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8. Commissioning / Decommissioning 12
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1. Declaration of conformity

Hereby we, KSB S.A.S.
Zone industrielle Gagnaire Fonsèche
24490 LA ROCHE CHALAI
Registered Office: 92635 - Gennevilliers
France

declare that the valves listed below comply:

- with the requirements of the Pressure Equipment Directive 97/23/EC.

Description of the valve types:

Butterfly valves
- ISORIA 10
- ISORIA 16
- ISORIA 20
- ISORIA 25
- MAMMOUTH 6, 10

As per harmonized European standards:
EN 10213-2; EN 10213-4; EN 1982; EN 12516-1:2005;

and other standards / directives:
EN 1561; EN 1563; ASME B 16.34; ASME B16.42

Suitable for:
Fluids group 1 and 2

Conformity Assessment Procedure:
Module H

Production sites:
LA ROCHE CHALAI / BURGOS

Name and address of the notified body
Lloyd's Register Verification Limited
71 Fenchurch Street,
London
EC3M 4BS
England

Number of notified body: 0038
Number of certificate: RPS 0160325/01

Name and address of the notified body
Bureau Veritas
67/71 boulevard du Château
92200 Neuilly-sur-Seine
FRANCE

Number of notified body: 0062
Number of certificate: CE-PED-H-KSB 001-11-FRA

Production site:
DALIAN

Name and address of the notified body
Lloyd's Register Verification Limited
71 Fenchurch Street,
London
EC3M 4BS
England

Number of notified body: 0038
Number of certificate: RPS 0160325/01
• with the requirements of AD 2000 - AD A4.

Description of the valve types:
- ISORIA 10 PS 10 bar DN 40-1000
- ISORIA 16 PS 16 bar DN 40-1000
- ISORIA 20 PS 20 bar DN 32-600

As per harmonized European standards:
EN 10213-2; EN 10213-4; EN 1982; EN 12516-1:2005;

and other standards / directives:
EN 1563

Name and address of the inspection body:
TÜV Rheinland France
62 bis, Avenue Henri Ginoux
92120 Montrouge
France

Number of certificate:
AF 03.00126

• with the requirements of the regulation EC REACH 1907/2006.

Regulation EC 1907/2006 on the registration, evaluation, authorization and restrictions of chemicals

Description of the valve types:
- ISORIA 10 PS 10 bar DN 40-1000
- ISORIA 16 PS 16 bar DN 40-1000
- ISORIA 20 PS 20 bar DN 32-600
- ISORIA 25 PS 25 bar DN 32-1000
- MAMMOUTH 6, 10 PS 6/10/16/20/25 bar 16, 20, 25 DN 1050-4000

Article 33/REACH:
None of substances included in the candidate list and in Annex XIV of this regulation are present in our actuators above a concentration of 0.1% (weight by weight)

Michel Delobel
Quality Assurance

Rev.12 - 07/11

This document was prepared electronically and is valid without signature. Its implementation in the public domain validates his condition.
2. Declaration of incorporation for Partly Completed machinery  
Machinery Directive 2006/42/EC

Hereby, we,:

KSB S.A.S.  
Zone industrielle Gagnaire Fonsèche  
24490 LA ROCHE CHALAIS  
Registered Office: 92635 – Gennevilliers France

Manufacturer of the partly completed machine (PCM) for following product aggregate of type: valve + automatic actuator + automation

Butterfly valves of type:
- BOAX-B, BOAX-N, BOAX-S, BOAX-SF
- BOAXMAT-N, BOAXMAT-S, BOAXMAT-SF, BOAX-B Mat P, BOAX-B Mat E
- ISORIA 10, ISORIA 16, ISORIA 20, ISORIA 25
- KE
- MAMMOUTH 6, 10, 16, 20, 25
- DANAÏS 150, DANAIS MTII, DANAIS TBT

Actuators of type:
- Electric: ACTELEC
- Pneumatic: ACTAIR et DYNACTAIR
- Hydraulic: ACTO, DYNACTO, ENNACTO
- Counterweight: Series R380 and R480

optionally with limit swich or automation boxes of type:
- AMTROBOX – All types –
- AMTROBOX R – All types –
- AMTROBOX C R1290
- AMTROBOX S R1195
- R1077 / R1078 / R1079 / R1158
- AMTRONIC / SMARTRONIC – All Types
- R1011 / R886 / R1007 / R834

declare the following essential requirements of the annex I of the Machine Directive 2006/42/EC are applied and fullfilled:

1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.4, 1.3.8, 1.3.8.1, 1.4.1, 1.4.2.1, 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.7, 1.5.8, 1.6.1, 1.7.2, 2.1.1 a, b, e

The relevant technical documentation is compiled in accordance with part B of Annex VII.

This documentation of parts hereof will be transmitted by post or electronically in response to a reasoned request by the national authorities. The person authorised to compile the relevant technical documentation by:

Nicolas Lefrancq – KSB  
Parc d’activité Rémora  
33170 Gradignan, France

Other EC-Directives to be used:

Directive ATEX 94/9/EC

This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC, where appropriate.
3. General

These operating instructions apply to KSB rubber lined butterfly valves (see section 6).

Design, manufacturing and testing of the KSB valves are subject to a Quality Assurance System according to EN ISO 9001 and to the European Pressure Equipment Directive 97/23/EC (PED).

For a specific product configuration as an actuated valve, the aggregate can be considered as a partly completed machine according to the machinery directive 2006/42/EC and comply with the requirements of the directive.

Correct installation and maintenance or repair are mandatory to ensure trouble free operation of the valves.

The manufacturer cannot be made liable for these valves if operating instructions are not being observed.

ATTENTION  The valves must not be operated outside the permissible operating range. The limits are indicated on the name plate or currently applicable type leaflet. The pressure-temperature ratings, in particular, must not be exceeded. Operation of the valves outside the above-mentioned conditions may result in overloads which may damage the valves.

The type leaflets can be found at www.ksb.com – product catalogue.

4. Safety

This manual contains basic instructions to be complied with during operation and maintenance. It is therefore vital for the fitter and the operator/user to read this manual before installing/commissioning the valve. Also, this manual must always be available at the site where the valve is installed.

It is not enough to observe the general instructions listed in the section “safety”, the specific safety instructions listed in the other sections should also be observed.

4.1 Safety Symbols in these Operating Instructions

Safety instructions put forth in this instruction manual, the nonobservance of which would involve the risk of personal injury, they are specially marked with the general hazard symbol:

\[\text{Safety symbol} \]

In accordance with ISO 3864-B.3.1. or with the electric voltage warning sign:

\[\text{Electric symbol} \]

In accordance with ISO 3864-B.3.6.

Safety instructions the nonobservance of which would involve hazard to the valve and jeopardize its operation have been marked with the word

ATTENTION

Instructions directly attached to the valve, (e.g. nominal pressure) must be complied with and maintained in a legible condition.

4.2 Qualification of personnel and training

The personnel for operation, maintenance, Inspection and installation must be adequately qualified for the work involved. The personnel responsibility, competence and supervision must be clearly defined by the user. If the personnel in question is not already in possession of the required know-how, appropriate training and instructions must be provided. If deemed necessary, the manufacturer/supplier will provide such training and instructions at the user’s request. In addition, the user is responsible for ensuring that the contents of these operating instructions are fully understood by the personnel involved.

4.3 Danger or nonobservance of the safety instructions

Nonobservance of the safety instructions may lead to personal injury and danger for both the environment and the valve itself. Nonobservance of these safety instructions will also forfeit the user’s warranty.

Such noncompliance could result in for example:

- failure of essential functions of the valve/plant
- failure of prescribed maintenance and repair practices
- hazard to people by electrical, mechanical or chemical effects
- hazard to the environment due to leakage of hazardous substances

4.4 Safety Consciousness

The safety instructions contained in this manual, the applicable national accident prevention regulations and any of the user’s own applicable internal work, operation or safety instructions must be fully complied with.

4.5 Safety Instructions for the User/Operator

Any hot or cold parts of the valve (e.g. body or handle or actuator) that could cause a hazard must be protected by the user against accidental contact.

Leakage of hazardous substance (e.g. flammable, corrosive, toxic, hot) must be drained so as to avoid all danger to people or the environment. All relevant laws must be observed.

\[\text{Electrical symbol} \]

Electrical hazards must be effectively prevented. (For details, please refer to the IEC 364 or equivalent national standard and/or local utility energy supply regulations).
4.6 Safety Instructions for Maintenance, Inspection and Installation work

4.6.1 General
On an actuated valve the operating instructions of the valve must be strictly followed as well as those of the operating instructions of the actuators, the limit switch or automation boxes. The user is responsible for ensuring that all maintenance, inspection and installation work is carried out by authorized, adequately qualified staff who are thoroughly familiar with this instruction manual. Any work on a valve may only be performed when the valve is un-pressurized and has cooled down to 60 °C. Any work on actuated valves may only be done after that the actuator has been disconnected from its energy supply. The procedure described in the operating instructions to shut down the actuator must be observed. Valves in contact with hazardous media must be decontaminated. Immediately following completion of the work, all safety relevant and protective devices must be reinstalled and/or re-enabled. Prior to recommissioning, refer to the points listed under section 7 Commissioning.

4.6.2 End of line installation
Use as end of line and downstream dismantling at ambient temperature of standard range. End of line and downstream dismantling not authorized for bodies type 1 (annular shape). NB: A valve fitted at the end of a pipe with a blind flange downstream is not to be considered as an end of pipe service.

<table>
<thead>
<tr>
<th>Valves</th>
<th>Gaz or liquids</th>
<th>Liquids</th>
</tr>
</thead>
</table>
| ISORIA 10   | Hazardous: All sizes: not authorized  
              | Non hazardous: Sizes ≤ 500: Liners: XA, XC, XV, K, Y, NH, VA, VC, CB, EG  
                              |         | Hazardous: All Sizes: Liners: XA, XC, XV, K, Y, NH, VA, VC, CB, EG  
                              |         | Non hazardous:  
              |              |          | All Sizes:  
                              |              |          | Liners: CC, SK, NB  
                              |              |          | ΔPS = 4.5 bar max.  
                              |              |          | 
| ISORIA 16   | Hazardous: All sizes: not authorized  
              | Non hazardous: Sizes ≤ 500: Liners: XA, XC, XV, K, Y, NH, VA, VC, CB, EG  
                              |         | Hazardous: All Sizes: Liners: XA, XC, XV, K, Y, NH, VA, VC, CB, EG  
                              |         | Non hazardous:  
              |              |          | All Sizes:  
                              |              |          | Liners: CC, SK, NB  
                              |              |          | ΔPS = 4.5 bar max.  
                              |              |          | 
| ISORIA 20   | Hazardous: All sizes: not authorized  
              | Non hazardous: Sizes ≤ 500: Liners: XA, XC, XV, K, Y, NH, VA, VC, CB, EG  
                              |         | Hazardous: All Sizes: Liners: XA, XC, XV, K, Y, NH, VA, VC, CB, EG  
                              |         | Non hazardous:  
              |              |          | All Sizes:  
                              |              |          | Liners: CC, SK, NB  
                              |              |          | ΔPS = 4.5 bar max.  
                              |              |          | 
| ISORIA 25   | Hazardous: non applicable  
              | Non hazardous: non applicable  
              |         | Hazardous: All sizes: not authorized  
              |         | Non hazardous: All sizes: not authorized  
                              |              |          | Liners: CC, SK, NB  
                              |              |          | ΔPS = 4.5 bar max.  
                              |              |          | 
| MAMMOUTH 6/10/16/20/25 | Hazardous: All sizes: not authorized  
                                      | Non hazardous: on request  
                                      |         | Hazardous: All sizes:  
                                      |         | Non hazardous:  
                                      |              |          | Liners: CC, SK, NB  
                                      |              |          | ΔPS = 4.5 bar max.  
                                      |              |          | 

ΔPS: Differential pressure  
* Liquids whose vapour pressure at the maximum allowable temperature is greater than 0.5 bar above normal atmospheric pressure (1013 mbar)

4.7 Unauthorized Modification and Manufacturing of Spare Parts
The equipment shall not be altered or modified in any way prior to consultation with the manufacturer. Genuine spare parts and accessories authorized by the manufacturer will ensure operational safety. The manufacturer cannot be held responsible for damage resulting from the use of non-genuine parts or accessories.

4.8 Inadmissible Modes of Operation
Operational safety and reliability of the valve supplied is only warranted for its designated use as defined in section 2 “General” of the operating instructions. The limits stated in the technical documentation must not be exceeded under any circumstances.

5 Transport and Interim Storage

5.1 Transport
The valves in the as-supplied condition are ready for operation. **ATTENTION** For transport and storage, the valves must always be maintained in the semi-closed position and be packed in cardboard, crate or case with suitable protection (dessicant, thermowelded barrier). **ATTENTION** To prevent damage, do not hang the valve by its handle or actuator. After delivery or prior to installation, the valve should be checked for damage during transit.

5.2 Interim Storage
The valves must be stored in such a way that correct operation is assured even after prolonged storage. This comprises: - Storing at 5° from the closed position  
- Suitable measures against contamination, frost and corrosion (e.g. by using thermowelded plastic bags with dessicant, protection caps and plugs onto threaded holes).
6 Description of valves
The sectional drawings shown hereafter are examples for the general design of our valves. For drawings and other information pertaining to a specific valve series, please refer to the relevant type leaflets.

6.1 Marking
The valves are marked to PED 97/23/EC.

Marking of the identity plate Example

1 - Valve type model
2 - Internal material code
3 - Valve PN /Class designation
4 - Maximum allowable pressure
5 - Maximum allowable pressure at end of line or for downstream dismantling
6 - Maximum allowable temperature
7 - Pipe flange drilling pattern (if known)
8 - Month and year of production
9 - Equipment serial number
10 - CE marking with notified body identification number

<table>
<thead>
<tr>
<th></th>
<th>PS</th>
<th>DN</th>
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</thead>
<tbody>
<tr>
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<td>≤32</td>
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</tr>
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<tr>
<td>3</td>
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</tr>
<tr>
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<td>200</td>
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<td>25</td>
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</tr>
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<td>≥310</td>
<td>≥310</td>
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Valves for non hazardous fluids (group 2) according to table 7 of annex II (PED)

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<tr>
<th></th>
<th>PS</th>
<th>DN</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>≤32</td>
<td>40</td>
</tr>
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<td></td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>10</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>16</td>
<td>250</td>
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<td>25</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>≥310</td>
<td>≥310</td>
<td></td>
</tr>
</tbody>
</table>

Valves for hazardous liquids and gaz (group 1) according to table 6 of annex II (PED)

6.2 Drawings and documents

<table>
<thead>
<tr>
<th>Type</th>
<th>DN (mm)</th>
<th>PS (bar)</th>
<th>Leaflet no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISORIA 10</td>
<td>40-1000</td>
<td>10</td>
<td>8444.1</td>
</tr>
<tr>
<td>ISORIA 16</td>
<td>40-1000</td>
<td>16</td>
<td>8445.1</td>
</tr>
<tr>
<td>ISORIA 20</td>
<td>32-600</td>
<td>20</td>
<td>8446.1</td>
</tr>
</tbody>
</table>

![Diagram of valves]
6.3 List of Components

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Name of Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Body</td>
</tr>
<tr>
<td>176</td>
<td>Bottom</td>
</tr>
<tr>
<td>210</td>
<td>Shaft</td>
</tr>
<tr>
<td>213</td>
<td>Operating shaft</td>
</tr>
<tr>
<td>310.*</td>
<td>Plain bearing</td>
</tr>
<tr>
<td>363</td>
<td>Wedge</td>
</tr>
<tr>
<td>411</td>
<td>Gasket</td>
</tr>
<tr>
<td>412.*</td>
<td>O-ring</td>
</tr>
<tr>
<td>413</td>
<td>Liner</td>
</tr>
<tr>
<td>414</td>
<td>Disc thrust plate</td>
</tr>
<tr>
<td>486</td>
<td>Ball</td>
</tr>
<tr>
<td>543.*</td>
<td>Spacer bush</td>
</tr>
<tr>
<td>550</td>
<td>Disc</td>
</tr>
<tr>
<td>553</td>
<td>Lubricating thrust insert</td>
</tr>
<tr>
<td>554</td>
<td>Washer</td>
</tr>
<tr>
<td>559</td>
<td>Gasket holder</td>
</tr>
<tr>
<td>560</td>
<td>Elastic pin</td>
</tr>
<tr>
<td>561</td>
<td>Grooved nail</td>
</tr>
<tr>
<td>900.*</td>
<td>Anti blow-out screw</td>
</tr>
<tr>
<td>901.*</td>
<td>Hexagon head screw</td>
</tr>
<tr>
<td>904</td>
<td>Adjusting screw</td>
</tr>
<tr>
<td>905</td>
<td>Tie rod</td>
</tr>
<tr>
<td>916</td>
<td>Plug</td>
</tr>
<tr>
<td>920.*</td>
<td>Nut</td>
</tr>
<tr>
<td>932</td>
<td>Self locking ring</td>
</tr>
<tr>
<td>940.*</td>
<td>Key</td>
</tr>
<tr>
<td>970</td>
<td>Identity plate</td>
</tr>
</tbody>
</table>

* Repetitive part

6.4 Functioning principle

Description

The valve consists mainly of a body (100), operating shaft (213), shaft (210), disc (550) and rubber liner (413).

The in-house designed formulated and manufactured rubber liner achieves the leak tightness at shaft passages, pipe flanges and downstream/upstream around the disc.

Disc-shaft connection: The disc (550) is connected to the operating shaft by key (s), or splines.

Anti blow-out device: Every valve is fitted with an anti blow-out device which prevents the shaft to burst off the body in case of shaft failure. This function is achieved by additional parts.

Operation: The valves are quarter-turn operated manually by handles or gear box or hydraulic, pneumatic or electric actuators mounted on the valve top plate (as per ISO 5211 standard).
6.5 Optional accessories

Body support

Caution: Supporting legs must not be fixed to the ground. They must remain free to move.

- Assemble separately, the four identical parts as shown hereunder, with the screws (900), the nuts (920.2) and the washers (554.2).
- Assemble the body supports onto the valve.

Depending on lifting means, place the valve either in vertical or horizontal position, sling with lifting and/or supporting means. Assemble every support onto the valve using connecting rods (81.51), eye bolts (81–39) + (920.1) and washers (554.1).

7 Installation

7.1 General

ATTENTION To avoid leakage, deformation or rupture of the body, the piping should be laid out in such a way that no thrust or bending forces act on the valve bodies (Part Nr. 100) when they are installed and operational.

ATTENTION The sealing faces of the flanges must be clean and undamaged (Ra ≤ 25 μm).

It is prohibited to add any additional gasket (except electric insulation gasket, please consult us) between body and piping flanges. To insert the valve between flanges, pull apart the two pipes flanges to obtain sufficient clearance between flange face and valve seat cheeks. All holes provided in the flanges must be used for the flange connection.

ATTENTION If construction work is still in progress, non-mounted valves must be protected against dust, sand and building material etc. (cover with suitable means). Do not use valve handles and gear handwheels as footholds!

ATTENTION Valves and pipes used for high (> 60 °C) or low (< 0 °C) temperatures must either be fitted with a protective insulation, or there must be warning signs fitted showing that it is dangerous to touch these valves.

ATTENTION If a valve is used as end-valve in a pipe, this valve should be protected against unauthorized or unintentional opening to prevent personal injury or damage to property.

7.2 Installation conditions

7.2.1 Recommended minimum distances between the position of the valve and of the T-piece or elbow.

Valves sizes DN ≤ 600 may be installed in any position.

Valves sizes DN > 600 have a mounting preferential direction horizontal shaft following the figure hereafter. This is the most favourable position because:

- The weight of the disc and shafts is borne by the two bearings,
- the pivot bearing is relieved,
- it is a guarantee of long valve life, specially in the case of fluids containing solids, where solid particles tend to accumulate on the bottom of the pipe (during the closing, the reduction in cross-section causes a local increase in velocity which results in a “sweeping” or “cleaning” of the liner).

The mounting, vertical shaft, actuators are upwards is allowable.

Also valid for valve placed at pump discharge.
For lengths shorter than those figured 1, 2, 3 and 4, the valve must be equipped with an anti-fluttering device.
7.2.2 Flanging dimensions

Connection to the piping.

Piping flanges must match the following dimensions.

**ISORIA 10, ISORIA 16**

<table>
<thead>
<tr>
<th>DN</th>
<th>NPS</th>
<th>ø2a</th>
<th>ø2b</th>
<th>ø3</th>
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<td>20</td>
<td>½</td>
<td>44</td>
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**ISORIA 20**

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**MAMMOUTH 6, 10, 16, 20, 25**

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* Please check that the body is well centered between the tie-rods.

**DN 3000 < DN ≤ 4000**: please consult us.
7.2.3 **Interface between valve and pipe flanges**

Correct fitting except T6 bodies

- Metallic intermediate insertion flange
- No rubber coated flange
- No gasket
- No direct contact with the expansion joint

T5 type body  
T6 type body

In case of coated pipe (hard rubber, concrete or Teflon for example), coating hardness and flanges detailed dimensions shall be given to KSB for acceptance.

In case of fitting between polyethylene flanges:
- Authorized fitting between flanges with flat faces
- Not authorized fitting between flanges with grooved faces

7.3 **Handling**

Handling means may be necessary to install large sizes valves. They must be used as shown.

- **Valve with motorization**
  - Correct  
  - Forbidden

- **Valve with counterweight**
  - Correct  
  - Forbidden

- **Valve with neck extension**
  - Correct  
  - Forbidden

Neck extension and body supports may have been delivered separately from the valve. They must be mounted onto the valve before fitting it between flanges.
7.4 Recommendations for installation

Before assembly
- Verify that pipeline flanges are free from metallic chips and weld splatter.
- Verify that pipeline flanges are located on the same centrel ine and are parallel.
- Verify that inside diameter of pipeline flange is in accordance with the minimum and maximum diameters given by the manufacturer.
- Verify that nothing hinders the complete moving of the disc during opening or closing, in particular at the internal weld seams or at the pipe ends.
- Pull apart the pipeline flanges to allow valve insertion without damaging the elastomer liner of the valve.

During assembly
- Place the disc as spaced apart as possible from the closing position, but without that disc protrudes past the valve’s body.
- Spread the two pipe flanges to obtain sufficient clearance between flange face and valve seat cheeks.
- Insert valve between pipeflanges and center using several tie-rods.
- Screw up progressively the nuts until metal to metal contact is achieved between the valve body and pipeline flanges, by making sure the good centering of the body compared with the flange is maintained.
- Operate the valve several times to ensure no valve disc obstruction.

7.5 Actuated valves

- Electrical cables may only be connected by qualified personnel.
- The applicable electrical regulations (e.g. IEC and national standards), also for equipment in hazardous locations, must be observed. All electrical equipment such as actuator, switchboard, magnetic valve drive, limit switch etc. must be installed in floodproof dry locations. Voltage and frequency must match the valves stated on the identity plate.

8 Commissioning/Decommissioning

8.1 Commissioning

8.1.1 General
Prior to commissioning the valve, the pressure, temperature and material data stated on the valve should be compared to the actual operating conditions in the piping system to check whether the valve can withstand the loads occurring in the system.

Possible pressure surges (water hammer) must not exceed the highest admissible pressure. Adequate precautions should be taken. In new pipe systems and especially after repair work, the system should be flushed with the valves fully open to remove solids, e.g. weld beads, which may damage the seats.

8.1.2 Operation
The position of the disc is indicated by the pointer of the actuator or by handle lever. The valves are closed by turning in the clockwise direction (top view) and opened in the counterclockwise direction.

8.1.3 Functional Check
The following functions should be checked before commissioning, the shut-off-function of the valves should be checked by repeated opening and closing.

8.1.4 Actuated valves
Adjustable end stops and torque limiter of actuators have been adjusted in factory.

8.2 Decommissioning
During extended shutdown periods, liquids liable to change their condition due to polymerization, crystallization, solidification etc. must be drained from the piping system. If necessary, the piping system should be flushed with the valves fully open.

9 Maintenance/Repair

9.1 Safety Instructions
Maintenance and repair work may only be carried out by skilled and qualified personnel.

For all maintenance and repair work, the safety instructions listed below and also the general notes in section 2 must be observed. Always use suitable spare parts and tools, even in case of emergency, otherwise correct operation of the valves cannot be assured.

9.2 Valve removal from piping and actuator disconnecting
Identify the valve by identity plate.

⚠️ Please check what is the relevant spare kit.

Place the disc at 10° opening.

⚠️ The entire valve must be unpressurized and must have cooled down sufficiently so that the temperature of the medium is lower than 60 °C, to prevent scalding.

⚠️ Opening pressurized valves will cause danger to life and limbs. If toxic or highly flammable substances or liquids whose residues may cause corrosion by interaction with the air humidity were handled by the valve, then the valve should be drained and flushed or vented. If necessary, wear safety clothing and a face guard/mask. Depending on the installation position, any liquid remaining in the valve may have to be removed.

Prior to possible transport, the valves must be flushed and drained carefully. If you have any questions please contact your KSB Sales Office.

⚠️ If actuators powered by an external source of energy (electric, pneumatic, hydraulic) need to be removed from the valves or dismantled, the energy supply must be shut down prior to starting any repair work.

Remove the valve from the piping with its actuator. Do not damage the liner during removal the valve from the pipe. Therefore, pull apart the pipe flanges to allow sufficient clearance.

Identify the mounting position of the actuator
Disconnect the actuator and take care of all bolting parts.
9.3 **Spares, list of tools, Consummables**

9.3.1 **Spares**

Use the relevant spare parts included in the liner kit or disc kit or shaft kit. Please refer to leaflets.

All constitutive parts of kits must be replaced.

⚠️ During the mounting/dismantling of the valve, the order of operations given in § 8.4.1. must be respected to prevent injuries and material damages.

During the tests, while closing and opening valves, care must be taken that no operator interferes with the disc travel.

9.3.2 **List of tools for mounting/dismantling**

- Pneumatic screwing machine
- Open ended spanner
- Ring spanner
- Box spanner
- Screwdrivers
- Hammer
- Pneumatic polisher
- Wedges
- Crow bar
- Silicon grease if authorized.

9.3.3 **Consummables**

Use only the silicon grease enclosed in the kit (Molykote type 111).

The use of mechanical grease is strictly prohibited.

9.4 **Valve disassembly and re-assembly**

9.4.1 **Valve disassembly**

- Remove the plug (916) or bottom (176), the spring retaining ring (932) if any.
- Remove the anti blow-out screws (900.*) and gasket holder (559) if any.
- Extract the operating shaft (213) and lower shaft (210)
- Remove the disc (550) and dismantle the liner (413)

⚠️ Take care to prevent disc edge, liner and paint from any damage.

Change O-rings 412.* using silicon grease. Put grease onto the liner at shaft passages.

9.4.2 **Valve re-assembly**

- Put in place the liner (413) into the body (100) so that shaft passages are correctly aligned with the bores of the body.
- Insert the disc (550) in open position and check correct alignment of shaft passages.
- Mount the shaft (210) with the ball (486) / keys (940.*) or spring retaining ring (932), the washer (554) and screw (901.*) if any.
- ISORIA 10,16 DN 250 to 600 : check that the groove of the shaft and operating shaft are in front of the anti blow-out screws (900.1) and (900.2) as shown below:

![Diagram](image)

- Mount the operating shaft (213) with keys (940.*) if any. Check the correct indexation with the disc edge (550)
- Adjust the anti blow-out screws (900.*)
- Mount the plug (916) or bottom (176) and gasket holder (559) if any.
- Valves with a bottom (176) must be put in a horizontal position to adjust screw (904) which is to be locked with nut (920).

9.5 **Test and re-installation**

Reassemble the actuator (check the N or M position)

- Open the valve at 10° opening.
- Pull apart the pipeline flanges to allow valve insertion without damaging the elastomer liner of the valve.
- Connect the power supply if necessary.
- Check that the valve can be fully operated by the actuator.
- Connect the valve to the pipe and follow assembling instructions.
### 10 Trouble shooting

#### 10.1 General

All repair and service work must be carried out by qualified personnel using suitable tools and genuine spare parts.

The previous safety instructions must be observed.

#### 10.2 Faults & Remedies

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<td>Downstream/Upstream leakage</td>
<td>- Actuator on safe position \n- Remove the particle \n- Inspect liner/disc \n- Replace liner/disc</td>
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<tr>
<td>Shaft leakage</td>
<td>- Replace shaft</td>
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<tr>
<td>Flange leakage</td>
<td>- Flange has to be modified in accordance with KSB technical leaflet</td>
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<tr>
<td>Over torque</td>
<td>- Adjust bottom screws</td>
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<tr>
<td>No opening</td>
<td>- Receding liner, damaged liner</td>
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<td>No closing</td>
<td>- Wrong flanging</td>
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<tr>
<td>Hard point</td>
<td>- Wrong flanging size</td>
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<td>Vibration / Fluttering</td>
<td>- Wrong operating conditions</td>
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<td>Foreign particles in the valve</td>
<td>- Replacement liner (liner kit)</td>
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<tr>
<td>Broken body</td>
<td>- If the liner is undamaged : separate the pipe flanges / remove valve / put it back between the pipe flanges / check operations.</td>
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<tr>
<td>Broken or warped disc</td>
<td>- Disc : check flanging dimensions and replace using the disc kit</td>
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<td>Damaged disc, corroded disc</td>
<td>- Adj ust bottom screws</td>
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<tr>
<td>Adjusting bottom screws</td>
<td>- Analyse the defect / research of causes / replace shaft</td>
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<td>Broken shaft, twisted shaft</td>
<td>- Replace / Repair the valve</td>
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<td>Worn out liner</td>
<td>- Replacement liner (liner kit)</td>
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<td>Receding liner, damaged liner</td>
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<tr>
<td>Wrong flanging</td>
<td>- Check type and flange bolting torque</td>
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<td>Wrong flanging size</td>
<td>- Check the technical offer versus service conditions</td>
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<tr>
<td>Wrong face to face, non parallel flanges</td>
<td>- Flanging has to be modified in accordance with KSB technical leaflet requirements.</td>
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<tr>
<td>Flow conditions</td>
<td>- Follow instructions given in KSB technical leaflet</td>
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<td>Wrong operating conditions</td>
<td>- Check the technical offer versus service conditions</td>
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<td>Damaged actuator</td>
<td>- Check sizing versus operating conditions (see KSB)</td>
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