FILSTAR OPERATION MANUAL
Be sure to read before use (at the time of installation).

1. When you clamp FILSTAR into a vise, please use the softest possible grip pad and do not insert a body. However, if the drain cup is made from plastic, clamp the body carefully.

2. Please be cautious not to scratch the flange and/or ferrule ends.

3. Be careful to screw bolts onto to flange with equal tightness when connecting to pipes.

4. Fully blow clean all the mill scales, dust and foreign substances that may remain inside FILSTAR before connecting to pipes by air or nitrogen gas.

5. The threads on FILSTAR is accurately produced and therefore, it is important for the connecting pipe threads to also have accurate dimensions. While connecting, take caution so that the pipe does not collide and damage the central part of FILSTAR’s body.

6. In the case of plant/factory piping, remove all scales, dust and foreign substances from equipment e.g. boilers, pressure containers, tanks as much as possible before operating FILSTAR. If this is not possible, it is recommended to attach a strainer (100 mesh) on pipes beforehand.

7. Although complete pressure inspections are conducted to guarantee no leakage, it is possible that drain cup section loosens itself when stress is relieved. Please make necessary adjustments according to pressure to the drain cup section before use. It will leak if loosely fitted and if fastened too tightly, there will be a possibility of breakage.

8. All distortion, bending, and twisting while attaching/connecting to pipes will affect FILSTAR. Make sure to have FILSTAR fully supported correctly while connecting.

9. If FILSTAR is connected to steam pipes, drain valve should be closed as a standard procedure. Moreover, make certain no external force applies to the pipes.

10. Make sure that the drain valve is opened when disassembling and/or assembling FILSTAR from equipment.

11. If possible, do not disassemble the FILSTAR unit once it’s installed. If disassembling is unavoidable, use suitable tools so not to crack and/or attached any scratches onto the body, drain cup, etc.

12. Contact supplier and receive advise before operating FILSTAR in a manner that exceeds its performance limits.

13. Warranty of FILSTAR applies one year after delivery.
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1. Outline
   In order to operate and handle equipment safely and smoothly, it is recommended to know features of each apparatus well and sufficient maintenance must be carried out. Considering that the fault of one filter can cause a stop of the whole equipment, the importance of taking all possible measures for thorough maintenance should be understood.

1-1 Application
   This operating manual is applied to element-less filter “FILSTAR” series.

1-2 Applicable range
   The scope of this manual applies mainly to FILSTAR. Drain valve and timers are based on separate manuals.

2. Attaching Filstar
   In order to use FILSTAR efficiently over long period of time, please attach accordingly as described.

2-1 Transportation and storage
   Proper handling while transporting FILSTAR greatly affects whether or not trouble will occur after attaching onto equipment.

2-1.1 Lashing and hoisting
   To hoist (large size) FILSTAR with a crane, tie rope and lift so it's aligned and balanced. DO NOT attach crane wire to drain valve part and/or thread parts. It is not only dangerous but might also damages parts.

2-2 Attaching FILSTAR

2-2.1 Please consult the attached drawing. FILSTAR has specific flow direction; IN, OUT and DRAIN. Confirm the pipes and/or hoses are connected properly.

2-2.2 When attaching FILSTAR, please check that the finish of the pipe screw/thread is good. If the screw mountain is chipped, it will also damage the FILSTAR threads and result in leakage. In the case of a pipe and connection, FILSTAR should not become the fulcrum (the point or support on which a lever pivots) of a lever or apply excessive weight load.

   It should be enough seal the connection by tightening the screw with less than 1.5 spanner rotation. Be careful not to tighten too much if sealing tape is on the thread part.

2-2.3 Check each bolting after attaching FILSTAR and if slack, refasten it. Leave one screw rotation so that no sealing agent, sealing tape, etc. do not enter FILSTAR.

2-2.4 Please be sure to flush and remove all foreign substances out completely after the completion of pipe connecting. Sufficient cautions are required for removal of a foreign substances.

2-2.5 If FILSTAR is installed in indoor facility, please take precautions from possible leakage by applying leak sensor or simply putting a drain pan under the drain valve.

2-2.6 Please install in places where operation and maintenance are easily accessible. Furthermore, if installed in high places, please prepare scaffolds for maintenance checks.

2-2.7 Please apply protection such as a fence if FILSTAR is installed near, by or on passages where there might be a danger of contact to people.

2-2.8 Please apply damage protection from salt water, snow and location where the product may freeze.

2-2.9 Please do install FILSTAR where there may be possible danger of rain water accumulating and sink the
3. Handling while in operation

3-1 Promptly remove all impurities recovered by opening the valve and discharging through the drain valve. If impurities are left without draining for a period of time, they will solidify and may not be discharged. This may decrease filtration ability and lower the flux.

3-2.a Drain valve operation
A valve becomes full open-full close by rotating the valve stem 90 degrees. A gear operated device, an electrically operated device, a pneumatic actuator, etc. can be attached as operational methods. Turn clockwise to close the valve manually using a handle, a handwheel, etc.

The open-close positions of a valve can be checked with the indicator attached on the stem top. If a valve is left in the state of prolonged half-opening, valve seals may be damaged and it will be the cause of leakage. Please avoid prolonged half-opened situation.

3-2.b Check if there are leaks from gland gaskets, flanges bolted face-to-face and from flanged ends pipes and/or hoses when operating (flowing liquid through) Filstar for the first time.

3-2.b-1 If a leak occurs from the crevice between glands, please retighten the gland bolts. Tighten by bolting gland bolts, applying equal power to all so not to fastened one gland bolt tighter than the other. Please perform bolting completely. Furthermore, if the leakage is not solved by refastening, it may be necessary to exchange the gland packing.

3-2.b-2 If a leak occurs from the gasket placed between flanges bolted face-to-face or from flanged ends of pipes and/or hoses, increase tightness of each bolt. Please increase tightness by diagonally applying equal strengths.

3-1.b-3 In an external leak like 3-2.b-1 and 3-2.b-2, if bolting is carried out while in a pressurization state, gland packing and gaskets may be damaged. Please decompress or be sure to carry out increase tightening in the state without pressure.
4. Inspection while in operation
Regular inspection is an important duty in order to maintain safe and normal operation of equipment. By not neglecting regular inspection, accidents can be prevented beforehand.

4-1 Fluid leakage
a) Leak from drain cup portion
b) Leak from endcap portion
c) Leak from thread part portion
d) Leak from drain valve portion

4-2 Allophones (Unfamiliar sound)
a) Generating from the Filstar itself.
b) Generating from loose bolts, etc.
c) Generating due to vibration of pipes

4-3 Visual and contact check
a) Bolt tightness
b) Degree of valve opening

4-1 Fluid leakage
If there is a leak from the screw portion, drain valve portion or any other parts after refastening the bolts, early exchange of the unit is recommended.

4-2 Allophones (Strange noises)
Although one cannot readily conclude whether a noise from an equipment is good or bad, it will be noticed if it’s not a sound usually heard. Although it’s not scientific but based on one’s senses, such awareness can lead to prevention of accidents and damages.

4-3 Visual and contact check
Finding and/or thinking there may be a flaw during regular visual and touch inspection can lead to prevention of accidents and damages. Leaving the drain valve half open for a long time is rare. However, degradation of ball valve seals advances rapidly depending on the medium and therefore, maintenance is required. It is also possible that bolts loosen by vibration coming from the surroundings. It is necessary to make visual judgment early.
5. Regular Inspection
The regular inspection of FILSTAR mainly checks for drain cup wear, whether corrosion exists on body/caps and screws parts. As a general rule, change O-rings and sealings when disassembling FILSTAR from equipment. It is necessary to stock spare parts for next scheduled inspection.

5-1 Disassembling FILSTAR
5-1.1 Consult separate sheet for disassembling and inspection while washing FILSTAR.

5-1.2 Parts check
Inspect FILSTAR in the following way as written below. If damage, wear, and/or dirt are severe, please do not use it but be sure to exchange for a new product.

The grade of wear/damage is investigated using a magnifying glass if needed. Be cautious not only of corrosion marks but of cracks too. Partially damaged area will degrade faster than as a whole, caution is required.

It is necessary to measure the inner thickness periodically and to record changes. If the inner part is dirty, clean using suitable methods, such as water, steam, acid washing, etc. Part which cannot be easily visible can be checked with a tester, small mirror, flashlight, etc.

For checking material thickness, such as a body and a cap, use an ultrasonic thickness meter or an electronic thickness meter.

5-2 Periodic inspection
Once disassembled/unattached from an equipment, even if FILSTAR itself doesn't need any maintenance, it is recommended to exchange o-rings, gaskets, seals, etc. and remove impurities from valve and/or drain cup and apply lubricant (e.g. metal guard 814 ) to relevant parts. Please apply grease to O-ring. If there is no specification, use lithium soap grease.

Finally, perform pressure test and then leak test using air at 0.5Mpa before reinstalling FILSTAR.
Attach FILSTAR vertically as shown. The "OUT" opening must face upward.

Flow direction