2.0 Specifications

WIKA Tronic catalog pages and data sheets have a consistent layout of technical information that is required to select the correct transmitter.

The second page of the data sheet lists general performance characteristics for each model. The following specification descriptions uses the S-10 transmitter as an example.

Specifications		Model S-10 / S-11								
Pressure range	50InWC	5psi	10psi	25psi	30psi	60psi	100psi	160psi	200psi	
Maximum pressure*	14psi	29psi	58psi	145psi	145psi	240psi	500psi	1160psi	1160psi	
Burst pressure**	29psi	35psi	69psi	170psi	170psi	290psi	600psi	1390psi	1390psi	
Pressure range	300psi	500psi	1000psi	2000psi	3000psi	5000psi	8000psi	10000psi[1]	15000psi[1]	
Maximum pressure*	1160psi	1160psi	1740psi	4600psi	7200psi	11,600psi	17,400psi	17,400psi	21,750psi	
Burst pressure**	1390psi	5800psi	7970psi	14,500psi	17,400psi	24,650psi	34,800psi	34,800psi	43,500psi	
{vacuum, gauge pressure, compound ranges, and absolute pressure references are available}										
[1] Ranges only available with Model S-10										
[2] For Model S-11 the burst pressure is limited to 21,000psi unless the pressure seal is accomplished by using the sealing ring underneath the hex.										
*Pressure applied up to the maximum rating will cause no permanent change in specifications but may lead to zero and span shifts										
**Exceeding the burst pressure may result in destruction of the transmitter and possible loss of media										
Materials										
■ Wetted parts		(other materials see WIKA diaphragm seal program)								
▸ Model S-10		Stainless steel								
▸ Model S-11		Stainless steel {Hastelloy C4}								
		O-ring: NBR [3] {Viton or EPDM}								
■ Case		Stainless steel								
Internal transmission fluid [4]		Synthetic oil {Halocarbon oil for oxygen applications} [5]								
		{Listed by FDA for food applications}}								
	[3] O-ring made of Viton or EPDM for Model S-11 with integral cooling element.									
	[4] Not available with Model S-10 in pressure ranges >300 psi.									
	[5] Media temperature for oxygen version: -22 ... 140 °F / -30 ... +60 °C. Oxygen version is not available in vacuum and absolute pressure ranges or with S-11 > 500 psi									
Power supply U_B [6]	U_B in DC V	10 < U_B ≤ 30 (14 ... 30 with signal output 0 ... 10 V)								
Signal output and maximum load R_A	R_A in Ohm	4 ... 20 mA, 2-wire	$R_A \leq (U_B - 10V) / 0.02$ A							
		0 ... 20 mA, 3-wire	$R_A \leq (U_B - 30V) / 0.02$ A							
		{0 ... 5 V, 3-wire}	$R_A > 5{,}000$							
		{0 ... 10 V, 3-wire}	$R_A > 10{,}000$	{other signal outputs available}						
Adjustability zero/span	%	± 10 using potentiometers inside the instrument								
Response time (10 ... 90 %)	ms	≤ 1 (≤ 10 ms at media temperatures below –22°F (-30°C) for ranges < 300 psi								
		or with flush diaphragm process connection)								
Isolation voltage	DC V	500								
	[6] NEC Class 02 power supply (low voltage and low current max. 100 VA even under fault conditions)									
Accuracy [7]	% of span	≤ ≤0.25 {0.125} [8] (BFSL)								
	% of span	≤ ≤0.5 {0.25} [8]} (limit point calibration)								
	[7] Including linearity, hysteresis and repeatability. Limit point calibration performed in vertical mounting position with pressure connection facing down.									
	[8] Improved accuracy is available for pressure ranges ≥ 100 InWC									
Non-repeatability	% of span	≤ ≤0.05								
1-year stability	% of span	≤ ≤0.2 (at reference conditions)								
Permissible temperature of										
■ Medium [9]		-22 ... +212 °F {-40 ... +257 °F}					-30 ... +100 °C {-40 ... +125 °C}			
		S-11 with cooling element: -4 ... +302 °F					S-11 with cooling element: -20 ... +150 °C			
■ Ambient [9]		-4 ... +176 °F					-20 ... +80 °C			
		S-11 with cooling element: -4 ... +176 °F					S-11 with cooling element: -20 ... +80 °C			
■ Storage [9]		-40 ... +212 °F					-40 ... +100 °C			
		S-11 with cooling element: -4 ... +212°F					S-11 with cooling element: -20 ... +100 °C			
	[9] Also complies with EN 50178, Tab. 7, Type C, Class 4KH Operation, 1K4 Storage, 1K3 Transport									
Compensated temperature range		32 ... +176 °F					0 ... +80 °C			
Temperature coefficients (TC) within compensated temp range:										
■ Mean TC of zero	% of span	≤ 0.2 / 10 K (< 0.4 for pressure range < 100 InWC)								
■ Mean TC of range	% of span	≤ 0.2 / 10 K								
CE - conformitiy		89/336/EWG interference emission and immunity see EN 61 326, interference								
		emission limit class A and B, 97/23/EG Pressure equipment directive (Module H)								
Shock resistance	g	1000 according to IEC 60068-2-27 (mechanical shock)								
Vibration resistance	g	20 according to IEC 60068-2-6 (vibration under resonance)								
Wiring protection		Protected against reverse polarity, overvoltage and short circuit								
Weight	lb	Approx. 0.4								

{ } Items in curved brackets { } are optional extras for additional price.

*These specifications are for layout description purposes only and are subject to change without notice.
Please contact WIKA for a copy of the most recent S-10 datasheet.

Ⓐ **Standard ranges** are listed in the first row. All Tronic transmitters except for the UniTrans are **fixed range,** so no adjustment or "turn down" of the pressure range is provided. Some models have adjustable zero and span. This feature is used to recalibrate the transmitter to original factory range should this become necessary after long term use. WIKA recommends that the adjustable zero and span not be used to change the original pressure range of the transmitter. For transmitters without zero and span adjustment, the readout device (meter or PLC) can be reprogrammed to compensate for output shifts. Other specifications are not affected by this shift.

Ⓑ **Maximum pressure** is listed in the second row. This is the maximum pressure the transmitter can be exposed to without permanent damage. The transmitters can tolerate the maximum pressure shown for brief periods, such as pressure pulsations or "spikes". Transmitters subjected to the maximum pressure may show zero and span shifts. Transmitters exposed to these pressures for long periods of time may suffer permanent damage.

Be sure to select a standard range that covers the maximum working pressure of the system. Transmitters are most accurate between 20% to 80% of their stated range.

Ⓒ Exceeding the **burst pressure** listed in the third row causes permanent, nonadjustable damage or destruction of the transmitter.

Ⓓ The **wetted parts** of WIKA industrial transmitters come in contact with the media. Piezoresistive pressure transmitters with ranges to 300 psi and all flush diaphragm transmitters have 316 *stainless steel* wetted parts. Thin Film transmitters with non-flush connections use PH17-4 *stainless steel*. This stainless steel is similar to 316 stainless for chemical resistance. It is used because it has better elastic properties than 316 stainless and results in a more accurate transmitter.

Ⓔ Power supply voltage

10-30 VDC
(14-30 VDC for 10V output signal)

All transmitters require an **input** (also referred to as *excitation or supply voltage*) in order to power the internal circuitry. This input voltage can range from 10 to 30 volts. A 0-10 volt output transducer requires a higher minimum supply of 14 volts. 24 volts is the optimal supply voltage. Since the transmitter has a built-in power regulation circuit, an unregulated power supply is acceptable. See section 2.1 for detailed wiring schematics.

Ⓕ Signal output and maximum load

4-20mA 2-wire $R_A = (V_S - 10V)/0.02\ A$
0-20mA 3-wire $R_A = (V_S - 3V)/0.02\ A$

R_A is the maximum *resistive* load permitted in the current loop that still allows the transmitter to function correctly. Meters, chart recorders, and other devices are placed in a 4-20 mA current loop to display or record the measured pressure. Each of these devices has a *resistive load* rating in their specifications. For example, a transmitter with a 24 volt power supply **(V_S)** will allow up to 700 Ohms load in the loop. If the R_A is exceeded, the transmitter will not produce the maximum 20 mA output when full pressure is applied.

For voltage output transducers:

0-5 V	**3-wire**	R_A	**> 5000 Ohms**
0-10 V	**3-wire**	R_A	**> 10,000 Ohms**

Transducers with a voltage output require a minimum resistance R_A in the three wire circuit to function properly. This minimum varies with the output voltage as shown.

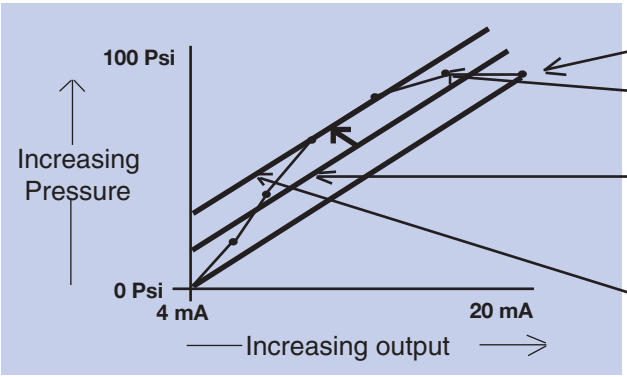
Ⓖ **Response time** is the length of time required for the transmitter output to change in response to a pressure change. WIKA industrial transmitters feature a response time of less than one millisecond (ms) or one-one thousandth of a second (0.001 sec) to pressure changes occurring within 10% to 90% of their rated pressure range.

Ⓗ **Accuracy** of a pressure transmitter is one measure of performance and includes the combined *linearity, hysteresis,* and *repeatability* errors.

Linearity (B.F.S.L) ≤ 0.25% of span (limit point: ≤ 0.5% of span)

Linearity is the error defined by the maximum deviation of a transmitter output from a best fit straight line during any one calibration cycle. In the best fit straight line (B.F.S.L.) method, a straight line is fit into a series of data points in such a way as to minimize the deviation of any one value from the ideal value.

The Limit point calibration (also called terminal based linearity) is double the B.F.S.L value since the straight line is not moved from the 0 and maximum span data points.



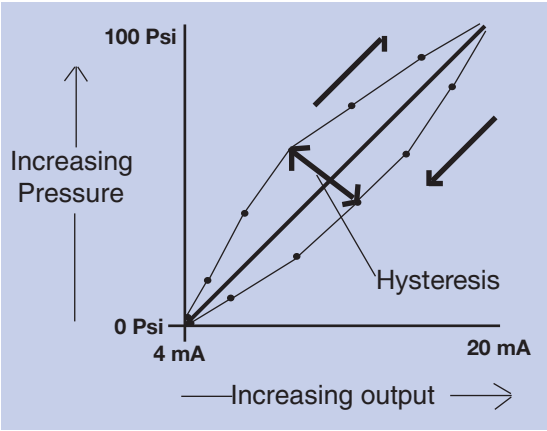
Ideal value line

Data points define the calibration curve

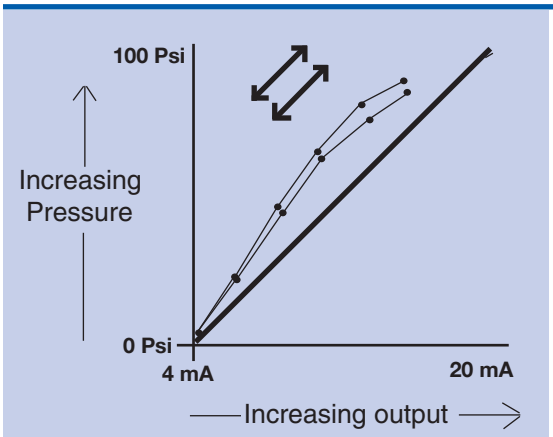
"Best fit straight line" (B.F.S.L.)
This straight line is moved to bisect the calibration curve for the "best fit". This is one half the value of the terminal based method.

"Limit point" (terminal based) line is parallel to the ideal line at the maximum error point. This is the maximum or true error.

Note: All data points in these illustrations are overstated for clarity. Actual data points are much closer to a straight line.



Hysteresis is the error defined by the maximum measured separation between the upscale and downscale indications of the measured pressure during a full range traverse from 0 to the maximum pressure. Hysteresis for WIKA industrial transmitters is equal to or less than 0.1% of span.



(I) **Non-Repeatability** is the error defined by the ability of a transmitter to reproduce an identical output signal when the same pressure is applied to it consecutively, under the same conditions, and in the same direction. *In industrial applications*, *non-repeatability is usually the most important specification*. Most WIKA industrial transmitters feature excellent non-repeatability: less than or equal to 0.05% of span.

(J) **One year stability** is the ability of a transmitter to maintain its performance specifications over time. It usually applies to calibration taken at ambient conditions and is expressed as a percentage of scale over one year. WIKA industrial transmitters feature a stability of better than 0.2% of span per year.

(K) **Permissable Temperature** changes have an effect on transmitter output. WIKA uses 70 °F as the reference temperature. This is the temperature when the initial calibration takes place. WIKA standard industrial transmitters are **temperature compensated** between 32 °F and 175 °F. This means that temperature changes between these two values will cause a change in output no greater than the **temperature error.**

The temperature effects on WIKA industrial transmitters is less than or equal to 0.2% of span for every 18 °F (10 °C) change in ambient temperature *within the compensated temperature range*.

For example, a transmitter that heats up from 70 °F to 88 °F will show a change in output no greater than 0.2% of span. If the same transmitter is heated another 18 degrees to 106 °F, it will show a total change in output no greater than 0.4% of span. Cooling the transmitter below 70 °F will also produce the same percentage effects. If the transmitter is heated above 175 °F or cooled below 32 °F, (outside the compensated temperature range!) the effects will be approximately 0.4% per 18 degree change. Extended compensated temperature ranges are available as an option.

Temperature effects occur *in addition to* linearity, hysteresis, and non-repeatability errors.

Permissible **media temperature** is -25 °F to 212 °F. Measuring media temperatures above 212 °F (for example, with steam monitoring applications) is possible by using a "pigtail", "siphon", or cooling element to isolate the transmitter from the heat. Flush diaphragm transmitters are available with an integral cooling extension for media temperatures to 300 °F. Some WIKA transmitters are available with an extended media temperature range. These transmitters use different internal components that allow them to function with higher media temperatures.

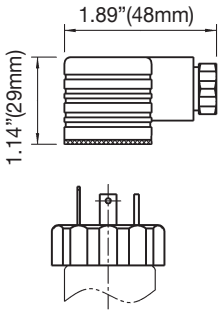
Ambient temperature is the temperature around the case of the transmitter. Whenever possible, transmitters should be mounted in an area protected from temperature extremes. This will reduce the temperature error and prolong the life of the transmitter.

The third page of the data sheet gives dimensional information for the transmitter and also information about the optional process and electrical connections.

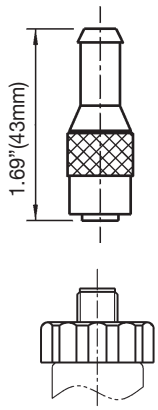
Dimensions in inches(mm)

Electrical connections (L)

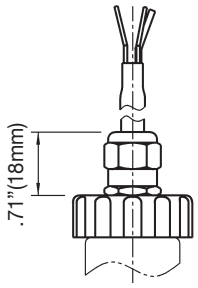
L-connector, DIN EN 175301-803, Form A (DIN 43 650) for conductor cross section up to max. 1.5 mm² , conductor outer diameter 0.3“ (6-8 mm), NEMA 5 / IP 65
Order code: A4



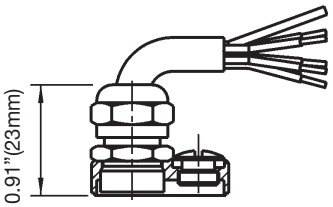
Circular connector M 12x1, 5-pin, NEMA 4 / IP 67
Order code: M5



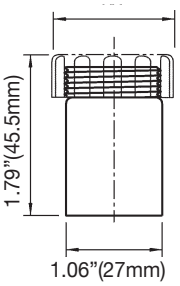
Cable with free ends conductor cross section up to max. 0.5 mm² / AWG 20 with end splices, conductor outer diameter 6.8 mm, NEMA 4 / IP 67
Order code: DL

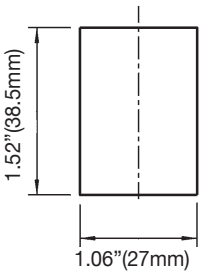


Cable with free ends adjustable zero and span conductor cross section up to max. 0.5 mm² / AWG 20 with end splices, conductor outer diameter 6.8 mm, NEMA 6 P / IP 68
Order code: XM



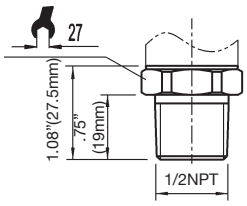
Case



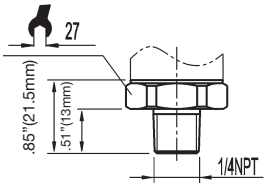


S-10 pressure connections (others available) (M)

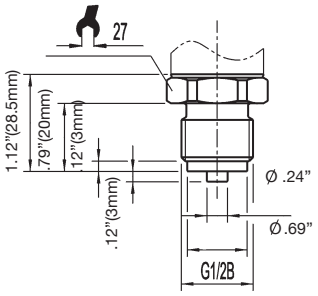
1/2 NPT male
Order code: ND



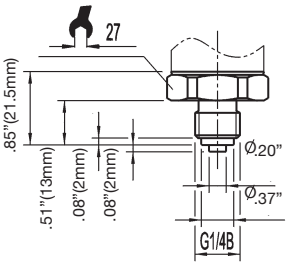
1/4 NPT male
Order code: NB



G1/2B male
Order code: GD

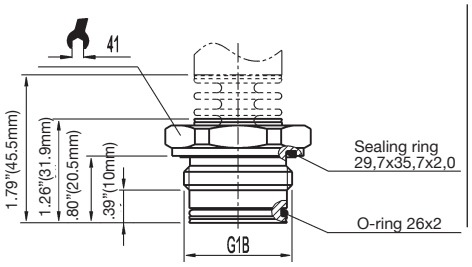


G1/4B male
Order code: GB

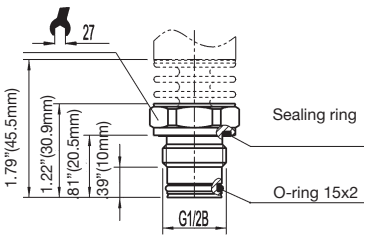


S-11 flush diaphragm pressure connections

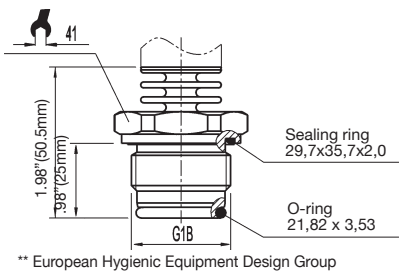
G 1B
with or without cooling element
50 InWC to 30 psi
Order code: 85



G 1/2 B
with or without cooling element
50 psi to 8000 psi
Order code: 86



G1B according to EHEDG **)
with cooling element , up to 302°F (150°C)
100 InWC to 250 psi
Order code: 84



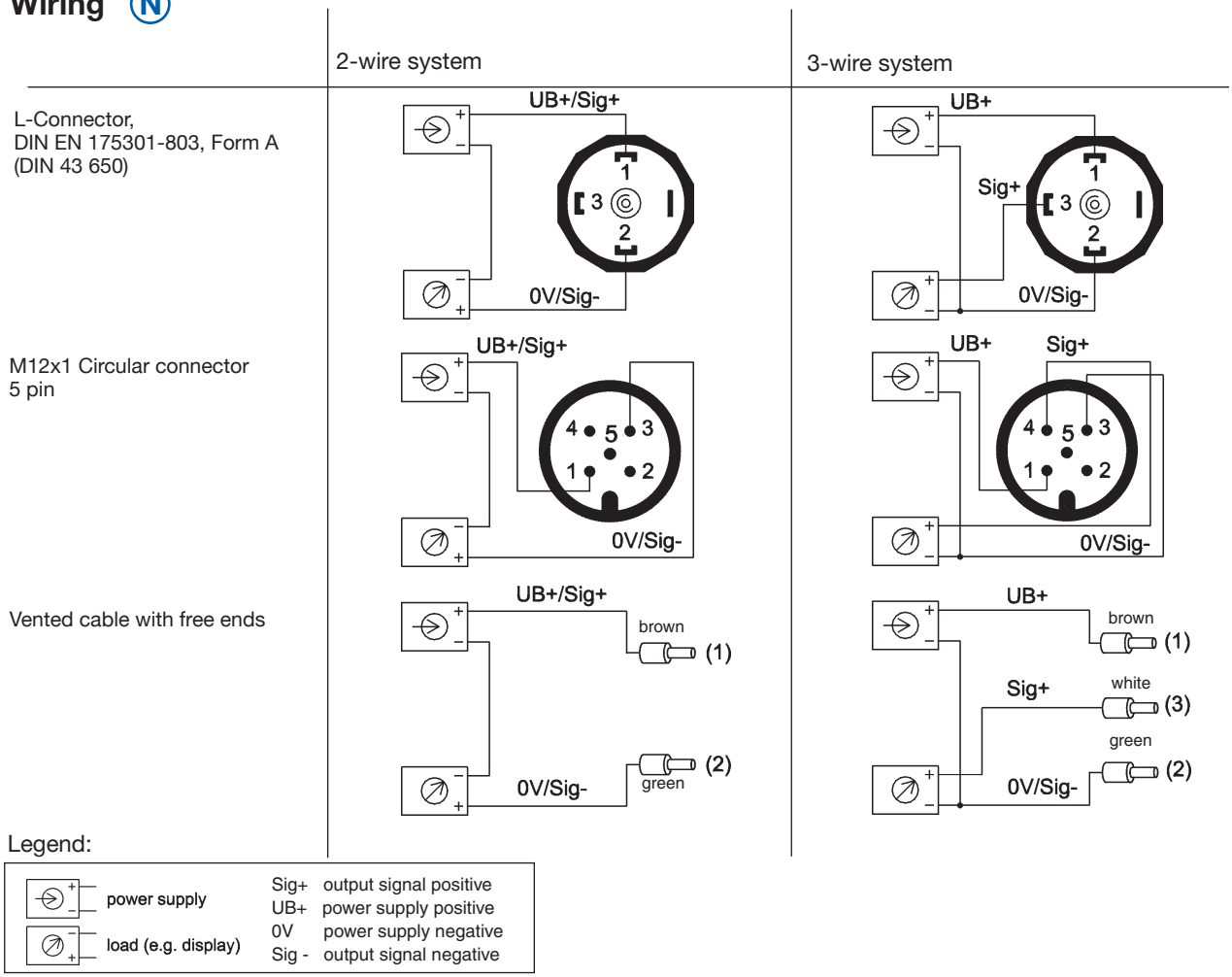
** European Hygienic Equipment Design Group

Ⓛ The standard **electrical connection** is the black L-shaped DIN 43650 cap. This is a fiber-glass reinforced plastic cap with solderless screw terminals. The standard cap is provided with a compression fitting so the user can install their own wiring. Other options include a DIN 43650 cap with a 1/2" NPT female conduit opening (rated NEMA4/IP65), 5 foot flying leads (NEMA 4/IP65) 4 or 6 pin Military style plugs, the Snap Cap with 1/2" NPT female conduit or compression fitting, and caps with flying leads already attached. Additional details are provided in section 3.5 of this manual.

Ⓜ The standard **process connection** is 1/2" NPT male for the industrial pressure transmitters. Other available connections include 1/4" NPT male, SAE straight threads, and G1/2B or G1B flush diaphragm connections. The standard pressure connection is indicated on the data sheets. These items are maintained in inventory (subject to prior sale). Non-standard connections add to delivery lead time. Additional information is supplied in section 3.4 of this manual.

The last page of the data sheet contains information about **wiring** the most common electrical outputs for the transmitter, as well as information about calibration, if applicable.

Wiring (N)



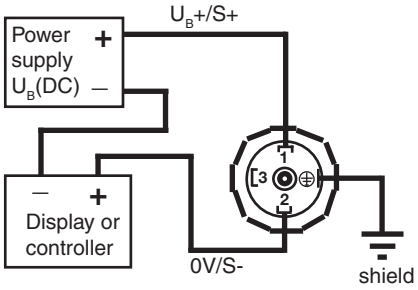
2.1 Wiring

(N) A pressure transmitter requires an external voltage supply to power the electronic amplifier and signal conditioning board. A third component to interpret the signal is also needed. This can be a digital panel meter, PLC (programmable logic controller), chart recorder, or computer. Pressure transmitters use 2-, 3-, or 4-wire systems, depending on the specific type of signal and circuit

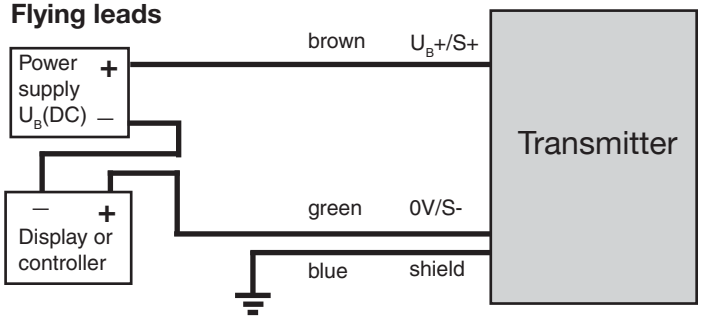
2-wire system: 4-20mA

The 2-wire system connects the power supply, transmitter, and indicating/recording instrument in a series circuit. This creates a "current loop" with the transmitter functioning as a current regulating device.

DIN connector



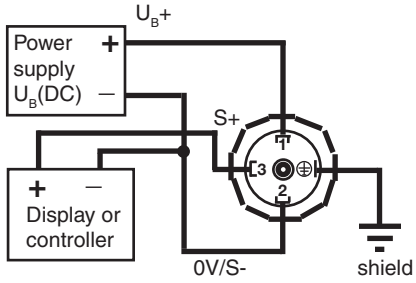
Flying leads



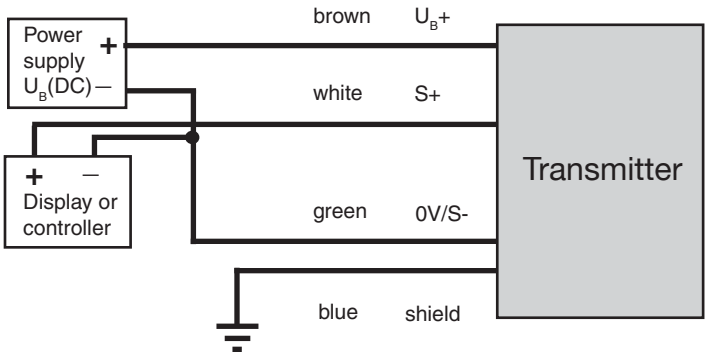
3-wire system: 0-5V, 0-10V, 0-20mA, 4-20mA

The 3-wire system features separate leads for the signal and power supply. The third lead is common minus for both devices. The signal source and indicating/recording instrument are connected in series, the power supply in parallel.

DIN connector



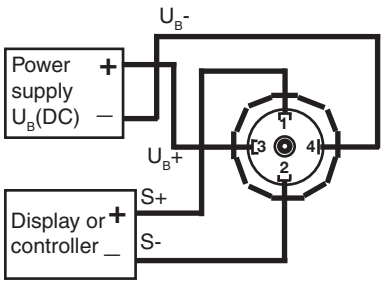
Flying leads



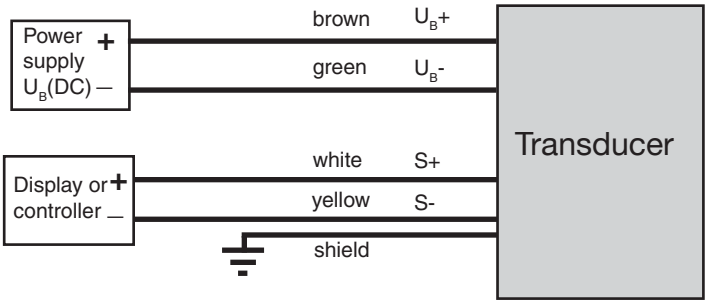
4-wire system: 0-100mV, 2 mV per Volt

In 4-wire systems each lead is a separate connection. Care must be taken that the minus leads do not come into contact with each other, as this will damage the circuitry.

DIN connector



Flying leads



Terminal coding:

U_B + Plus power supply
0V Minus power supply (common, ground)
S + Plus output signal
S - Minus output signal (common, ground)
Shield Cable shield / transmitter body

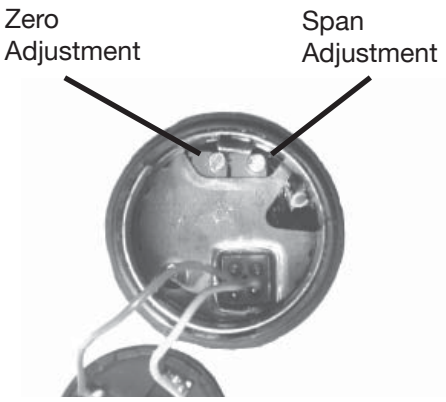
2.2 Calibration

Calibration is required for all WIKA transmitters with accessible zero and span potentiometers. Models without this feature are calibrated by changing the scaling of the digital panel meter or PLC to compensate for changes in transmitter output caused by overpressurization or long term drift.

WIKA industrial grade transmitters feature adjustable zero and span potentiometers located inside the transmitter body. These can adjust the output signal up to +/- 10% of the pressure range. These adjustments should only be used to return the transmitter to the original specifications as shown on the label. They should not be used to "re-range" the transmitter to a different span, as this may adversely affect linearity specifications. If the application requires "re-ranging" or a turn down, the UT-10 and UT-11 have a 20:1 turndown capability.

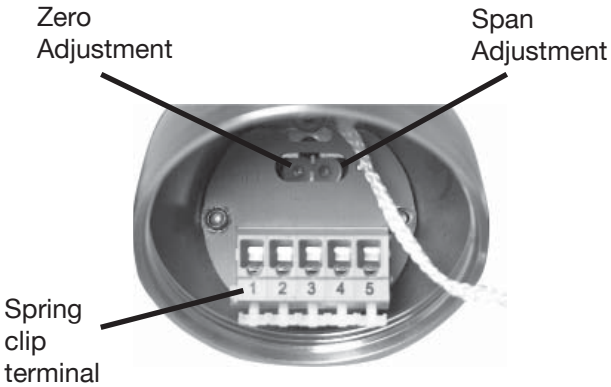
To calibrate these transmitters, access the zero and span potentiometers inside the transmitter body by removing the electrical connection (access will depend on the specific model), and retaining ring. Orient the transmitters so the potentiometers are above the four pin wiring connector (see pictures below). The zero potentiometer is below left (sometimes marked Z or O), the span potentiometer is on the right. For gauge (psi) and sealed gauge (psis) ranges, the transmitter zero potentiometer can be adjusted to produce a null output when no pressure is applied. Adjustment of the span potentiometer requires the use of a dead weight tester or other pressure reference instrument. To calibrate compound and absolute transmitters, a reference vacuum and pressure source is required to complete the calibration procedure.

Zero and span adjustments allow recalibration of the transmitter pressure range to original specifications due to changes caused by overpressure, excessive temperature, or drift over time. WIKA industrial transmitters allow for adjustment of approximately +/- 5% of the pressure range. Zero and span adjustments should be used for recalibration purposes only, not to change the transmitter's original pressure range.



View inside transmitter with connector and retaining ring removed.

Type S-10 calibration access



View inside transmitter with cover removed.

Type F-20 calibration access