

# 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!

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# 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.

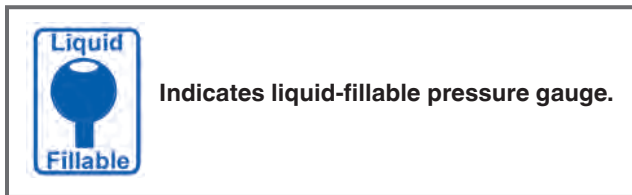
# Advantages of Liquid-filled Gauges

## 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.

## 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

## 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

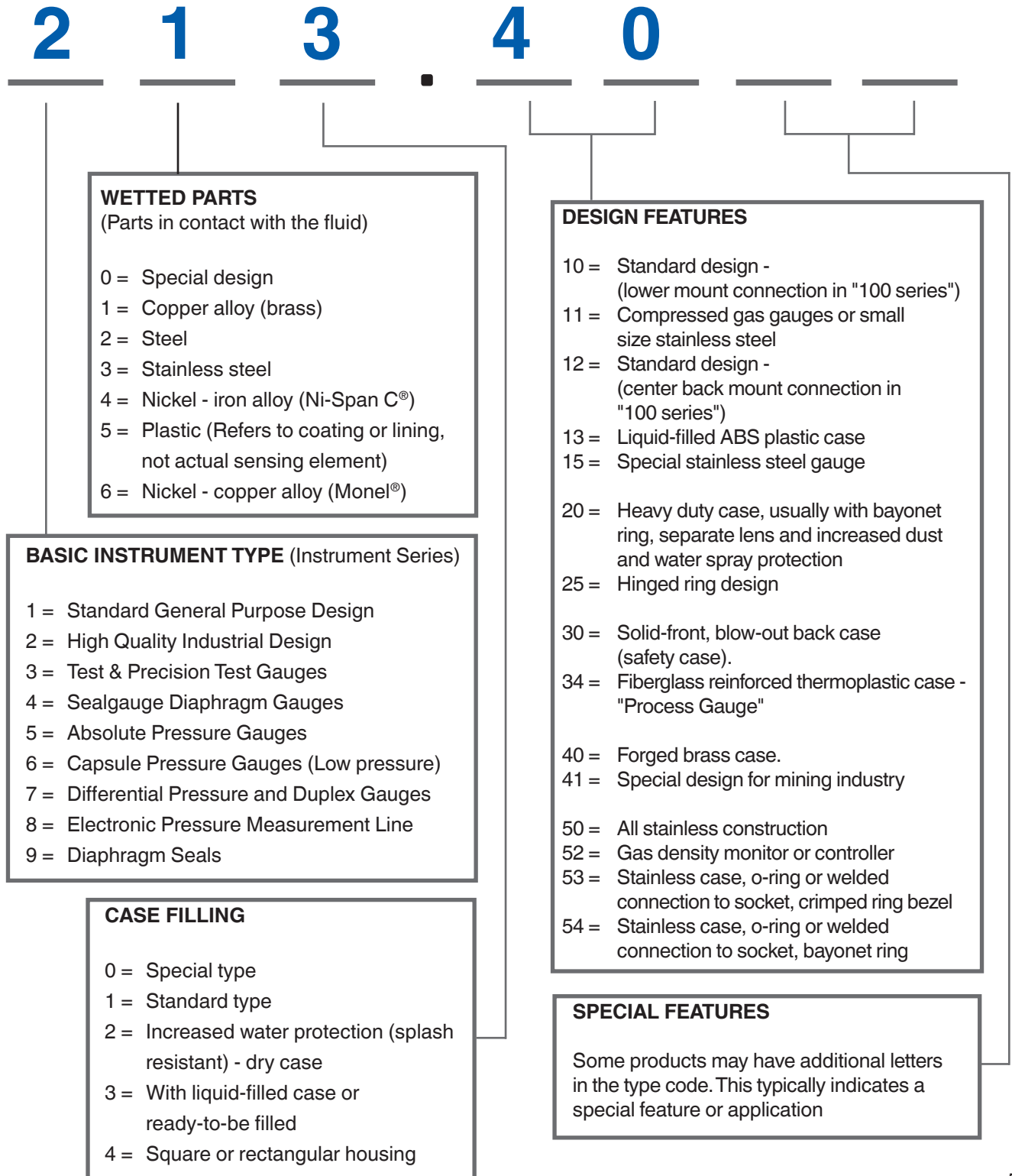
The higher the liquid viscosity, the greater its dampening capacity. The reason for this is that dampening changes in proportion to the temperature-dependent viscosity of the filling liquid. The suitable degree of dampening depends on the operating requirements the gauge must meet, such as pointer response 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

# 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.

## Type 23X.53

The rugged construction of WIKA type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 SS wetted parts and 304 SS case and crimped ring, and can be liquid-filled in the field.

### Standard Features

<b>Size:</b>	2", 2½" & 4"	<b>Accuracy:</b>	(2" & 2½") ± 2/1/2% of span ASME B40.100 Grade A
<b>Case:</b>	304 SS		
<b>Wetted Parts:</b>	316 SS		(4") ± 1.0% of span (4" size) ASME B40.100 Grade1A
<b>Window:</b>	Polycarbonate	<b>Connection:</b>	Lower or back mount
<b>Dial:</b>	White aluminum		
<b>Ring:</b>	Stainless steel polished		
<b>Pointer:</b>	Black aluminum		



Type 232.53 - Dry case  
Type 233.53 - Liquid-filled case

### Available Options

- Dampened movement
- Drag pointer (max. reading indicator)
- Cleaned for oxygen service
- Special connection

### 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 off shore, environmental technology, mechanical engineering and plant construction

Type	232.53 (Dry)					
Size	2"		2½"			
Connection	LM	CBM	LM	CBM		
Conn. Size	1/4" NPT		1/4" NPT			
Press. Scale	PSI	PSI	PSI	PSI	PSI/BAR	PSI/KPA
30" Hg	50533614	50533797	9768777	9768394		
30"-0-15 psi	50533622	50533801				
30"-0-30 psi	50533631	50533819	9768769	9768386		
30"-0-60 psi	50533649	50533827	9768750	9768378		
30"-0-100 psi	50533657	50533835				
30"-0-160 psi	50533665	50533843	9768742	9768360		
30"-0-200 psi	50533673	50533851				
15 psi	50533690	50533860	9768734	9768351		
30 psi	4222680	50533878	9768726	9768343		
60 psi	4282907	4214318	9768718	9768335	8992848	8993089
100 psi	4222698	4282915	9768700	9768327	8992856	8993097
160 psi	50466721	50466747	9768696	9768319	8992865	8993101
200 psi	4282923	50533886	9768688	9768300	8992873	8993119
300 psi	50533711	50533894	9768670	9768297	8992881	8993127
400 psi	50533720	50533908	9768661	9768289		
600 psi	4222702	50533916	9768653	9768270	9779685	9779693
800 psi	50533738	50533924				
1,000 psi	4222710	50533932	9768645	9768262	8992899	8993135
1,500 psi	50533746	50533941	9768637	9768254	8992903	8993144
2,000 psi	50533754	50533959	9768629	9768246	8992911	8993152
3,000 psi	50466739	50466755	9768610	9768238	8992929	8993160
5,000 psi	50533762	50533967	9768602	9768220	8992937	8993178
6,000 psi				8993208	8992945	8993186
10,000 psi	50533771	50533975	9768599	9768211	8992954	8993195
15,000 psi	50533789	50533983		9779715	9776715	9779723
Accessory order codes (installed at factory)						
Front flange, SS	--	+ FF S	--			+ FF S
U-clamp, steel	--	+ UC Z	--			+ UC Z
U-clamp, SS	--	+ UC S	--			+ UC S
Rear flange, SS				+ RF S		
Restrictor				+ R		
Glycerine fill				Type 233.53		

### Abbreviations

LM - Lower mount  
CBM - Center back mount  
SS - Stainless steel

Stock items shown in blue print.

## Type 23X.53

Type	232.53 (Dry)		
Size	4"		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	1/2" NPT
Press. Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 psi	9737910	9768467	9737065
30"-0-30 psi	9767398	9768475	9737073
30"-0-60 psi	9767401	9768483	9737081
30"-0-100 psi	9737898	9737880	9737090
30"-0-160 psi	9767410	9768491	9737103
30"-0-200 psi	9737901	9768505	9737111
15 psi	9767428	9768513	9737120
30 psi	9767436	9768521	9737138
60 psi	9767444	9768530	9737146
100 psi	9767452	9768548	9737154
160 psi	9767460	9768556	9737162
200 psi	9767479	9768564	9737170
300 psi	9767487	9768572	9737189
400 psi	9767495	9768580	9737197
600 psi	9767509	9768963	9737200
800 psi			9737219
1,000 psi	9767517	9768858	9737227
1,500 psi		9768866	9737235
2,000 psi		9768807	9737243
3,000 psi		9768874	9737251
5,000 psi		9768823	9737260
10,000 psi		9768831	9737278
15,000 psi		9768840	9737286
Accessory order codes (installed at factory)			
Front flange, SS	--		+ FF S
U-clamp, steel	--		+ UC Z
U-clamp, SS	--		+ UC S
4½" panel kit	--		+ PM ADAPT
Rear flange, SS		+ RF S	
Restrictor		+ R	
Glycerine fill		Type 233.53	

Type	233.53 (Glycerine-filled)				
Size	2½"		4"		
Connection	LM	CBM	LM	LM	LBM
Conn. Size	1/4" NPT		1/4" NPT	1/2" NPT	
Press. Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833310	9833124	9833328	9831504
30"-0-15 psi			9831775	9833336	9831512
30"-0-30 psi	9833638	9833302	9832993	9833345	9831520
30"-0-60 psi	9833620	9833298	9833000	9833353	9831538
30"-0-100 psi			9831759	9831741	9831546
30"-0-160 psi	9833612	9833280	9833018	9833361	9831555
30"-0-200 psi			9831767	9833379	9831563
15 psi	9833604	9833272	9833026	9833387	9831571
30 psi	9833590	9833264	9833035	9833395	9831589
60 psi	9833582	9833255	9833043	9833409	9831597
100 psi	9833574	9833247	9833051	9833417	9831601
160 psi	9833565	9833239	9833069	9833425	9831619
200 psi	9833557	9833221	9833077	9833434	9831627
300 psi	9833549	9833213	9833085	9833442	9831635
400 psi	9833531	9833205	9833094	9833450	9831644
600 psi	9833523	9833191	9833107	9833727	9831652
1,000 psi	9833515	9833183	9833115	9833697	9831678
1,500 psi	9833506	9833175		9833701	9831686
2,000 psi	9833493	9833166		9833655	9831695
3,000 psi	9833485	9833158		9833719	9831708
5,000 psi	9833476	9833140		9833663	9831716
10,000 psi	9833468	9833132		9833671	9831725
15,000 psi				9833689	9831733
Accessory order codes (installed at factory)					
See tables for type 232.53					

**Abbreviations**  
 LM - Lower mount  
 CBM - Center back mount  
 LBM - Lower back mount  
 SS - Stainless steel

Stock items shown in blue print.