4.0 Model Number Selection

The environment where the transmitter is installed has a major impact on its performance and longevity. The primary environmental factors include *ambient temperature, media temperature, media compatibility, vibration, moisture*, and the presence of RFI (radio frequency interference). **Model numbers** apply to the specific requirements of these environmental factors.

4.1 Ambient Temperature

All transmitters have defined temperature limits as indicated on the specific data sheet. Exceeding these limits will cause the transmitter to not function or be permanently damaged. Two sets of temperature limits must be considered:

The **operating temperature range** is the temperature range within which a transmitter can function without damage.

The **compensated temperature range** (see page 10 for specification definitions) is usually more limited than the corresponding operating temperature range. For a transmitter to operate within specification, the ambient temperature must be maintained within the compensated temperature range. Extended compensated temperature range is available on most models at additional cost.

Example: A user wants to install an S-10 industrial transmitter where temperatures can sometimes drop to as low as 0 °F in winter. Since these transmitters are rated to -5 °F, the transmitter will function at this temperature. However, since 0 °F is 32 degrees below the minimum compensated temperature range, the temperature-induced error in these conditions will increase to approximately 0.4% per 18 °F Since the low temperature occurs infrequently, the user determines this transmitter is suitable for his application.

Steps can be taken to provide additional protection in environments where the ambient temperature exceeds the design limits of the transmitter. These can include heat tracing the transmitter in cold environments, or insulating the transmitter from excessive heat.

Media Temperature

The media temperature must fall within the limits defined by the specifications for each model. Standard industrial transmitters have a permissible media temperature range of -25 °F (-20 °C) to 212 °F (100 °C). Exceeding the media temperature specification will cause readings outside the rated accuracy or may permanently damage the transmitter. Many applications have high temperature requirements. The following options are available to protect transmitters from high media temperatures:

Media Temperature Range

Transmitter process connection	-25 °F to 212 °F. (-20 °C to 100 °C)	212 °F. to 300 °F. (100 °C to 150 °C)	Over 300 °F. (over 150 °C).
NPT	Industrial or OEM	Standard or OEM model with siphon or pigtail extension	
Flush diaphragm	Industrial only	Flush diaphragm with integral cooling extension	Use standard transmitter with diaphragm-type chemical seal and capillary line

Many custom transmitter diaphragm seal combinations are available for special applications.

Application example: Pressurized steam can reach extremely high temperatures. Since steam is a non-clogging media, a standard NPT transmitter is used with a pigtail or siphon to protect the transmitter. To allow for maximum convection cooling, the transmitter should not be mounted in a direct vertical position over the steam line.

4.2 Media Compatibility

The media being measured must be compatible with the wetted parts of the transmitter in order to provide a long, reliable service life. Most Tronic transmitters feature stainless steel wetted parts. Piezoresistive transmitters and all flush diaphragm transmitters are 316 stainless. Thin film transmitters use PH17-4 stainless. Stainless steel is acceptable for the vast majority of industrial and OEM applications. The user must determine chemical compatibility of the media with stainless steel. If stainless steel is not acceptable, several options are available.

NPT transmitters can be mounted to a diaphragm seal made of special materials including Hastelloy®, titanium, tantalum, or PFA (Teflon®) coating. Diaphragm seal selection depends upon the specific application.

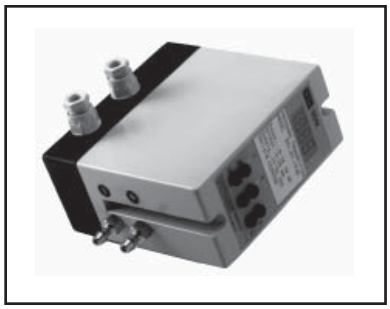
Flush diaphragm transmitters can be provided with Hastelloy® C or Teflon®-coated wetted parts, along with Viton® O-rings and seals. All flush diaphragm transmitters use a silicone liquid fill behind the diaphragm to transmit the pressure to the sensing element. This silicone is isolated from the media by the diaphragm. In the unlikely event the diaphragm ruptures, the silicone would be released into the process media. If silicone is incompatible with the media, alternate fill liquids are available, including vegetable oil for food applications, and Halocarbon® for non-silicone-based paint applications and oxygen applications.

There are important exceptions for specific model numbers:

The model **SL-1** low pressure industrial transmitter and the **DP-10** low/differential transmitter are only suitable for *dry, inert gases*. This is because stainless steel isolation is not possible in extremely low pressure ranges. The media comes into direct contact with the sensor. The materials coming into contact with the media include aluminum, silicon, gold, silicone rubber, brass, and copper.

Since the entire **LH-10** and **LS-10** submersible transmitters are submerged in the media, the wetted parts include 316 and 304 stainless steel, polyurethane cable, polyolefin shrink tubing, and polyamide protective cap. The user must be sure that all these materials are compatible with the media.

SL-1 Low pressure industrial



DP-10 Low and differential pressure

LH-10 Submersible

4.3 Vibration

Excessive vibration can damage or significantly reduce the life span of pressure transmitters. The nature of the vibration is important. Vibration can occur with low or high frequency and amplitude, and can occur in one or many different directions. Whenever possible, the user should always try to install the transmitter in an area that minimizes vibration.

WIKA manufactures some of the most vibration resistant industrial and OEM transmitters available. The OEM transmitter Model C-10 and MH-1 are found on off-road equipment transmissions and hydraulic systems worldwide. The use of the cable option increases vibration resistance. Extremely severe vibration applications may require testing by the user to determine suitability.

Model	Shock	Vibration
S-10, S-11	1000 g	50 g
C-10	1000 g	50 g
MH-1	1000 g	50 g
M-10	1000 g	30 g
UT-10, UT-11	100 g	5 g

Test results per DIN IEC 770

4.4 Moisture

Moisture can have a major impact on the function and longevity of pressure transmitters. Environments can range from "condensing" moisture to washdown with water under pressure to total, permanent submersion. WIKA manufactures a wide range of transmitters to meet specific moisture protection requirements.

The degree of protection of an enclosure from environmental elements is defined by two types of enclosure classification rating systems. One is the **NEMA rating** (National Electronic Manufacturers Association). The other is the **IP** system (Ingress Protection), which is in common use in Europe and is increasingly being used in the U.S. These systems include defining protection from solids and liquids entering an enclosure. The two systems use different test parameters; therefore, they are not directly comparable. The most common NEMA/IP ratings for transmitters are as follows.

NEMA Ratings

NEMA 3 - Windblown dust, rain, sleet
NEMA 4 - Washdown
NEMA 4X- Washdown and corrosion resistant
NEMA 5 - Dust tight
NEMA 6 - Temporary submersion
NEMA 6P- Permanent submersion

IP Ratings

IP 65 - Dust tight; water sprayed from any direction shall have no harmful effect
IP 67 - Designed to withstand temporary submersion
IP 68 - Designed to withstand permanent submersion
IP 69K - Designed to withstand high pressure steam

IP 65 ⟶ IP 67 ⟶ IP 68 ⟶ IP 69K

S-10 with DIN connection

S-10 with cable or F-20

Submersible LH-10 or LS-10

MH-1 with IP 69K cable output

Increasing Moisture Protection ⟶

4.5 RF (EMI) Interference

Radio frequency or electromagnetic interference is produced by motors, solenoids, portable radios, and many other sources in industrial environments. As industrial controls increase in complexity, the problem of RFI causing unwanted fluctuations in pressure transmitter output signals is becoming more common. Several steps can be taken to reduce or eliminate RFI problems.

• Relocate the transmitter as far as possible from the RFI source.

• Use shielded cable when wiring the transmitter. Use the shield wire as a "floating ground" by attaching it to the transmitter shield lead but not to the controller/indicator. The shield lead can also be connected to the controller or indicator, but not to the transmitter. Test the output to see which connection provides the best RFI protection.

• Use a 4-20 mA signal. 4-20 mA output signals are inherently less susceptible to interference than voltage signals.

• Where applicable, the DIN 43650 cap is available with a built-in RFI filter. This cap replaces the standard electrical connector found on Model S-10 and S-11.

• Use a transmitter with the ***CE*** mark on the label. The CE mark indicates the transmitter meets stringent RFI protection and emission requirements. The CE mark is standard on all WIKA transmitters.

CE Mark