

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.

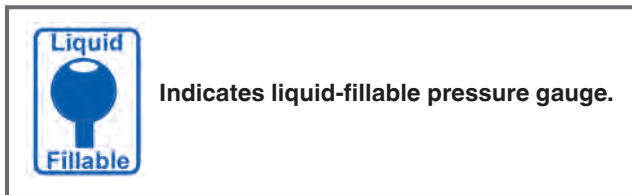
Advantages of Liquid-filled Gauges

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

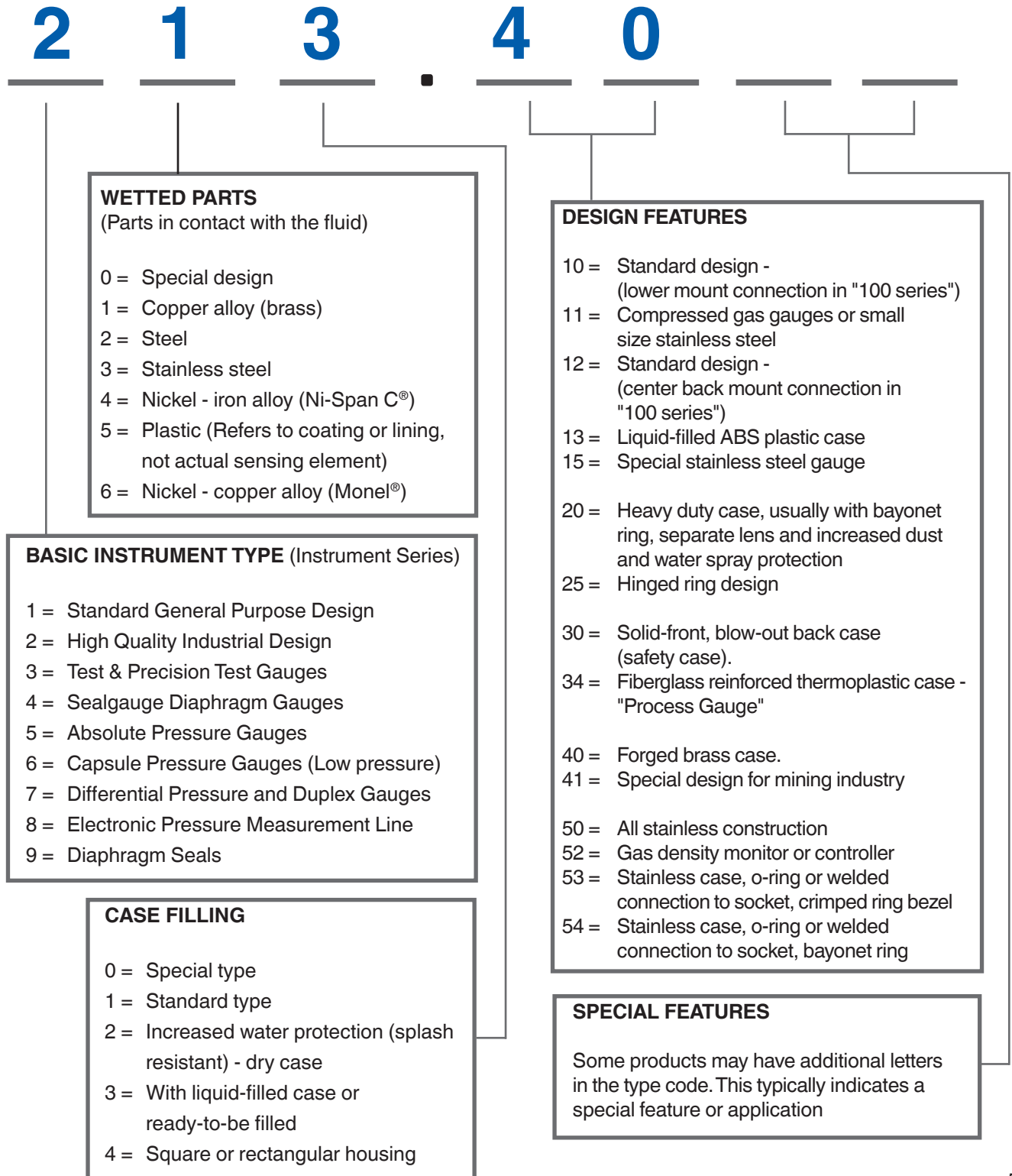
The higher the liquid viscosity, the greater its dampening capacity. The reason for this is that dampening changes in proportion to the temperature-dependent viscosity of the filling liquid. The suitable degree of dampening depends on the operating requirements the gauge must meet, such as pointer response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

| Fill Fluid | Allowable Operating Range |
|--|------------------------------|
| Glycerine Dow 99.7% USP, Synthetic 1118 Centistokes at 68°F | -4°F to 140°F -20°C to 60°C |
| Silicone Dow Corning 200 Fluid 1000 Centistokes at 77°F | -40°F to 140°F -40°C to 60°C |
| Halocarbon® 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 | |
|--------------------------------------|-------------|------------------|----------------------------|----------------------------------|------------------------------------|
| 232.34 | 4.5 | 100 psi | 1/2" | LM | SG, PM |
| (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 > 213.40

Type 213.40

This type 213.40 gauge features an integral Bourdon tube which is soldered or brazed directly into the one-piece case/socket.

Applications

- Intended for adverse service conditions where pulsation or vibration exists
- Suitable for gaseous or liquid media that will not obstruct the pressure
- Hydraulics and compressors

Standard Features

| | | | |
|----------------------|---|---------------------|--|
| Size: | 2½" & 4" | Pointer: | Black aluminum |
| Case: | Forged brass, gold-painted | Accuracy: | (2½") ± 2/12% of span |
| Ring: | (2½") Gold-plated ABS (4") Chrome-plated brass | | ASME B40.100 Grade A (4) ± 1% of span |
| Wetted Parts: | Copper alloy | | ASME B40.100 Grade 1A |
| Window: | Acrylic | Connection: | Lower or back mount |
| Dial: | White aluminum | Liquid Fill: | Glycerine |



Available Options

- Safety glass window
- Pressure compensating window
- Drag pointer (max. reading indicator)
- Special connections

| Type | 213.40 | | | | | |
|--|----------|---------|---------|---------|---------|---------|
| Size | 2½" | | | | | |
| Connection | LM | | | CBM | | |
| Conn. Size | 1/4" NPT | | | | | |
| Press. Scale | PSI | PSI/KPA | PSI/BAR | PSI | PSI/KPA | PSI/BAR |
| 30" Hg | 9318003 | 9456198 | 9734109 | 9318070 | 9455930 | 9764312 |
| 30"-0-15 psi | 9318011 | 9613862 | | 9318089 | 9325662 | |
| 30"-0-30 psi | 9318020 | 9456163 | | 9318097 | 9325689 | |
| 30"-0-60 psi | 9318038 | 9456201 | | 9318100 | 9325816 | |
| 30"-0-100 psi | 9318046 | 9679928 | | 9318119 | 9149872 | |
| 30"-0-160 psi | 9318054 | 9679936 | | 9318127 | 9325972 | |
| 30"-0-200 psi | 9318062 | 9442863 | | 9318135 | 9326251 | |
| 15 psi | 9310673 | 9456155 | 9734117 | 9318143 | 9455949 | 9734215 |
| 30 psi | 9310681 | 9456171 | 9734125 | 9318151 | 9455957 | 9734223 |
| 60 psi | 9310690 | 9456210 | 9734134 | 9318160 | 9455965 | 9734231 |
| 100 psi | 9310703 | 9456228 | 9734142 | 9318178 | 9456120 | 9746072 |
| 160 psi | 9310711 | 9456180 | 8986216 | 9318186 | 9455981 | 9734257 |
| 200 psi | 9310720 | 9456236 | | 9318194 | 9442979 | |
| 300 psi | 9310738 | 9442871 | 9798870 | 9318208 | 9442987 | 9734265 |
| 400 psi | 9310746 | 9611452 | | 9318216 | 9455990 | |
| 600 psi | 9310754 | 9456244 | 8985815 | 9318224 | 9456007 | 8985774 |
| 800 psi | 9310762 | 9690115 | | 9318232 | 9128832 | |
| 1,000 psi | 9310770 | 9456252 | 9798404 | 9318240 | 9456015 | 9746048 |
| 1,500 psi | 9310789 | 9456260 | 9734193 | 9318259 | 9207511 | 8985829 |
| 2,000 psi | 9310797 | 9455906 | | 9318267 | 9456023 | |
| 3,000 psi | 9310800 | 9455914 | 8985566 | 9318275 | 9435220 | 8985831 |
| 5,000 psi | 9310819 | 9456279 | | 9318283 | 9442995 | |
| 7,500 psi | 9325107 | 9455922 | | 9318291 | 9128840 | |
| 10,000 psi | 9790454 | | | | | |
| 15,000 psi | | | | | | |
| Accessory order codes (installed at factory) | | | | | | |
| FF, brass pol | + FF P | | + FF P | | | |
| FF, chrome | + FF C | | + FF C | | | |
| FF, SS | + FF SS | | + FF SS | | | |
| UC, SS | - | | + UC S | | | |
| RF, black-painted steel | | | + RF | | | |
| Restrictor | | | + R | | | |

| Type | 213.40 | | |
|--|------------|----------|----------|
| Size | 4" | | |
| Connection | LM | LBM | |
| Conn. Size | 1/4" NPT | 1/2" NPT | 1/4" NPT |
| Press. Scale | PSI | PSI | PSI |
| 30" Hg | 9314555 | | 9314296 |
| 30"-0-15 psi | 9314563 | | 9314300 |
| 30"-0-30 psi | 9314571 | | 9314318 |
| 30"-0-60 psi | 9314580 | | 9314326 |
| 30"-0-100 psi | 9314598 | | 9314334 |
| 30"-0-160 psi | 9314601 | | 9314342 |
| 30"-0-200 psi | 9314610 | | 9314350 |
| 15 psi | 9314644 | 9314121 | 9314385 |
| 30 psi | 9314652 | 9314130 | 9314393 |
| 60 psi | 9314660 | 9314148 | 9314407 |
| 100 psi | 9314679 | 9314156 | 9314415 |
| 160 psi | 9314687 | 9314164 | 9314423 |
| 200 psi | 9314695 | 9314172 | 9314431 |
| 300 psi | 9314709 | 9314180 | 9314440 |
| 400 psi | 9314717 | 9314199 | 9314458 |
| 600 psi | 9314725 | 9314202 | 9314466 |
| 800 psi | 9314733 | 9314210 | 9314474 |
| 1,000 psi | 9314741 | 9314229 | 9314482 |
| 1,500 psi | 9314750 | 9314237 | 9314490 |
| 2,000 psi | 9314768 | 9314245 | 9314504 |
| 3,000 psi | 9314776 | 9314253 | 9314512 |
| 5,000 psi | 9314784 | 9314261 | 9314520 |
| 7,500 psi | | | |
| 10,000 psi | 9314792 | 9314270 | 9314539 |
| 15,000 psi | | | |
| Accessory order codes (installed at factory) | | | |
| FF, chrome | + FF C | | + FF C |
| UC, chrome | - | | + UC C |
| RF, chrome | + RF C | | + RF C |
| 4½" panel kit | + PM ADAPT | | |
| Restrictor | + R | | |

Stock items shown in blue print.

Abbreviations

CBM - Center back mount, FF - Front flange, LM - Lower mount, RF - Rear flange, UC - U-clamp, SS - Stainless steel