

# Selecting a Pressure Gauge

When selecting a pressure gauge, it is important to consider the following factors to ensure safety and accuracy:

1. Pressure fluid composition
2. Pressure fluid temperature
3. Ambient conditions
4. Pressure range
5. Conditions affecting wear of the system
6. Method of mounting
7. Required accuracy

## 1. Pressure fluid composition

Since the sensing element of a pressure gauge may be exposed directly to the measured medium, consider the characteristics of this medium. It may be corrosive, it may solidify at various temperatures or it may contain solids that will leave deposits inside the sensing element. For pressure fluids that will not solidify under normal conditions or leave deposits, a Bourdon tube gauge is acceptable. Otherwise a Sealgauge or diaphragm seal should be used. A chemical compatibility chart follows this section to aid in the selection of the proper sensing element material.

## 2. Pressure fluid temperature

Steam and other hot media may raise the temperature of the gauge components above safe working limits of the sealed joints. In these cases it is recommended that a siphon, cooling tower or diaphragm seal be used in conjunction with the pressure gauge.

## 3. Ambient conditions

The normal ambient temperature range for WIKA pressure gauges is -40°F to +140°F (-40°C to +60°C) for dry or silicone-filled gauges and -4°F to +140°F (-20°C to +60°C) for glycerine-filled gauges. The error caused by temperature changes is +0.3% or -0.3% per 18°F rise or fall, respectively. The reference temperature is 70°F (20°C). The correction is for the temperature of the gauge, not the temperature of the measured medium.

Remote gauge mounting using a diaphragm seal and capillary line is one alternative for applications involving extreme ambient temperature.

Moisture and weather effects must also be considered. Liquid-filled gauges prevent condensation build up. For outdoor use, stainless steel, brass or plastic cased gauges are recommended.

## 4. Pressure range

A gauge range of twice the working pressure is generally selected. The working pressure in all cases should be limited to 75% of the gauge range. Where alternating pressure and pulsation are encountered, working pressure should be limited to 2/3 of the gauge range.

## 5. Conditions affecting wear of the system

In applications involving severe pressure fluctuation or pulsation, the use of restrictors and/or snubbers is recommended. In addition, liquid-filled gauges increase the service life of gauges in these conditions. WIKA liquid-filled gauges are generally filled with glycerine. Silicone for larger temperature extremes and Halocarbon® for use with oxidizing agents such as chlorine, oxygen and hydrogen peroxide are also available.

## 6. Method of mounting

Radial (LM) and back (CBM or LBM) connections are available for most WIKA gauges. WIKA stocks gauges with standard NPT threaded connections. Other types such as metric threads, straight threads, hose barbs and special fittings are available as a special order.

Pressure gauges should be mounted in the upright position. For applications where the gauge is mounted side ways, horizontally or upside down, contact WIKA Customer Service for gauge type compatibility.

## 7. Required accuracy

WIKA stocks gauges with accuracies from  $\pm 3/2/3\%$  to  $\pm 0.1\%$  of span (ASME Grade B to Grade 4A).

To ensure safe and accurate gauge selection, you must take all of the above factors into consideration. When in doubt, please do not hesitate to contact your local stocking distributor or WIKA Customer Care for assistance!

1-888-WIKA-USA

# Chemical Compatibility Chart

Acetic Acid	B	Ethyl Acetate	A	Oxygen	A
Acetic Anhydride	D	Ethyl Cellulose	B	Paraffin	A
Acetone	B	Ethylene	A	Phosphoric Acid	B
Acetylene	B	Ethylene Dibromide	B	Photographic Solutions	B
Alcohol	A	Ethylene Dichloride	D	Pickling Solutions	B
Alums	B	Ethylene Glycol	A	Picric Acid	B
Aluminum Sulfate	B	Ferric Nitrate	B	Picric Acid (dry)	B
Ammonia	B	Ferric Sulfate	B	Potassium Chloride	D
Ammonium Carbonate	B	Formaldehyde	B	Potassium Cyanide	B
Ammonium Hydroxide	D	Freon	A	Potassium Permanganate	B
Ammonium Phosphate	D	Gallic Acid	B	Prestone	A
Beer	A	Gas (for lighting)	A	Salicylic Acid	A
Benzine	A	Gasoline	A	Sea Water	C
Benzol	A	Gasoline (refined)	B	Silver Nitrate	B
Benzyl Alcohol	B	Glucose	C	Sodium Carbonate	D
Bleach Liquors	B	Glycerine	A	Sodium Cyanide	D
Bordeaux Mixture	A	Hydrocyanic Acid	B	Sodium Hydroxide	D
Butane	B	Hydrogen	B	Sodium Nitrate	B
Butanol	A	Hydrogen Peroxide	B	Sodium Peroxide	B
Butyric Acid	B	Kerosene	A	Sodium Phosphate	B
Calcium Bisulfite	B	Lacquers	A	Sodium Sulfate	B
Calcium Chloride	C	Lactic Acid	B	Sodium Sulfide	D
Calcium Hydroxide	B	Lysol	B	Sodium Sulfite	B
Carbon Dioxide(dry)	B	Magnesium Hydroxide	C	Sulfur Dioxide	D
Carbon Bisulfide	B	Magnesium Sulfate	B	Sulfur Dioxide (dry)	B
Casein	B	Mercury	B	Sulfuric (75%)	B
Chloroform	B	Methyl Chloride	D	Sulfurous Acid	B
Chromic Acid	B	Methyl Salicylate	D	Tanning Liquors	D
Citric Acid	B	Naphtha	A	Toluene	A
Coal Gas	A	Nickel Acetate	B	Vegetable Oils	B
Copper Sulfate	B	Nitric Acid (pure)	B	Vinegar	B
Cottonseed Oil	B	Nitrous Acid	D	Water	A
Creosote (crude)	B	Nitrous Oxide	D	Whiskey	B
Dextrine	A	Oil (lubricating)	A	Wines	B
Ethers	D	Oil (refined)	A	Zinc Sulfate	B

**NOTE: For steam service, a siphon is required.**

Find the process fluid in the table above and match the letter code (A,B,C, or D) with the wetted part material listed below:

**A = Brass (Copper Alloy)    B = 316 SS    C = Monel®    D = Consult Factory**

This table is provided as a reference only and is accurate to the best of WIKA's knowledge. WIKA assumes no responsibility for, or obligation from, the information here.

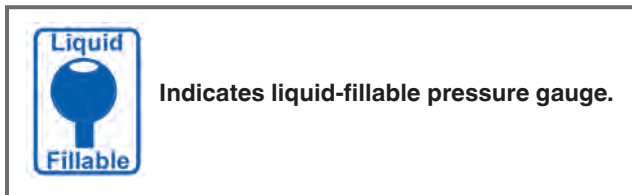
# Advantages of Liquid-filled Gauges

## Liquid-filled gauges

Liquid-filled pressure gauges provide a number of advantages:

- the liquid absorbs vibration and pressure spikes
- the dampening action of the liquid enables the operator to take readings during conditions of rapid dynamic loading and vibration
- the liquid lubricates all moving elements, dramatically reducing wear in the movement
- because most liquid-filled gauges are filled with non-aqueous liquid and hermetically sealed, they perform in corrosive environments and are immune to moisture penetration and icing, and shock effects are lessened

Liquid-filled gauges enhance the reliability and integrity of the measuring system for long periods under extreme operating conditions.



## Liquid Fill Fluid

Ambient Temperature Ratings (Table A)

**Allowable Operating Range** - Temperature range in which the operation of the gauge is not adversely affected by the filling liquid. At temperatures above the maximum rating, the fluid may break down. At temperatures below the minimum rating, the fluid may solidify (freeze).

**NOTE:** Some parts of the pressure gauge may not be able to withstand temperatures above 140°F. Consult with the factory for technical assistance for these applications.

## Choose the Right Liquid

The type of liquid used to fill the gauge varies with the application. Although pure glycerine provides the best performance in most applications, each has its own requirements. Guidelines to help ensure that a fluid is properly matched to an application are:

- if icing is a problem, use gauges filled with silicone oil or other comparable liquids. They have low viscosities even at -60°C
- if the system has electric accessories, such as contacts, use insulating oils, and
- if extreme temperature fluctuations are expected, use silicone oils

The higher the liquid viscosity, the greater its dampening capacity. The reason for this is that dampening changes in proportion to the temperature-dependent viscosity of the filling liquid. The suitable degree of dampening depends on the operating requirements the gauge must meet, such as pointer response time, pressure extremes, vibration and changes in pressure. WIKA can recommend specific liquids to suit problem applications.

Fill Fluid	Allowable Operating Range
<b>Glycerine</b> Dow 99.7% USP, Synthetic 1118 Centistokes at 68°F	-4°F to 140°F -20°C to 60°C
<b>Silicone</b> Dow Corning 200 Fluid 1000 Centistokes at 77°F	-40°F to 140°F -40°C to 60°C
<b>Halocarbon®</b> Halocarbon® Products 6.3 Centistokes at 100°F	-40°F to 140°F -40°C to 60°C

Table A - Allowable Ambient Temperature Ratings

## Liquid-filled Gauge Case Venting

For pressure gauges with full scale ranges of 300 psi and below (including vacuum and compound ranges of 30" Hg-0-200 psi and below), case venting (after the gauge is installed) is necessary to preserve the accuracy. Temperature fluctuations during shipment and in the process application cause the liquid filling to expand and contract which in turn increases or decreases case pressure. As a result, accuracy can be decreased and the pointer may not return to zero properly until the gauge is vented to the atmosphere.

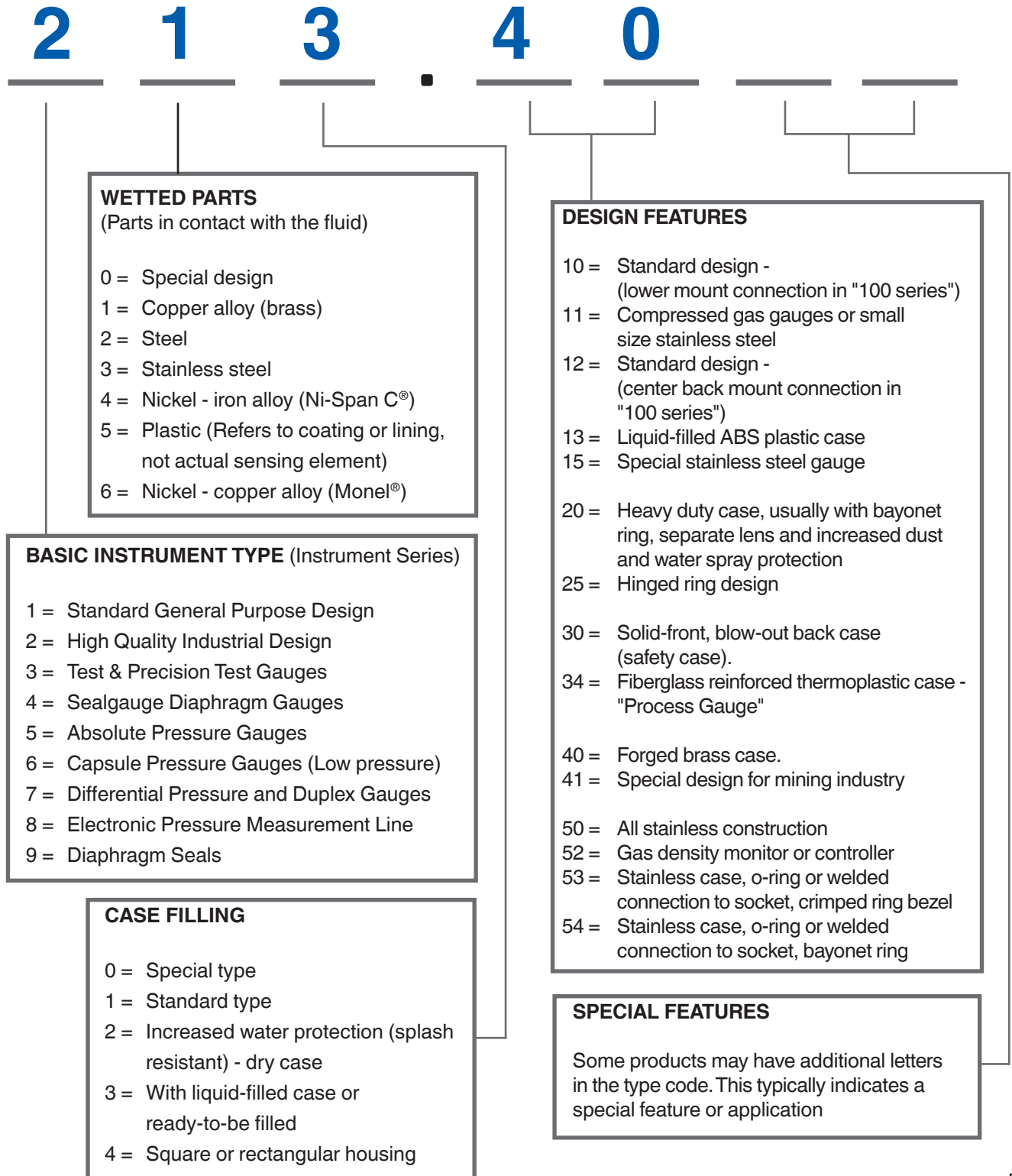
To vent a WIKA gauge, move the valve to the open position which will release any pressure or vacuum built up in the case. If the gauge is installed in an upright position, the lever can be left in the open position. The lever allows the use of a gauge in a non-upright orientation.



Vent Plug

# WIKA Type Numbers

The following is a guide to the WIKA model numbering system.



# Ordering Guidelines for Pressure Gauges

## 1) Quick Order 7- or 8-Digit Part Numbers:

**Example: 9834850**

Use the part number for the instrument you wish to order.

If you need additional options, or don't see a part number referenced for the exact product you need, you may use Descriptive Text as indicated below (see #2). **A 7-or 8-digit part number will be provided with your order confirmation.** The part number provided may then be used for re-ordering purposes.

## 2) Descriptive Text Part Number System:

**Example:**

Standard Product Description Section				Additional Options & Accessories	
<b>232.34</b>	<b>4.5</b>	<b>100 psi</b>	<b>1/2"</b>	<b>LM</b>	<b>SG, PM</b>
(Type #)	(Dial Size)	(Pressure Range)	(Process Conn. & Location)		(Additional Options / Accessories)

*The above example would indicate a 4 1/2" process gauge, dry, 100 psi dial scale, 1/2" NPT connection, lower mount connection with the following selected options: safety glass (SG) and panel mount (PM), as indicated.*

- Descriptive text can be used anytime you do not find an exact item with a listed part number. You may add as many codes at the end of the descriptive text as is required to configure the product.
- Codes and installed prices are found on a selection chart for each product type. Additional options may be located on the Accessory pages section in the back of the Catalog 900.
- Please reference the WIKA Type Number (pg. 5) for additional product type information. WIKA product types may already determine many configurations for wetted parts and case fill.
- Options and accessories should always appear at the end of the descriptive text, separated by commas. If you are not sure what to use for abbreviated code, then simply spell it out.

**NOTE: If you provide a part number and descriptive text, we will use the part number only.**

If you are unclear, do not see the option(s) needed, or require ordering assistance, please contact a WIKA Customer Care or Technical Quote Team representative.

Mechanical Pressure > Industrial Gauges > 23X.50

## Type 23X.50

### Applications

- With liquid-filled case for applications with high dynamic pressure pulsations or vibration
- Suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system
- Process industry: chemical/petrochemical, power stations, mining, on and offshore, environmental technology, mechanical engineering and plant construction

### Standard Features

- Size:** 2½", 4", 4½" & 6"  
**Case:** 304 SS  
**Wetted Parts:** 316 SS  
**Window:** (2½") Polycarbonate  
 (4" & larger) Safety glass  
**Dial:** White aluminum  
**Ring:** Stainless steel polished
- Pointer:** Black aluminum, adjustable  
**Accuracy:** (2½") ±2/12% of span  
 ASME B40.100 Grade A  
 (4" & up) ±1% of span  
 ASME B40.100 Grade 1A  
**Connection:** Lower or back mount



Type 232.50 - Dry case  
 Type 233.50 - Liquid-filled case

### Available Options

- Dampened movement
- Safety glass window
- Drag pointer (max. reading indicator)
- Cleaned for oxygen service
- Magnetic or inductive contact switches
- Special connections

Type	232.50 (Dry)					
Size	2½"		4"		4½"	
Connection	LM	CBM	LM	LBM	LM	LBM
Conn. Size	1/4" NPT		1/2" NPT		1/2" NPT	
Press. Scale	PSI	PSI	PSI	PSI	PSI	PSI
30" Hg	9110992				50474511	50474588
30"-0-15 psi					50474529	50474596
30"-0-30 psi					50474537	50474600
30"-0-60 psi					50474545	50474618
30"-0-100 psi					50474553	50474626
30"-0-160 psi					50474561	50474634
30"-0-200 psi					50474570	50474642
10 psi						
15 psi	9111000	9110062	9319492		50474171	50474359
30 psi	9111018	9110070	9226860		50474197	50474367
60 psi	9111026	9110089	9154671		50474201	50474375
100 psi	9111034	9110097	9189459	50999452	50474219	50474383
160 psi	9111042	9110100	9189467		50474235	50474391
200 psi	9111050	9110119	9154701		50474243	50474405
300 psi	9111069	9110127	9154710		50474251	50474413
400 psi	9111077	9110143	9154728		50474260	50474421
600 psi	9111085	9110151			50474278	50474430
800 psi					50474286	50474448
1,000 psi	9111107	9110178	9154752	50997591	50474294	50474456
1,500 psi	9111115	9110186			50474308	50474464
2,000 psi	9111123	9110194	9212744		50474316	50474472
3,000 psi	9111131	9110208	9232087		50474324	50474481
5,000 psi	9111140	9110216	9145664		50474332	50474499
10,000 psi	9111158	9110224	9319506		50474341	50474502
15,000 psi					50474651	50474677
20,000 psi					50474669	50474685
Accessory order codes (installed at factory)						
Front flange, SS	--	+ FF S	--	+ FF S	--	+ FF S
Rear flange, SS				+ RF S		
Restrictor				+ R		
Glycerine fill				Type 233.50		

Stock items shown in blue print.

Type	232.50 (Dry)		
Size	6"		
Connection	LM	LM	LBM
Conn. Size	1/2" NPT		
Press. Scale	PSI	PSI/BAR	PSI
30" Hg	4213688	4213939	4214218
30"-0-15 psi	4213696		4214226
30"-0-30 psi	4213700		4214234
30"-0-60 psi	4213718		4214242
30"-0-100 psi	4213726		4214251
30"-0-160 psi	4213734		4214269
30"-0-200 psi	4213742		4214277
10 psi			
15 psi	4213751	4213947	4214285
30 psi	4213769	4213955	4214293
60 psi	<b>4213777</b>	4213963	4214307
100 psi	<b>4213785</b>	4213971	4214315
160 psi	<b>4213793</b>	4213981	4214323
200 psi	<b>4213807</b>		4214331
300 psi	<b>4213815</b>	4213999	4214340
400 psi	4213823		4214358
600 psi	<b>4213831</b>	4214005	4214366
800 psi	4213840		4214374
1,000 psi	<b>4213858</b>	4214013	4214382
1,500 psi	4213866	4214021	4214391
2,000 psi	<b>4213874</b>		4214404
3,000 psi	4213882	4214030	4214412
5,000 psi	4213891	4214048	4214421
10,000 psi	4213904	4214056	4214439
15,000 psi	4213912	4214064	4214447
20,000 psi	4213921		4214587
Accessory order codes (installed at factory)			
Front flange, SS	--	--	+ FF S
Rear flange, SS		+ RF S	
Restrictor		+ R	
Glycerine fill		Type 233.50	

Abbreviations LM - Lower mount,  
 LBM - Lower back mount, SS - Stainless steel