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JOHN C. ERNST LLC

PROCESS OBSERVATION SOLUTIONS

LIQUID LEVEL GAUGES

INSTALLATION, OPERATION & MAINTENANCE MANUAL

FOR SERIES: T14

STYLES
408 409

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PRODUCT QUICK SPECS.

Style	NPT Size	Glass O.D.	Length from Centers		Primary Material	Shut-Off Type	Pressure/Temp.		Maximum Steam Rating
			Glass	Rods			@ 100°F	@400°F	
408-04	1/2”	5/8”	-2”	-1”	Bronze	Lever	500 PSI	250 PSI	250 PSIG
408-05	3/4”	3/4”	-2”	-1”	Bronze	Lever	500 PSI	250 PSI	250 PSIG
409-04	1/2”	5/8”	-2”	-1”	Bronze	Handwheel	500 PSI	250 PSI	250 PSIG
409-05	3/4”	3/4”	-2”	-1”	Bronze	Handwheel	500 PSI	250 PSI	250 PSIG
436-04	1/2”	5/8”	-2”	-1”	316SS	Handwheel	500 PSI @ 100°F to 425°F		310 PSIG
436-05	3/4”	3/4”	-2”	-1”	316SS	Handwheel	500 PSI @ 100°F to 425°F		310 PSIG
							Limited to Glass & Gasket Ratings		

I. INTRODUCTION

This manual is a guide for the responsible personnel installing, operating and maintaining these items. It is imperative that instructions are read and understood thoroughly before attempting any installation, operation and maintenance.

Features and Specifications

John C. Ernst valve sets are supplied in pairs, which consist of an upper and lower valve, that secure each end of a vertically placed tubular gauge glass. The complete assembly of valves and gauge glass creates a gauge that visually indicates accurate liquid level and characteristics. Unless requested otherwise, all valve sets include the following features:

- ASME Section 1 Boiler Code Ball Checks; where the automatic ball check in the lower valve body moves vertically, preventing it from sticking.
- A 1/4" FNPT ball valve drain for boiler blowouts.
- An inspection Port.

These valves are suitable for steam-water applications in the following configurations:

1. **Automatic ASME** – Standard Configuration (temporarily retains media if glass breaks) - This consists of a vertical rising ball check with a ball inspection plug in the lower valve. The upper valve is equipped with a horizontal ball check and a leaky seat formed in the body.
2. **Non-Automatic** – Non-Standard Configuration (will not retain media if glass breaks) - Ball checks are removed from both valves. Typically removed for steam applications.

⚠ WARNINGS

Failure to follow instructions could result in a malfunction or breakage of the indicator, resulting in fluid escaping from the unit and fragmenting glass.

Always wear safety glasses when installing, servicing or operating sight glass.

Failure to follow precautions can result in personal injury and property damage.

Design Ratings at Maximum and Minimum Operating Temperatures

⚠ WARNING

Under most circumstances, these valves are not recommended without the ball check shut-off. Valves without the ball check shut-off feature will not stop leakage of contained fluid in the event of accidental tubular glass breakage.

To determine maximum allowable working pressures at specific temperatures, the user should refer to the chart at the bottom under the table of contents, the valve set drawing, and the specific design limits on the John C. Ernst LLC. product proposal. All ratings are limited to the Glass & Gasket pressure & temperature limitations.

⚠ WARNING

Under no circumstances should the ratings be exceeded. Exceeding ratings or application data may cause property damage or physical injury to personnel.

II. INSPECTION & PERFORMANCE CONFIRMATION

Receiving Inspection

Upon receipt of gauge valve set, the user(s) must confirm that:

- No damage occurred to any components. If damage is evident or suspected, do not attempt installation.
- The valve model number in **FIGURE 1** matches the Packing list.
- The glass tubes (if included) are free of scratches, chips, or other imperfections.
- The threaded connections are clean and free of any foreign material.
- The materials of construction are chemically compatible with both the media(s) and surrounding environment.

⚠ WARNING

If the Model Number, size, and/or performance data of the gauge valve set as received does not conform with the criteria above, do not proceed with installation. Contact a John C. Ernst Sales Representative.

Figure 1

NOTICE

Signs of corrosion could indicate a misapplication. An investigation should immediately be carried out as to the cause of the problem. It is the user's responsibility to choose materials of construction compatible with both the contained fluid and surrounding atmosphere.

III. INSTALLATION

SAFETY INSTRUCTIONS

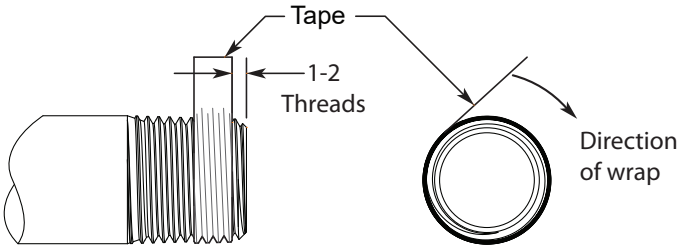
Personal Protection Equipment for eyes and hands should be worn when installing and/or operating a gauge valve.

Installation should only be performed by qualified and experienced personnel who are familiar with this equipment, have read and understood all instructions in this manual.

The user should refer to the John C. Ernst LLC. product proposal or drawing to obtain dimensional information for the specific size and model of the valve set.

Mounting

1. Close each valve by turning the handwheel clockwise until it stops.
2. Close drain valve by turning it clockwise until it stops.
3. Clean any debris or old media from vessel connection threads.
4. Remove the glass packing nuts, glass packing glands, and both gaskets from each valve. Ensure that these components are free of debris and place them in a safe location.
5. Mount upper and lower (with the ball valve) valves to vessel ports using about 2.5 wraps of Teflon® tape (or compatible equivalent) on all male NPTs.

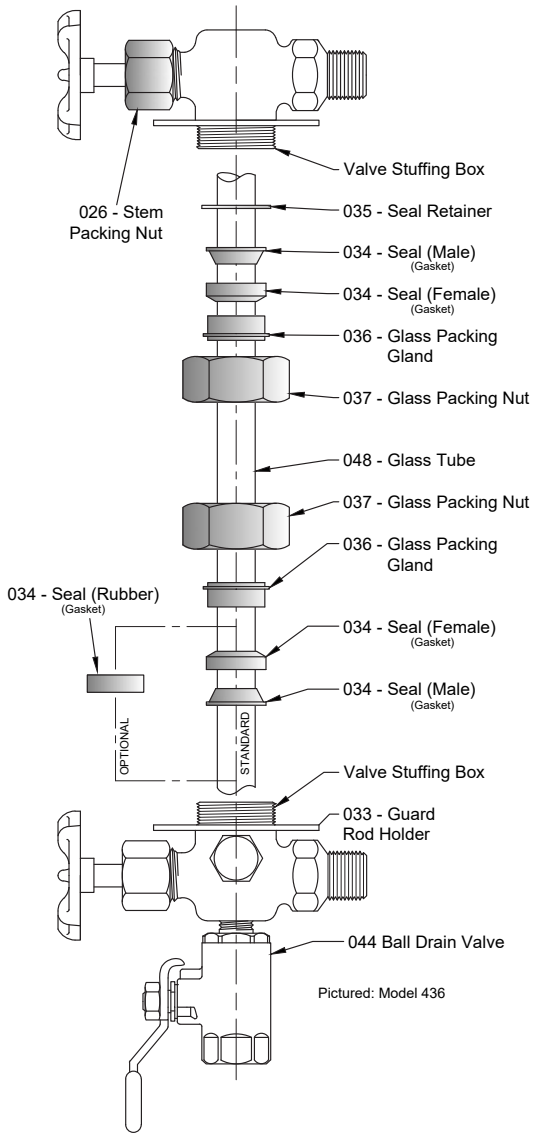


6. Tighten the valve set connections to vessel fittings ensuring that the sight glass connections are aligned vertically.

Sight Glass Installation

1. Slide the components onto the new sight glass, as seen in **FIGURE 2.**
2. Rotate the upper valve counter-clockwise (approx. 1/8 turn), for additional clearance to insert the sight glass.
3. While holding all components in place, insert the sight glass into the upper valve, and then directly over the lower valve.
4. Rotate the upper valve back to its original vertical position, and allow the sight glass to temporarily sit on the glass rest in the lower valve. Check alignment of valves.
5. Ensure the seal/gasket and packing gland are resting in the lower valve, then thread, but do not tighten, the glass packing nut. Repeat this for the top.
6. Lift the sight glass a 1/16” off the bottom rest so the sight glass is suspended between the valves, then hand-tighten each packing nut into place. The sight glass cannot come in contact with the bottom metal rest! For red line sight glasses, rotate the red and white stripe so it’s on the back-end of the glass viewing.
7. Packing Nuts must be hand-tight with an additional 1/2 turn with a wrench. **DO NOT OVERTIGHTEN**, as it can permanently deform gaskets and/or break the sight glass. Tighten only enough to prevent leakage in 1/4 turn increments, while retesting after each increment.
8. Insert the 4 guard rods into their respective holes from the top. They will come with a top cap, or for longer sections, have a threaded portion with 2 included nuts for each end to secure from the guard rod holder.
9. Ensure both stem packing nuts are tight. (5-7 ft.-lbs.)

FIGURE 2



IV. OPERATION

⚠ CAUTION

Valve sets should be brought into service slowly. The tubular glass used in gauge valves is annealed. To avoid excessive thermal shock or mechanical stress on the tubular glass, the connecting valves should be opened slightly, and the tubular glass temperature and pressure allowed to slowly equalize with the vessel.

Pre-Operational Check

1. Assure that all installation procedures have been completed.
2. Check that all connections are pressure tight.

Hydrostatic Test

1. Take all precautions necessary to handle the possibility of leakage during the test.
2. Pressure test assembly to rated pressure.
3. Repair any leakage before proceeding.

Operating

If the valves are furnished with ball checks, the valves must be opened all the way after the pressure and temperature have equalized, so the automatic ball checks can seat properly should the glass ever break.

V. MAINTENANCE

SAFETY INSTRUCTIONS

Personal Protection Equipment for eyes and hands should be worn when installing and/or operating a gauge valve.

Maintenance should only be performed by qualified and experienced personnel who are 1) familiar with this equipment and 2) have read and understood all instructions in this manual.

During system shut down, the gauge valves should be left open to relieve pressure and cool with the rest of the system. Failure to do so will trap high-pressure fluid in the gauge.

Preventative Maintenance

On all installations, the user should regularly evaluate for signs of:

- Leakage around stem area.
- Internal stem leak.
- Leakage around stuffing box connection.
- Internal or external corrosion.

The user must have maintenance schedules, safety manuals and inspection details created for each application and valve set. These must be determined based on evaluation of the maintenance team's operating experience, for what's necessary for the specific application.

⚠ WARNING

Do not proceed with the disassembly of a gauge valve unless the gauge valve has been relieved of all pressure or vacuum, has been allowed to reach ambient temperature, and has been drained or purged of all fluids.

Glass & Gasket Servicing

1. Close both handwheels (if equipped), upper valve first, so additional media cannot enter the sight glass.
2. Drain all remaining media in the sight glass using the included drain.
3. Remove guard rods, if present.
4. Loosen and remove glass packing nuts on both upper and lower valves. They can rest around the sight glass.
5. Slide the sight glass into the upper valve until the bottom clears the stuffing box port on the lower valve.
6. While holding tubular glass in this upward position, rotate upper valve counterclockwise (approx. 1/8 turn) to allow additional clearance for removing the sight glass from upper valve. Note that some resistance may be felt when moving upward due to the glass gasket.
7. Remove sight glass from upper valve.
8. Remove the glass packing nuts, glass packing glands, and glass packing gaskets from both valves.
9. To reassemble, follow the Sight Glass Installation instructions on **Page 2.**

Valve Stem Servicing (If Equipped)

NOTICE

John C. Ernst LLC. highly recommends replacing both glass and gaskets at the same time.

Disassembly

1. Close both handwheels, upper valve first, so additional media cannot enter the sight glass.
2. Drain all remaining media in the sight glass using the included drain.
3. Tank must be empty, or valves completely isolated from media before proceeding.
4. Loosen and remove stem packing nut.
5. Remove stem by completely loosening handwheel, and then firmly rotating counterclockwise while pulling through the valve body. The stem and stem packing will be removed as one entity.
6. Remove handwheel screw, nameplate, and handwheel from stem if necessary.
7. Slip the stem packing from the nut.

⚠ CAUTION
These valves have an integral stem seat. The valve must be replaced when seat becomes worn or damaged beyond repair.

Reassembly

1. Prepare for installation of new packing by cleaning all packing chambers and glands of upper and lower valves.
2. Slip new stem packing onto the stem.
3. Thread stem assembly into valve by turning clockwise until stem seats and then back off one turn.
4. Assemble handwheel, nameplate, and handwheel screw on stem and tighten to 5-7 ft-lbs. Refer to Section IV for operation of gauge valve when returned to service.

Troubleshooting

Problem: Buildup inside sight glass
Solution:

- Follow the steps in Glass & Gasket Servicing to remove the sight glass. Clean the inside of the glass with a brush (Model 854.)

Brush Bristle Sizing			
Glass Type	**Glass O.D.**	**Brush Diameter**	**Lengths Available**
505/506	5/8” or 3/4”	5/8”	21” 36” 48” & 72”
507/508	5/8” or 3/4”	3/16”	48”

Problem: Level indicated does not match the actual level in the tank
Solution:

- The emergency automatic ball checks most likely rolled into place and stopped the liquid flow if it rushed toward the sight glass. This can happen when the handwheels are opened too quickly. To fix, push the ball check away from the seat by closing and slowly opening the handwheel.

Problem: Leakage around glass connections
Potential Solutions:

- Glass and Gaskets will need periodic replacement. Pressures, temperatures, handling, and frequency of use are just some of the factors that can affect this.
- Glass and/or gaskets may be incompatible with application’s media and/or surrounding atmosphere.
- The assembly is being used in a steam application, which it is not recommended for.

If Occurring Shortly After Installation/Servicing

- Tighten the glass packing nuts in 1/4 increments. **Do not exceed 1 full turn.**
- Confirm that the valve sight glass ports are aligned from both front and side views.
- Confirm that the glass length is 2″ (±1/16″) less than the distance between the vessel connection points.
- Confirm that the order and amount of components exactly matches **Figure 2** on **Page 2**.
- Confirm that the correct part numbers and sizes have been ordered and received.

Problem: Leakage around valve stem
Potential Solutions:

- Gradually tighten the Stem Packing Nut (#026) in 1/8 increments. Do not exceed 1 full turn.
- Stem Packing and/or Stem may need to be replaced. See **Page 3** for servicing valve stems.

Problem: Valve allowing media to enter when closed
Potential Solutions:

- Valve Stem may need to be replaced. See **Page 2** for Valve Stem Servicing.
- Replace Valve.

Problem: Leakage around vessel connection ports
Potential Causes:

- Debris residing in threads.
- Insufficient Teflon® Tape applied during installation.
- Valve cross-threaded into vessel.
- Connection threads are damaged.
- Existing threading a different size or not for National Pipe Thread (NPT).

LIMITED WARRANTY

Period of Coverage
The John C. Ernst LLC. expressly warrants products to the original purchaser to be free from defects in the material and workmanship for 12 months from date of shipment. John C. Ernst LLC. will, at its option, replace or repair any products which fail during the warranty period due to defective material or workmanship. Evaluations, repairs, and replacements will most often occur in Sparta NJ 07871 USA, or another facility determined by the John C. Ernst LLC.. The warranty does not cover costs required to transport warrantied units to or from the John C. Ernst facility.

Limitations
The responsibility of the John C. Ernst LLC. is hereunder limited to repairing or replacing the product at its expense. This warranty shall not apply if the product has been disassembled, tampered with, repaired, subjected to misuse, neglect, accident, or otherwise altered in any way. The warranty does not guarantee products against normal wear, glass breakage, clouding, or corrosion. The John C. Ernst LLC. shall not be liable for loss, shipping costs, damage, or expenses related directly or indirectly to the installation or use of its products. It is expressly understood that the John C. Ernst LLC. is not responsible for damage or injury caused to other products, buildings, personnel, citizens, or property by reason of the installation or use of its products.
Advertised ratings apply only to units serviced with parts supplied by the John. C. Ernst LLC. Service must be done in accordance with the instructions of the product that is being serviced.
THIS IS JOHN C. ERNST, CO's. SOLE WARRANTY AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. WE WILL NOT BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY NATURE.

How to get Warranty Service
Prior to submitting any claim for warranty service, the owner must submit proof of purchase, and obtain written authorization to return the product. All returns must be sent back with an MSDS for the application that the product was used in, and with a maintenance log of all service including inspections. Thereafter, the product shall be returned to the John C. Ernst LLC. with freight paid and packaged to prevent damage in transit. Should damage in transit occur the John C. Ernst LLC. will not be held liable.

GENERAL PRESERVATION

Recommended Practice for Long Term Storage of John C. Ernst Products

1. All units should be inspected upon receipt to ensure that no damage has been incurred during transit. If there has been damage, a claim should be filed with the carrier immediately. Units should be stored in an area protected from the elements and corrosive fumes, in a secure manner where they can neither fall nor be struck by other objects. Care should be taken to protect the glass and the end connections from damage. Avoid placing any objects directly on the glass(es) at any time.
2. Units should be checked to ensure that they contain no foreign matter and that the end connections are clean, undamaged, and in line with adjoining piping. Examine each glass carefully using a flashlight for any indications of chips, scratches, blemishes or cloudiness. Inspect for scratches, shining a bright concentrated light (powerful flashlight will suffice) at about a 45º angle. Any scratch that glistens and catches a fingernail, or star or crescent-shaped mark that glistens, is cause for replacement. Process surface that appears cloudy or roughened, after cleaning, is evidence of chemical attack and is cause for replacement. If any type of flaw is apparent, the unit should not be installed until the glass and gaskets have been replaced. Follow the torquing recommendations given by the gasket and piping manufacturers to achieve proper sealing pressures.
3. Some products are shipped unassembled, as they are to be welded into position and then assembled. Individual pieces should be carefully stored in a manner to avoid damage until installation. The glass requires special attention. It should not be stored or mixed with objects that may cause damage and should remain wrapped or boxed until assembly.
4. Gaskets frequently assume a compression-set over a period of time. Some materials, however, may compress/relieve or creep. Visually inspect the gaskets for gaps or looseness before start-up. If the gaskets are not compressed, adjust the unit gasket compression. Do not tighten any fasteners or clamps while the unit is in operation.
5. Periodic visual inspection should be made to ensure that no leaks are evident and that there is no clouding, scratching, or blemishing of the glass. Keep glasses clean using commercial glass cleaners. Cleaning should be done without removing glass. This may require recirculation of cleaning material if process side of glass is not accessible. Never use harsh abrasives, wire brushes, metal scrapers, or anything that may scratch the glass. Do not attempt to clean glasses while equipment is in operation.
6. Should leaking around the glass occur, first check the glass for damage. If the glass appears to be in good condition, the gasket seal should be checked, but only after the system pressure has been brought down to zero. If the gasket appears to be loose, or hardly compressed, the spacers must be adjusted. If the leak persists after repressurizing, disassemble and replace the gaskets.
7. Glass, shields and gaskets that have been removed, MUST BE REPLACED. Used parts may contain hidden damage. Induced stress in glass and de-tempering are NOT visible to the naked eye. Be sure that the replacement glass is proper for the service.
8. Inspect protective coating (if applied) for chipping.
9. Store within the temperature extremes of the nameplate or specification documents – do not expose to direct sunlight or other UV sources.
10. Products should be stored off of the floor on suitable skids, pallets, or racks and protected from dirt, debris, and exposure to direct sunlight, particularly to soft sealing surfaces.
11. Store in a cool dry place, room temperatures between 40°F - 80°F with a relative humidity level between 40 – 75%.
12. Store in dry areas, avoiding any contamination with any liquids. Products should be kept in a clean, heated, weather-tight (dry), well ventilated facility.
13. If a flanged product is to be stored for any extended period of time, the flange or end protector should be examined to ensure they are fastened securely, and any other open areas should be sealed to prevent any moisture damage.
14. Product assemblies with electrical components, pneumatic tubing, positioners, actuators, and other accessories should be protected from impact.
15. Useful Life When Stored:
    a. Unit: Indefinite, based on ideal storage conditions.
    b. Spare Gaskets: Indefinite, based on ideal storage conditions.
    c. After 9 months, the torque of the bolting should be checked as the gasket relaxes. This should be done for units not in service as well as those installed in process.
    d. The useful life of the material, when the storage conditions differ from the recommended factors is not known. It has been established, however, that room temperature has a significant influence on the shelf life of material.
    e. Spare Gaskets should be stored flat.
16. Periodical checks at least every 6 months have to be carried out in the storage area to verify that the above mentioned conditions are maintained.

If there are any questions or concerns, please contact the John C. Ernst LLC. Sales Office at 888-943-5000.

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