a too high bending torque to the valve body.

⇒ At installation into an existing pipe system be sure, that the gap between the pipe ends has sufficient clearance to protect all connecting surfaces (and gaskets) from damage.
But the gap shall not be larger than necessary to limit additional pipe load.

Flanged butterfly valves only:

⇒ The flanged pipe ends shall be installed in line with the faces being parallel.

⚠ **Attention**	*Butterfly valves with flanged ends:* The mating flange surfaces shall be conform to EN 1092-1 or "stock-finish" conform to ANSI B16.5, with flat mating faces (i.e. form C or form D or form E). The manufacturer ZWICK shall be asked torelease flanges of other standards or other kinds of mating faces.
⚠ **Attention**	Install a wafer type butterfly valve into the clearance between the adjacent pipe flanges with the disk in full closed position. Otherwise the valve disc is damaged and the valve will not be tight.

⇒ When fastening the flange bolting, be sure, that the bolts centre the valve body correctly.

⚠ **Attention**	Wafer type butterfly valves series TRI-CON may need flange bolts and studs with different length for connection to the pipe flanges. For bolting dimensions refer to ZWICK-document < Zw-TriCon-Scr-2002-A1>.

Butt-welded butterfly valves only:

⇒ The pipe ends shall be installed in line with the faces being parallel.

⇒ The butt-weld ends of the valve – see valve marking – shall fit to the pipe material. The valve and pipe welding ends shall have the same diameter and the same welding die.

⇒ Do not connect the welding cable not at the valve body, but at the pipe only.

⇒ The seam shall be welded by experts to reduce stresses produced by the welding process in the valve body and in the adjacent pipe. The body wall temperature shall be limited to <300°C.

⇒ *Valves >DN400:*

⚠ **Attention**	Be careful at the welding process: The temperature in the valve body shall be restricted to protect it from local deformation. The seam shall be welded with interruption, alternating crossover, to limit the temperature in the seam area. Ignoring these requirements could mean a permanent deformation in the valve body. Even by 1/10 mm permanent deformation of the body seat (around the body necks) the valve may become useless.

5 Pressure test of the pipe system

The valve manufacturer before supply has made the pressure test of the valve. When testing a pipe section with valves installed, take care to observe:

⇒ Flush new installed pipe systems carefully before the pressure test to be sure, that all hard particulates have been flushed out,

⇒ **Valve in OPEN position:** The test pressure shall be limited to **1,5 x PS** (see valve marking) (*PS = maximal admissible pressure at 20°C).*

⇒ **Valve in CLOSED position:** The test pressure shall be limited to **1,5 x PS** (see valve marking) (*PS = maximal admissible pressure at 20°C).*

In case of leakage at the valve connections section 7 <troubleshooting> shall be observed.

6 Normal service and inspection

The adjustment of a gear supplied together with the valve shall not be changed as long as the valve operates correctly. To operate the gear, normal manual force is sufficient. It is not permitted to use extension levers to increase the torque.

Regular maintenance is not required for valves. When at examination of the line section a leakage is detected at a valve, section 7 <troubleshooting> shall be observed.

For valves remaining permanently in the same position, it is recommended, to operate it 1x to 2x each year to check their function.

⚠ **Danger**	*A butterfly valve is not self-locking:* The gear shall not be disassembled, **as long as the valve is pressurised.**

7 Troubleshooting Guide

At any troubleshooting, respect the requirements of clause 2 <Safety instructions>.

Possible Defect	Remedy	Remark
Leakage at the pipe flange or at a cover flange connection	Tighten the gasket by the flange bolting. *If this is in vain:* Replace the flange or cover gasket. Observe clause 2.3 <Special danger> and order cover gaskets and repair instruction from ZWICK.	***Note 1:*** *To order spare parts, transmit all markings from the valve tag. Only original ZWICK-parts shall be used.* ***Note 2:*** *If a disassembled valve is corroded at body or trim surfaces, choose wear and spare parts of a more resistant material quality.*
Leakage in the seat	Close the gear under full manual force. *If the gear closes the valve completely, but the seat continues to leak:* Open and close the valve several times under differential pressure. *If the seat continues to leak:* The valve shall be repaired: Replace the seat ring in the disc. Observe clause 2.3 <Special danger> and order spare parts and repair instruction from ZWICK.	
Leakage at the stuffing box	Tighten the stuffing box by the stuffing box bolting in little steps of ¼ turn clockwise alternating at both nuts. *If the stuffing box continues to leak:* The shaft seal shall be replaced. Observe clause 2.3 <Special danger> and order spare parts and repair instruction from ZWICK. *If the nuts at the stuffing box shall be loosened or disassembled (anti-clockwise):* ⚠ **Attention: Danger for the life or health of the user:** Make sure, that the pipe at both sides of the valve is completely depressurised. Before the gear is disassembled from the valve disconnect the pilot pressure supply.	
Defect of the valve functional parts	Check the gear function to be correct. *If the gear is OK:* Disassemble the valve from the pipe system and inspect it. Observe clause 2.3 <Special danger> *If the valve is damaged:* The valve shall be repaired: Order spare parts and repair instruction from ZWICK and replace it.	

8 Warnings

Source of danger	Precautions
Ignitable atmospheres	Operating instruction: Mind leakages, otherwise the development of an ignitable atmosphere is possible
Inflammation of explosive atmospheres	
Ignition sparks during the start-up / assembly	Operating instruction: Assembly / Disassembly/ Maintenance service only valid at a non-ignitable atmosphere
Static charge of single building components	Ensure the TRI-CON valve is grounded. Proceed with any contingently regarding add-on parts according to the manufacturers guidelines
Disposition	The heating of valve parts caused by hot media has to be below the ignition temperature Sound energy could be caused by contingent add-on parts or hydrodynamic noise Closing times below the rule of thumb (closing time in seconds = nominal size in mm / 100) are not valid Proceed with any contingently existing add-on parts according to the manufacturers guidelines
Creation of ignition sources	With attachment of additional parts which are not attached by the manufacturer or explicitly permitted for attachment, like aluminium labels or other pieces of equipment like electrical position transmitter the danger analysis has to be implemented again

9 More information

This manual, ZWICK-catalogue-sheets and other information – even in other languages – are also available at:

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