

## LIQUID LEVEL GAGES & VALVES

# QUESTTEC SOLUTIONS

## LIQUID LEVEL GAGES & VALVES

Forty years of product knowledge brings you the best the market has to offer:

Questtec Solutions is a young company with a long lineage of quality, experience and care. The development and engineering of the liquid level gage and valve product lines began more than forty years ago.

These products have been consistently refined and improved to remain one of the industry leaders in liquid level measurement. One of the leading liquid measurement companies, Daniel Measurement and Control, directed this product development and engineering.

New management means a fresh dedication to bring you solutions: On September 27, 2001, the Daniel liquid level gage and valve product lines were purchased by **Questtec Solutions**. The management and staff at Questtec have collective hands-on experience with all aspects of the liquid level gage and valve product line of over 150 years.

New facilities mean flexibility to better meet your needs: **Questtec** relocated its manufacturing facility for better growth and flexibility across Houston to 13960 S. Wayside Drive, Houston, Texas 77048 with a new phone number of [281] 240-0440. This new facility has also allowed for the expansion into new product offerings such as Magnetic Level gages, High Pressure Steam gages, Electronic Boiler trim and Armored Tubular.

When choosing your liquid level measurement solution provider, why not choose the best? The symmetry of a market tried-and-true product coupled with the energy of new management, has positioned **Questtec** to be best suited to assist you in solving your liquid level measurement challenges.



# GLASS-TRAC LIQUID LEVEL GAGES & VALVES

## ORDERING INFORMATION

**Please Specify:**

- Gage Size Number
- Type of Service
- Temperature Limits
- Pressure Limits
- Type of Connections
- Special Functions
- Vessel Centers if Close Hook-up

## GAGE NUMBERING SYSTEM

**Example: 71-RL:**

7 is #7 Glass [#1 through #9]  
 1 is One-Section Gage [1, 2, 3, 4, . . .]  
 R is Reflex [T-Transparent]  
 L is Low Pressure Series  
 [M = Mid, H = High, WP = Weld Pad]

[Add appropriate digits or letters to indicate special purpose gage or accessory]

- HC** Externally Heating/Cooling Gages
- FP** Frost Preventive Extensions
- LC** Large Chamber Gage
- EP** Explosion Proof Illuminator
- CH** Close Hook-up Connections

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Carbon steel is the standard material for all Glass-Trac low, mid and high pressure liquid level gages. The percentages of carbon steel pressure ratings for optional gage materials are listed below.

**GAGES**

Stainless Steel 300 & 400 Types . . . . .	100%
Monel®, Hastelloy® B & C . . . . .	90%
Brass . . . . .	50%

**GASKETS**

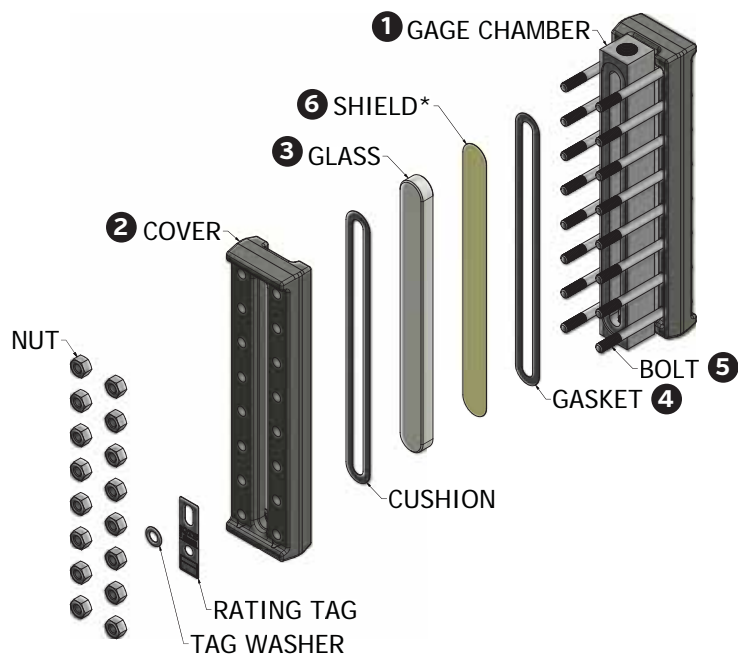
Special Acid Sheet Gasketing . . . . .	75%
Teflon®, PCTFE [Kel-F®] . . . . .	50%
Glass-filled Teflon® . . . . .	100%
Grafoil® GHR . . . . .	100%

Monel and Hastelloy are registered trademarks of Special Metals Corporation. Teflon is a registered trademark of DuPont. All specifications are subject to change without notice as part of a continuing program of product improvement. Kel-F is a registered trademark of 3M. Grafoil GH, GT are trademarks of GraphTech Inc.

# QUESTTEC SOLUTIONS FLAT GLASS GAGE OVERVIEW

## FLAT GLASS GAGES

Questtec flat glass gages are used where direct visual observation of process fluids is required. These gages are suitable for a wide range of applications with pressures up to 6000 psig @ 100°F, and temperatures up to 800°F to 2620 psig. Questtec gages are available in either carbon steel or 316 stainless steel construction materials to meet most specifications.



\* OPTIONAL MICA SHIELD SHOWN

### Transparent Gage Exploded View

There are five main components common to all flat glass gages:

#### 1 CHAMBER

Center of the gage, and is the part that primarily contains the process fluid. It is machined from bar stock. The gasket seat is a recessed seat for lateral support, and easy positioning.

#### CHAMBER MATERIAL OPTIONS

Alloy 20	Chrome	AL-6XN
Hastelloy® C276	Super-Stainless [SM0254]	321SS
Monel®		347SS
Titanium	Chrome-Moly (various grades)	Zirconium
Duplex SS [22% Chrome]	Inconel®	317SS
Super-Duplex SS [25%		410SS

#### 2 COVER

Protects the glass, and provides the compression surface for sealing the gage. The cushion seat is a recessed seat for lateral support and easy positioning.

#### 3 GLASS

Provides the visual interface between the process fluid and the outside.

#### 4 GASKET/CUSHION

Provides for a seal between the chamber and glass [gasket], and protects the glass from mechanical stresses from the cover [cushion]. For a given gage, the gasket and cushion are normally the same material.

#### 5 BOLTS/STUDS/NUTS

Provides a uniform compression load to the gage for pressure sealing.

#### 6 SHIELDS (Option for transparent gage)

## TRANSPARENT GLASS

Reliable, accurate liquid level indication where fluid properties must be directly viewed.

#### Features:

- Recessed Gasket Surface
- Shrouded Covers
- Meets ASME/ANSI/NACE Standards
- Complete line of safety shut off valves available.
- Allows users to see fluid characteristics
- Pressures from full vacuum to 6000 psig
- Temperatures from cryogenic to 800°F [427°C]
- Large Volume Chambers Available
- Available with a wide variety of connection configurations
- Custom Engineered Solutions

#### Applications:

- Interface Applications
- Steam Applications to 350 psig w/mica shields to protect glass
- Hydrocarbon Processes
- Offshore Platforms
- Acid Storage
- Water Treatment
- Pulp & Paper

## REFLEX GLASS

Reliable, accurate bi-color liquid level indication of liquid-gas interface.

#### Features:

- Low Maintenance
- Recessed Gasket Surface
- Shrouded Covers
- Meets ASME/ANSI/NACE Standards
- Pressures from full vacuum to 6000 psig
- Temperatures from cryogenic to 800°F [427°C]
- Large Volume Chambers Available
- Custom Engineered Solutions

#### Applications:

- Low Pressure Steam to 300 psig
- Hydrocarbon Processes
- Offshore Platforms
- Acid Storage
- Water Treatment
- Pulp & Paper



## GLASS TYPES, SIZES & PRESSURE SERIES

### Glass Materials

- Tempered Borosilicate [Standard]
  - Up to 600° F [316° C]
  - Up to 300 psig WSP
  - Over psig 300 PSIG, Mica Protected Transparent Glass Only
- Tempered Aluminosilicate [Optional]
  - Up to 800° F [427° C]

### Glass Sizes

- Industry Standard 34mm
- Sizes 1 through 9



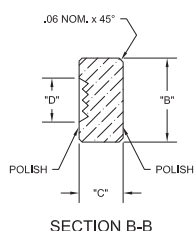
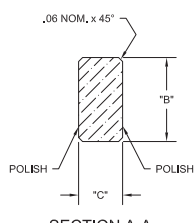
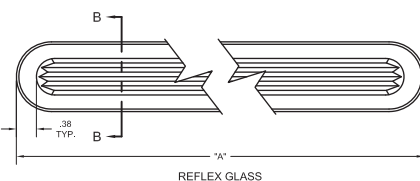
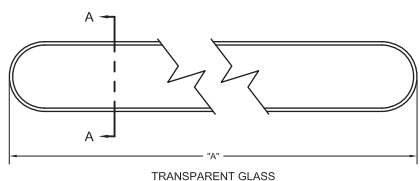
### Gage Type Pressure Series

#### Reflex

- Low 1800 to 2400 PSIG
- Medium 2250 to 3000 PSIG
- High 4000 PSIG

#### Transparent

- Low 500 to 1000 PSIG
- Medium 1000 to 2500 PSIG
- High 3000 PSIG
- Ultra HP 6000 PSIG



"A" DIMENSION		
SIZE	INCHES	mm
1	4.50	115
2	5.50	140
3	6.50	165
4	7.50	190
5	8.63	220
6	9.88	250
7	11.00	280
8	12.63	320
9	13.38	340

DIMENSIONS		
SIZE	INCHES	mm
B	1.31	34
C	.69	18
D	.69	18

## SPECIFICATIONS

### Materials of Construction

- **Borosilicate Glass**
- **Gaskets**
  - IFG®-5500 Standard [Seal/Cushion]
  - Graphite, with .002" [.05mm] stainless steel reinforcement layer -standard
  - Teflon®
  - Other Materials Available
- **Chamber**
- **Carbon Steel-A696 Grade C**
  - To -20° F [-28° C]
  - Bolts A193, Grade B7**
  - Nuts A194, Grade 2H**
- **Low Temp Carbon Steel-A350LF2**
  - To -50° F [-45° C]
  - Charpy Impact Tested
  - Bolts A193, Grade B7M**
  - Nuts A194, Grade 2HM**
- **Stainless Steel-ASTM A276 Grade 316/316L**
  - To -325° F [-198° C]
  - Dual Rated 316/316L
  - Bolts A193, Grade B8M**
  - Nuts A194, Grade 8M**
- All Wetted Parts Acceptable for NACE Service MR-01-75

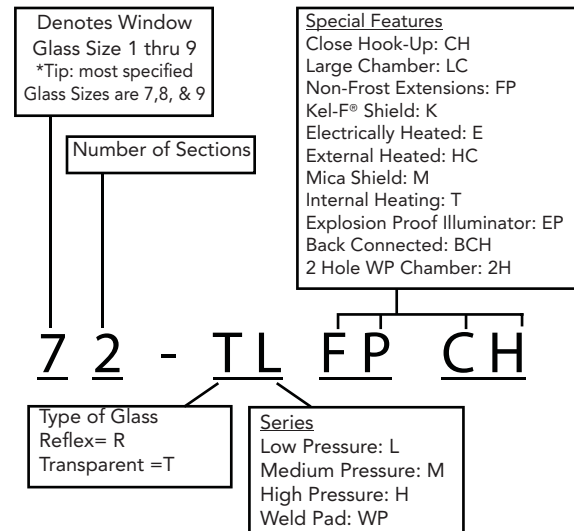
### Shields

- Shields are used to protect the glass from chemical attack. Two shields are available: Mica and PCTFE.
- Mica shields are used to protect the glass from corrosion in high pressure steam [over 350 psig WSP] and caustic applications [pH>11].
  - PCTFE shields [formerly known as Kel-F®] are primarily used in Hydrofluoric Acid service. Note that the PCTFE shield also serves as the sealing gasket; no additional sealing gasket is required.

### Spring Washers

For cyclic temperature applications or to aid in torque retention spring washers are available upon request.

### Gage Code for Questtec Gages



### Gasket Materials

Material	Min. Temperature	Max. Temperature	Rating Factor
Garlock® IFG-5500 (standard)	-40°F (-40°C)	550°F (288°C)	100%
25% Glass Filled TFE	-328°F (-200°C)	500°F (260°C)	100%
Graphite	-400°F (-240°C)	800°F (427°C)	100%
PCTFE(Kel-F®) Shield	-400°F (-240°C)	302°F (150°C)	50%

# REFLEX GAGE QUESTTEC GLASS-TRAC

## For Pressures up to 4000 PSIG @100°F

Available in three pressure based series, RL, RM and RH, Glass-Trac Reflex Level Gages use glass with molded prisms on the process side designed to absorb light when filled with liquid, and to reflect light where vapor is present. The result is a clear distinction between liquid and vapor. Because liquid always appears very dark or black, liquid level is obvious, even from a substantial distance.

Reflex Gages are suitable for use where the liquid is clean, and of low enough viscosity that the prisms will not be fouled. They are less expensive than Transparent type gages, and do not require back lighting. They should not be used with liquids that aggressively attack glass, as the glass cannot be shielded. The maximum pressure for use as a water gage in steam service is 300 PSIG [20.7 BARG].

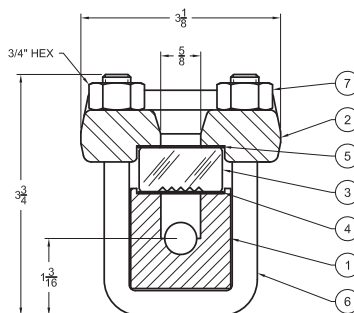
Glass-Trac Reflex Gages are constructed of one piece chambers, machined from bar or square tube with a recessed gasket seat. The chamber, gasket and glass are the only parts that contact the process. Forged carbon steel covers are standard for RL, RM and RH Reflex Gage, with the RM and RH gages having shrouded, wrap around covers to offer protection to the glass sides.



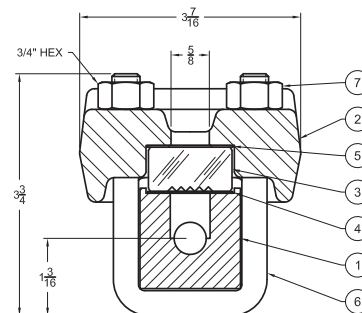
Typical Reflex Top/Bottom



Typical Reflex Close Hook-Up



Section "X-X"  
Low Pressure



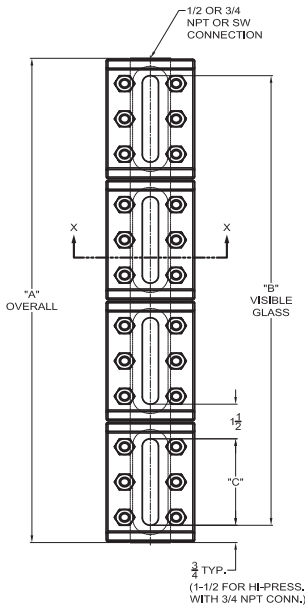
Section "X-X"  
Mid/High Pressure

Standard Bills of Material					
Item	Part	Carbon Steel	Low Temp To -50 F	Stainless Steel Parts in Contact	Stainless Steel All Metal Parts
1	Liquid Chamber	SA-696 Grade C	SA-350 LF2	SA-276 Type 316	
2	Cover	SA-105	SA-350 LF2	SA-105	SA-182 Type 316 or SA-276 Type 316
3	Glass	Tempered Borosilicate (Aluminosilicate above 602° F)			
4	Gasket	Garlock® IFG 5500			
5	Cushion	Garlock® IFG 5500			
6	U-Bolt	SA-193 B7 Alloy Steel			SA-193 B8M
7	Nut	SA-194 2HM Alloy Steel			SA-194 8M

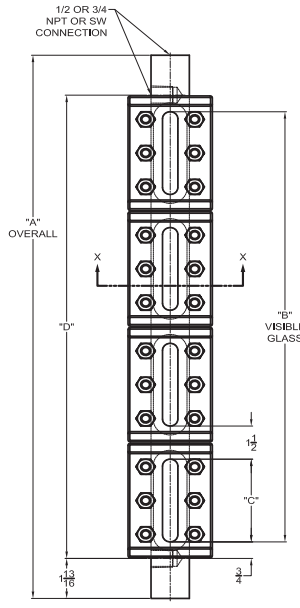
# QUESTTEC SOLUTIONS

## SIZE & DIMENSIONS

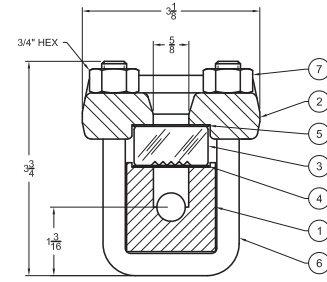
### End Connections & Close Hook-Up



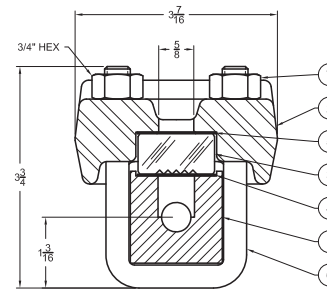
**STANDARD  
END CONNECTED**



**CLOSE HOOK-UP  
SIDE CONNECTED**



**Series RL Cross Section**



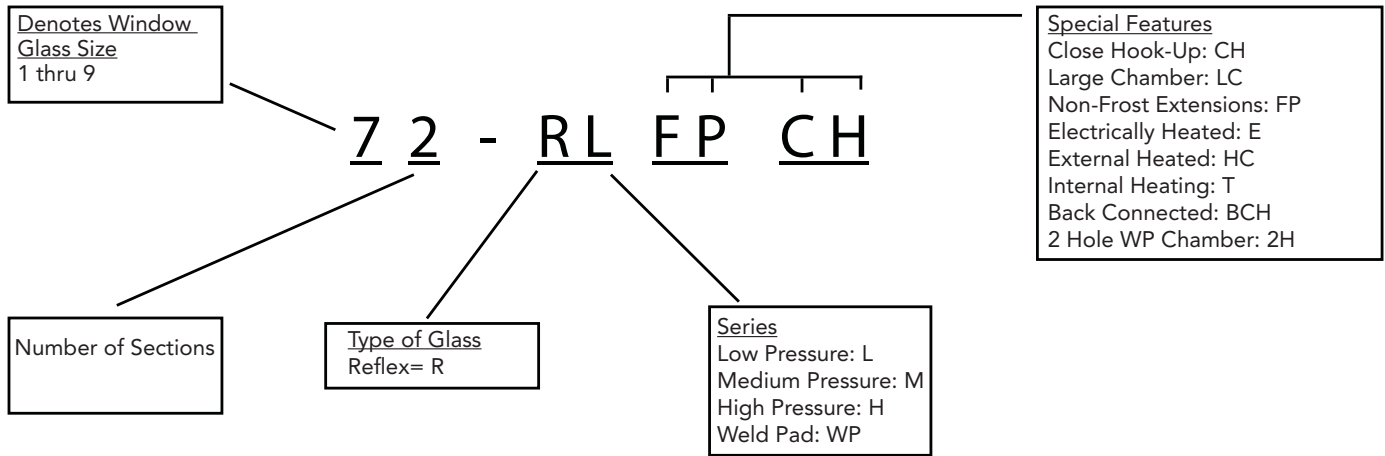
**Series RM/RH Cross Section**

## REFLEX GAGES

SIZE & WEIGHTS											
SIZE NUMBERS			OVER-ALL LENGTH (IN.)			VISIBLE GLASS (IN.) B	GLASS SIZE (IN.) C	CLOSE HOOK-UP CENTER-TO-CENTER (IN.)		APPROX. WT. (LBS)	
LOW PRESS.	MID PRESS.	HIGH PRESS.	A (STD)* 1/2" OR 3/4" NPT	A (CH) 1/2" NPT	A (CH) 3/4" NPT			D 1/2" NPT	D 3/4" NPT	LOW PRESS.	MID-HIGH PRESS.
<b>SINGLE-SECTION GAGE</b>											
11RL	11RM	11RH	5.25	8.875	9.25	3.75	3.75	5.25	5.625	7	8
21RL	21RM	21RH	6.25	9.875	10.25	4.75	4.75	6.25	6.625	8	9
31RL	31RM	31RH	7.25	10.875	11.25	5.75	5.75	7.25	7.625	9	11
41RL	41RM	41RH	8.25	11.875	12.25	6.75	6.75	8.25	8.625	10	12
51RL	51RM	51RH	9.375	13	13.375	7.875	7.875	9.375	9.75	12	14
61RL	61RM	61RH	10.625	14.25	14.625	9.125	9.125	10.625	11	14	16
71RL	71RM	71RH	11.75	15.375	15.75	10.25	10.25	11.75	12.125	15	18
81RL	81RM	81RH	13.375	17	17.375	11.875	11.875	13.375	13.75	17	20
91RL	91RM	91RH	14.125	17.75	18.125	12.625	12.625	14.125	14.5	18	21
<b>TWO-SECTION GAGE</b>											
32RL	32RM	32RH	14.5	18.125	18.5	13	5.75	14.5	14.875	19	22
42RL	42RM	42RH	16.5	20.125	20.5	15	6.75	16.5	16.875	22	25
52RL	52RM	52RH	18.75	22.375	22.75	17.25	7.875	18.75	19.125	24	28
62RL	62RM	62RH	21.25	24.875	25.25	19.75	9.125	21.25	21.625	27	32
72RL	72RM	72RH	23.5	27.25	27.5	22	10.25	23.5	23.875	29	35
82RL	82RM	82RH	26.75	30.375	30.75	25.25	11.875	26.75	27.125	34	40
92RL	92RM	92RH	28.25	31.875	32.25	26.75	12.625	28.25	28.625	37	43
<b>THREE-SECTION GAGE</b>											
63RL	63RM	63RH	31.875	35.5	35.875	30.375	9.125	31.875	32.25	41	48
73RL	73RM	73RH	35.25	38.875	39.25	33.75	10.25	35.25	35.875	45	53
83RL	83RM	83RH	40.125	43.75	44.125	38.625	11.875	40.125	40.5	52	60
93RL	93RM	93RH	42.375	46	46.375	40.875	12.625	42.375	42.75	55	64
<b>FOUR-SECTION GAGE</b>											
74RL	74RM	74RH	47	50.625	51	45.5	10.25	47	47.375	60	71
84RL	84RM	84RH	53.5	57.125	57.5	52	11.875	53.5	53.875	69	80
94RL	94RM	94RH	56.5	60.125	60.5	55	12.625	56.5	56.875	72	85
<b>FIVE-SECTION GAGE</b>											
75RL	75RM	75RH	58.75	62.375	62.75	57.25	10.25	58.75	59.125	74	88
85RL	85RM	85RH	66.875	70.5	70.875	65.375	11.875	66.875	67.25	86	100
95RL	95RM	95RH	70.625	74.25	74.625	69.125	12.625	70.625	71	90	106

\*3/4" NPT Tapped High Pressure Gages Add 1-1/2" to 'A' Dimension

# MODEL CODE BREAKDOWN & PRESSURE RATINGS



Low Pressure - Series RL - Rating PSIG							
Glass Size	100° F	200° F	300° F	400° F	500° F	600° F	700° F
1	2400	2320	2240	2150	2000	1780	1520
2	2325	2250	2170	2090	1940	1720	1470
3	2250	2180	2100	2020	1880	1670	1420
4	2175	2100	2020	1940	1820	1600	1370
5	2100	2030	1960	1880	1750	1550	1320
6	2025	1950	1890	1810	1680	1500	1280
7	1950	1890	1820	1750	1630	1440	1230
8	1875	1820	1750	1680	1560	1390	1180
9	1800	1740	1680	1620	1510	1340	1140

Borosilicate (standard) Glass up to 600°F (316°C).  
 Aluminosilicate Glass 600-800°F (316-427°C).  
 Saturated steam rating 300 PSIG WSP.

Medium Pressure - Series RM - Rating PSIG							
Glass Size	100° F	200° F	300° F	400° F	500° F	600° F	700° F
1	3000	2900	2800	2690	2500	2220	1890
2	2910	2810	2710	2600	2420	2150	1840
3	2820	2720	2625	2525	2345	2080	1780
4	2725	2640	2560	2460	2270	2040	1740
5	2630	2540	2460	2360	2190	1950	1660
6	2535	2450	2360	2270	2110	1875	1600
7	2440	2360	2280	2190	2030	1805	1540
8	2345	2270	2190	2110	1960	1740	1480
9	2250	2180	2100	2020	1880	1670	1420

High Pressure - Series RH - Rating PSIG							
Glass Size	100° F	200° F	300° F	400° F	500° F	600° F	700° F
ALL	4000	3890	3790	3700	3470	3080	2530

**Technical Notes:**

- Pressure rating is determined by glass size for Series RL and RM.
- Series RH is designed with cross members, allowing uniform pressure ratings for all glass sizes.
- For Glass-Trac Reflex Gages used in non ASME Sec 1 steam service, the maximum working steam pressure rating is 300 psig.
- Saturated steam applications above 300 psig need to be specified using Glass-Trac Transparent Series.
- Pressure-temperature above 4000 PSIG @ 250°F refer to 6K Series Gages.
- Consult Factory for temperatures above 800°F.



# TRANSPARENT GAGES QUESTTEC GLASS-TRAC

## For Pressures up to 3000 PSIG @100°F

Glass-Trac Transparent Gages use clear, see-through glass on both sides so that both the color and the interface of liquids can be viewed. Transparent glass is flat on both sides. Level indication depends on the color of the liquid. Transparent gages have flat glass on both sides of the chamber to allow sufficient light to enhance viewing. Illuminators are used to supplement ambient light. Since transparent glass is flat on both sides, the glass may be shielded by Mica or PCTFE [Kel-F®]. Specify transparent gages where:

- Liquid-liquid interface must be viewed;
- Shields to protect the glass must be used;
- Steam above 350 PSIG [2413 KPa] is to be gaged, using mica shields;
- Liquid viscosity may foul reflex prisms.

Transparent Gages are made in three pressure series [maximum 3000 psig @ 100°F] and are tapped for 1/2" or 3/4" NPT connections. The standard Glass-Trac level gages are designed for -20°F service.

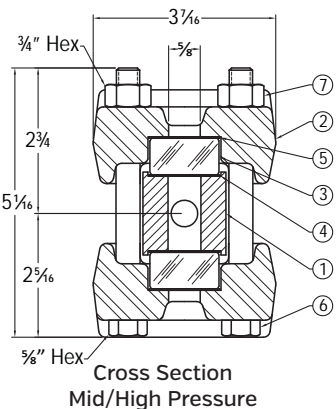
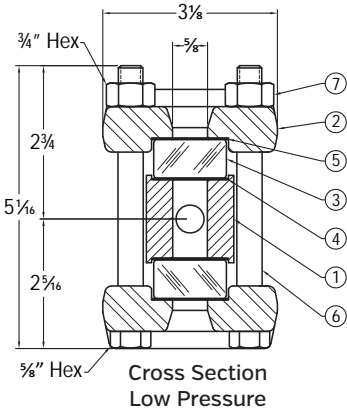
On Glass-Trac Transparent Close Hook-up Gages with 1/2" NPT connections, the center-to-center dimension is the same as the overall length on standard gages. On Close Hook-up Gages with 3/4" NPT connections the center-to-center dimension is the same as the overall length on standard gages plus 3/8".



Typical Transparent Top/Bottom



Typical Transparent Close Hook-Up



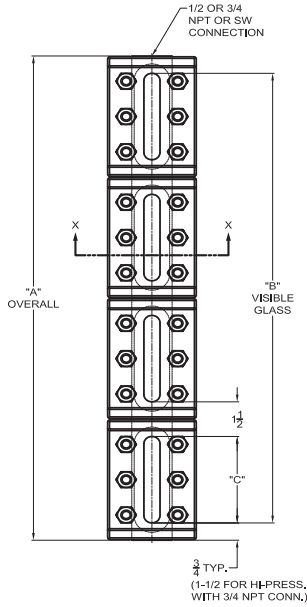
Standard Bills of Material					
Item	Part	Carbon Steel	Low Temp To -5° F	Stainless Steel Parts in Contact	Stainless Steel All Metal Parts
1	Liquid Chamber	SA-696 Grade C	SA-350 LF2	SA-276 Type 316	
2	Cover	SA-105	SA-350 LF2	SA-105	SA-182 Type 316 or SA-276 Type 316
3	Glass	Tempered Borosilicate (Aluminosilicate above 602° F)			
	Shield	Mica or PCTFE			
4	Gasket	Garlock® IFG 5500			
5	Cushion	Garlock® IFG 5500			
6	Bolt	SA-193 B7M Alloy Steel			SA-193 B8M
7	Nut	SA-194 2HM Alloy Steel			SA-194 8M

TRANSPARENT GAGES

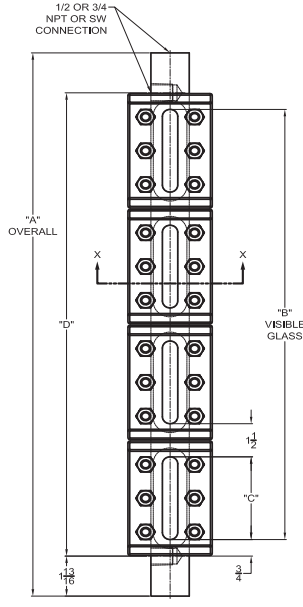
# QUESTTEC SOLUTIONS

## SIZE & DIMENSIONS

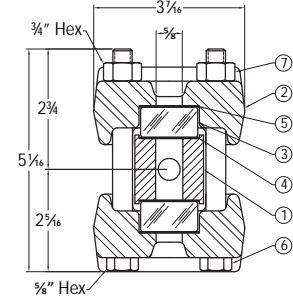
### End Connections & Close Hook-Up



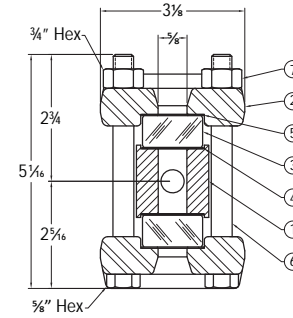
**STANDARD  
END CONNECTED**



**CLOSE HOOK-UP  
SIDE CONNECTED**



**Series TM/TH Cross Section**



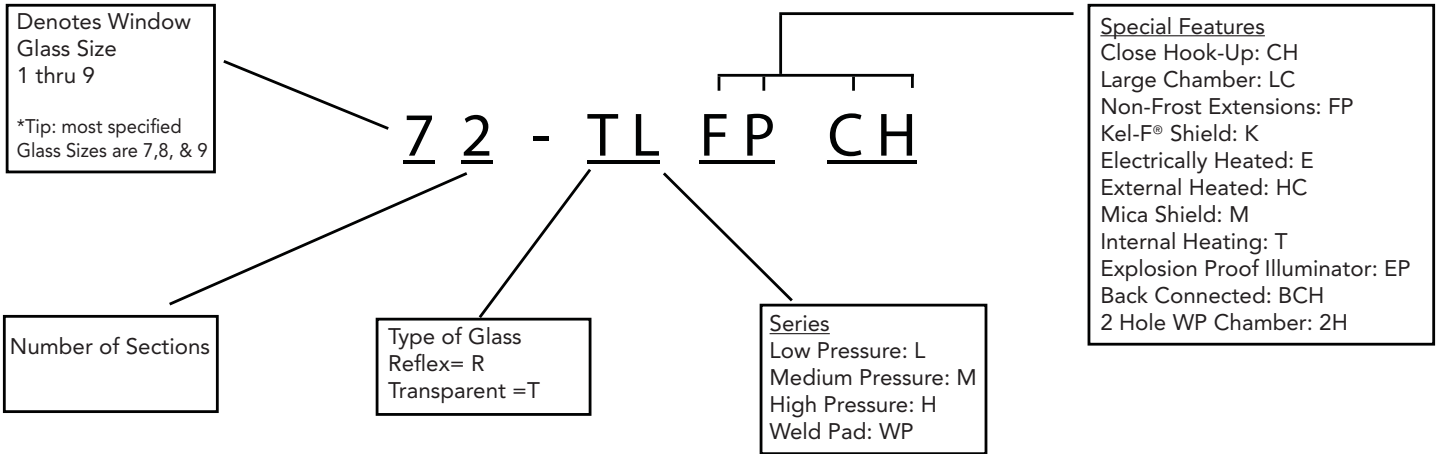
**Series TL Cross Section**

## TRANSPARENT GAGES

SIZE & WEIGHTS											
SIZE NUMBERS			OVER-ALL LENGTH (IN.)			VISIBLE GLASS (IN.) B	GLASS SIZE (IN.) C	CLOSE HOOK-UP CENTER-TO-CENTER (IN.)		APPROX. WT. (LBS)	
LOW PRESS.	MID PRESS.	HIGH PRESS.	A (STD)* 1/2" OR 3/4" NPT	A (CH) 1/2" NPT	A (CH) 3/4" NPT			D 1/2" NPT	D 3/4" NPT	LOW PRESS.	MID-HIGH PRESS.
<b>SINGLE-SECTION GAGE</b>											
11TL	11TM	11TH	5.25	8.875	9.25	3.75	3.75	5.25	5.625	10	12
21TL	21TM	21TH	6.25	9.875	10.25	4.75	4.75	6.25	6.625	11	14
31TL	31TM	31TH	7.25	10.875	11.25	5.75	5.75	7.25	7.625	14	17
41TL	41TM	41TH	8.25	11.875	12.25	6.75	6.75	8.25	8.625	16	19
51TL	51TM	51TH	9.375	13	13.375	7.875	7.875	9.375	9.75	17	21
61TL	61TM	61TH	10.625	14.25	14.625	9.125	9.125	10.625	11	19	24
71TL	71TM	71TH	11.75	15.375	15.75	10.25	10.25	11.75	12.125	21	27
81TL	81TM	81TH	13.375	17	17.375	11.875	11.875	13.375	13.75	24	30
91TL	91TM	91TH	14.125	17.75	18.125	12.625	12.625	14.125	14.5	26	32
<b>TWO-SECTION GAGE</b>											
32TL	32TM	32TH	14.5	18.125	18.5	13	5.75	14.5	14.875	27	33
42TL	42TM	42TH	16.5	20.125	20.5	15	6.75	16.5	16.875	32	38
52TL	52TM	52TH	18.75	22.375	22.75	17.25	7.875	18.75	19.125	36	43
62TL	62TM	62TH	21.25	24.875	25.25	19.75	9.125	21.25	21.625	40	49
72TL	72TM	72TH	23.5	27.25	27.5	22	10.25	23.5	23.875	43	54
82TL	82TM	82TH	26.75	30.375	30.75	25.25	11.875	26.75	27.125	50	61
92TL	92TM	92TH	28.25	31.875	32.25	26.75	12.625	28.25	28.625	51	64
<b>THREE-SECTION GAGE</b>											
63TL	63TM	63TH	31.875	35.5	35.875	30.375	9.125	31.875	32.25	59	73
73TL	73TM	73TH	35.25	38.875	39.25	33.75	10.25	35.25	35.875	63	80
83TL	83TM	83TH	40.125	43.75	44.125	38.625	11.875	40.125	40.5	75	92
93TL	93TM	93TH	42.375	46	46.375	40.875	12.625	42.375	42.75	78	97
<b>FOUR-SECTION GAGE</b>											
74TL	74TM	74TH	47	50.625	51	45.5	10.25	47	47.375	85	107
84TL	84TM	84TH	53.5	57.125	57.5	52	11.875	53.5	53.875	100	122
94TL	94TM	94TH	56.5	60.125	60.5	55	12.625	56.5	56.875	104	129
<b>FIVE-SECTION GAGE</b>											
75TL	75TM	75TH	58.75	62.375	62.75	57.25	10.25	58.75	59.125	106	134
85TL	85TM	85TH	66.875	70.5	70.875	65.375	11.875	66.875	67.25	124	152
95TL	95TM	95TH	70.625	74.25	74.625	69.125	12.625	70.625	71	129	161

\*3/4" NPT Tapped High Pressure Gages Add 1-1/2" to 'A' Dimension

# MODEL CODE BREAKDOWN & PRESSURE RATINGS



Low Pressure - Series TL - Rating PSIG							
Glass Size	100° F	200° F	300° F	400° F	500° F	600° F	700° F
1	2000	1935	1870	1790	1660	1480	1260
2	1815	1750	1690	1620	1510	1340	1150
3	1630	1580	1520	1460	1360	1210	1050
4	1440	1390	1340	1290	1200	1060	900
5	1250	1210	1170	1120	1040	920	790
6	1065	1030	995	950	890	790	680
7	875	845	815	785	730	645	550
8	690	665	645	620	575	510	440
9	500	480	465	445	415	370	320

Borosilicate (standard) Glass up to 600°F (316°C).  
Aluminosilicate Glass 600-800°F (316-427°C).  
Saturated steam rating 350 PSIG WSP.

Medium Pressure - Series TM - Rating PSIG							
Glass Size	100° F	200° F	300° F	400° F	500° F	600° F	700° F
1	2500	2420	2340	2240	2080	1850	1580
2	2315	2250	2170	2090	1940	1720	1740
3	2130	2060	1990	1910	1770	1575	1340
4	1940	1875	1810	1740	1620	1435	1230
5	1750	1690	1630	1570	1460	1295	1100
6	1565	1510	1460	1400	1305	1160	990
7	1375	1330	1280	1230	1145	1015	870
8	1190	1150	1110	1065	990	880	750
9	1000	970	935	895	835	740	630

High Pressure - Series TH - Rating PSIG							
Glass Size	100° F	200° F	300° F	400° F	500° F	600° F	700° F
ALL	3000	2920	2850	2780	2600	2310	1970

**Technical Notes:**

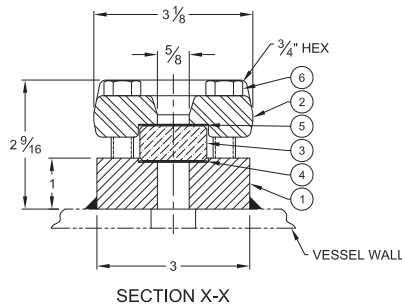
- Pressure rating is determined by glass size for Series TL and TM.
- Series TH is designed with cross members, allowing uniform pressure ratings for all glass sizes.
- For Glass-Trac Transparent Gages used in non ASME Sec 1 steam service, the maximum working steam pressure rating is 350 psig.
- Saturated steam applications above 350 psig need to be specified using Steam-Trac Series.
- Pressure-temperature above 4000 PSIG @ 250°F refer to 6K Series Gages.
- Consult Factory for temperatures above 800°F.

TRANSPARENT GAGES



71RWP Reflex Weld pad  
71R-WP-2H

[No. 7 Glass, 1 Section, Reflex, Low Pressure, Weld Pad, 2 Hole Chamber Pad]



### WELDING PAD

Glass-Trac Welding Pad Gages are used when standard tank connections cannot be used or when the liquid has solids in suspension. The gage becomes an integral part of the vessel because it is weld-attached to the outer wall. Reflex or Transparent glass is used in any of nine standard lengths. Standard covers are 3 1/8" wide.

NOTES: Welding pad gages to be used on vessels less than 36" in diameter must be special ordered. The welding pad body must be machined to allow proper fit up.

Method of Installation:

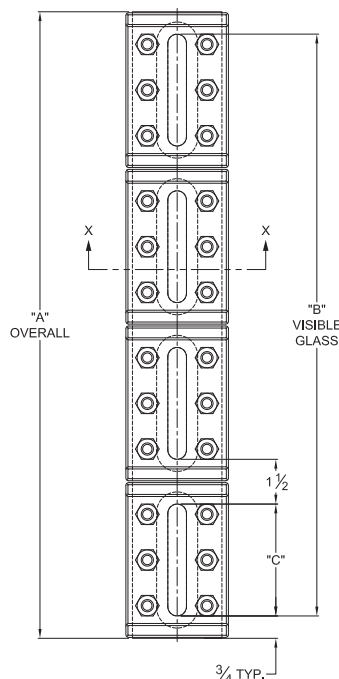
1. Assemble complete gage with spacer plate [available on request] in place of gage glass.
2. Place gage in exact location desired on empty vessel and weld around circumference of the pad.
3. Allow gage to cool, then remove cover and spacer. Drill or burn top and bottom holes in vessel wall at the top and bottom of each gage slot. Slot is 5/8" wide.
4. Replace gage glass, gasket, cushion and cover. Tighten fasteners to the prescribed torque.

NOTES: While the gage itself can be designed to withstand certain pressures, Questtec cannot control the installation of each gage or the load applied to the gage by the vessel. Because of this, Questtec cannot rate Weld Pad Gages.

When ordering, add WP to gage size number.

### DIMENSIONS

SIZE NO.		DIMENSIONS (IN INCHES)		
GLASS SIZE	NO. SEC T.	A	B	C
1	1	5 1/4	3 3/4	3 3/4
2	1	6 1/4	4 3/4	4 3/4
3	1	7 1/4	5 3/4	5 3/4
4	1	8 1/4	6 3/4	6 3/4
5	1	9 3/8	7 7/8	7 7/8
6	1	10 5/8	9 1/8	9 1/8
7	1	11 3/4	10 1/4	10 1/4
8	1	13 3/8	11 7/8	11 7/8
9	1	14 1/8	12 5/8	12 5/8
3	2	14 1/2	13	5 3/4
4	2	16 1/2	15	6 3/4
5	2	18 3/4	17 1/4	7 7/8
6	2	21 1/4	19 3/4	9 1/8
7	2	23 1/2	22	10 1/4
8	2	26 3/4	25 1/4	11 7/8
9	2	28 1/4	26 3/4	12 5/8
6	3	31 7/8	30 3/8	9 1/8
7	3	35 1/4	33 3/4	10 1/4
8	3	40 1/8	38 5/8	11 7/8
9	3	42 3/8	40 7/8	12 5/8
7	4	47	45 1/2	10 1/4
8	4	53 1/2	52	11 7/8
9	4	56 1/2	55	12 5/8
7	5	58 3/4	57 1/4	10 1/4
8	5	66 7/8	65 3/8	11 7/8
9	5	70 5/8	69 1/8	12 5/8



### PARTS

ITEM NO.	NAME	MATERIAL
1	WELDING PAD	AI08 1018
2	COVER	ASME SA105
3	GLASS	BOROSILICATE
4	GASKET	GARLOCK® IFG 5500
5	CUSHION	GARLOCK® IFG 5500
6	BOLT	ASME SA193 B7

# QUESTTEC SOLUTIONS SPECIALTY GAGES QUESTTEC GLASS-TRAC

## LARGE CHAMBER



EXAMPLE: 72RL-LC-CH  
[No. 7 glass, 2 section, reflex, low pressure,  
side/side connection, large chamber]

Glass-Trac Large Chamber Gages are made in a special low pressure series of both Reflex and Transparent Gages. The large diameter chamber makes accurate liquid level readings possible under unusual conditions such as boiling, flashing, or foaming of the liquid. The chamber is manufactured from heavy duty seamless steel pipe with an inside diameter of 2 1/8". Each end of the pipe is closed off with a welded plug that is drilled and tapped for 3/4" NPT connections. For close hook-ups, 3/4" NPT side connections are used and pipe ends may be drilled, tapped and plugged for cleaning as required.

Recessed seats are machined into the liquid chamber and gage covers for protection of glass, gasket and cushion. Special bolts are used. Large Chamber Gages are made in lengths for standard flat glasses and multiple section gages are available.

When ordering, add LC for large chamber to gage size number and CH for close hook-up.

SIZE NO.		DIMENSIONS (IN INCHES)						
GLASS SIZE	NO. SECT.	TOP AND BOTTOM			CLOSE HOOK-UP			
		Overall	Visible Glass	Glass Size	Overall	Visible Glass	Glass Size	D
1	1	6 1/4	3 3/4	3 3/4	10 1/4	3 3/4	3 3/4	5 5/8
2	1	7 1/4	4 3/4	4 3/4	11 1/4	4 3/4	4 3/4	6 5/8
3	1	8 1/4	5 3/4	5 3/4	12 1/4	5 3/4	5 3/4	7 5/8
4	1	9 1/4	6 3/4	6 3/4	13 1/4	6 3/4	6 3/4	8 5/8
5	1	10 3/8	7 7/8	7 7/8	14 3/8	7 7/8	7 7/8	9 3/4
6	1	11 5/8	9 1/8	9 1/8	15 5/8	9 1/8	9 1/8	11
7	1	12 3/4	10 1/4	10 1/4	16 3/4	10 1/4	10 1/4	12 1/8
8	1	14 3/8	11 7/8	11 7/8	18 3/8	11 7/8	11 7/8	13 3/4
9	1	15 1/8	12 5/8	12 5/8	19 1/8	12 5/8	12 5/8	14 1/2
3	2	15 1/2	13	5 3/4	19 1/2	13	5 3/4	14 7/8
4	2	17 1/2	15	6 3/4	21 1/2	15	6 3/4	16 7/8
5	2	19 3/4	17 1/4	7 7/8	23 3/4	17 1/4	7 7/8	19 1/8
6	2	22 1/4	19 3/4	9 1/8	26 1/4	19 3/4	9 1/8	21 5/8
7	2	24 1/2	21 1/4	10 1/4	28 1/2	22	10 1/4	23 7/8
8	2	27 3/4	25 1/4	11 7/8	31 3/4	25 1/4	11 7/8	27 1/8
9	2	29 1/4	26 3/4	12 5/8	33 1/4	26 3/4	12 5/8	28 5/8
6	3	32 7/8	30 3/8	9 1/8	36 7/8	30 3/8	9 1/8	32 1/4
7	3	36 1/4	33 3/4	10 1/4	40 1/4	33 3/4	10 1/4	35 5/8
8	3	41 1/8	38 5/8	11 7/8	45 1/8	38 5/8	11 7/8	40 1/2
9	3	43 3/8	40 7/8	12 5/8	47 3/8	40 7/8	12 5/8	42 3/4
7	4	48	45 1/2	10 1/4	52	45 1/2	10 1/4	47 3/8
8	4	54 1/2	52	11 7/8	58 1/2	52	11 7/8	53 7/8
9	4	57 1/2	55	12 5/8	61 1/2	55	12 5/8	56 7/8
7	5	59 3/4	57 1/4	10 1/4	63 3/4	57 1/4	10 1/4	59 1/8
8	5	67 7/8	65 3/8	11 7/8	71 7/8	65 3/8	11 7/8	67 1/4
9	5	71 5/8	69 1/8	12 5/8	75 5/8	69 1/8	12 5/8	71

# LARGE CHAMBER REFLEX & TRANSPARENT

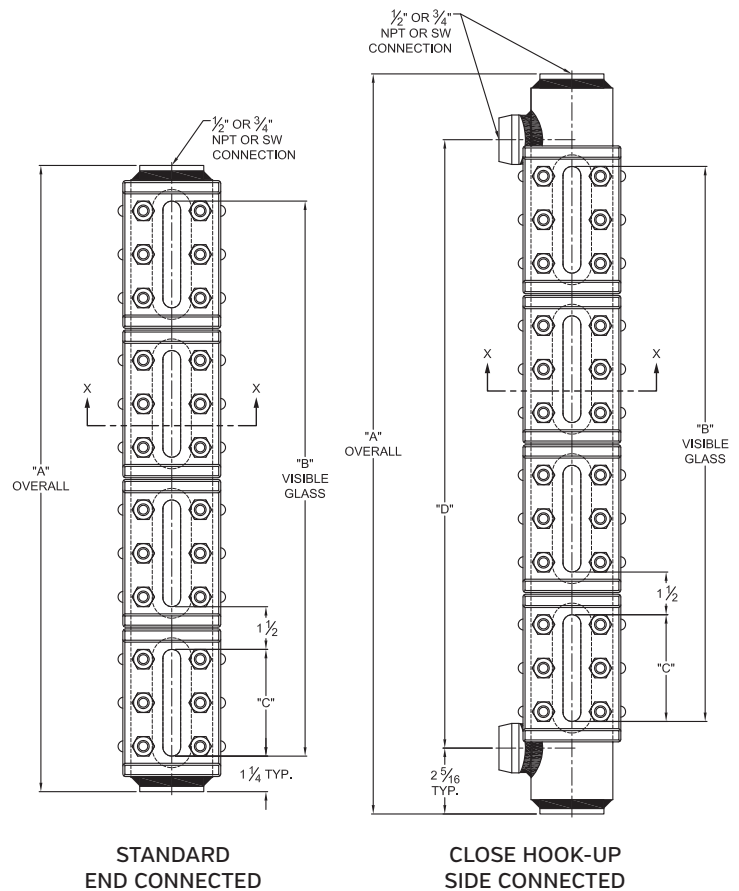
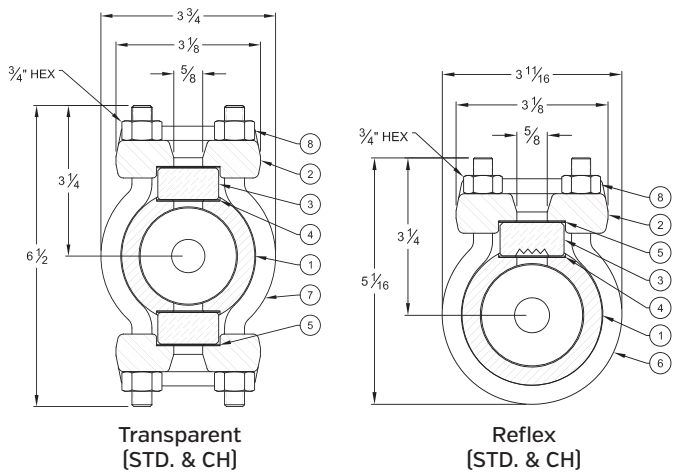
## Pressure Ratings & Dimensions

REFLEX - LARGE CHAMBER							
GLASS SIZE	100° F	200° F	300° F	400° F	500° F	600° F	700° F
1	1020	990	950	910	850	755	620
2	980	950	915	875	815	725	600
3	940	910	880	840	780	695	590
4	900	870	840	805	750	665	560
5	860	830	800	770	715	635	540
6	830	805	775	745	690	610	530
7	790	765	735	710	660	585	510
8	750	725	700	670	625	555	500
9	720	695	670	645	600	530	480

TRANSPARENT - LARGE CHAMBER							
GLASS SIZE	100° F	200° F	300° F	400° F	500° F	600° F	700° F
1	790	765	740	705	660	585	390
2	750	725	700	670	625	555	380
3	720	695	670	645	600	530	360
4	680	655	635	610	565	500	340
5	650	630	605	580	540	480	330
6	610	590	570	545	510	450	310
7	580	560	540	520	485	430	300
8	540	520	505	480	450	400	280
9	500	485	465	445	415	370	260

Temperatures from 600° to 800° Require Aluminosilicate Glass



ITEM NO.	NAME	MATERIAL
1	CHAMBER	ASTM A106 GRB
2	COVER	ASME SA105
3	GLASS	BOROSILICATE
4	GASKET	GARLOCK® IFG 5500
5	CUSHION	GARLOCK® IFG 5500
6	U-BOLT	ASME SA193 B7
7	BOLT	ASME SA193 B7
8	NUT	ASME SA194 2H

SPECIALTY GAGES - LARGE CHAMBER

## HEATED/COOLED EXTERNALLY

Glass-Trac Externally Heated/Cooled Gages may be either Low Pressure or Mid Pressure, Reflex or Transparent and have 1/2" or 3/4" NPT Connections. Pressure-temperature ratings and sizes remain the same as standard flat gages.

On externally heated/cooled gages a metal tube is employed to transmit heating or cooling fluid. The tubing starts from one valve, passes along a machined groove in the gage body wall and connects to the opposite valve. Fluid piped through the tubing serves as the heating or cooling media. Gage bodies (liquid chambers) are made extra long to accommodate the groove and tubing.

Most common heating fluids are steam and hot water. To cool gages, methane, propane, freon and ammonia refrigerants are used.

When ordering Glass-Trac Externally Heated/Cooled Gages, add HC to the gage size number.



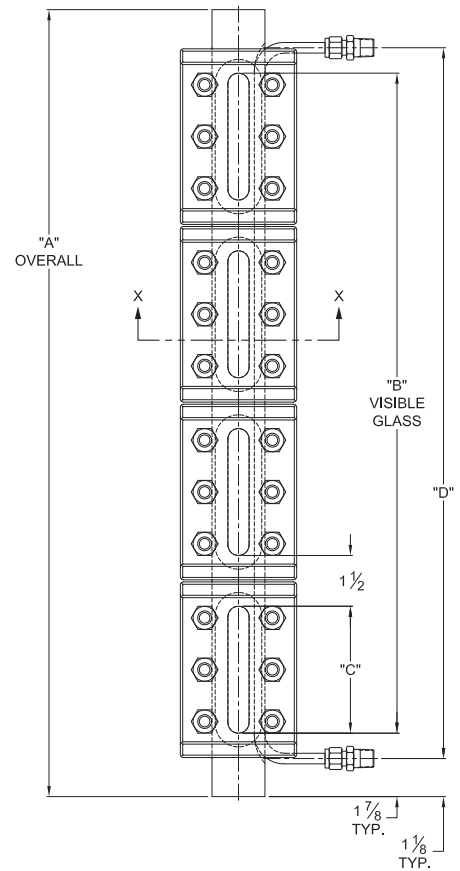
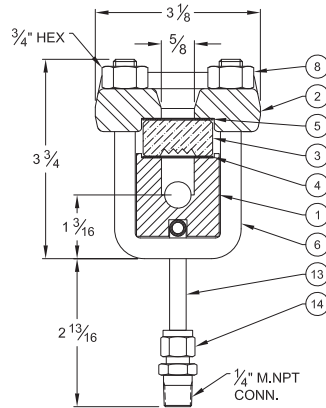
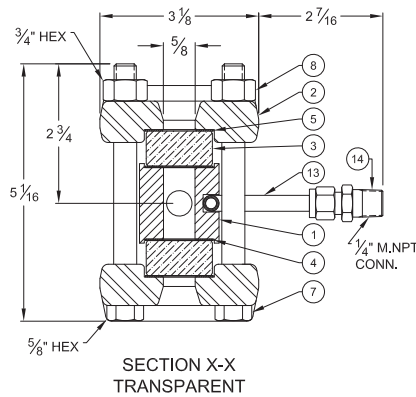
EXAMPLE: 42TM  
[Transparent Medium Pressure]  
Shown with Type 7U 2" 300RF Flanged Gage Valves &  
3/4" Vent and Drain Gate Valves

# HEATED/COOLED EXTERNALLY GAGE

## Pressure Ratings & Dimensions

SPECIALTY GAGES - HEATED/COOLED EXTERNALLY

SIZE NO.		DIMENSIONS (IN INCHES)				LOW PRESSURE				MEDIUM PRESSURE			
GLASS SIZE	NO. SECT.	OVERALL LENGTH	TOTAL VISIBLE GLASS	SINGLE VISIBLE GLASS	CLOSE HOOK-UP	REFLEX MAX. PSIG @ TEMP.		TRANSPARENT MAX. PSIG @ TEMP.		REFLEX MAX. PSIG @ TEMP.		TRANSPARENT MAX. PSIG @ TEMP.	
						100° F	700° F	100° F	700° F	100° F	700° F	100° F	700° F
1	1	7 1/2	3 3/4	3 3/4	5 1/4	2400	1520	2000	1260	3000	1890	2500	1580
2	1	8 1/2	4 3/4	4 3/4	6 1/4	2325	1470	1815	1150	2910	1840	2315	1470
3	1	9 1/2	5 3/4	5 3/4	7 1/4	2250	1420	1630	1050	2820	1780	2130	1340
4	1	10 1/2	6 3/4	6 3/4	8 1/4	2175	1370	1440	900	2725	1740	1940	1230
5	1	11 5/8	7 7/8	7 7/8	9 3/8	2100	1320	1250	790	2630	1660	1750	1100
6	1	12 7/8	9 1/8	9 1/8	10 5/8	2025	1280	1065	680	2535	1600	1565	990
7	1	14	10 1/4	10 1/4	11 3/4	1950	1230	875	550	2440	1540	1375	870
8	1	15 5/8	11 7/8	11 7/8	13 3/8	1875	1180	690	440	2345	1480	1190	750
9	1	16 3/8	12 5/8	12 5/8	14 1/8	1800	1140	500	320	2250	1420	1000	630
3	2	16 3/4	13	5 3/4	14 1/2	2250	1420	1630	1050	2820	1780	2130	1340
4	2	18 3/4	15	6 3/4	16 1/2	2175	1370	1440	900	2725	1740	1940	1230
5	2	21	17 1/4	7 7/8	18 3/4	2100	1320	1250	790	2630	1660	1750	1100
6	2	23 1/2	19 3/4	9 1/8	21 1/4	2025	1280	1065	680	2535	1600	1565	990
7	2	25 3/4	22	10 1/4	23 1/2	1950	1230	875	550	2440	1540	1375	870
8	2	29	25 1/4	11 7/8	26 3/4	1875	1180	690	440	2345	1480	1190	750
9	2	30 1/2	26 3/4	12 5/8	28 1/4	1800	1140	500	320	2250	1420	1000	630
6	3	34 1/8	30 3/8	9 1/8	31 7/8	2025	1280	1065	680	2535	1600	1565	990
7	3	37 1/2	33 3/4	10 1/4	35 1/4	1950	1230	875	550	2440	1540	1375	870
8	3	42 3/8	38 5/8	11 7/8	40 1/8	1875	1180	690	440	2345	1480	1190	750
9	3	44 5/8	40 7/8	12 5/8	42 3/8	1800	1140	500	320	2250	1420	1000	630
7	4	49 1/4	45 1/2	10 1/4	47	1950	1230	875	550	2440	1540	1375	870
8	4	55 3/4	52	11 7/8	53 1/2	1875	1180	690	440	2345	1480	1190	750
9	4	58 3/4	55	12 5/8	56 1/2	1800	1140	500	320	2250	1420	1000	630
7	5	61	57 1/4	10 1/4	58 3/4	1950	1230	875	550	2440	1540	1375	870
8	5	69 1/8	65 3/8	11 7/8	66 7/8	1875	1180	690	440	2345	1480	1190	750
9	5	72 7/8	69 1/8	12 5/8	70 5/8	1800	1140	500	320	2250	1420	1000	630



ITEM NO.	NAME	MATERIAL
1	CHAMBER	CARBON STEEL
2	COVER	CARBON STEEL
3	GLASS	BOROSILICATE
4	GASKET	GARLOCK® IFG 5500
5	CUSHION	GARLOCK® IFG 5500
6	U-BOLT	ASME SA193 B7
7	BOLT	ASME SA193 B7M
8	NUT	ASME SA194 2HM
13	TUBING	STEEL OR SS
14	TUBING	STEEL OR SS
15	FITTING	STEEL OR SS





EXAMPLE: 71RL-CH-FP 4 5/8"  
Frost-Prevention Extensions

## FROST-PREVENTION EXTENSIONS

Glass-Trac plastic extensions for flat gage glasses prevent frost from forming in the liquid level view slot in low temperature services. Reflex and Transparent Gages in all pressure ratings can be fitted with plastic extensions.

Projecting from the view slot, the clear plastic extensions keeps the liquid level indication clearly visible. Stocked extensions are 3 5/8" through 5 5/8" in length. If the gage is thickly insulated, longer extensions are available. The extension is held in place by stainless steel clamps fastened to the gage cover. For extra low temperature services, Glass-Trac gages can be made of special metals.

For process temperatures below 0°F [-18°C], it is likely that frost will build up around a gage due to contact with the ambient temperature. When this is likely, a non-frost extension should be specified. Questtec Solutions recommends using the following table to determine extension length.

Recommended length for Frost-Prevention Extensions: 3 5/8" extension is standard from 80°F ambient to 0°F temperature. Add 1" extension length for each 100° F below 0° F.

When ordering, specify length and add FP to gage size number.

Process Temperature		Extension Length	
°F	°C	mm	inches
0	-18	92	3 5/8"
-100	-73	117	4 5/8"
-200	-129	143	5 5/8"

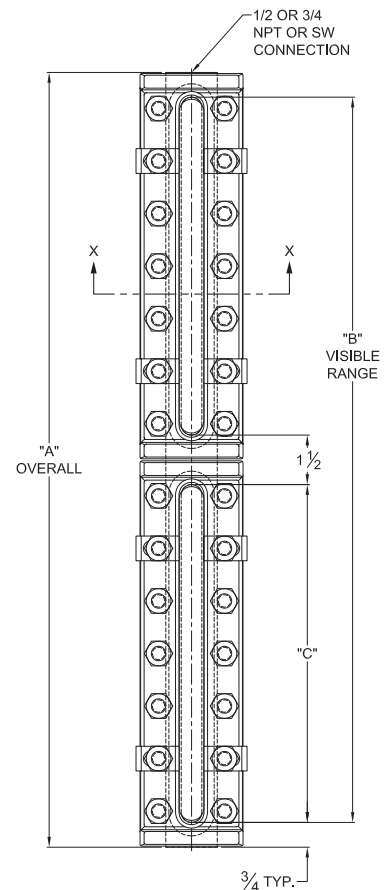
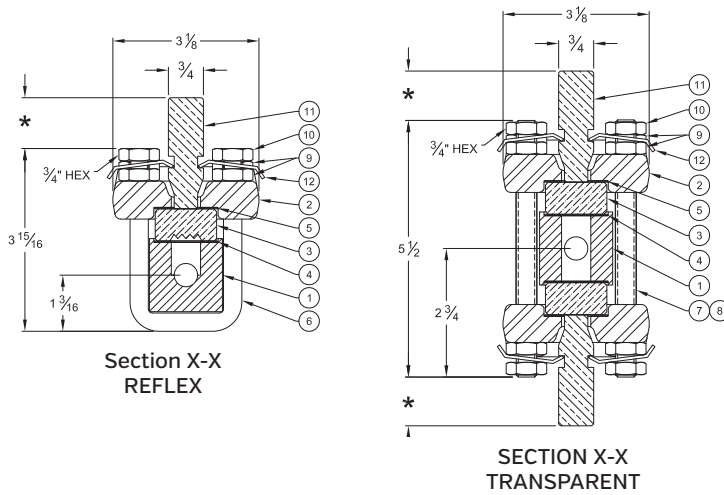
Note: Frost-prevention extension is sold separately and requires installation in field with low temperature resistant caulking. Caulk inside vision slot and press fit acrylic shield into slot.

# QUESTTEC SOLUTIONS

## FROST PREVENTION EXTENSIONS

### Pressure Ratings & Dimensions

SIZE NO.		DIMENSIONS (IN INCHES)			LOW PRESSURE				MEDIUM PRESSURE			
GLASS SIZE	NO. SECT.	A	B	C	REFLEX MAX. PSIG @ TEMP.		TRANSPARENT MAX. PSIG @ TEMP.		REFLEX MAX. PSIG @ TEMP.		TRANSPARENT MAX. PSIG @ TEMP.	
					100° F	700° F	100° F	700° F	100° F	700° F	100° F	700° F
					1	1	5 1/4	3 3/4	3 3/4	2400	1520	2000
2	1	6 1/4	4 3/4	4 3/4	2325	1470	1815	1150	2910	1840	2315	1470
3	1	7 1/4	5 3/4	5 3/4	2250	1420	1630	1050	2820	1780	2130	1340
4	1	8 1/4	6 3/4	6 3/4	2175	1370	1440	900	2725	1740	1940	1230
5	1	9 3/8	7 7/8	7 7/8	2100	1320	1250	790	2630	1660	1750	1100
6	1	10 5/8	9 1/8	9 1/8	2025	1280	1065	680	2535	1600	1565	990
7	1	11 3/4	10 1/4	10 1/4	1950	1230	875	550	2440	1540	1375	870
8	1	13 3/8	11 7/8	11 7/8	1875	1180	690	440	2345	1480	1190	750
9	1	14 1/8	12 5/8	12 5/8	1800	1140	500	320	2250	1420	1000	630
3	2	14 1/2	13	5 3/4	2250	1420	1630	1050	2820	1780	2130	1340
4	2	16 1/2	15	6 3/4	2175	1370	1440	900	2725	1740	1940	1230
5	2	18 3/4	17 1/4	7 7/8	2100	1320	1250	790	2630	1660	1750	1100
6	2	21 1/4	19 3/4	9 1/8	2025	1280	1065	680	2535	1600	1565	990
7	2	23 1/2	22	10 1/4	1950	1230	875	550	2440	1540	1375	870
8	2	26 3/4	25 1/4	11 7/8	1875	1180	690	440	2345	1480	1190	750
9	2	28 1/4	26 3/4	12 5/8	1800	1140	500	320	2250	1420	1000	630
6	3	31 7/8	30 3/8	9 1/8	2025	1280	1065	680	2535	1600	1565	990
7	3	35 1/4	33 3/4	10 1/4	1950	1230	875	550	2440	1540	1375	870
8	3	40 1/8	38 5/8	11 7/8	1875	1180	690	440	2345	1480	1190	750
9	3	42 3/8	40 7/8	12 5/8	1800	1140	500	320	2250	1420	1000	630
7	4	47	45 1/2	10 1/4	1950	1230	875	550	2440	1540	1375	870
8	4	53 1/2	52	11 7/8	1875	1180	690	440	2345	1480	1190	750
9	4	56 1/2	55	12 5/8	1800	1140	500	320	2250	1420	1000	630
7	5	58 3/4	57 1/4	10 1/4	1950	1230	875	550	2440	1540	1375	870
8	5	66 7/8	65 3/8	11 7/8	1875	1180	690	440	2345	1480	1190	750
9	5	70 5/8	69 1/8	12 5/8	1800	1140	500	320	2250	1420	1000	630



PARTS		
ITEM#	NAME	MATERIAL
1	CHAMBER	CARBON STEEL
2	COVER	CARBON STEEL
3	GLASS	TEMPERED BOROSILICATE
4	GASKET	GARLOCK® IFG-5500
5	CUSHION	GARLOCK® IFG-5500
6	U-BOLT	ASME SA193 B7
7	BOLT	ASME SA193 B7M
8	STUD	ASME SA193 B7
9	NUT	ASME SA194 2HM
10	JAM NUT	316 SS
11	EXTENSION	ACRYLIC
12	CLIP	316 SS

### SERIES 6K - SIDE CONNECTED

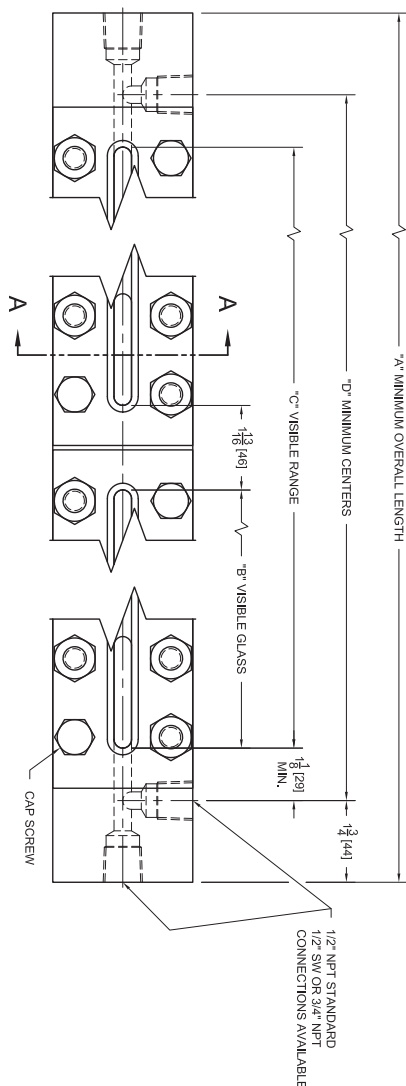
Specialty Gages

6000 psig @ 250°F

1/2" NPT Standard

1/2" SW or 3/4" NPT Connections

Ultra High Pressure - Series 6K Rating PSIG PRESSURE - TEMPERATURE RATING	
Viton O Ring	
6000 psig	250°F



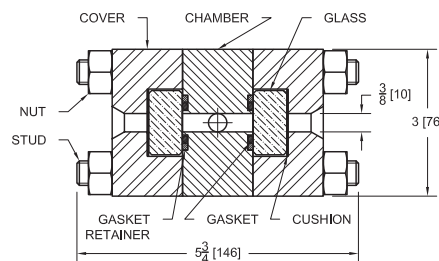
### ULTRA HIGH PRESSURE SERIES 6K GAGES

The method of clamping and sealing the glass differs from other gages in that the glass does not experience stress concentrations imposed by bolting. The glass becomes a floating member between two solidly bolted blocks of rigid plate.

The pressure activated seal principle provides a self adjusting means of maintaining a tight joint between glass and liquid chamber. The gasket system compensates for machining variations.

Because glass can take a tremendous amount of evenly loaded compression, the gage can withstand extremely demanding pressure requirements.

All materials in 6K gages conform to ASTM specifications. 6K gages can achieve pressures to 6000 psig @ 250° F. Pressure rating is not glass size dependent. High pressure borosilicate glass (up to 600° F [316° C]) used due to higher tolerances.



SECTION A-A

#### Model 6K SIDE CONNECTED

Weight per set approximately 10lbs. 12ozs

#### DIMENSIONS & WEIGHTS

SIZE	"A" MINIMUM OVERALL LENGTH	"B" VISIBLE GLASS	"C" VISIBLE RANGE	"D" MINIMUM CENTERS	APPROX. WEIGHT lbs [kg]	SIZE	"A" MINIMUM OVERALL LENGTH	"B" VISIBLE GLASS	"C" VISIBLE RANGE	"D" MINIMUM CENTERS	APPROX. WEIGHT lbs [kg]
11-6K	9-9/32 [236]	3-17/32 [90]	3-17/32 [90]	5-25/32 [147]	23 [10]	33-6K	25-31/32 [660]	5-17/32 [140]	20-7/32 [514]	22-15/32 [571]	82 [37]
21-6K	10-9/32 [261]	4-17/32 [115]	4-17/32 [115]	6-25/32 [172]	26 [12]	43-6K	28-31/32 [736]	6-17/32 [166]	23-7/32 [590]	25-15/32 [647]	93 [42]
31-6K	11-9/32 [287]	5-17/32 [140]	5-17/32 [140]	7-25/32 [198]	30 [14]	53-6K	32-11/32 [822]	7-21/32 [194]	26-19/32 [675]	28-27/32 [733]	104 [47]
41-6K	12-9/32 [312]	6-17/32 [166]	6-17/32 [166]	8-25/32 [223]	34 [15]	63-6K	36-3/32 [917]	8-29/32 [226]	30-11/32 [771]	32-19/32 [828]	118 [53]
51-6K	13-13/32 [341]	7-21/32 [194]	7-21/32 [194]	9-29/32 [252]	38 [17]	73-6K	39-15/32 [1003]	10-1/32 [255]	33-23/32 [856]	35-31/32 [914]	129 [59]
61-6K	14-21/32 [372]	8-29/32 [226]	8-29/32 [226]	11-5/32 [283]	42 [19]	44-6K	37-5/16 [948]	6-17/32 [166]	31-9/16 [802]	33-13/16 [859]	123 [56]
71-6K	15-25/32 [401]	10-1/32 [255]	10-1/32 [255]	12-9/32 [312]	46 [21]	54-6K	41-13/16 [1062]	7-21/32 [194]	36-1/16 [916]	38-5/16 [973]	138 [63]
32-6K	18-5/8 [473]	5-17/32 [140]	12-7/8 [327]	15-1/8 [384]	56 [25]	64-6K	46-13/16 [1189]	8-29/32 [226]	41-1/16 [1043]	43-5/16 [1100]	156 [71]
42-6K	20-5/8 [524]	6-17/32 [166]	14-7/8 [378]	17-1/8 [435]	63 [29]	74-6K	51-5/16 [1303]	10-1/32 [255]	45-9/16 [1157]	47-13/16 [1214]	171 [77]
52-6K	22-7/8 [581]	7-21/32 [194]	17-1/8 [435]	19-3/8 [492]	71 [32]	65-6K	57-17/32 [1461]	8-29/32 [226]	51-25/32 [1315]	54-1/32 [1372]	194 [88]
62-6K	25-3/8 [645]	8-29/32 [226]	19-5/8 [498]	21-7/8 [556]	80 [36]	75-6K	63-5/32 [1604]	10-1/32 [255]	57-13/32 [1458]	59-21/32 [1515]	212 [96]
72-6K	27-5/8 [702]	10-1/32 [255]	21-7/8 [556]	24-1/8 [613]	87 [40]	66-6K	68-1/4 [1734]	8-29/32 [226]	62-1/2 [1588]	64-3/4 [1645]	232 [105]
						76-6K	75 [1905]	10-1/32 [255]	69-1/4 [1759]	71-1/2 [1816]	254 [115]

### SERIES 6K - END CONNECTED

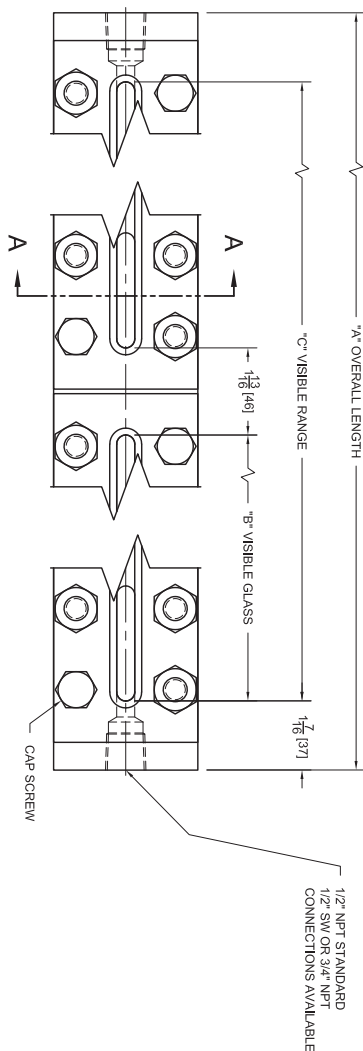
Specialty Gages

6000 psig @ 250°F

1/2" NPT Standard

1/2" SW or 3/4" NPT Connections

Ultra High Pressure - Series 6K Rating PSIG PRESSURE - TEMPERATURE RATING	
Viton O Ring	
6000 psig	250°F



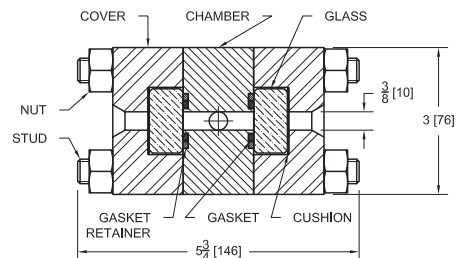
### ULTRA HIGH PRESSURE SERIES 6K GAGES

The method of clamping and sealing the glass differs from other gages in that the glass does not experience stress concentrations imposed by bolting. The glass becomes a floating member between two solidly bolted blocks of rigid plate.

The pressure activated seal principle provides a self adjusting means of maintaining a tight joint between glass and liquid chamber. The gasket system compensates for machining variations.

Because glass can take a tremendous amount of evenly loaded compression, the gage can withstand extremely demanding pressure requirements.

All materials in 6K gages conform to ASTM specifications. 6K gages can achieve pressures to 6000 psig @ 250° F. Pressure rating is not glass size dependent. High pressure borosilicate glass used due to higher tolerances.



SECTION A-A

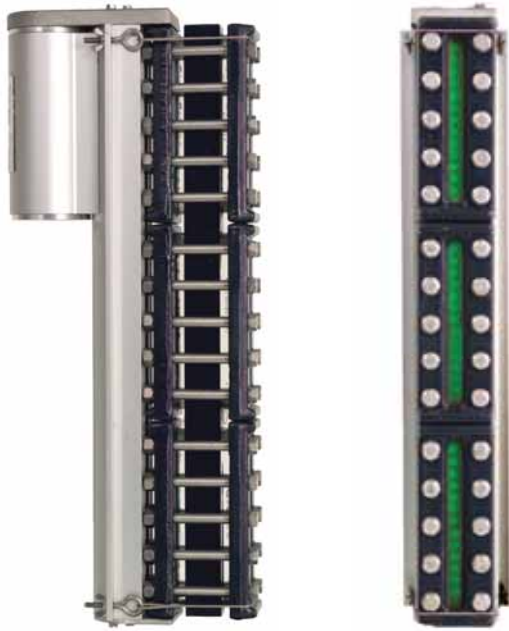
### Model 6K END CONNECTED

Weight per set approximately 11lbs. 12ozs

#### DIMENSIONS & WEIGHTS

SIZE	"A" OVERALL LENGTH	"B" VISIBLE GLASS	"C" VISIBLE RANGE	APPROX. WEIGHT lbs [kg]	SIZE	"A" OVERALL LENGTH	"B" VISIBLE GLASS	"C" VISIBLE RANGE	APPROX. WEIGHT lbs [kg]
11-6K	6-13/32 [163]	3-17/32 [90]	3-17/32 [90]	20 [9]	33-6K	23-3/32 [587]	5-17/32 [140]	20-7/32 [514]	79 [36]
21-6K	7-13/32 [188]	4-17/32 [115]	4-17/32 [115]	23 [11]	43-6K	26-3/32 [663]	6-17/32 [166]	23-7/32 [590]	90 [41]
31-6K	8-13/32 [214]	5-17/32 [140]	5-17/32 [140]	27 [12]	53-6K	29-15/32 [749]	7-21/32 [194]	26-19/32 [675]	101 [46]
41-6K	9-13/32 [239]	6-17/32 [166]	6-17/32 [166]	31 [14]	63-6K	33-7/32 [844]	8-29/32 [226]	30-11/32 [771]	115 [52]
51-6K	10-17/32 [267]	7-21/32 [194]	7-21/32 [194]	35 [16]	73-6K	36-19/32 [929]	10-1/32 [255]	33-23/32 [856]	126 [57]
61-6K	11-25/32 [299]	8-29/32 [226]	8-29/32 [226]	39 [18]	44-6K	34-7/16 [875]	6-17/32 [166]	31-9/16 [802]	120 [54]
71-6K	12-29/32 [328]	10-1/32 [255]	10-1/32 [255]	43 [19]	54-6K	38-15/16 [989]	7-21/32 [194]	36-1/16 [916]	135 [61]
32-6K	15-3/4 [400]	5-17/32 [140]	12-7/8 [327]	53 [24]	64-6K	43-15/16 [1116]	8-29/32 [226]	41-1/16 [1043]	153 [69]
42-6K	17-3/4 [451]	6-17/32 [166]	14-7/8 [378]	60 [27]	74-6K	48-7/16 [1230]	10-1/32 [255]	45-9/16 [1157]	168 [76]
52-6K	20 [508]	7-21/32 [194]	17-1/8 [435]	68 [31]	65-6K	54-21/32 [1388]	8-29/32 [226]	51-25/32 [1315]	191 [86]
62-6K	22-1/2 [572]	8-29/32 [226]	19-5/8 [498]	77 [35]	75-6K	60-9/32 [1531]	10-1/32 [255]	57-13/32 [1458]	209 [95]
72-6K	24-3/4 [629]	10-1/32 [255]	21-7/8 [556]	84 [38]	66-6K	65-3/8 [1661]	8-29/32 [226]	62-1/2 [1588]	229 [104]
					76-6K	72-1/8 [1832]	10-1/32 [255]	69-1/4 [1759]	251 [114]

# QUESTTEC SOLUTIONS ACCESSORIES QUESTTEC GLASS-TRAC

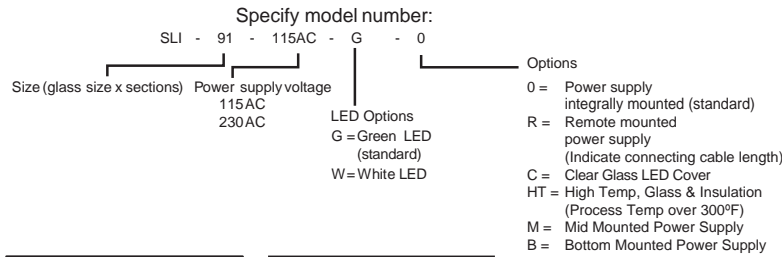


## SEE LEVEL ILLUMINATOR (EXPLOSION PROOF)

The Questtec Solutions See-Level™ LED Illuminator for hazardous locations utilizes the latest technology to provide brilliant green back lighting to any process gage. Innovative circuitry allows for the use of an individual light source every 1/2" along the length of any gage. With a life span of over 100,000 hours each, light source is likely to never need replacing. Even in the event of an individual lamp failure, the design provides lighting overlap ensuring that the fluid level is always illuminated. All of this is accomplished with a meager 5 watts of power usage.

Through the use of new attachment techniques, the See-Level™ Illuminator readily mounts to any brand of existing or new process gages in a matter of minutes without the loosening of any cover bolting. Mounting requires no special tools or modifications to the existing structure. Set it up, attach the power and go! It's that easy.

The modular design allows for a single illuminator to be manufactured to your specific visible length eliminating the labor involved in mounting and wiring multiple illuminators.

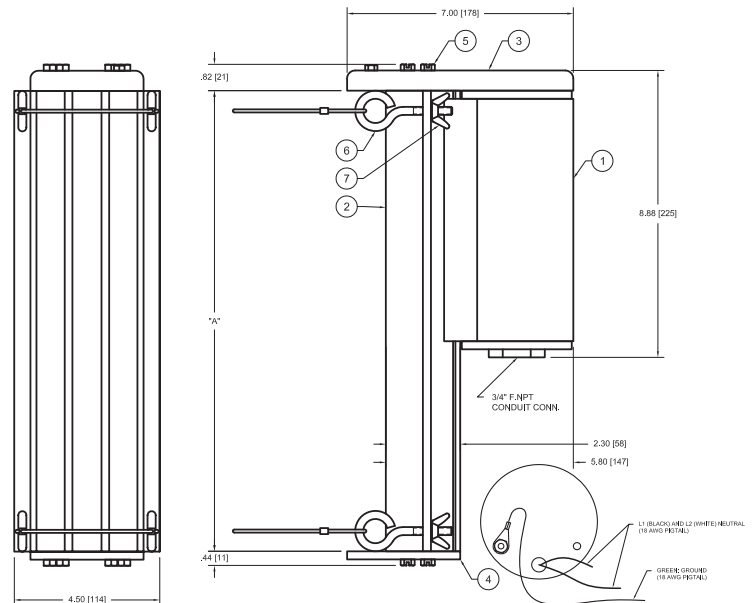


Illuminator Housing	
SIZE #	DIMENSION "A"
32	14-5/8"
41	8-3/8"
42	16-5/8"
51	9-1/2"
52	18-7/8"
61	10-3/4"
62	21-3/8"
63	32"
71	11-7/8"
72	23-5/8"
73	35-3/8"
74	47-1/8"
75	58-7/8"
81	13-1/2"
82	26-7/8"
83	40-1/4"
84	53-5/8"
91	14-1/4"
92	28-3/8"
93	42-1/2"
94	56-5/8"

Illuminator Weights			
SLI	'A"	OAL	'Weight
91	15.6	12.44	
92	29.7	16.63	
93	43.8	20.82	
94	57.9	25.01	
81	14.8	12.21	
82	28.2	16.19	
83	41.6	20.17	
84	54.9	24.12	
71	13.2	11.73	
72	24.9	15.21	
73	36.7	18.71	
74	48.4	22.19	
61	12.1	11.40	
62	22.7	14.55	
63	33.3	17.70	
51	10.8	11.02	
52	20.2	13.81	
42	17.9	13.13	
32	15.9	12.53	

BILL OF MATERIALS		
ITEM#	DESCRIPTION	MATERIAL
1	POWER SUPPLY ENCLOSURE	ANODIZED ALUMINUM
2	LED HOUSING	ANODIZED ALUMINUM
3	TOP END CAP	CAST ALUMINUM
4	BOTTOM END CAP	CAST ALUMINUM
5	CAP SCREW	18-8 SS
6	EYE BOLT	18-8 SS
7	WING NUT	18-8 SS

**Tip: Select mid mounted power supply for back connected gages and clearance issues**



Technical Specifications	
Power Supply	115/230 VAC @ 50/60 HZ
Power Consumption	<150 mA @ 115 VAC
Supply Connection	3/4 NPT
Ambient Temperature	-40°F (-40°C) to 150°F (65°C)
LED Estimated Life	100,000 hours
Certification	UL1203, UL913, CSA 22.2 CL I, DIV 1, Groups B, C, & D NEMA 4X & 8

ACCESSORIES - ILLUMINATORS

### FLEXIBLE INSULATION JACKET

The Questtec Solutions Flexible Insulation Jacket for cold and hot service protects the process application and helps maintain a constant temperature when fitted over flat glass gages. Customized fiberglass insulation jackets wrap around the level indicator and are secured with velcro straps. High quality materials are used for contact with temperatures up to 800° F. QTS insulation jackets are created to fit applications with unique shapes and dimensions while being designed for the convenience of easy removal for maintenance. Removable insulation jackets limit direct contact with high temperature units for greater safety in the workplace. Consult factory for dimensional details.

Features:

- Available for Reflex & Transparent Glass Gages
- Reduces heat or cold loss for temperatures ranging from -65°F to 800°F
- High Temperature flexible fiberglass material
- Adaptive cover pieces for access to bolting, glass, and flanges without complete removal of insulation jacket
- Velcro straps for easy installation and maintenance – no tools necessary



EXAMPLE: 42TM (Transparent Medium Pressure)  
Assembled 7U valves [2" 300# rfs w x 3/4" fsw  
x 3/4" gate valves]

<b>Weight</b>	Dependent on Application
<b>Overall Length</b>	Available in all Lengths Consult Factory
<b>Process Temperature</b>	<ul style="list-style-type: none"> <li>• 0-249°F: ½" thickness of flexible insulation</li> <li>• 250-499°F: 1" thickness of flexible insulation</li> <li>• 500°F-849°F: 2" thickness of flexible insulation</li> <li>• 850°F-1100°F: 3" thickness of flexible insulation</li> </ul>
<b>Standard Insulation</b>	Thickness from ½" – 3" consult factory for details
<b>Insulation Densities</b>	Silicone infused cloth #9 type E
<b>Material</b>	Silicone sewn external cloth with ceramic and tempmat flexible fiber insulation

## COATING OPTIONS



### FIN-001 (Standard)

Basic finish coating for carbon steel, forged or cast steel product components. Intended as a prime coat and provides protection in general environments.

### FIN-004

For coastal and offshore applications, this Three-Coat system is designed to give optimal service life in corrosive applications and environments. Inorganic zinc base coat, epoxy mid-coat, urethane top coat. All components are coated after assembly. Most economical.

### FIN-005

This option includes the same coating procedure as FIN-004 except all gages are coated prior to assembly. The option includes 316SS fasteners and acrylic protector that covers the exposed glass on the front (and back if transparent) of the gage.

### FIN-006

High temperature Zinc-Rich coating for continuous service to 750°F.

### Custom Coatings

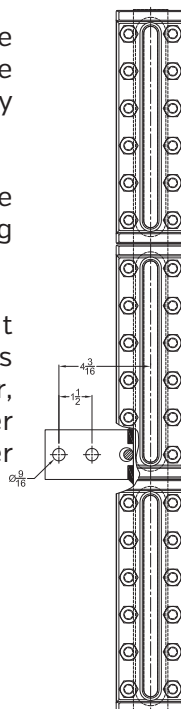
Questtec can provide coatings per your project specifications. Contact an Applications Engineer for assistance.

## SUPPORT BRACKET & INSTRUMENT BRIDLE SOLUTIONS

Gages with more than five sections are recommended to have additional support due to weight considerations. Questtec can supply support brackets welded to the gage chamber.

Although support brackets are available, some installations are known to prohibit gages having more than five sections.

Questtec manufactures custom instrument bridles in several configurations, utilizing various technologies, including guided wave radar, buoyancy-based devices, process gages, boiler gage systems, differential pressure and other equipment needing to be attached to the bridle.



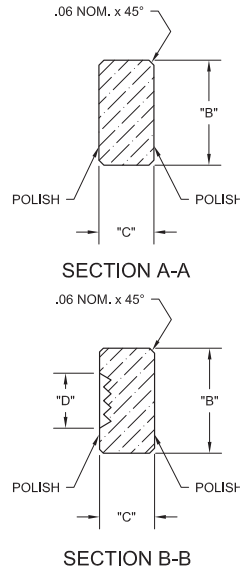
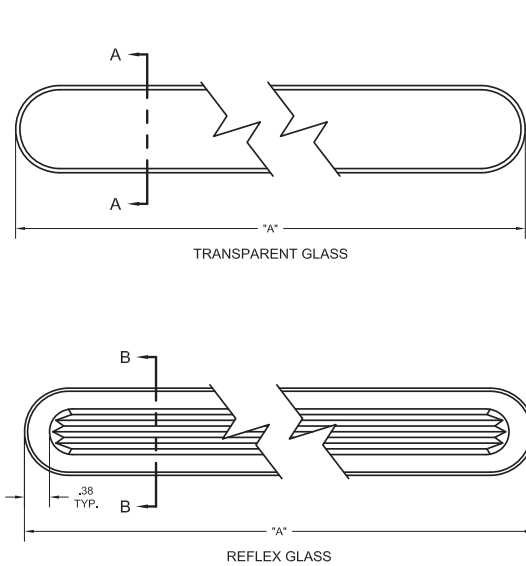
## CALIBRATED SCALE

A calibrated scale can be mounted alongside the viewing face of the gage. Scale index markings should be in inches and feet, millimeters and meters or percent of level span.



## SPARE PARTS

For Reflex or Transparent Standard Size 1 through 9 Glass



"A" DIMENSION		
SIZE	INCHES	mm
1	4.50	115
2	5.50	140
3	6.50	165
4	7.50	190
5	8.63	220
6	9.88	250
7	11.00	280
8	12.63	320
9	13.38	340

DIMENSIONS		
SIZE	INCHES	mm
B	1.31	34
C	.69	18
D	.69	18

## SPARE PART KITS

REFLEX - GARLOCK® IFG 5500 GASKET & GARLOCK® IFG 5500 CUSHION	
PART NUMBER	SIZE
1-011-14-010	Size 1
1-011-14-020	Size 2
1-011-14-030	Size 3
1-011-14-040	Size 4
1-011-14-050	Size 5
1-011-14-060	Size 6
1-011-14-070	Size 7
1-011-14-080	Size 8
1-011-14-090	Size 9

REFLEX - GRAFOIL®, GASKET, GARLOCK® IFG 5500 CUSHION	
PART NUMBER	SIZE
1-011-14-211	Size 1
1-011-14-212	Size 2
1-011-14-213	Size 3
1-011-14-214	Size 4
1-011-14-215	Size 5
1-011-14-216	Size 6
1-011-14-217	Size 7
1-011-14-218	Size 8
1-011-14-219	Size 9

REFLEX - GRAFOIL®, GASKET, GRAFOIL® CUSHION	
PART NUMBER	SIZE
1-011-14-231	Size 1
1-011-14-232	Size 2
1-011-14-233	Size 3
1-011-14-234	Size 4
1-011-14-235	Size 5
1-011-14-236	Size 6
1-011-14-237	Size 7
1-011-14-238	Size 8
1-011-14-239	Size 9

TRANSPARENT - GARLOCK® IFG 5500 GASKET & GARLOCK® IFG 5500 CUSHION	
PART NUMBER	SIZE
1-011-14-110	Size 1
1-011-14-120	Size 2
1-011-14-130	Size 3
1-011-14-140	Size 4
1-011-14-150	Size 5
1-011-14-160	Size 6
1-011-14-170	Size 7
1-011-14-180	Size 8
1-011-14-190	Size 9

TRANSPARENT - GRAFOIL®, GASKET, GARLOCK® IFG 5500 CUSHION	
PART NUMBER	SIZE
1-011-14-201	Size 1
1-011-14-202	Size 2
1-011-14-203	Size 3
1-011-14-204	Size 4
1-011-14-205	Size 5
1-011-14-206	Size 6
1-011-14-207	Size 7
1-011-14-208	Size 8
1-011-14-209	Size 9

TRANSPARENT - GRAFOIL®, GASKET, GRAFOIL® CUSHION	
PART NUMBER	SIZE
1-011-14-221	Size 1
1-011-14-222	Size 2
1-011-14-223	Size 3
1-011-14-224	Size 4
1-011-14-225	Size 5
1-011-14-226	Size 6
1-011-14-227	Size 7
1-011-14-228	Size 8
1-011-14-229	Size 9

TRANSPARENT - STANDARD MICA, GRAFOIL® GASKET, & GRAFOIL® CUSHION	
PART NUMBER	SIZE
1-011-14-241	Size 1
1-011-14-242	Size 2
1-011-14-243	Size 3
1-011-14-244	Size 4
1-011-14-245	Size 5
1-011-14-246	Size 6
1-011-14-247	Size 7
1-011-14-248	Size 8
1-011-14-249	Size 9

TRANSPARENT - HQ (1PC) MICA, GRAFOIL® GASKET, & GRAFOIL® CUSHION	
PART NUMBER	SIZE
1-011-14-261	Size 1
1-011-14-262	Size 2
1-011-14-263	Size 3
1-011-14-264	Size 4
1-011-14-265	Size 5
1-011-14-266	Size 6
1-011-14-267	Size 7
1-011-14-268	Size 8
1-011-14-269	Size 9

# OEM PARTS

Same Day Shipping  
www.qtslevel.com



# QUESTTEC SOLUTIONS

## GAGECOCKS: VALVE SUMMARY

### GAGE VALVE MODELS

VALVE TYPE	1	2	4	3A	5	7
Vessel Connection	Union	Union	Union	Solid Shank	Solid Shank	Solid Shank
Body Pattern	Offset	Offset	Straight	Offset	Straight	Offset
Bonnet Type Seat	Integral Integral	Union Replaceable	Union Replaceable	Bolted OS&Y Replaceable	Bolted OS&Y Replaceable	Bolted OS&Y Replaceable
Screwed Gage	1S	2S	4S	3A-S	5S	7S
Union Gage	1U	2U	4U	3A-U	5U	7U
Tubular Gage	1T	2T	X	3A-T	X	X
Gasket Union Gage	1G	2G	4G	3A-G	5G	7G

### STANDARD VALVE SPECIFICATIONS

#### Carbon Steel Body with 416/440 Stainless Steel Trim

- To -20°F [-29°C]

#### Low Temp Carbon Steel Body with 316 Stainless Steel Trim

- To -50°F [-46°C]
- Charpy Impact Tested

#### 316 Stainless Steel Body & Trim Wetted Parts Only

[Parts in Contact]

- To -20°F [-28°C]

#### All Parts 316 Stainless Steel Body & Trim

- To -325°F [-198°C]
- Dual Rated 316/316LSS

Contact Factory for special alloy materials

### VALVE TRIM OPTIONS

416SS [standard]

316SS Required for NACE Compliance

Monel®

Alloy 20

Other - Consult Factory

### VALVE PACKING OPTIONS

Teflon® [standard] up to 450°F

Flexible - unreinforced

Flexible Graphite w/Inconel® Wire

- Fugitive Emission to API Standards 622 & 624

### CONNECTION OPTIONS

Union Vessel [Types 1, 2 & 4]

Solid Shank [Types 3A, 5 & 7]

Threaded - 1/2" or 3/4" as standard

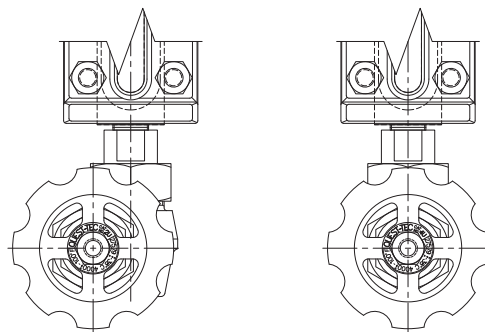
Socket Weld - 1/2" or 3/4" as standard

ASME B16.5 Flanged

### OFFSET & STRAIGHT PATTERN DESIGNS FOR FLAT GLASS & TUBULAR GLASS GAGES

Questtec offers offset and straight pattern gagecocks that isolate the gage chamber from the fluid contents of the vessel.

Offset gagecocks have an advantage of permitting the inside of the gage glass to be cleaned easily with a minimum of disassembly. By removing the vent and drain plugs (or other connection), a straight passage through the gage chamber is opened. A brush can be inserted through the gagecock vent and drain for glass cleaning.



Offset Pattern Valve

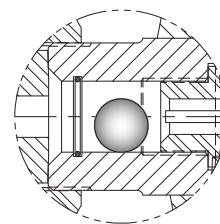
Straight Pattern Valve

### SAFETY BALL-CHECK VALVES

To prevent rapid loss of fluid in the event of accidental glass breakage, Questtec supplies its gagecocks with automatic ball-check shut-off. Should the glass break, the pressure drop causes the ball-checks to seat to prevent loss of tank contents.

To unseat these ball-checks during the liquid level, the valve stem has an extended tip that prevents the ball check from inadvertent closing when the valve is initially "cracked-open" [about one rotation of the handwheel] on start-up. The valve is then fully opened once the pressure has equalized across the valve seat. The ball is retained with a spring clip to prevent roll-out from the valve body.

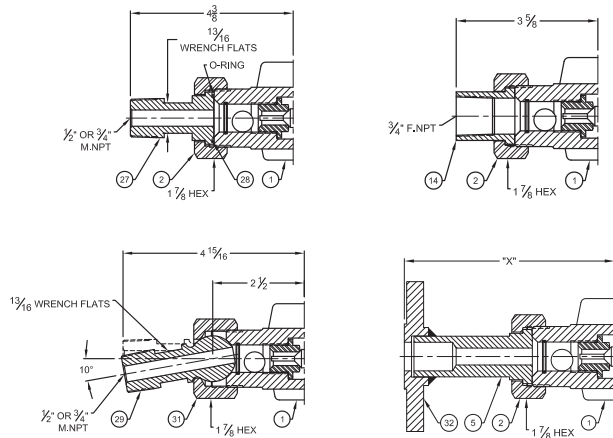
Both upper and lower gagecocks in each set are equipped with horizontal ball-checks. Balls are located on the vessel side of the gagecock seats.



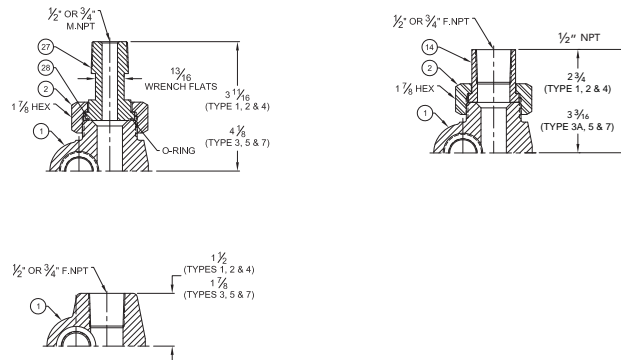
Ball-Check Cutaway

# QUESTTEC SOLUTIONS VALVE SUMMARY TANK & GAGE CONNECTIONS

## Common Vessel Connections



## Common Gage Connections



Refer to Pages 38-40 for more Vessel and Gage Connections

## GAGECOCK BODIES - OFFSET & STRAIGHT PATTERN

Offset Pattern Valves

Offset Pattern Valves

Offset Pattern Valves

Straight Pattern Valves

Straight Pattern Valves

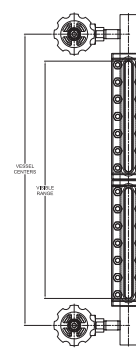
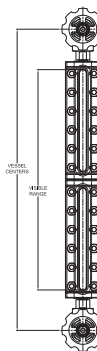
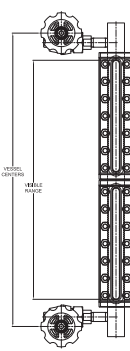
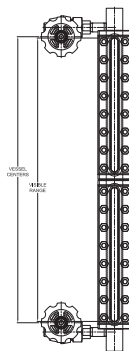
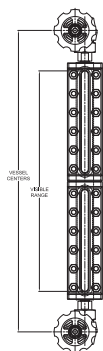
End Connected

Offset Inside  
Side Connected

Offset Outside  
Side Connected

End Connected

Side Connected



## Union Tailpiece Options

**Spiral Wound Gasket** [available on both vessel & gage connections]- Recommended for severe service for enhanced sealing reliability.

**Spherical Union Connections** - Can compensate for up to 10 degrees of misalignment, which results in [+/- 3/4" on side connected gages]. Spherical unions are not recommended for low emission applications utilizing Type 3A valves with fugitive emissions stem packing.

**Adjustable Tailpiece** - Greater rigidity than spherical unions, can compensate for minor misalignment of vessel connections.

## Other Options

**Vertical Rising Ball-check** - Used for compliance with ASME B&PV Code Section I [lower offset end connected valves only].

**Quick-Closing Stems** - Allow for rapid isolation of the level gage assembly from the vessel. This option is typically used in steam service in conjunction with vertical rising ball-check in the lower valve as it can be difficult to commission [start-up] quick-closing valves having conventional ball-checks.

**Stellite® Hardfacing** [seat/stem] - Provides enhanced corrosion & erosion resistance.

# QUESTTEC SOLUTIONS

## VALVES QUESTTEC GLASS-TRAC

### TYPE 1S & 1U VALVES | TYPE 2S & 2U VALVES

Integral Bonnet & Seat    Removable Bonnet & Seat

4000 psig CWP, 6000 psig Test  
 3/4" NPT Male Union Vessel Connection  
 1/2" NPT Female Gage Connection  
 1/2" NPT Female Drain Connection

PRESSURE - TEMPERATURE RATINGS			
Teflon® Packing		Graphite Packing	
4000 psig	100° F	2950 psig	500° F
3730 psig	200° F	2700 psig	600° F
3470 psig	300° F	2430 psig	700° F
3200 psig	400° F		

PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	CARBON STEEL
3	BALL	440 SS	316 SS
4	BALL RETAINER	316 SS	316 SS
5	MALE CONNECTOR	CARBON STEEL	316 SS
6	STEM	416 SS	316 SS
7	PACKING WASHER	17-4 PH SS	316 SS
8	PACKING RING	TEFLON®	TEFLON®
9	PACKING FOLLOWER	316 SS	316 SS
10	PACKING NUT	CARBON STEEL	CARBON STEEL
11	HANDWHEEL	IRON	IRON
12	NAMEPLATE	304 SS	304 SS
13	HANDWHEEL NUT	316 SS	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
15	SEAT	416 SS	316 SS
16	BONNET	CARBON STEEL	316 SS

Note: The valves illustrated are bottom left-hand and top right-hand gage mounting configuration; top left-hand and bottom right-hand mounting valves are available. Gage valves are typically sold as sets (one top & one bottom valve).

### OFFSET VALVES

Glass-Trac Type 1 & 2 Offset Gage Valves are available with screwed (S), union (U), (illustrated below) and tubular (T) gage connections. Type 1 and 2 Valves are used with Reflex and Transparent Gages in working pressures up to 4000 psig and with Tubular Gages to their maximum rating. The Teflon® packing is furnished as standard for temperatures not exceeding 450° F; for higher temperatures not exceeding 700° F, flexible graphite packing is standard. Both valves have stainless steel ballchecks to block fluid leakage from the vessel in the event of gage glass breakage.

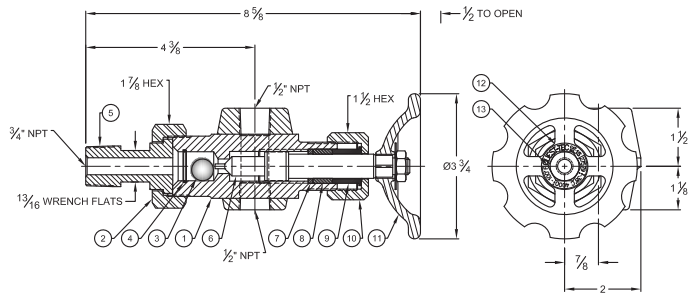
The "offset" feature permits easy cleaning of gages. A floating tailpiece on Type 1 & 2 Valves permits vertical adjustment of the Gage when the vessel connections are not precisely spaced thus facilitating installation and reducing gage stress.

The Type 2 Valve is available with an optional back-seating feature that extends the service life of the stem packing.

For Type 1 & 2 Tubular Gage Valves see pages 35-36. Optional Gage & Vessel Connections are shown on pages 38-40.

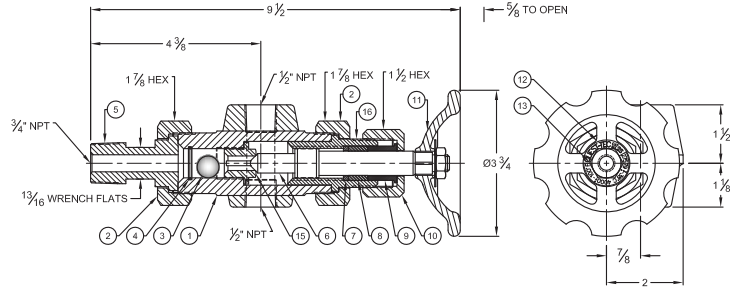
#### Type 1S

Weight per set approximately 10lbs. 6oz.



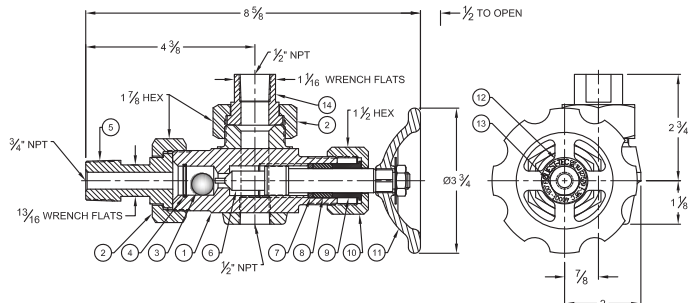
#### Type 2S

Weight per set approximately 11lbs. 6oz.



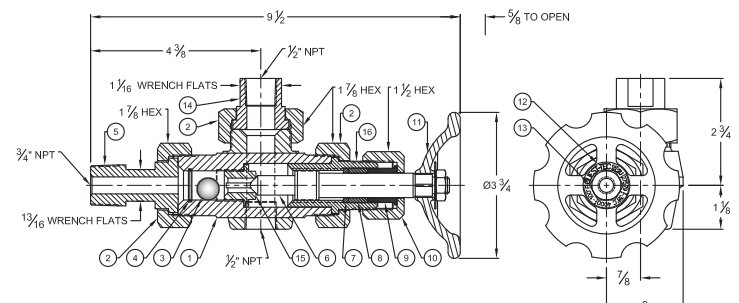
#### Type 1U

Weight per set approximately 11lbs. 6oz.



#### Type 2U

Weight per set approximately 12lbs. 6oz.



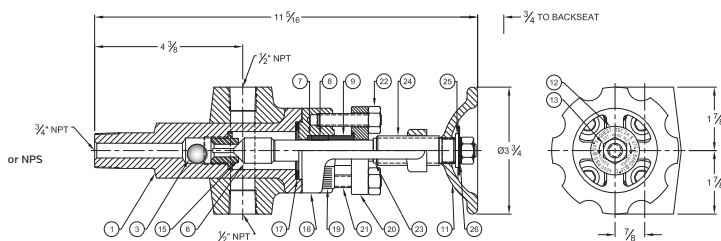
**TYPE 3A-S & 3A-U VALVES**

Heavy Duty OS&Y

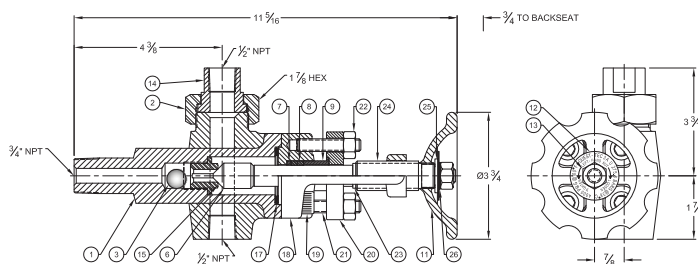
PRESSURE - TEMPERATURE RATINGS			
Temp	ASME B16.34 Class 900 Rating, SA-105, SA-350 LF2	ASME B16.34 Class 900 Rating, SA-182 F316 SS	Non-ASME Commercial Rating
100° F	2220 psig	2160 psig	4000 psig
200° F	2035 psig	1860 psig	3730 psig
300° F	1965 psig	1680 psig	3470 psig
400° F	1900 psig	1540 psig	3200 psig
500° F	1810 psig	1435 psig	2950 psig
600° F	1705 psig	1355 psig	2700 psig
700° F	1590 psig	1305 psig	2430 psig

PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	316 SS
3	BALL	440 SS	316 SS
6	STEM	416 SS	316 SS
7	PACKING WASHER	17-4 PH SS	316 SS
8	PACKING RING	TEFLON®	TEFLON®
9	PACKING FOLLOWER	316 SS	316 SS
11	HANDWHEEL	IRON	IRON
12	NAMEPLATE	304 SS	304 SS
13	HANDWHEEL NUT (LEFT HAND THREADS)	316 SS	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
15	SEAT	416 SS	316 SS
17	YOKE GASKET	304 SS/GRAPHITE	316 SS/GRAPHITE
18	YOKE	FORGED CARBON STEEL	316 SS
19	YOKE SCREW	SA-193 B7	SA-193 B7
20	PRESSURE BAR	CARBON STEEL	CARBON STEEL
21	PRESSURE BAR STUD	SA-193 B7	SA-193 B7
22	PRESSURE BAR NUT	SA-194 2H	SA-194 2H
23	INNER THRUST WASHER	17-4 PH SS	17-4 PH SS
24	HANDWHEEL SCREW	SIL BRZ	SIL BRZ
25	OUT THRUST WASHER	17-4 PH SS	17-4 PH SS
26	INTERNAL TOOTH LOCK WASHER	410 SS	410 SS

The Type 3 Valve is superseded by the Type 3A that brings forth the enhanced features of increased gasket joint rigidity, superior compression members for low emission packing and improved user serviceability. The Type 3A Valve maintains the same connection dimensions as the Type 3 and the Type 3 can be upgraded to a Type 3A by replacing the OS&Y topworks assembly.



**3A-S**



**3A-U**

**TYPE 3A VALVE OVERVIEW**

Glass-Trac Type 3A Valves are the model to select for the most rigorous service. These Gage Valves have the following standard features:

- Outside Screw & Yoke - and are not exposed to the process media
- Reciprocating Stem - The stem rises and falls against the seat without rotational twisting through the packing
- Back-Seating Stem - Provides a secondary fluid seal when valve is in the full open position
- Automatic Ball Check - Prevents the escape of vessel fluid in the event of gage glass failure
- ASME B16.34 150-900 - Class compliance
- Offset Flow Path - This permits cleaning a top and bottom connected gage through the vent or drain port
- Solid Shank Vessel Connection - Male threaded NPT or socket weld or ASME B16.5 flanged

Type 3A Gage Valves are available in four basic gage connection configurations:

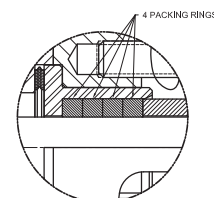
- Type 3A-S - With a rigid, 1/2" or 3/4", NPT or SW connection to the Level Gage
- Type 3A-U - With a metal-to-metal union connection to the Level Gage
- Type 3A-G - With a gasketed union connection to the Level Gage
- Type 3A-T - Tubular gage connection to the Level Gage

**Low Emissions Valve**

**Type 3A-S-LE, 3A-U-LE, 3A-G-LE, 3A-T-LE**

To combat the release of fugitive emissions into the environment, the Type 3A Valve is available with a low emissions stem packing design that has been tested and certified compliant by a 3rd party independent laboratory to the following standards:

- API Standard 622 Type Testing of Process Valve Packing for Fugitive Emissions
- API Standard 624 Type Testing Rising Stem Valves Equipped with Graphite Packing for Fugitive Emissions



Low Emissions Packing

# QUESTTEC SOLUTIONS

## VALVES QUESTTEC GLASS-TRAC

### TYPE 7S & 7U VALVES

Standard Outside Screw & Yoke

1440 psig CWP, 2160 psig Test  
[ASME Class 600]

3/4" NPT Male Vessel Connection

1/2" NPT Female Union Gage Connection

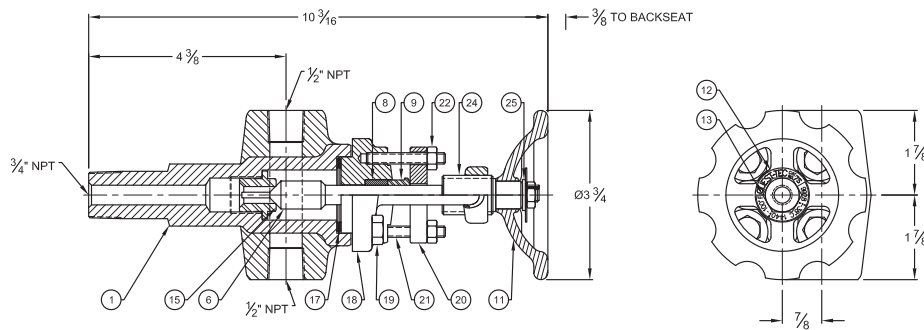
PRESSURE - TEMPERATURE RATINGS			
Teflon® Packing		Graphite Packing	
1440 psig	100°F	1250 psig	500°F
1400 psig	200°F	1110 psig	600°F
1365 psig	300°F	1065 psig	700°F
1330 psig	400°F		

PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	316 SS
6	STEM	416 SS	316 SS
8	PACKING PING	TEFLON®	TEFLON®
9	PACKING FOLLOWER	316 SS	316 SS
11	HANDWHEEL	IRON	IRON
12	NAMEPLATE	304 SS	304 SS
13	HANDWHEEL NUT	316 SS	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
15	SEAT	416 SS	316 SS
17	YOKE GASKET	304 SS / GRAPHITE	316 SS / GRAPHITE
18	YOKE	FORGED CARBON STEEL	316 SS
19	YOKE SCREW	SA-193 B7	SA-193 B7
20	PRESSURE BAR	CARBON STEEL	CARBON STEEL
21	PRESSURE BAR STUD	SA-193 B7	SA-193 B7
22	PRESSURE BAR NUT	SA-194 2H	SA-194 2H
24	HANDWHEEL SCREW	SIL BRZ	SIL BRZ
25	OUTER THRUST WASHER	17-4 PH SS	17-4 PH SS

### OFFSET VALVES OVERVIEW

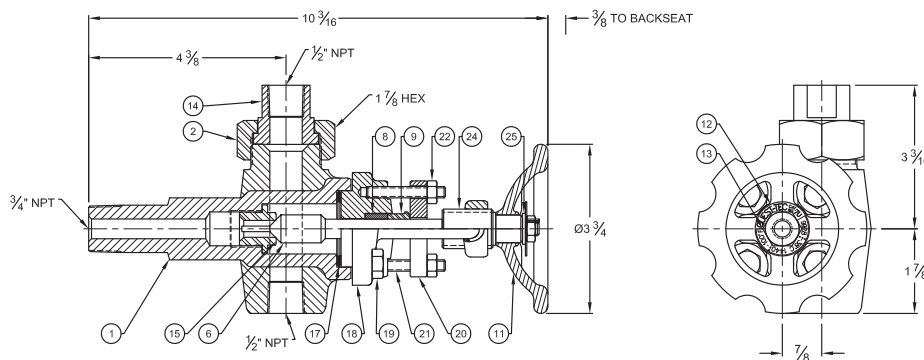
The Glass-Trac Type 7 Offset Gage Valve features the Outside Screw & Yoke [OS&Y] design which prevents excessively hot or corrosive fluids from contacting stem threads. The linear reciprocating stem avoids potential rotational galling of the replaceable valve seat when closing the valve. This valve is offset for ease in gage cleaning and is available in screwed [S] and union [U] gage connections. The Type 7 Valve also has a back-seating stem as a standard feature. Stainless steel ball checks are available upon request.

Type 7 Tubular Gage Valves available upon request  
Optional Gage & Vessel Connections are shown on pages 38-40.



#### Type 7S

Weight per set approximately 12lbs.



#### Type 7U

Weight per set approximately 12lbs.

Note: The valves illustrated are bottom left-hand and top right-hand gage mounting configuration; top left-hand and bottom right-hand mounting valves are available. Gage valves are typically sold as sets [one top & one bottom valve].

### TYPE 4S & 4U VALVES

Removable Bonnet & Seat

4000 psig CWP, 6000 psig Test  
 3/4" NPT Male Union Vessel Connection  
 1/2" NPT Female Gage Connection  
 1/2" NPT Female Drain Connection

PRESSURE - TEMPERATURE RATINGS			
Teflon® Packing		Graphite Packing	
4000 psig	100°F	2950 psig	500°F
3730 psig	200°F	2700 psig	600°F
3470 psig	300°F	2430 psig	700°F
3200 psig	400°F		

PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	CARBON STEEL
3	BALL	440 SS	316 SS
4	BALL RETAINER	316 SS	316 SS
5	MALE CONNECTOR	CARBON STEEL	316 SS
6	STEM	416 SS	316 SS
7	PACKING WASHER	17-4 PH SS	316 SS
8	PACKING RING	TEFLON®	TEFLON®
9	PACKING FOLLOWER	316 SS	316 SS
10	PACKING NUT	CARBON STEEL	CARBON STEEL
11	HANDWHEEL	IRON	IRON
12	NAMEPLATE	304 SS	304 SS
13	HANDWHEEL NUT	416 SS	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
15	SEAT	416 SS	316 SS
16	BONNET	CARBON STEEL	316 SS

### STRAIGHT-THRU VALVES OVERVIEW

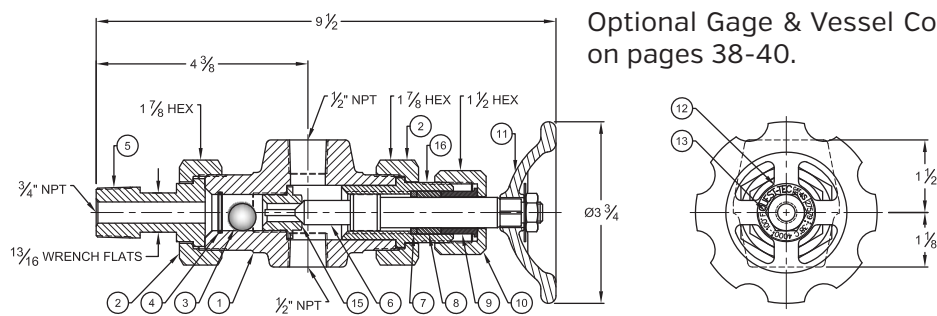
The Glass-Trac Type 4 Straight-Thru Gage Valve is available with Screwed [S] and Union [U] gage connections and used with Reflex and Transparent Gages in working pressures up to 4000 psig. The "straight-thru" valve body design is frequently specified with close hook-up [side connection] gages because the gage side connection centers and vessel centers can be identical whereas with offset valves, the vessel centers must be inside or outside side connection centers.

Type 4 Valves have a 3/4" NPT Male Vessel Connection as standard, with other connections available on application.

Type 4 Straight-Thru Gage Valves are stocked in carbon steel with stainless steel trim. Teflon® packing is furnished as standard for temperatures not exceeding 450° F; for higher temperatures not exceeding 700° F, flexible graphite packing is standard. The Type 4 Valve utilizes a stainless steel ball-check to block fluid leakage from the vessel in the event of gage glass breakage. The Type 4 Valve is available with an optional back-seating stem that extends the service life of the stem packing. An optional back seating stem is available on request.

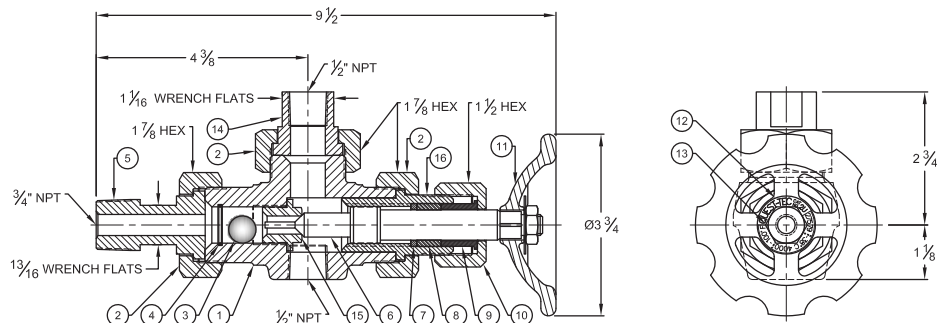
Optional Gage & Vessel Connections are shown on pages 38-40.

STRAIGHT-THRU VALVES - 4S & 4U



**Type 4S**

Weight per set approximately 12lbs.



**Type 4U**

Weight per set approximately 12lbs.

Note: Gage Valves are typically sold as sets (one top & one bottom valve).

# QUESTTEC SOLUTIONS

## VALVES QUESTTEC GLASS-TRAC

### TYPE 5S & 5U VALVES

Standard Outside Screw & Yoke

1440 psig CWP, 2160 psig Test  
[ASME Class 600]

3/4" NPT Male Vessel Connection

1/2" NPT Female Union Gage Connection

1/2" NPT Female Drain Connection Only

PRESSURE - TEMPERATURE RATINGS			
Teflon® Packing		Graphite Packing	
1440 psig	100°F	1250 psig	500°F
1400 psig	200°F	1110 psig	600°F
1365 psig	300°F	1065 psig	700°F
1330 psig	400°F		

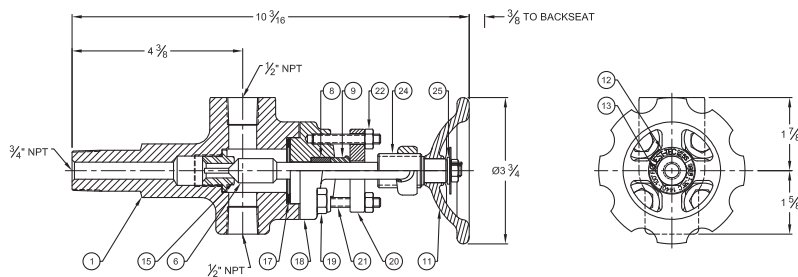
PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	316 SS
6	STEM	416 SS	316 SS
8	PACKING RING	TEFLON®	TEFLON®
9	PACKING FOLLOWER	316 SS	316 SS
11	HANDWHEEL	IRON	IRON
12	NAMEPLATE	304 SS	304 SS
13	HANDWHEEL NUT	316 SS	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
15	SEAT	416 SS	316 SS
17	YOKE GASKET	304 SS / GRAPHITE	316 SS / GRAPHITE
18	YOKE	FORGED CARBON STEEL	316 SS
19	YOKE SCREW	SA-193 B7	SA-193 B7
20	PRESSURE BAR	CARBON STEEL	CARBON STEEL
21	PRESSURE BAR STUD	SA-193 B7	SA-193 B7
22	PRESSURE BAR NUT	SA-194 2H	SA-194 2H
24	HANDWHEEL SCREW	SIL BRZ	SIL BRZ
25	OUTER THRUST WASHER	17-4 PH SS	17-4 PH SS

### STRAIGHT-THRU OS&Y VALVES OVERVIEW

The Glass-Trac Type 5 Offset Gage Valve features the Outside Screw & Yoke [OS&Y] design which prevents excessively hot or corrosive fluids from contacting stem threads. The linear reciprocating stem avoids potential rotational galling of the replaceable valve seat when closing the valve. The valve has a "straight-thru" body design and, with an optional bleed valve, can be used in a block and bleed application. Standard gage connections are Screwed [S] and Union [U] but other connections can be supplied on application.

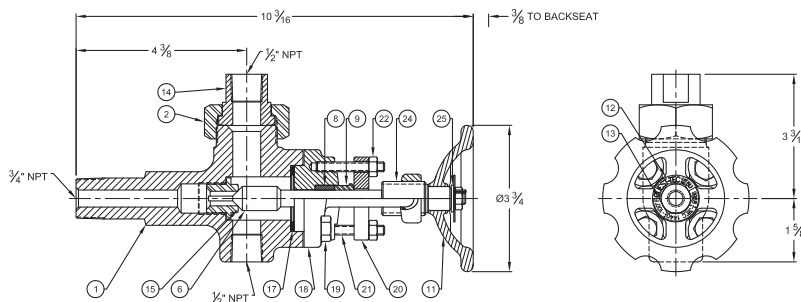
The standard vessel connection for Type 5 OS&Y Straight-Thru Gage Valves is a 3/4" NPT solid shank, with optional 1/2" and 1" NPT sizes. Ends beveled for welding also are available. Valve materials include forged carbon steel with stainless steel trim. Teflon® packing is furnished as standard for temperatures not exceeding 450° F; for higher temperatures not exceeding 700° F, flexible graphite packing is standard. As standard, the Type 5 Valve has a back-seating stem feature that extends the service life of the stem packing. A stainless steel ball-check is available as needed for the application.

Optional Gage & Vessel Connections are shown on pages 38-40.



#### Type 5S

Weight per set approximately 12lbs.



#### Type 5U

Weight per set approximately 12lbs.

Note: Gage Valves are typically sold as sets (one top & one bottom valve).

## TYPE ITC VALVE

Straight-Thru Pattern



## TYPE IT VALVE

Offset pattern



## TYPE 2T VALVE

Offset pattern



## TYPES & CONNECTIONS TO SUIT ALL REQUIREMENTS

### Type ITC Features

- Bar stock valve body with integral bonnet and seat
- 1/2" or 3/4" NPT male non-union vessel connection
- Grafoil® stem packing standard
- Stainless steel ballcheck to prevent fluid leakage in the event of gage glass breakage
- Optional glass tube protectors: Guard rods (4), plastic shield, wire mesh

### Type IT Features

- Forged valve body with integral bonnet and seat
- 1/2" or 3/4" NPT male union vessel connection
- Stem packing: Teflon® [250°F max.], Graphite [425°F max.]
- Stainless steel ballcheck to prevent fluid leakage in the event of glass tube breakage
- Optional glass tube protectors: Guard rods (4), plastic shield, wire mesh

### Type 2T Features

- Forged valve body with removeable bonnet and replaceable seat
- 1/2" or 3/4" NPT male union vessel connection
- Stem packing: Teflon® [250°F max.], Graphite [425°F max.]
- Stainless steel ballcheck to prevent fluid leakage in event of gage glass breakage
- Available options:
  1. Quick-closing 90° stem rotation from fully open to tightly closed with chain & lever operation
  2. Back-seating stem to extend the service life of packing
  3. Glass tube protectors: Guard rods (4), plastic shield, wire mesh

### Cut Lengths for Tubular Glass

CENTERLINE FACTOR TO CALCULATE EXACT LENGTHS			
Model	Visible Range	Tubular Glass	Guard Rod
1T/2T	-5.0"	-1.50"	-1.75"
1TC	-4.0"	2.125"	1.125"



# QUESTTEC SOLUTIONS

## VALVES QUESTTEC GLASS-TRAC

### TYPE ITC VALVE

Tubular Gage Valves  
NACE MR-0175 Body & Trim

Pressures to 600 psig @ 100°F [limited by glass].

Temperature range from -20°F to +400°F

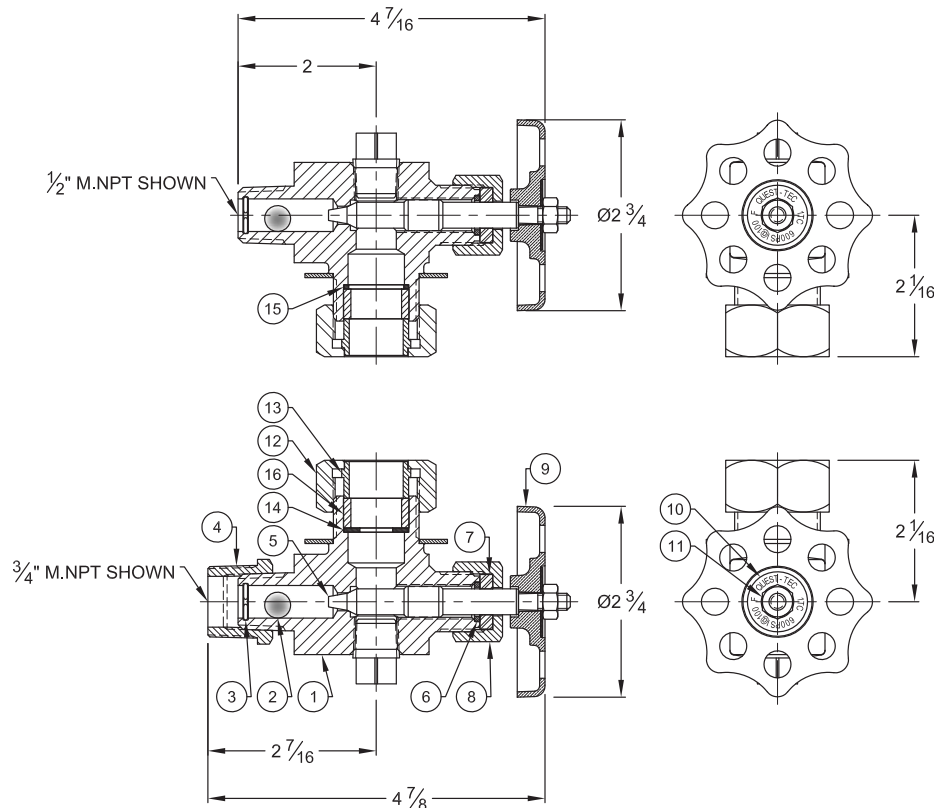
1/2" & 3/4" NPT Male Vessel Connection

5/8" & 3/4" O.D. Tubular Glass Gage Connection

GLASS-TRAC ITC PART NUMBERS		
PART NUMBER	CONNECTIONS	MATERIAL
1-209-01-049D	1/2" x 5/8" O.D. GLASS	CARBON STEEL
1-209-01-049E	3/4" x 5/8" O.D. GLASS	CARBON STEEL
1-209-01-049L	1/2" x 3/4" O.D. GLASS	CARBON STEEL
1-209-01-049GB	3/4" x 3/4" O.D. GLASS	CARBON STEEL
1-209-01-049H	1/2" x 5/8" O.D. GLASS	316 SS
1-209-01-049I	3/4" x 5/8" O.D. GLASS	316 SS
1-209-01-049M	1/2" x 3/4" O.D. GLASS	316 SS
1-209-01-049K	3/4" x 3/4" O.D. GLASS	316 SS

PARTS			
ITEM#	NAME	STANDARD	316 SS
		MATERIAL	MATERIAL
1	VALVE BODY	CARBON STEEL	316 SS
2	BALL	316 SS	316 SS
3	BALL RETAINER	316 SS	316 SS
4	3/4" X 1/2" NPT REDUCER BUSHING	CARBON STEEL	316 SS
5	STEM	316 SS	316 SS
6	STEM PACKING WASHER	CARBON STEEL	316 SS
7	STEM PACKING RING	GRAFOIL®	GRAFOIL®
8	STEM PACKING NUT	CARBON STEEL	316 SS
9	HANDWHEEL	ALUMINUM	ALUMINUM
10	NAMEPLATE	304 SS	304 SS
11	HANDWHEEL NUT	CARBON STEEL	18-8 SS
12	GLASS PACKING NUT	CARBON STEEL	316 SS
13	GLASS FOLLOWER	CARBON STEEL	316 SS
14	LOWER GLASS SUPPORT	CARBON STEEL	316 SS
15	UPPER GLASS SUPPORT	CARBON STEEL	316 SS
16	GLASS GASKET	VITON A®	VITON A®

See Glass Gage Rating on page 37.



### TUBULAR GAGES WITH TYPE ITC VALVES

For low pressure water vessels, storage tanks, etc. Glass-Trac provides Type ITC carbon steel and 316 stainless steel valves for Tubular Gages. These valves are used with 5/8", and 3/4" O.D. Pyrex® Red Line, High Pressure or Heavy Wall Glass. A stainless steel ballcheck is included to prevent fluid leakage in the event of gage glass breakage. The maximum working pressure is dependent on the length and rated pressure of the glass.

The pressure-temperature rating of stand-alone Tubular Valves (without glass) is typically greater than that of the glass tube. The table on page 34 displays the maximum recommended pressure-temperature of the glass tube based on its diameter, type and overall length. The overall length of the glass is 2-1/8" shorter and the visible range is approximately 4" shorter than the center-to-center dimension of the vessel connections.

**Glass Overall Length = Valve C-C less 2 1/8"**

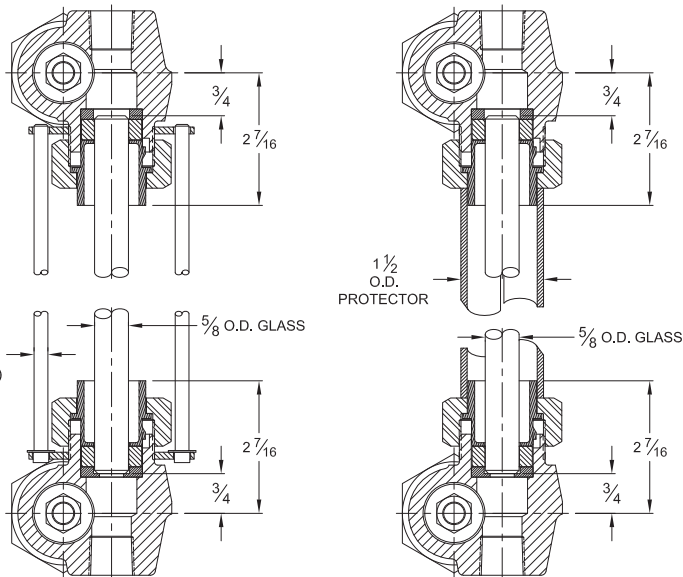
### Type ITC

Shown with [4] guard rods option



## TYPE 1TC & 2TC VALVES

Shown with [4] guard rods option



## TUBULAR GAGE GLASS OVERVIEW

Glass-Trac Tubular Glass Gages are available in any length desired and can be fitted with Type 1T or 2T Gage Valves. These gages provide 360° visibility of the liquid level through strong, clear glass.

Three types of glass are available; Red Line, High Pressure and Heavy Wall. Glass type selection is dependent on the required working pressure-temperature and the glass overall length - see page 36.

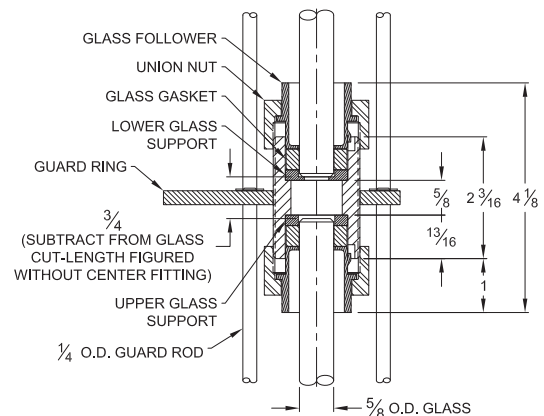
Red Line glass is heat resistant and has a bright crimson stripe against a narrow white stripe extending the length of the tube giving an optical effect that is easy to see. High Pressure glass is a versatile, medium-strong material used in many applications. Heavy Wall glass has provides the highest pressure rating. It has exceptional clarity and corrosion, scratch and thermal shock resistance.

The overall length of the glass is 1-1/2" shorter shorter and the visible range is approximately 5" shorter than the center-to-center dimension of the vessel connections.

The Type 1T and 2T Valves utilize a stainless steel ballcheck to block fluid leakage from the vessel in the event of gage glass breakage.

To protect the glass tube against incidental contact and breakage, the valves can be furnished with [4] guard rods that extend the exposed length of the tube. Additional glass protection [that can be used in conjunction with the guard rods] include a clear plastic shield and/or a wire-mesh wrap.

**Glass Overall Length = Valve C-C less 1 1/2"**



Center Fitting - Recommended when valve centers exceed maximum recommended service length

# QUESTTEC SOLUTIONS

## VALVES QUESTTEC GLASS-TRAC

### TYPE 1T & 2T VALVES

Tubular Gage Valves

4000 psig CWP, 6000 psig Test

3/4" NPT Male Union Vessel Connection

1/2" NPT Female Union Gage Connection

1/2" NPT Female Drain Connection Only

PRESSURE - TEMPERATURE RATINGS			
Teflon® Packing		Graphite Packing	
4000 psig	100°F	3470 psig	300°F
3730 psig	200°F	3200 psig	400°F
3600 psig	250°F	3150 psig	425°F

Note: These ratings are for the valves only and not the tubular glass gages. See Glass Gage Ratings on page 36.

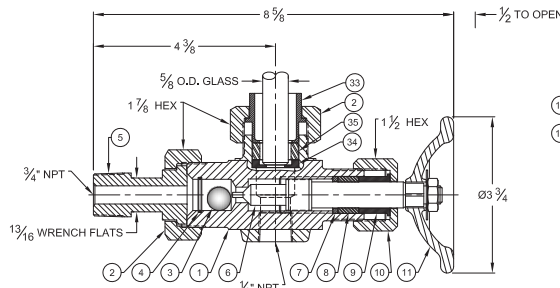
PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	CARBON STEEL
3	BALL	440 SS	316 SS
4	BALL RETAINER	316 SS	316 SS
5	MALE CONNECTOR	CARBON STEEL	316 SS
6	STEM	416 SS	316 SS
7	PACKING WASHER	17-4 PH SS	316 SS
8	PACKING RING	TEFLON®	TEFLON®
9	PACKING FOLLOWER	316 SS	316 SS
10	PACKING NUT	CARBON STEEL	CARBON STEEL
11	HANDWHEEL	IRON	IRON
12	NAMEPLATE	304 SS	304 SS
13	HANDWHEEL NUT	316 SS	316 SS
15	SEAT	416 SS	316 SS
16	BONNET	CARBON STEEL	316 SS
33	GLASS FOLLOWER	CARBON STEEL	CARBON STEEL
34	GLASS SUPPORT	CARBON STEEL	316 SS
35	GLASS GASKET	BUNA N®	BUNA N®

### TUBULAR GAGES WITH TYPE 1T & 2T VALVES

Glass-Trac Type 1T and 2T Offset Tubular Gage Valves are fitted with 5/8" O.D. glass [standard] or with 3/4" O.D. glass [optional]. Teflon® stem packing and Buna N® glass gaskets are furnished as standard for temperatures not exceeding 250°F. For higher temperatures not exceeding 425°F, valves are furnished with graphite packing and Viton® glass gaskets.

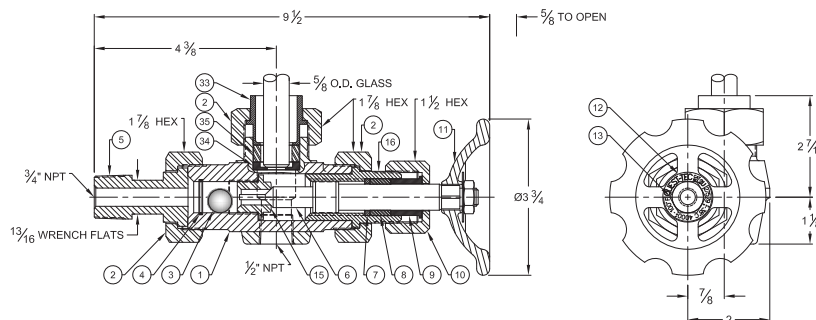
Type 1T and 2T Valves are fitted with a stainless steel ballcheck to block fluid leakage from the vessel in the event of gage glass breakage.

The Type 2T valve can be furnished with a quick-closing 90° stem rotation from fully open to tightly closed with chain & lever operation.



**Type 1T**

Weight per set approximately 10lbs.  
12ozs



**Type 2T**

Weight per set approximately 11lbs.  
12ozs

QUESTTEC SOLUTIONS

# TUBULAR GAGE GLASS ASSEMBLY

## Pressure-Temperature Ratings

### MAXIMUM RECOMMENDED WORKING PRESSURE-TEMPERATURE, PSIG

GLASS LENGTH	5/8" O.D. RED LINE		3/4" O.D. RED LINE		5/8" O.D. HIGH PRESSURE	
	TO 150° F	TO 425° F	TO 150° F	TO 425° F	TO 150° F	TO 425 °F
8"	370	285	360	280	435	320
10"	345	280	340	275	420	315
12"	335	280	330	275	410	305
14"	325	275	320	270	390	295
15"	320	275	315	270	380	290
16"	315	270	310	265	375	285
18"	305	265	300	260	360	280
20"	290	265	285	260	350	270
22"	280	260	275	255	335	265
24"	265	255	260	250	320	255
30"	235	†	230	†	280	†
36"	205	†	200	†	245	†
48"	165	†	160	†	195	†
60"	125	†	125	†	150	†
72"	90	†	90	†	100	†

GLASS LENGTH	3/4" O.D. HIGH PRESSURE		5/8" O.D. HEAVY WALL		3/4" O.D. HEAVY WALL	
	TO 150° F	TO 425° F	TO 150° F	TO 425° F	TO 150° F	TO 425° F
8"	425	315	600	350	600	350
10"	410	310	600	345	600	345
12"	400	300	600	340	600	340
14"	385	290	600	335	600	335
15"	375	285	600	330	600	330
16"	370	280	600	325	600	325
18"	355	275	600	320	600	320
20"	345	265	600	315	600	315
22"	330	260	590	310	590	310
24"	315	250	580	300	580	300
30"	275	†	550	†	550	†
36"	240	†	500	†	500	†
48"	190	†	340	†	340	†
60"	145	†	‡	†	‡	†
72"	100	†	‡	†	‡	†

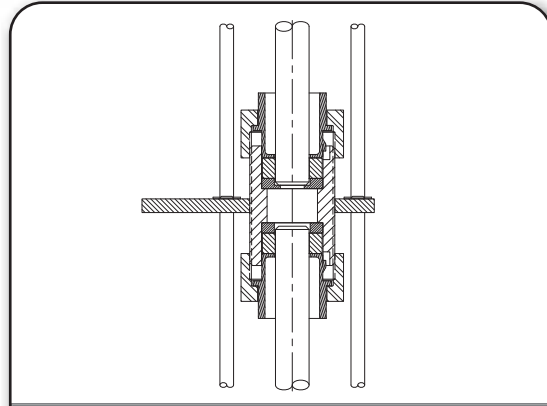
† Maximum recommended length is 24". ‡ Maximum recommended length is 48".

**TUBULAR GAGE & ITC, 1T & 2T  
 VALVE OPTIONS**



**Glass Protection**

- Guard Rods (4)  
 Carbon Steel  
 Stainless Steel
- Plastic Shield
- Wire Mesh



**Center Fittings - 1T & 2T Valves**

- Recommended for glass length exceeding:**
- 24" - Red Line & High Pressure
  - 48" - Heavy Wall
  - Carbon & Stainless Steel (standard)
  - All Stainless Steel (available)



**Glass Gaskets**

- Buna N®
- Viton®
- EPDM - 1T & 2T only
- Grafoil® - 1T & 2T only

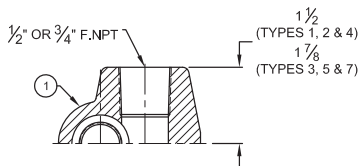


**Tubular Glass Selection**

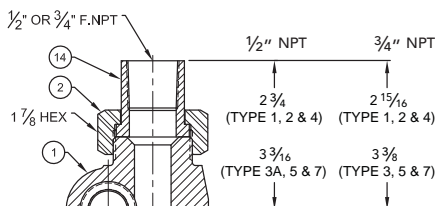
- Heat Treated High Pressure - 5/8" & 3/4" O.D.
- Pyrex® Red Line - 5/8" & 3/4" O.D.
- Pyrex® Heavy Wall - 3/4" O.D. only
- Polycarbonate - 3/4" O.D. only
- PCTFE - 3/4" O.D. only

# GAGE CONNECTIONS QUESTTEC GLASS-TRAC

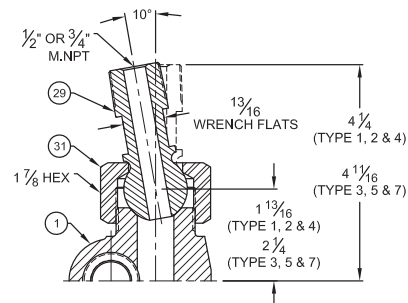
**GLASS-TRAC GAGE VALVES, TYPES 1 THRU 7, CAN BE FITTED WITH ANY GAGE CONNECTION SHOWN BELOW:**



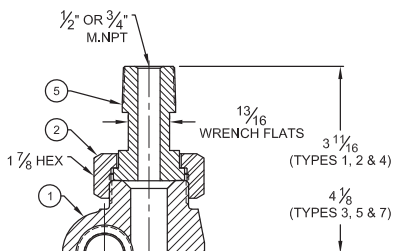
Integral Female NPT



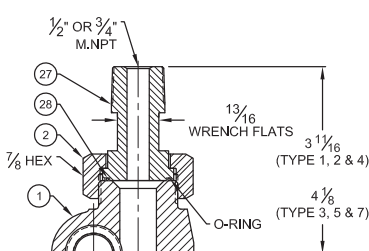
Union Female NPT



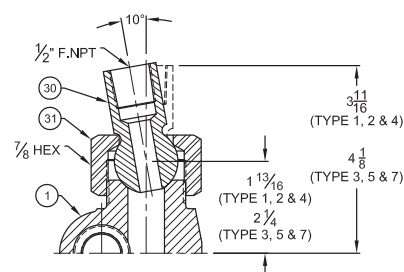
Spherical Union Male NPT



Union Male NPT



Union W/O-Ring Male NPT

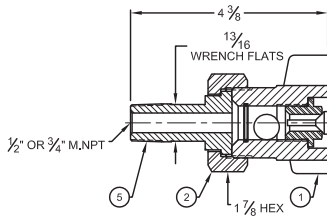


Spherical Union Female NPT  
[1/2" NPT only]

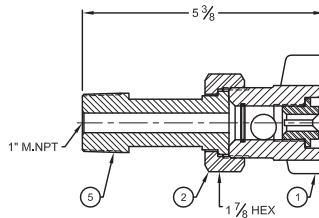
PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	CARBON STEEL
5	MALE CONNECTOR	CARBON STEEL	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
27	MALE O-RING CONNECTOR	CARBON STEEL	316 SS
* 28	O-RING	BUNA N®	BUNA N®
29	MALE SPHERICAL CONNECTOR	CARBON STEEL	316 SS
** 30	FEMALE SPHERICAL CONNECTOR	CARBON STEEL	304 SS
31	SPHERICAL NUT	CARBON STEEL	CARBON STEEL

\*Viton® and Teflon® are available or on request O-Ring material options.

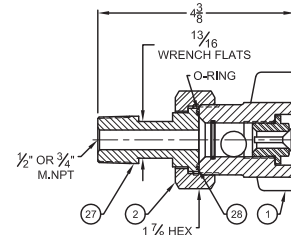
\*\*3/4" NPT female spherical connections are not available.



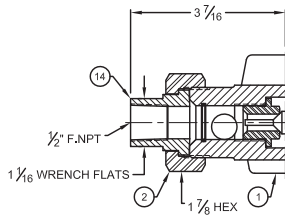
Union Male NPT



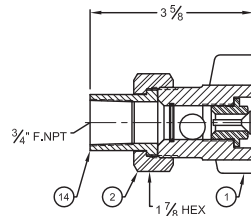
Union Male NPT



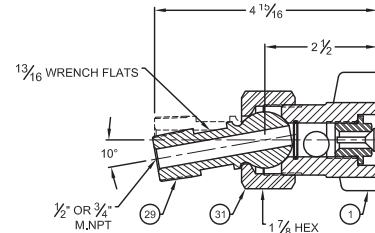
Union W/O-Ring Male NPT



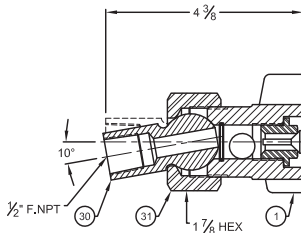
Union Female NPT



Union W/Female NPT



Spherical Union Male NPT



Spherical Union Female NPT  
[1/2" NPT only]

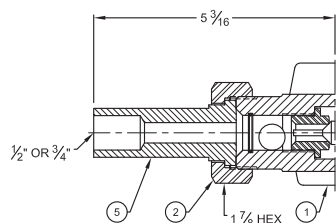
PARTS

ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	CARBON STEEL
5	MALE CONNECTOR	CARBON STEEL	316 SS
14	FEMALE CONNECTOR	CARBON STEEL	316 SS
*27	MALE O-RING CONNECTOR	CARBON STEEL	316 SS
28	O-RING	BUNA N®	BUNA N®
**29	MALE SPHERICAL CONNECTOR	CARBON STEEL	316 SS
30	FEMALE SPHERICAL CONNECTOR	CARBON STEEL	316 SS
31	SPHERICAL NUT	CARBON STEEL	CARBON STEEL

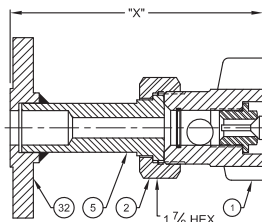
\* Viton® and Teflon® are available O-Ring material options.

\*\*3/4" NPT female spherical connections are not available

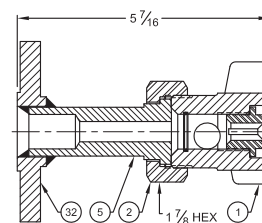
# VESSEL CONNECTIONS QUESTTEC GLASS-TRAC (CONT.)



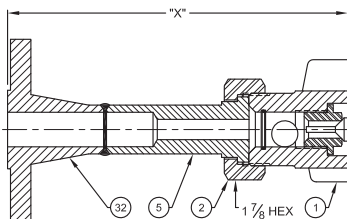
Union NPS Stub End



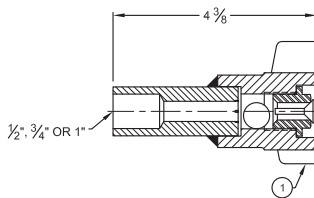
Union Socket Weld Flange



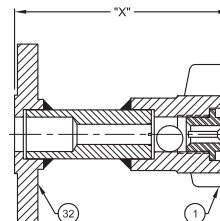
Union Slip-On Flange



Union Weld Neck Flange

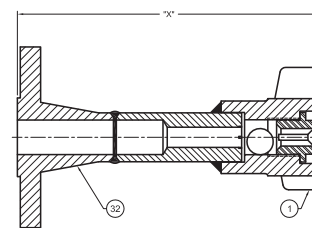


Solid Shank NPS Stub End



Solid Shank Socket Weld Flange

SOCKET WELD FLANGED UNION CONNECTION		
SIZE(in.)	ASME CLASS	"X"(in.)
3/4	150	5-7/16
	300	5-13/16
	600	6-1/16
	900/1500	6-7/16
1	150	5-1/2
	300	5-7/8
	600	6-1/8
	900/1500	6-11/16
1-1/4	150	5-5/8
	300	5-7/8
	600	6-3/16
	900/1500	6-11/16
1-1/2	150	5-11/16
	300	6
	600	6-5/16
	900/1500	6-13/16
2	150	5-13/16
	300	6-1/8
	600	6-1/2
	900/1500	7-5/16



Solid Shank Weld Neck Flange

PARTS			
ITEM#	NAME	STANDARD	316 SS WETTED PARTS
		MATERIAL	MATERIAL
1	BODY	FORGED CARBON STEEL	316 SS
2	UNION NUT	CARBON STEEL	CARBON STEEL
5	MALE CONNECTOR	CARBON STEEL	316 SS
32	FLANGE	CARBON STEEL	316 SS

SOCKET WELD FLANGED SOLID SHANK CONNECTION		
SIZE(in.)	ASME CLASS	"X"(in.)
3/4	150	4-5/8
	300	5
	600	5-1/4
	900/1500	5-5/8
1	150	4-11/16
	300	5-1/16
	600	5-5/16
	900/1500	5-7/8
1-1/4	150	4-13/16
	300	5-1/16
	600	5-3/8
	900/1500	5-7/8
1-1/2	150	4-7/8
	300	5-3/16
	600	5-1/2
	900/1500	6
2	150	5
	300	5-5/16
	600	5-11/16
	900/1500	6-1/2

WELD NECK FLANGED UNION CONNECTION		
SIZE(in.)	ASME CLASS	"X"(in.)
3/4	150	7-5/16
	300	7-1/2
	600	7-3/4
	900/1500	8-1/4
1	150	7-3/8
	300	7-9/16
	600	7-13/16
	900/1500	8-3/8
1-1/4	150	7-7/16
	300	7-5/8
	600	7-15/16
	900/1500	8-3/8
1-1/2	150	7-1/2
	300	7-11/16
	600	8
	900/1500	8-1/2
2	150	7-9/16
	300	7-3/4
	600	8-1/8
	900/1500	8-3/4

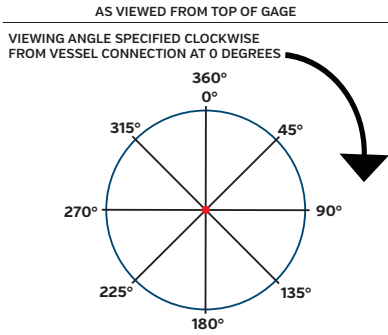
WELD NECK FLANGED SOLID SHANK CONNECTION		
SIZE(in.)	ASME CLASS	"X"(in.)
3/4	150	6-1/2
	300	6-11/16
	600	6-15/16
	900/1500	7-7/16
1	150	6-9/16
	300	6-3/4
	600	7
	900/1500	7-9/16
1-1/4	150	6-5/8
	300	6-13/16
	600	7-1/8
	900/1500	7-9/16
1-1/2	150	6-11/16
	300	6-7/8
	600	7-3/16
	900/1500	7-11/16
2	150	6-3/4
	300	9-15/16
	600	7-5/16
	900/1500	7-15/16



# QUESTTEC SOLUTIONS

## GENERAL INFORMATION

### VIEWING ANGLE SPECIFICATION

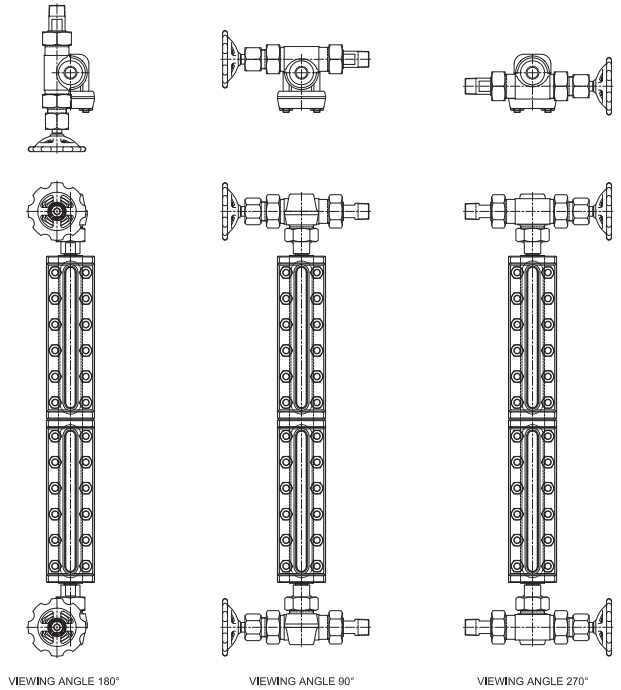


To specify the assembly orientation two reference points must be identified, the vessel connection and viewing angle. The vessel connection is set at 0 Deg. The viewing angle is set at any desired position where clearance permits. The standard viewing angle is 180 Deg for all Glass-Trac

Gage assemblies, unless noted otherwise. If a non-standard viewing angle is required, specify the viewing angle.

**Note:**

- 1) Side connected [close hook-up "CH"] gage assemblies are fixed at 180 Deg.
- 2) Back connected gage assemblies are fixed at either 90 or 270 Deg.

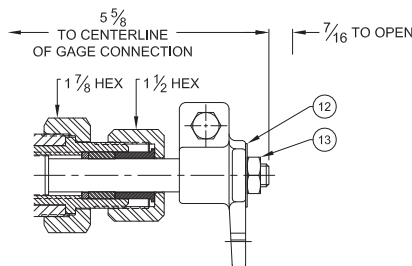
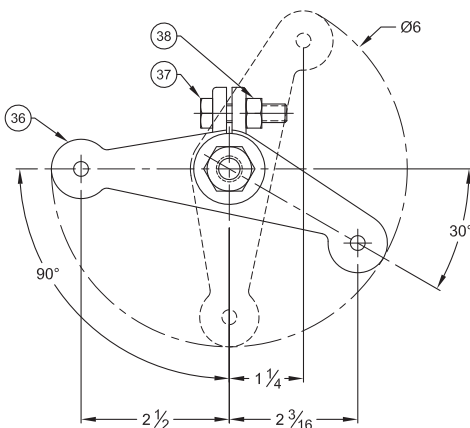


### LIQUID LEVEL GAGE VOLUMES

STANDARD CHAMBER GAGE VOLUMES (APPROXIMATE)						LARGE CHAMBER GAGE VOLUMES (APPROXIMATE)			
GLASS SIZE NO.	VISIBLE LENGTH (INCHES)	REFLEX		TRANSPARENT		REFLEX		TRANSPARENT	
		CU. IN.	CU. CM.	CU. IN.	CU. CM.	CU. IN.	CU. CM.	CU. IN.	CU. CM.
1	3 3/4	2.07	34	3.17	52	15.49	254	15.92	261
2	4 3/4	2.61	43	3.99	65	19.16	314	19.70	323
3	5 3/4	3.21	53	4.82	79	22.82	374	23.48	385
4	6 3/4	3.68	60	5.63	92	26.49	434	27.26	447
5	7 7/8	4.28	70	6.55	107	30.61	501	31.51	516
6	9 1/8	4.94	81	7.58	124	35.19	577	36.24	594
7	10 1/4	5.55	91	8.50	139	39.31	644	40.49	664
8	11 7/8	6.42	105	9.83	161	45.26	742	46.64	764
9	12 5/8	6.82	112	10.45	171	48.01	787	49.47	811

Liquid volume encased between gage sections: Standard Chamber = .271 cu.in. [4.44 cu.cm.], Large Chamber = 3.54 cu.in. [58.01 cu.cm.]

### QUICK-OPENING LEVERS

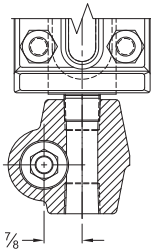
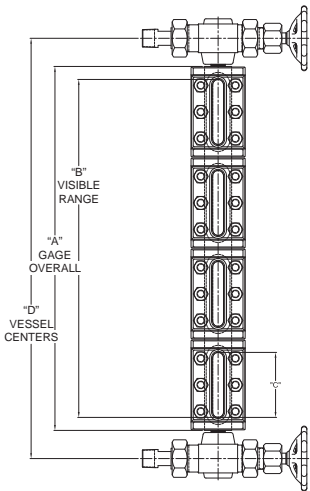


Glass-Trac Gage Valves can be furnished with a quick-closing 90° stem rotation from fully open to tightly closed with chain & lever operation.

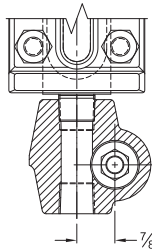
PARTS		
ITEM#	NAME	MATERIAL
12	NAMEPLATE	304 SS
13	LEVER NUT	316 SS
36	LEVER	CARBON STEEL
37	BOLT	SAE J429 Gr.8
38	NUT	SA-194 2H

# INSTALLATION: STANDARD GAGES

## End Connected



BOTTOM LEFT HAND OFFSET GAGE VALVE



BOTTOM RIGHT HAND OFFSET GAGE VALVE

INSTALLATION: STANDARD GAGES

SIZE NO.		A GAGE OVERALL	B VISIBLE GLASS	C VISIBLE GLASS	D VESSEL MINIMUM CENTER-TO-CENTER WITH GAGE CONNECTIONS SHOWN ON PAGE 38*							
					FOR GAGES TAPPED 1/2" NPT				FOR GAGES TAPPED 3/4" NPT			
					**1/2" NPT FEMALE INTEGRAL**	**1/2" NPT FEMALE UNION**	1/2" NPT MALE UNION	1/2" NPT MALE UNION	**3/4" NPT FEMALE INTEGRAL**	3/4" NPT FEMALE UNION**	3/4" NPT MALE UNION	3/4" NPT MALE UNION
GLASS NO.	NO. SECT.											
1	1	5 1/4"	3 3/4"	3 3/4"	8 1/2"	11"	11 5/8"	12 3/4"	8 3/4"	11 5/8"	11 1/2"	12 5/8"
2	1	6 1/4"	4 3/4"	4 3/4"	9 1/2"	12"	12 5/8"	13 3/4"	9 3/4"	12 5/8"	12 1/2"	13 5/8"
3	1	7 1/4"	5 3/4"	5 3/4"	10 1/2"	13"	13 5/8"	14 3/4"	10 3/4"	13 5/8"	13 1/2"	14 5/8"
4	1	8 1/4"	6 3/4"	6 3/4"	11 1/2"	14"	14 5/8"	15 3/4"	11 3/4"	14 5/8"	14 1/2"	15 5/8"
5	1	9 3/8"	7 7/8"	7 7/8"	12 5/8"	15 1/8"	15 3/4"	16 7/8"	12 7/8"	15 3/4"	15 5/8"	16 3/4"
6	1	10 5/8"	9 1/8"	9 1/8"	13 7/8"	16 3/8"	17"	18 1/8"	14 1/8"	17"	16 7/8"	18"
7	1	11 3/4"	10 1/4"	10 1/4"	15"	17 1/2"	18 1/8"	19 1/4"	15 1/4"	18 1/8"	18"	19 1/8"
8	1	13 3/8"	11 7/8"	11 7/8"	16 5/8"	19 1/8"	19 3/4"	20 7/8"	16 7/8"	19 3/4"	19 5/8"	20 3/4"
9	1	14 1/8"	12 5/8"	12 5/8"	17 3/8"	19 7/8"	20 1/2"	21 5/8"	17 5/8"	20 1/2"	20 3/8"	21 1/2"
3	2	14 1/2"	13"	5 3/4"	17 3/4"	20 1/4"	20 7/8"	22"	18"	20 7/8"	20 3/4"	21 7/8"
4	2	16 1/2"	15"	6 3/4"	19 3/4"	22 1/4"	22 7/8"	24"	20"	22 7/8"	22 3/4"	23 7/8"
5	2	18 3/4"	17 1/4"	7 7/8"	22"	24 1/2"	25 1/8"	26 1/4"	22 1/4"	25 1/8"	25"	26 1/8"
6	2	21 1/4"	19 3/4"	9 1/8"	24 1/2"	27"	27 5/8"	28 3/4"	24 3/4"	27 5/8"	27 1/2"	28 5/8"
7	2	23 1/2"	22"	10 1/4"	26 3/4"	29 1/4"	29 7/8"	29 7/8"	27"	29 7/8"	29 3/4"	30 7/8"
8	2	26 3/4"	25 1/4"	11 7/8"	30"	32 1/2"	33 1/8"	34 1/4"	30 1/4"	33 1/8"	33"	34 1/8"
9	2	28 1/4"	26 3/4"	12 5/8"	31 1/2"	34"	34 5/8"	35 3/4"	31 3/4"	34 5/8"	34 1/2"	35 5/8"
6	3	31 7/8"	30 3/8"	9 1/8"	35 5/8"	37 5/8"	38 1/4"	39 3/8"	35 5/8"	38 1/4"	38 1/8"	39 1/4"
7	3	35 1/4"	33 3/4"	10 1/4"	38 1/2"	41"	41 5/8"	42 3/4"	38 3/4"	41 5/8"	41 1/2"	42 5/8"
8	3	40 1/8"	38 5/8"	11 7/8"	43 3/8"	45 7/8"	46 1/2"	47 5/8"	43 5/8"	46 1/2"	46 3/8"	47 1/2"
9	3	42 3/8"	40 7/8"	12 5/8"	45 5/8"	48 1/8"	48 3/4"	49 7/8"	45 7/8"	48 3/4"	48 5/8"	49 3/4"
7	4	47"	45 1/2"	10 1/4"	50 1/4"	52 3/4"	53 3/8"	54 1/2"	50 1/2"	53 3/8"	53 1/4"	54 5/8"
8	4	53 1/2"	52"	11 7/8"	56 3/4"	59 1/4"	59 7/8"	61"	57"	59 7/8"	59 3/4"	60 7/8"
9	4	56 1/2"	55"	12 5/8"	59 3/4"	62 1/4"	62 7/8"	64"	60"	62 7/8"	62 3/4"	63 7/8"
7	5	58 3/4"	57 1/4"	10 1/4"	62"	64 1/2"	65 1/8"	66 1/4"	62 1/4"	65 1/8"	65"	66 1/8"
8	5	66 7/8"	65 3/8"	11 7/8"	70 1/8"	72 5/8"	73 1/4"	74 3/8"	70 3/8"	73 1/4"	73 1/8"	74 1/4"
9	5	70 5/8"	69 1/8"	12 5/8"	73 7/8"	76 3/8"	77"	78 1/8"	74 1/8"	77"	76 7/8"	78"
8	6	80 1/4"	78 3/4"	11 7/8"	83 1/2"	86"	86 5/8"	87 3/4"	83 3/4"	86 5/8"	86 1/2"	87 5/8"
9	6	84 3/4"	83 1/4"	12 5/8"	88"	90 1/2"	91 1/8"	92 1/4"	88 1/4"	91 1/8"	91"	92 1/8"
8	7	93 3/8"	92 1/8"	11 7/8"	96 7/8"	99 3/8"	100"	101 1/8"	97 1/8"	100"	99 7/8"	101"
9	7	98 7/8"	97 3/8"	12 5/8"	102 1/8"	104 5/8"	105 1/4"	106 3/8"	102 3/8"	105 1/4"	105 1/8"	106 1/4"
8	8	107"	105 1/2"	11 7/8"	110 1/4"	112 3/4"	113 3/8"	114 1/2"	110 1/2"	113 3/8"	113 1/4"	114 3/8"
9	8	113"	111 1/2"	12 5/8"	116 1/4"	118 3/4"	119 3/8"	120 1/2"	116 1/2"	119 3/8"	119 1/4"	120 3/8"
8	9	120 3/8"	118 7/8"	11 7/8"	123 5/8"	126 1/4"	126 1/8"	127 7/8"	123 7/8"	126 3/4"	126 5/8"	127 3/4"
9	9	127 1/8"	125 5/8"	12 5/8"	130 3/8"	132 7/8"	133 1/2"	134 3/8"	130 5/8"	133 1/2"	133 3/8"	134 1/2"

\* These dimensions apply to Low Pressure [Series L], Mid Pressure [Series M], 1/2" NPT High Pressure [Series H], Frost-Free [all Series] and internally heated/cooled Reflex and Transparent Level Gages tapped 1/2" or 3/4" NPT. See footnotes below for all other gages installation dimensions.

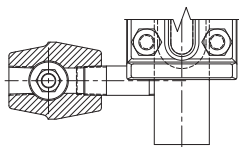
\*\* These dimensions are based on gage connections using close pipe nipples; if using "short" pipe nipples, add 3/4" for 1/2" NPT and 1-1/4" for 3/4" NPT.

- Footnotes for installation dimensions of other gage types:
1. Low Pressure [Series L] Large Chamber Gages, add 1" to Dimensions "A" and "D".
  2. Low Pressure [Series L] and Mid Pressure [Series M] externally heat/cooled gages, add 2-1/4" to Dimension "D".
  3. Gage Valve Types 3A, 5 and 7, add 7/8" to Dimension "D".
  4. High Pressure [Series H] Gages with 3/4" NPT connection, add 1-1/2" to Dimensions "A" and "D".
  5. Gages with Female 1/2" NPT Spherical Union connections, add 1-7/8" to Dimension "D".
  6. Gages with 1/2" and 3/4" socket weld connections, add 1-3/4" to Dimension "D".

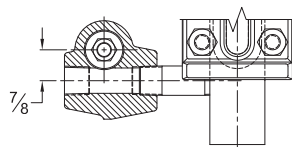
# INSTALLATION: CLOSE HOOK-UP GAGE

## Side Connected (GAGE CONNECTIONS)

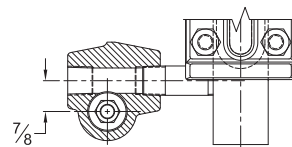
SIZE NO.	MINIMUM CENTER-TO-CENTER VESSEL CONNECTIONS					
	STRAIGHT-THRU VALVES		OFFSET VALVES W/HANDLE INSIDE		OFFSET VALVES W/HANDLE OUTSIDE	
	1/2"	3/4"	1/2"	3/4"	1/2"	3/4"
11	5 1/4"	5 5/8"	3 1/2"	3 7/8"	7"	7 3/8"
21	6 1/4"	6 5/8"	4 1/2"	4 7/8"	8"	8 3/8"
31	7 1/4"	7 5/8"	5 1/2"	5 7/8"	9"	9 3/8"
41	8 1/4"	8 5/8"	6 1/2"	6 7/8"	10"	10 3/8"
51	9 3/8"	9 3/4"	7 5/8"	8"	11 1/8"	11 1/2"
61	10 5/8"	11"	8 7/8"	9 1/4"	12 3/8"	12 3/4"
71	11 3/4"	12 1/8"	10"	10 3/8"	13 1/2"	13 7/8"
81	13 3/8"	13 3/4"	11 5/8"	12"	15 1/8"	15 1/2"
91	14 1/8"	14 1/2"	12 3/8"	12 3/4"	15 7/8"	16 1/4"
32	14 1/2"	14 7/8"	12 3/4"	13 1/8"	16 1/4"	16 5/8"
42	16 1/2"	16 7/8"	14 3/4"	15 1/8"	18 1/4"	18 5/8"
52	18 3/4"	19 1/8"	17"	17 3/8"	20 1/2"	20 7/8"
62	21 1/4"	21 5/8"	19 1/2"	19 7/8"	23"	23 3/8"
72	23 1/2"	23 7/8"	21 3/4"	22 1/8"	25 1/4"	25 5/8"
82	26 3/4"	27 1/8"	25"	25 3/8"	28 1/2"	28 7/8"
92	28 1/4"	28 5/8"	26 1/2"	26 7/8"	30"	30 3/8"
63	31 7/8"	32 1/4"	30 1/8"	30 1/2"	33 5/8"	34"
73	35 1/4"	35 5/8"	33 1/2"	33 7/8"	37"	37 3/8"
83	40 1/8"	40 1/2"	38 3/8"	38 3/4"	41 7/8"	42 1/4"
93	42 3/8"	42 3/4"	40 5/8"	41"	44 1/8"	44 1/2"
74	47"	47 3/8"	45 1/4"	45 5/8"	48 3/4"	49 1/8"
84	53 1/2"	53 7/8"	51 3/4"	52 1/8"	55 1/4"	55 5/8"
94	56 1/2"	56 7/8"	54 3/4"	55 1/8"	58 1/4"	58 5/8"
75	58 3/4"	59 1/8"	57"	57 3/8"	60 1/2"	60 7/8"
85	66 7/8"	67 1/4"	65 1/8"	65 1/2"	68 5/8"	69"
95	70 5/8"	71"	68 7/8"	69 1/4"	72 3/8"	72 3/4"
86	80 1/4"	80 5/8"	78 1/2"	78 7/8"	82"	82 3/8"
96	84 3/4"	85 1/8"	83"	83 3/8"	86 1/2"	86 7/8"
87	93 5/8"	94"	91 7/8"	92 1/4"	95 3/8"	95 3/4"
97	98 7/8"	99 1/4"	97 1/8"	97 1/2"	100 5/8"	101"
88	107"	107 3/8"	105 1/4"	105 5/8"	108 3/4"	109 1/8"
98	113"	113 3/8"	111 1/4"	111 5/8"	114 3/4"	115 1/8"
89	120 3/8"	120 3/4"	118 5/8"	119"	122 1/8"	122 1/2"
99	127 1/8"	127 1/2"	125 3/8"	125 3/4"	128 7/8"	129 1/4"



CLOSE HOOK-UP  
STRAIGHT THRU



CLOSE HOOK-UP  
OFFSET INSIDE



CLOSE HOOK-UP  
OFFSET OUTSIDE

# CAUTION

Gage glasses can fail from induced external mechanical stress or accidental contact rather than from internal pressure, but both factors must be considered. The following basic precautions will ensure safe usage and satisfactory performance of glass gages:"

1. Glass selection is application appropriate.
2. Glass, cover and bolting are properly assembled.
3. Periodic inspection and cleaning of gage and glass.
4. Glass is replaced when inspection results warrant.

The service pressure and temperature must be considered when selecting gage style (flat or tubular), glass size, gage length and glass quality. Shorter length multi-section gages are less vulnerable to failure than long single-section gages. Guard rods, a plastic shield or wire mesh is recommended to protect tubular gages.

Never use glass that is blemished, scratched or has chipped edges. Glass must be precisely fitted into its enclosure. Flat glass must be fully supported by the gasket and cushion and never allowed to contact the metal gage chamber or cover. Flat glass cover bolting must be tightened evenly in the correct sequence making multiple passes to arrive at the

prescribed final torque value using a calibrated torque wrench. Do not tighten fasteners with the gage under pressure or attempt to install the gage between mismatched or non-vertical vessel centers.

Apply an ordinary commercial glass cleaner to the external exposed surface of the glass to facilitate visual inspection. Glass observed to have chips, scratches, blemishes or lacking optical clarity require replacement to ensure safe operation. Gages exposed to elevated service temperatures require more frequent periodic inspection.

Should the glass be removed/replaced, always install new gaskets/cushions after thoroughly cleaning and drying the gage chamber and cover recesses (flat glass) or valve socket bores (tubular glass).

Glass should be replaced if any blemish mars surface. If gage is taken apart, glass, gaskets and cushions should be automatically replaced to reduce risk; make sure gage or tubular valves surfaces are clean and dry before installing glasses.

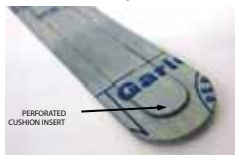
For safety purposes, glasses in high temperature service should be replaced more often than similar glasses used in low temperature services.

Step 1



Glass Cover Removal  
[Perforated Cushion Insert]

Step 2



Step 3



Step 4

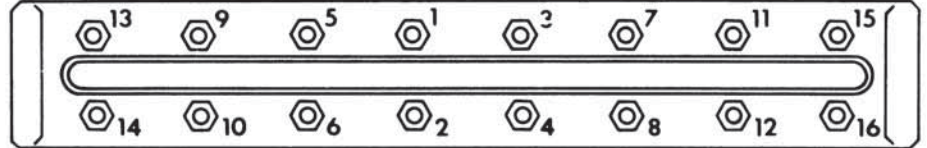


Step 5



# GLASS-TRAC GAGE ASSEMBLY

[Numbers Indicate Proper Bolt  
Torquing Sequence.]



GAUGE SERIES	TORQUE (TIGHTEN IN 4 – 5 FT.-LB. STEPS)
Low Pressure Large Chamber	20 Ft.-Lb.
Medium Pressure	32 Ft.-Lb.
High Pressure	40 Ft.-Lb.

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