

**SERIE 2000**

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42 048 661

## 1. Declaration of conformity

Hereby we,

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

declare that the check valves listed below comply:

- **with the requirements of the Pressure Equipment Directive 2014/68/EU.**

Description of the check valves type:	<b>Check valves</b>		
	- SERIE 2000	PN 16	DN 50-600
		PN 25	DN 50-1200
		Class 150	DN 50-1200
		Class 300	DN 50-600

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

and other standards / directives: ASME B16.42; ASME B16.34; RCCM code ASTM A395; ASTM A126; RCCM M1112; RCCM M3402

Suitable for: **Fluids group 2** for ASTM A126  
**Fluids group 1 and 2** for other materials than ASTM A126

Conformity Assessment Procedure: **Module H**

Production sites :  
LA ROCHE CHALAIS

Name and address of the notified body  
for orders made from the 01/10/2011

**Bureau Veritas Exploitation**  
**8, cours du triangle**  
**92800 Puteaux**  
**FRANCE**

Number of notified body: **0062**

- **Product information as per Regulation No. 1907/2006 (REACH)**

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <http://www.ksb.com/reach>.

## 2. General

These operating instructions apply to KSB SERIE 2000 non return check valves (see section 5).

Design, manufacturing and testing of the KSB check valves are subject to a Quality Assurance System according to EN ISO 9001 and to the European Pressure Equipment Directive 2014/68/EU (PED).

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](http://www.ksb.com) – product catalogue.



Nonobservance of this warning may lead to personal injury or property damage, e.g.:

- Injury caused by escaping fluids (cold/hot, toxic, flammable, corrosive or under pressure)
  - Incorrect operation or destruction of the check valve.
- The descriptions and instructions in this manual refer to the standard versions but also apply to the related variants. These operating instructions do not take into consideration:
- incidents which may occur during installation, operation and maintenance.
  - the local safety regulations. It is the user's responsibility to ensure that these are also observed by the installation staff involved.

**ATTENTION** Handling a check valve requires skilled and experienced personnel.

The personnel in charge of operation, maintenance and installation of this check valve must be aware of the interaction between the valve and the plant.

Operator's errors concerning the check valve may have serious consequences for the entire plant, e.g.:

- fluid may escape
- downtime of the plant/machine
- adverse effect/reduction/increase of the efficiency/function of a plant/machine.

For further questions or in case of damage to the check valve, please contact your KSB Sales Office.

For further questions and supplementary orders, especially when ordering spare parts, please always state the indications of the marking plate.

The specifications (operating data) of the check valves are listed in the technical documentation & type leaflet of the related check valve (see also section 5).

When returning check valves to the manufacturer, please refer to section 4.

## 3. 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 check valve. Also, this manual must always be available at the site where the check 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.

### 3.1. 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:



in accordance with ISO 3864-B.3.1.

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

**ATTENTION**

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

### 3.2. 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.

### 3.3. 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 check 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 check valve/plant
- failure of prescribed maintenance and repair practices
- hazard to people by mechanical or chemical effects
- hazard to the environment due to leakage of hazardous substances

### 3.4. 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.

### 3.5. Safety Instructions for the User/Operator

Any hot or cold parts of the check valve (e.g. body ) 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.

### 3.6. Safety Instructions for Maintenance, Inspection and Installation work

#### 3.6.1. General

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 check valve may only be performed when the check valve is un-pressurized and has cooled down to 60° C.

Check 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.

#### 3.6.2. End of line installation

Check valves cannot be used as end of line and to do downstream dismantling.

### 3.7. 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.

### 3.8. Inadmissible Modes of Operation

Operational safety and reliability of the check 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.

## 4. Transport and Interim Storage

### 4.1. Transport

The check valves in the as-supplied condition are ready for operation.

**ATTENTION** For transport and storage, the check valves must be packed in cardboard, crate or case with suitable protection (dessicant, thermowelded barrier).

**ATTENTION** To prevent damage, hang the check valve by an eye bolt if necessary. After delivery or prior to installation, the check valve should be checked for damage during transit.

### 4.2. Interim Storage

The check valves must be stored in such a way that correct operation is assured even after prolonged storage.

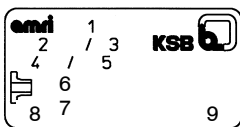
- Suitable measures against contamination, frost and corrosion (e.g. by using thermowelded plastic bags with dessicant, protection caps and plugs onto threaded holes).

## 5. Description of SERIE 2000 check valves

The sectional drawings shown hereafter are examples for the general design of our check valves. For drawings and other information pertaining to a specific check valve series, please refer to the relevant type leaflets.

### 5.1. Marking

The valves are marked to PED 2014/68/EU.



Marking



Example

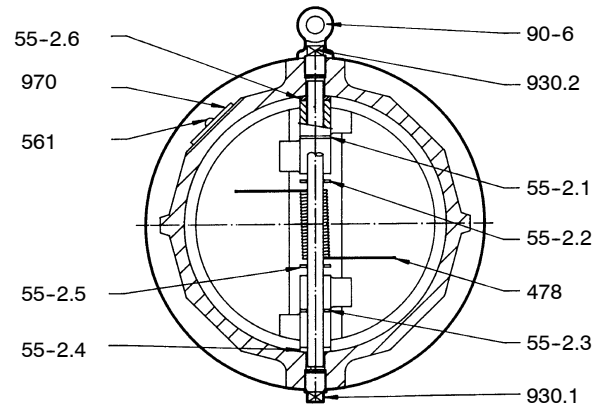
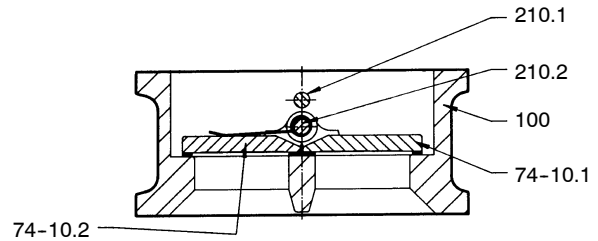
- 1 - Check valve type model
- 2 - Internal material code
- 3 - Check valve PN /Class designation
- 4 - Maximum allowable pressure
- 5 - Maximum allowable temperature
- 6 - Pipe flange drilling pattern (if known)
- 7 - Month and year of production
- 8 - Equipment serial number
- 9 - CE marking

## 5.2. Drawings and documents

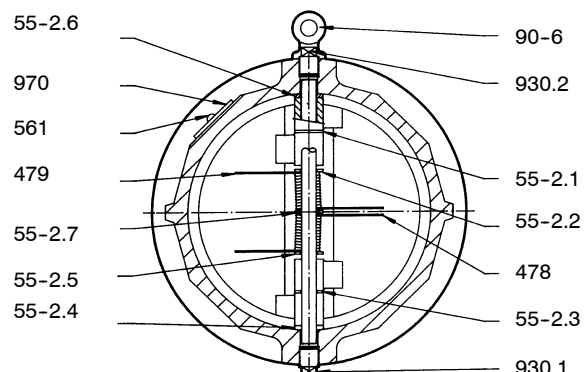
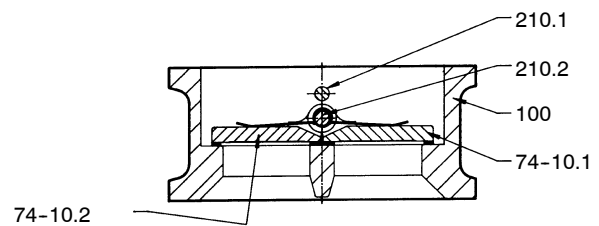
### 5.2.1. Sectional drawing (PN16, PN25)

Type	DN (mm)	Type series booklet
SERIE 2000 PN 16	50-600	8480.16/.-10
SERIE 2000 PN 25	50-600	8480.12/.-10
	DN 700-1200 on request	

DN 50 to 300 and 450  
single spring

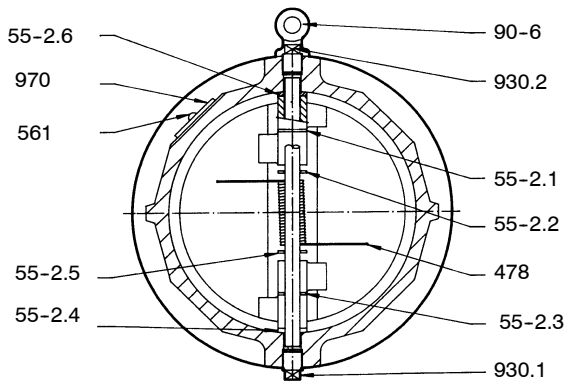
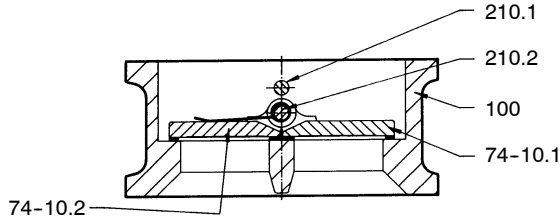


DN 400, 500 and 600  
Double spring



### 5.2.2. Sectional drawing (Class 150, class 300)

Type	DN (mm)	Type Series Booklet
SERIE 2000 Class 150	50-600	8485.15/.-20
SERIE 2000 Class 300	700-1200 on request 50-300 350-600 on request	8485.13/.-20



### 5.3. List of Components

Part No.	Name of Parts
100	Body
210.1	Stop pin
210.2	Hinge pin
478	Spring (right hand)
479	Spring (left hand)
55-2.*	Friction washer
561	Grooved pin
74-10.1	Plate
90-6	Eye bolt
903.1	Stop pin threaded plug
903.2	Hinge pin threaded plug
970	Identification plate
*	Repetitive part

### 5.4. Functioning principle

#### Description

The check valve consists mainly of a flat faces wafer body (100), 2 plates (74-10), hinge pin (210.\*), stop pin (210.\*), spring (478, 479) and pin threaded plug(s) (903.\*).  
The seat may be either a rubber seat (integral part of body) or a metal seat.  
Both plates rotate around the hinge pin and are stopped in the open position by the stop pin.  
The closing function is achieved by the action of spring(s).

## 6. Installation

### 6.1. 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 (100) when they are installed and operational.

**ATTENTION** Only remove the covers from the connection ends just before installation. The sealing faces of the flanges must be clean and undamaged.



The gaskets at the connecting flanges must be precisely inserted. Use only joints and gaskets of approved materials. All holes provided in the piping flanges must be used for the flange connection.



If construction work is still in progress, non-mounted check valves must be protected against dust, sand and building material etc. (cover with suitable means).

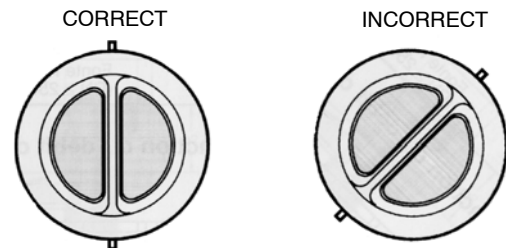


Check valves and pipes used for high (> 60° C) or low (< 0° C) temperatures must either be fitted with a protective insulation, or there must be warning signs fitted showing that it is dangerous to touch these check valves SERIE 2000.

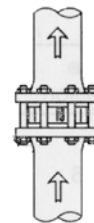
### 6.2. Installation conditions

#### 6.2.1. Optimum installation

In a horizontal pipe, the check valve must always be installed with its hinge pin in the vertical position



In a vertical pipe mounting, the correct direction of the flow is bottom ==> top ( for a direction top ==> bottom, please consult us).

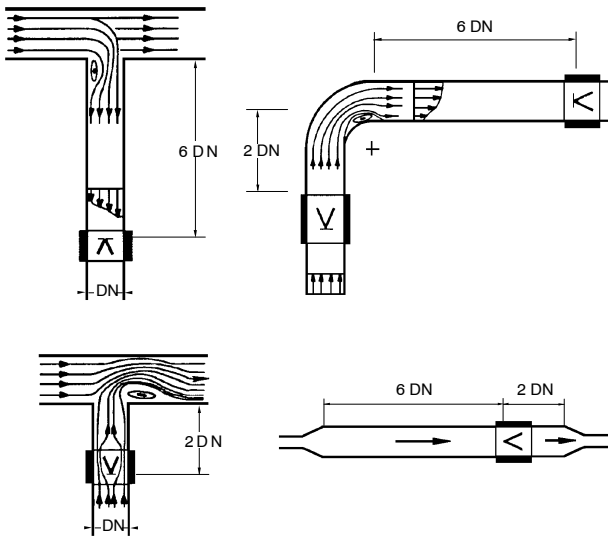


### 6.2.2. Minimum distances to be respected between the position of the check valve and of the elbow, tee, pump or valve, ... causing perturbation

In a piping system, some minimum distances must be respected between the check valve position and an elbow, tee, pump or valve causing disturbance.

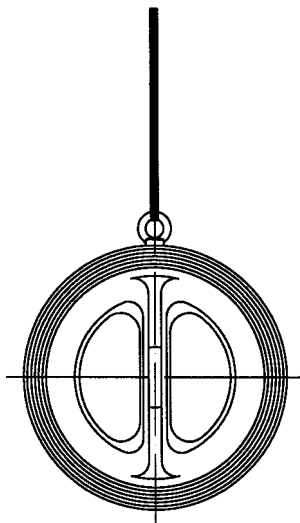
The following drawings show some horizontal pipe configurations (viewed from above) in which the check valve is installed with its hinge pin in the vertical position.

The minimum distance to be respected for a check valve installed downstream from a bend, tee, pump or valve causing disturbance is 6 DN. When such a unit is downstream of the check valve, it is necessary to respect a distance of at least 2 sizes.



### 6.3. Handling

Handling means may be necessary to install large sizes check valves SERIE 2000 (sizes  $\geq 200$ ). Use an eye bolt to lift and handle check valves.



### 6.4. 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 centreline and are parallel.
- Verify that inside diameter of pipeline flange is in accordance with the gasket and check valve facing.
- Pull apart the pipeline flanges to allow gaskets and check valve insertion without damaging the gasket.

#### During assembly

- Insert check valve with the gaskets between pipeflanges and center using several tie-rods.
- Screw up progressively the nuts to achieve tightness between the valve body and pipeline flanges, by making sure the good centering of the body compared with the flange is maintained.

## 7. Commissioning/Decommissioning

### 7.1. Commissioning

Prior to commissioning the check 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 to remove solids, e.g. weld beads, which may damage the seats.

### 7.2. 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 check valves fully open.

## 8. Maintenance/Repair

### 8.1. 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 check valves cannot be assured.

### 8.2. SERIE 2000 check valve removal from piping

Identify the check valve by identity plate.



Please check what is the relevant spare kit.



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 limb. If toxic or highly flammable substances or liquids whose residues may cause corrosion by interaction with the air humidity were handled by the check valve, then the check 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 check valves must be flushed and drained carefully. If you have any questions please contact your KSB Sales Office.

**Remove the check valve from the piping.**

Therefore, pull apart the pipe flanges to allow sufficient clearance.

### 8.3. Spares, list of tools, Consummables

#### 8.3.1. Spares

Use the relevant spare parts kit.

Please refer to leaflets.

All constitutive parts of kits and flange gaskets must be replaced.



During the mounting /dismantling of the check valve, the order of the operations must be respected to prevent injuries and material damages.

#### 8.3.2. List of tools for mounting/dismantling

Open ended spanner, Allen keys

#### 8.3.3. Consummables

- Teflon tape,

- Cleaning solvent which will not attack the elastomer seat.

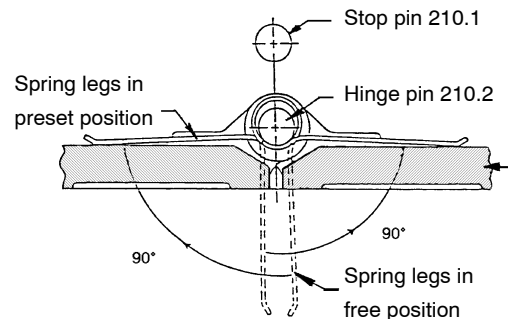
### 8.4. Check valve disassembly and re-assembly

#### 8.4.1. Check valve disassembly

- Remove the check valve from the pipe. Lay it flat on a protected work bench with the downstream side face upwards
- Using an open end spanner, unscrew the 4 pin retainers
  - 2 hinge pin retainers (930.2) (930.4)
  - 2 stop pin retainers (930.1) (930.3)
- Remove stop pin (210.1)
- Push down on the hinge pin (210.2) maintaining downwards pressure on the spiral part of spring with the hand, in the cavity between the plates.
- Remove the hinge pin and carefully release the spiral part of the spring(s) (478) (479) until it reaches its relaxed position.
- Remove the spring(s) as well as the bearing washers(s) (55-2.\*) and the plates (74-10.1) (74-10.2).
- After cleaning body (100) with suitable solvent (according to the nature of the elastomer seat) visually inspect the condition of the seat, ensuring that it is bonded to the check valve body.
- If the condition of seat is worn or damaged, the check valve must be returned to the factory for replacement of the old elastomer seal or in the case of Metal / Metal seal for re-working the seal face.
- Clean all parts with solvent

#### 8.4.2. Check valve re-assembly

- Position plates (74-10.1) (74-10.2) in body (100), taking care to align the hubs of each plates with the threaded holes of the hinge pin retainer.
- Position the bearing washers (55-2.\*). The bearing washers have a spherical side which must be positioned towards the body.
- Simulate the assembly of the hinge pin to check the alignment of the plate bores and of the washers with the pin bores.
- Remove the hinge pin in order to free the spring housing.
- Clockwise pre-load the spring(s) (478) (479) at 180° : see figure



- Position the pre-loaded spring in between plate lugs while carefully maintaining the pressure on the spring by hand. Insert hinge pin (210.2) in the body, plates, bearings and spring.
- The spring can then be released.
- Position stop pin (210.1) and the stop pin retainers (930.\*) taking care to wind Teflon tape around the retainer threads to ensure their tightness.
- Check that the hinge pin (210.2) is not blocked by the retainer pins (930.\*) (minimum clearance of some 1/10 millimeters).

## 9. Trouble shooting

### 9.1. 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.

### 9.2. Faults & Remedies

Downstream/Upstream leakage	
Leakage at pin retainers	
Flange leakage	
No opening	
No closing	
Hard point	
Vibration / Fluttering	
Foreign particles in the valve	- Open the check valve, line without fluid or flow, remove the particle - inspect seat/plate - replace seat/plate
Broken body	Defect due to water hammer Search for the reasons. Replace / Repair the check valve
Broken or warped plate	Defect due to water hammer Search the reasons. Replace / Repair the check valve
Damaged / corroded plate	Plate: search the reasons and replace both plates
Broken spring(s)	Analyse the defect / Check vibrations / Fatigue
Broken / twisted hinge / stop pin	Analyse the defect / research of causes / replace pin
Worn out seat	Replacement the seat
Wrong flanging	Check type and flange bolting torque
Wrong flanging size	Follow instructions given in KSB technical leaflet
Wrong face to face, non parallel flanges	Flanging has to be modified in accordance with KSB technical leaflet requirements.
Flow conditions Wrong operating conditions	Check the technical offer versus service conditions
Damaged plate	Check the wear of the plate at pin passage