PENBERTHY®

K2 / N2 Series
Tubular Gaugecocks

PENBERTHY®

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1.Introduction

From its beginning in 1886 with the boiler feedwater injector to present-day ISO 9001 certification, Penberthy has utilized advanced technology to anticipate customer needs and solve problems. Many years of research and development, lab and field product testing, and product performance monitoring have resulted in a superior product line used in oil and gas production, transportation, refining, petrochemical, chemical, and power generation industries

1.Warranty

Clark-Reliance warranties its manufactured goods as being free from defects in material and workmanship for one (1) year from the date of shipment. If any of the goods are found by the seller to be defective, such goods will be replaced or repaired at the seller's cost. Refer to the Clark-Reliance Terms & Conditions for full warranty details.

3. About This Manual

This manual is designed to aid and guide in the installation, operation, and maintenance of the Penberthy K2 / N2 family of tubular gaugecocks. Authorized personnel must read and understand all instructions before attempting to install, operate or maintain this equipment. Only persons certified to perform work described herein should attempt any actions suggested. Safety precautions and company safety standards should be always observed when performing the activities described in this manual.

4. Inspection & Delivery

Upon receiving valves, check all components carefully for damage incurred during shipping. Sign for the shipment noting “damaged” and immediately notify the shipping firm of any such damage and request damage inspection. Confirm valve model number, pressure and temperature ratings (on nameplate) meet application specifications. Also confirm that the material of construction is compatible with both the process fluid and surrounding atmosphere.

5. Product Description

The Penberthy K2/N2 tubular gaugecock set delivers a clear, reliable, level reference for various applications. Tubular gauges allow operators to verify level and visually inspect fluid characteristics without electronic aids. Requiring no electrical power, these valves provide accurate direct-reading measurement in remote or unpowered locations and remain fully operational during plant blackouts. Offset-pattern bodies permit straight-through rodding without removal, while precision ball-check shutoffs instantly isolate the vessel upon glass breakage to prevent fluid loss.

These valves must be installed, operated, and maintained with reasonable care and due regard for the applications and environment if they are to provide safety and reliability for their service lifetime.

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6. Selection Guide

SELECTION GUIDE - PART 1 — **PART 2 - PAGE 13**

Example:	N2A	S	S	X	C	A	X	D	E	A	C	A	G	G	S	S

Model

N2A	Model N2A tubular gaugecock
N2B	Model N2B tubular gaugecock
N2C	Model N2C tubular gaugecock
K2A	Model K2A tubular gaugecock
K2B	Model K2B tubular gaugecock
K2C	Model K2C tubular gaugecock
N7A	Model N7A tubular gaugecock
N7B	Model N7B tubular gaugecock

Body Material

C	Carbon steel
S	316/316L Stainless
B	Bronze (N7 only)
G	Ductile Iron (N7 only)

Trim Material

C	416 SST (standard on Carbon steel and ductile iron body)
S	316/316L SST (standard on 316 SST body)
B	Bronze (standard on bronze body, N7 only)

NACE MR-01-75 and/or MR-0103

X	None
E	NACE Environmental

Vessel Connection Size

C	1/2"
E	3/4"
F	1"

Vessel Connection Type

A	NPT male union
B	NPT female union
C	Socket weld male union
D	Socket weld female union
E	Spherical union NPT male
J	Solid shank NPT male
K	Solid shank SW male
N	Raised face SO
P	Flat face SO

Pressure Class (if flanged)

X	None
1	P CL 150
3	P CL 300
6	P CL 600

Gauge Connection Size

D	5/8"
E	3/4"

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PART 1 - PAGE 12

N2A	S	S	X	C	A	X	D

SELECTION GUIDE - PART 2

Example:	E	A	C	A	G	G	S	S	XXX
Vent Connection Size									
X None (standard on N7)									
C 1/2"									
E 3/4" (standard on N2, K2)									
Vent Connection Type									
X None (standard on N7)									
A NPT Female (standard)									
B Socket Weld Female									
F Plugged									
Drain Connection Size									
X None									
C 1/2" (standard on N2, K2)									
E 3/4"									
Drain Connecion Type									
X None									
A NPT Female (standard)									
B Socket Weld Female									
F Plugged									
G Drain Cock									
Stem Packing Material									
B Braided Carbon Fiber									
G Grafoil® (standard)									
T Teflon®									
Glass Packing Material									
B Buna N									
T Teflon®									
Stem Operation									
S Standard close w/ handwheel (standard)									
A Quick close w/ lever									
B Quick close w/ handwheel									
F Standard close w/ lever									
Paint Specification									
X None									
S Standard									
Options									
XXX None									
* Plastic Protector									
* Horizontal ball check									
* Vertical rise ball check lower gaugecock									
* ASME vertical rise ball check lower gaugecock plug									
* Ball check shut off omitted (ASME)									
* Vacuum service vessel connection									
* Smooth body (N7 only)									

* Option code assigned at time of order

Pressure Ratings (Carbon & Stainless Steel Valves):

PRESSURE/TEMPERATURE RATINGS FOR GAUGES WITH A SINGLE PIECE OF TUBULAR GLASS (BOTH ⅝" AND ¾")

Center to center distance for vessel connections inch (mm)	No corrosion up to 150°F (66°C) psig (kPa)			Steam boiler service up to 425°F (218°C) psig (kPa)		
	High pressure	Heavy wall	Red line	High pressure	Heavy wall	Red line
10 (254)	410 (2830)	600 (4140)	340 (2340)	310 (2140)	345 (2380)	275 (1900)
15 (381)	385 (2650)	600 (4140)	310 (2140)	280 (1930)	325 (2240)	265 (1830)
20 (508)	355 (2450)	600 (4140)	285 (1960)	265 (1830)	315 (2170)	260 (1790)
25 (635)	300 (2070)	580 (4000)	260 (1790)	250 (1720)	300 (2070)	250 (1720)
30 (762)	275 (1900)	550 (3790)	230 (1590)	-	-	-
35 (889)	240 (1650)	500 (3450)	200 (1380)	-	-	-
40 (1016)	210 (1450)	420 (2890)	180 (1240)	-	-	-
45 (1143)	200 (1380)	360 (2480)	170 (1170)	-	-	-
50 (1270)	180 (1240)	340 (2340)	160 (1100)	-	-	-
55 (1397)	150 (1030)	N/A	140 (970)	-	-	-
60 (1524)	140 (970)	N/A	120 (830)	-	-	-
65 (1651)	125 (860)	N/A	100 (690)	-	-	-
70 (1778)	100 (690)	N/A	90 (620)	-	-	-

Using secured glass unions and multiple pieces of tubular glass will increase the pressure/ temperature rating over that of an equivalent length of single glass.

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7. Installation

Fittings The gauge glass fittings (valves) are supplied as assembled units complete with holders for protectors specified. Before mounting each fitting to the vessel connection, remove the packing nut, packing gland and packing from the glass side. Mount each fitting to the vessel connection, paying particular attention to the alignment of the glass connections.

NOTE: Fittings with glass connections out of line will cause glass breakage. Connect drain cocks or other piping to the fitting before installing the glass.

Glass To install the glass, first place a gland nut, gland and packing (in that order) on each end of the glass.

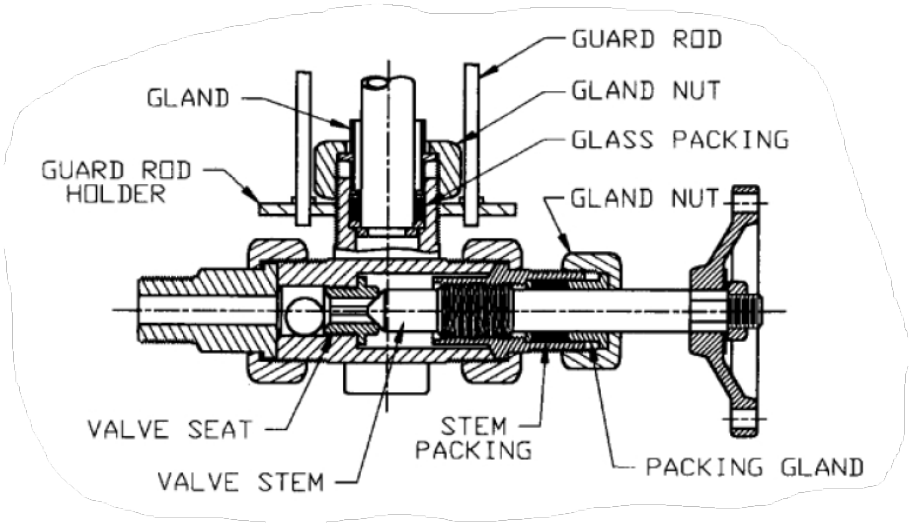
Note: If a plastic protector is being used, it must first be put over the glass. The glass is then inserted up into the stuffing box in the top fitting, centered over the stuffing box in the bottom fitting, and inserted into position.
With the glass in place, slide the packing into the stuffing box and engage the packing nut. Lift the glass slightly to prevent contact with the metal seat in the bottom fitting and tighten both packing nuts only enough to prevent leakage, but not so much that expansion or contraction of the glass is restricted.

PROTECTORS (when specified)

Guard Rods Insert the end of the guard rod through the hole in the holder on the top fitting from the underside. The rod is then centered over the corresponding hole in the holder on the bottom fitting and dropped into place.

NOTE: Rod length equals center to center of fitting stems less 1-1/8".

Plastic Protector Place the plastic protector (a 1-3/8" OD plastic tube inside of a 1-3/4" OD plastic tube) over the glass before the packing nut, gland, and packing are placed on the ends of the glass per the “INSTALLATION” instructions for “Glass” above. Slide the end of the larger, 1-3/4" OD plastic tube with the two (2) 3/16" ID holes over the upper valve packing nut and secure by threading the two (2) supplied machine screws (with washers) through the holes and into the threads on the packing nut. The smaller, 1-3/8" OD plastic tube will then rest on the lower valve packing nut.



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8. Recommended Commissioning Procedure

1. When there is liquid already present in the vessel, open the top valve ¼ to ½ turn. It is always best practice when commissioning any Penberthy Gaugecock to open the top valve first.
2. Next, open the bottom valve ¼ to ½ turn to allow liquid to flow into the gage. Liquid will flow into the gage until the gage level equalizes with the vessel level. Wait for the gage level to stop rising before proceeding.

** If the valve handle is opened too quickly, retracting the stem tip into the seat cavity, the kinetic energy of the fluid could potentially force the ballcheck into the seat. This will isolate the gage from the vessel and yield a false level reading **

3. Once the gage level has stopped rising, fully open the top valve.
4. Next, fully open the bottom valve.
5. The gage is now ready for normal operation. In the event of a catastrophic failure, the ballchecks will seat, isolating the gage from service.

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9. Maintenance

CAUTION: Prior to any disassembly of valves, first be sure that the valves are relieved of all internal pressure, temperature is ambient, and the valves have been drained and/or purged of any fluids. Failure to do so may result in a sudden release of pressure and/or physical injury to personnel.

CAUTION: When gage fails causing ball checks to seat, closing the valve will allow fluid to flow from the vessel during that period when the pin pushes the ball off its seat and before the stem has contacted the seat. The operator could be hurt if not realizing what is happening or fires could result if hazardous liquids are involved.

To Replace Broken Glass

1. Shut off bottom and top fittings and open the drain.
2. Remove the packing nut, gland, packing, and broken pieces of glass from each fitting.
3. Open the top fitting slowly to blow out any remaining pieces.
4. Open the bottom fitting slowly to remove any remaining pieces from the bottom fitting.
5. Install new glass as in original installation (see Installation – Glass).

CAUTION: Care should be taken when blowing out broken pieces of glass to prevent injury to operating personnel.

NOTE: The required length of replacement glass is equal to the center-to-center distance of the fitting stems minus 1-3/8"

Centerline factor to calculate lenghts

Model	Visible Range		Tubular Glass		Guard Rods	
	in	mm	in	mm	in	mm
K2 / N2	4.625	-117	-1.375	-35	-2.125	-54

To Replace Stem Packing

1. Close fittings and drain the gage glass.
2. Disengage the packing gland nut and pull the packing gland out of the stuffing box.
3. Remove old packing and insert new packing.
4. Put the packing gland back into position and tighten the nut.
5. The gland nut should be tightened enough to stop leakage around the stem without causing excessive binding of the stem during operation.

To Replace the Seat

1. Remove the stem unit as described above.
2. Using a standard 5/8" socket wrench, remove the seat.
3. Before replacing the seat, apply lubricant (Molykote “G” or equivalent) to the threads to prevent seizure of metals.
4. Replace the seat and tighten well to prevent leakage.
5. Replace the stem unit in the body and tighten the sleeve nut.

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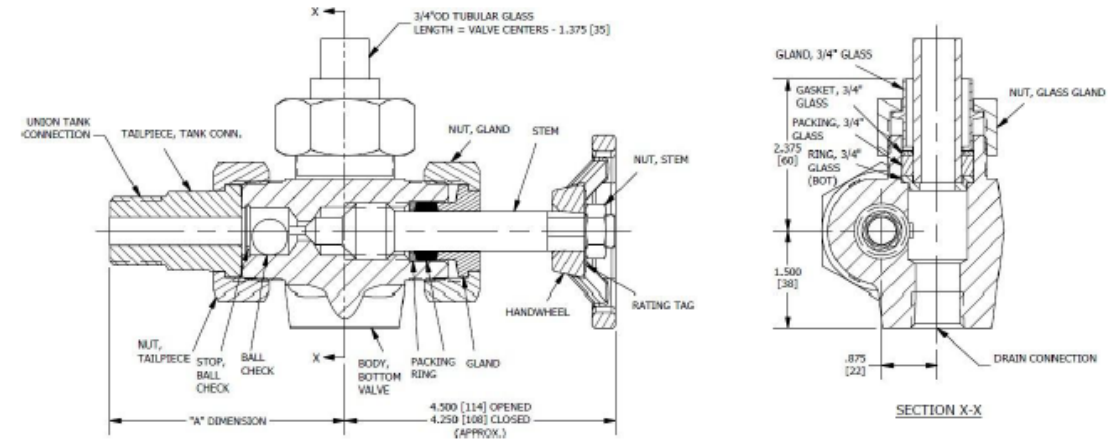
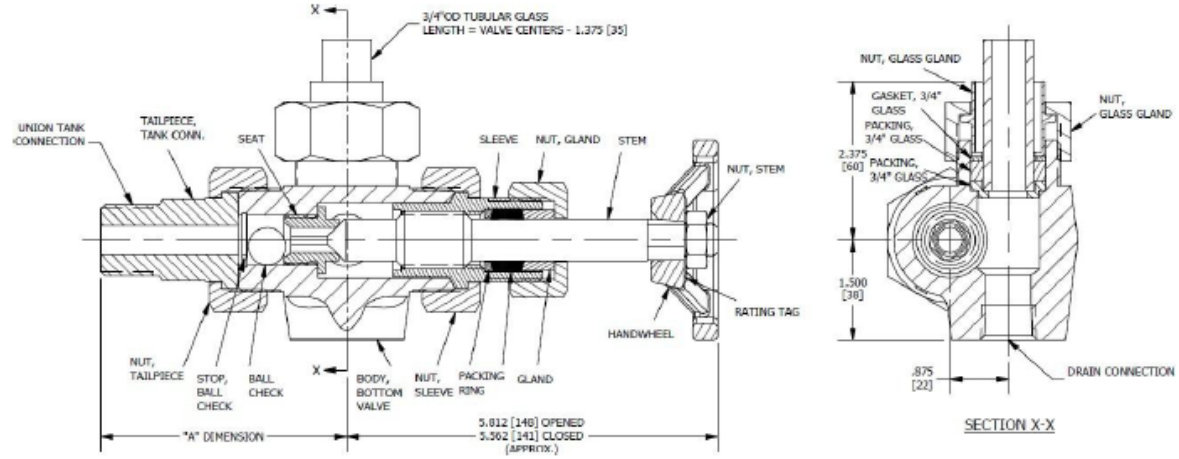
10. Valve Diagrams

SERIES N2

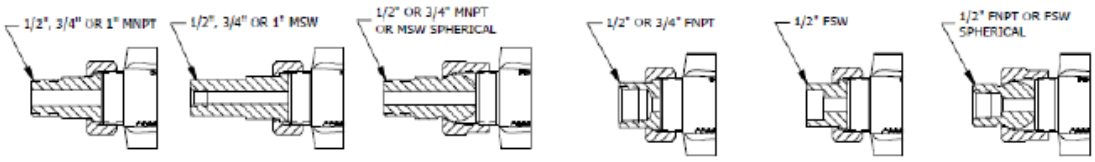


SERIES K2



UNION TANK CONNECTION ("A" DIMENSION)								
1/2" MNPT (OR MSW)	1/2" FNPT (OR FSW)	1/2" MNPT SPH. (OR MSW)	1/2" FNPT SPH. (OR FSW)	3/4" MNPT	3/4" MSW	3/4" FNPT	3/4" MNPT SPH. (OR MSW)	1" MNPT (OR MSW)
3.688 [94]	2.813 [71]	4.313 [110]	3.438 [87]	3.688 [94]	4.500 [114]	2.813 [71]	4.313 [110]	4.125 [105]

VENT / DRAIN CONNECTION
1/2" OR 3/4" FNPT (OR FSW) ONLY



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