



White Paper

Connection guaranteed

The Baumer portfolio for process connections

Countless connection types complicate the life of plant engineers when integrating process sensors. The following white paper shows you various options for integrating process sensors into new and existing systems, thus providing you with the optimum solution for the simple and fast integration of process sensors – without any adjustments. This white paper uses examples to explain which variants are available and how the user can find the right sensor or adapter in just a few steps.

Table of Content

1 Introduction	3
2 Process connections	3
2.1 Baumer makes finding the correct process connection quick and easy	3
2.2 Process connections – the unchecked growth of standards	3
2.3 The Baumer connection variety	3
3 One-piece design or adapter?	4
3.1 Connection needed: one-piece design or adapter?	4
3.2 Connection found: the Baumer BCID code	4
3.3 Example of clamp connection	5
4 Hygienic Design	6
4.1 Baumer hygienic connection: no chance for bacteria	6
5 Accessories	6
5.1 Icing on the cake – the correct accessories	6
6 Conclusion	6
7 Authors	7

1 Introduction

Countless connection types complicate the life of plant engineers when integrating process sensors. The following white paper shows you various options for integrating process sensors into new and existing systems, thus providing you with the optimum solution for the simple and fast integration of process sensors – without any adjustments. This white paper uses examples to explain which variants are available and how the user can find the right sensor or adapter in just a few steps.

2 Process connections

2.1 Baumer makes finding the correct process connection quick and easy

In process sensor technology, the countless connection types make life difficult for plant engineers. When a new sensor is installed, holes must be drilled, couplings welded on, or even the whole system redesigned in the worst case. But what is the use of the best sensor if it cannot be fitted easily and quickly? Exactly: no use at all. Unfortunately, this is quite often the case, especially in the process industry, where sensors measure filling levels, pressure, temperature, flow, and conductivity – in an “invasive” manner, i.e. during ongoing operations. This is where the advantages of Baumer sensors come into play. The Swiss sensor specialist not only offers high-precision and robust sensors for all measurement tasks in industry and food processing but also an extensive, cleverly designed system of installation solutions for standard and brand-compatible process connections. The company offers more than 40 connection types. For every existing or future process connection, users can find a compatible sensor or adapter that allows simple, fast, and cost-effective installation – without having to change anything in the system.

This whitepaper presents examples that show the different available variants and how users can find the correct sensor or adapter with only a few steps.

2.2 Process connections – the unchecked growth of standards

Is the milk sufficiently cooled? How full is the tank? How many liters are flowing through the pipe to the filling system? Modern dairies are highly automated high-tech operations in which dozens of sensors constantly control and monitor the processes. The manufacturers of such systems are aware of that and include suitable connections for these sensors. The standardized milk pipe connection is very common in dairies. This connection is available in various sizes, and the system manufacturer can be sure that a matching sensor will be found.

Process sensor technology is dominated by standards, and at least when it comes to hygiene applications, the number of connection variants is limited. Therefore, new systems only very rarely pose problems. However, renovating an older system often involves the installation of new, more powerful sensors, and these may not fit directly on the old connection. Should the old connection be sealed, a new hole drilled next to it, and a coupling welded on? This can be done, but it is rather costly and not possible during ongoing operations.

In industrial applications, the challenge is even bigger. In this sector, the sensor manufacturers have introduced a great number of variations within the standards. Of course, this is anything but user-friendly.

2.3 The Baumer connection variety

Whatever the reason for replacing a sensor, it can often only be successfully connected if the sensor manufacturer can supply a suitable adapter. Which Baumer does. The sensor specialist offers a variety of process sensors with a one-piece design, i.e., a large number of connections that can be directly connected to the system. In addition, it offers a vast range of adjustment options, from adapters to seals to installation components, if a one-piece sensor should happen to not fit directly. This means that users can find a sensor solution from Baumer with a compatible connection or adapter for every measurement task, no matter how exotic.

Another advantage of the Baumer connection variety: Should a customer be unsure of whether a specific Baumer sensor is suitable for a specific application purpose, it can be quickly integrated into the process with an adapter and tested without any major conversion measures or welding.

3 One-piece design or adapter?

3.1 Connection needed: one-piece design or adapter?

The first question that a plant engineer must ask when planning to install a sensor is whether the sensor is to be installed in an existing process connection in a tank or a pipe or whether a new process connection is required. The latter approach has the advantage that the connection can be chosen to match the sensor, which means it can be installed without an adapter. The benefits of this are high robustness, a limited parts and order volume, easily achievable food safety, and cost effectiveness. Plus, it offers flexibility when selecting the connection type: Threaded connections, clamp connections, or welded connections are all possible. Usually recommended are threaded connections such as G 1/2 A hygienic, G 1 A hygienic, or BHC (see more below), as this offers maximum flexibility.

However, if a process connection is already present, the question is whether a sensor with this type of process connection is available (one-piece design) or whether an adapter is required. For example, a sensor with a G 1/2 A process connection can be installed via an adapter in a clamp connection on the pipe or tank. The benefits of adapter solutions are the greater flexibility when replacing sensors and limited warehousing thanks to the “One sensor fits all” approach.

3.2 Connection found: the Baumer BCID code

If the only option is a solution with an adapter, the designer has to determine which adapter is the right one. The Baumer Connection Identifier (BCID) makes the search easier. It is based on a system of short letter and number codes, similar to screws – if you have a screw with a metric threading of eight millimeters (M8) you can be sure that an M8 nut will fit on it. For connections for process sensors, it takes the following form, for example: C04. “C” stands for “clamp connection” and “04” for a diameter of the size DN38 on the process side. Similar to metric screw threading, it also applies here that a sensor or adapter with a C04 connection always fits on a C04 process connection, such as a welding coupling on a tank.

If the sensor and the process connection do not match, an adapter is required. The adapter has two codes: one on the process side – for example C04 – and one on the sensor side, for example A03. In this case as well, only the code must match that of the sensor. Then both are compatible with each other. The adapter then forms the bridge between two connection codes. The BCID includes many other code combinations for different connection types – a total of several hundred combinations.

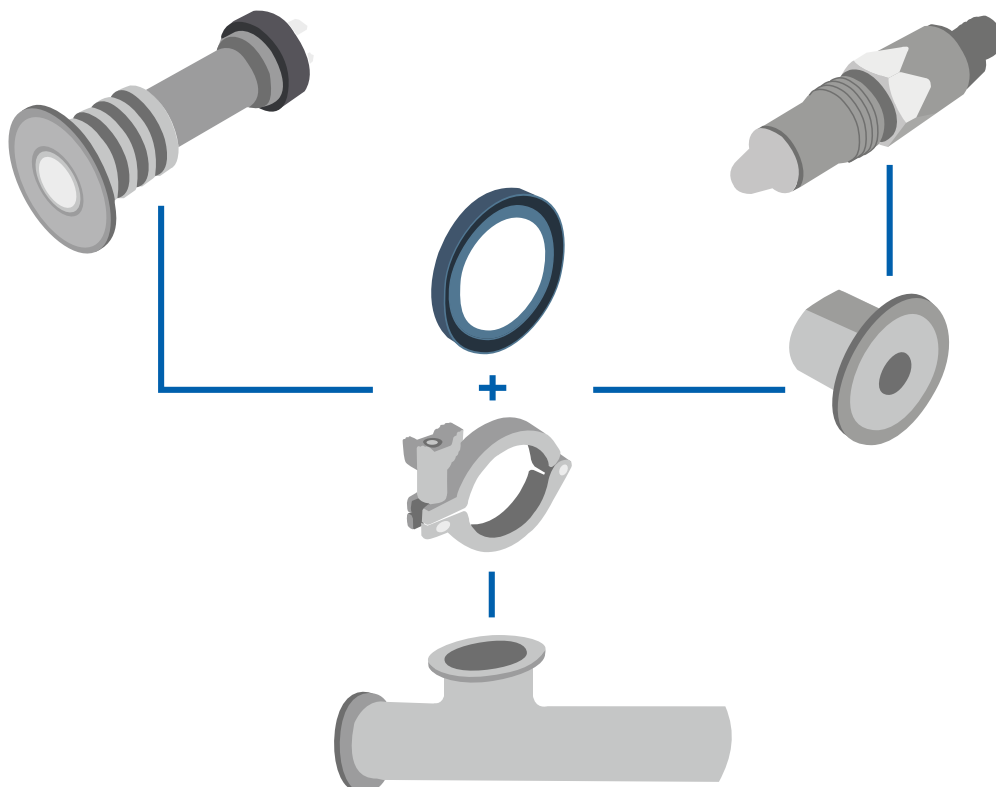


Fig. 1: The right connection for existing processes: one-piece design or adapter

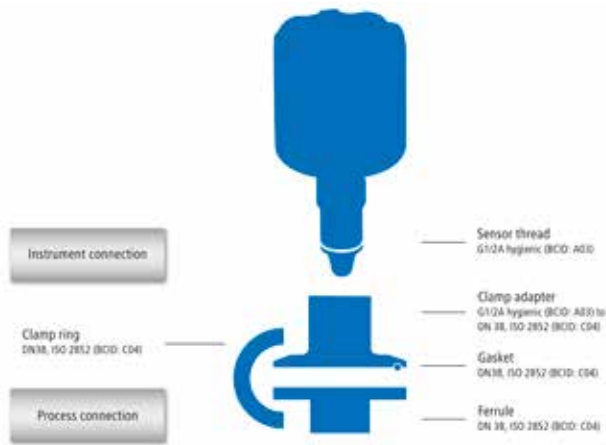


Fig. 2: Baumer BCID code for easy selection of the right adapter

This may seem rather complicated to users at first due to the great variety of different connection variants. However, they do not have to deal with the code system. Because all they want is to quickly find the one code (or the two codes) and thus the sensor, or, if required, the adapter with which the sensor can be installed. Baumer makes this easy. At website, users find a selection tool that outputs the right code and the matching adapter after a few mouse clicks.

3.3 Example of clamp connection

Since all theory is gray, the following are two specific examples that show the diverse connection options offered by Baumer and how to find the right combination with the BCID. One example consists of the connection of a PBMH pressure transmitter as a one-piece design to a milk pipe, and the other is the connection of a *CleverLevel* filling level switch LBFH via an adapter.

The process connection is a welding coupling that is welded to the pipe. It carries the BCID C04, where "C" indicates the code for a clamping connection on the process connection side. This means that the sensors must also have this process connection.

One-piece design

The PBMH pressure transmitter with a one-piece design already includes the process connection C04; it can therefore be directly installed with a clamp bracket and a sealing ring.

With tri-clamp adapter

This does not apply to the *CleverLevel* filling level switch LBFH. It requires an adapter with the BCID C04 on the process side and a threading on the sensor side that matches the threading of the sensor. The BCID for this is A03, which complies with the standard connection G 1/2 A hygienic; the "A" indicates that this is the code for the sensor side. In the product selector, the user quickly finds out that the adapter ZPH3-3213 with C04/A03 connections is required. The user therefore attaches this adapter with the clamp and the seal to the welding coupling and screws the sensor in on the back – done.

With welding adapter

There is an even easier way. The above-mentioned variant with tri-clamp attachment is only needed if an accordingly sized hole has already been drilled for the welding coupling on the pipe or tank. On a new system or if the installer can freely decide which connection to implement, the suitable solution is a welding coupling that already has an A03 connection on the sensor side. This means easier installation and lower space requirements. Whichever solution is selected, the easy adjustment and quick installation help save costs.

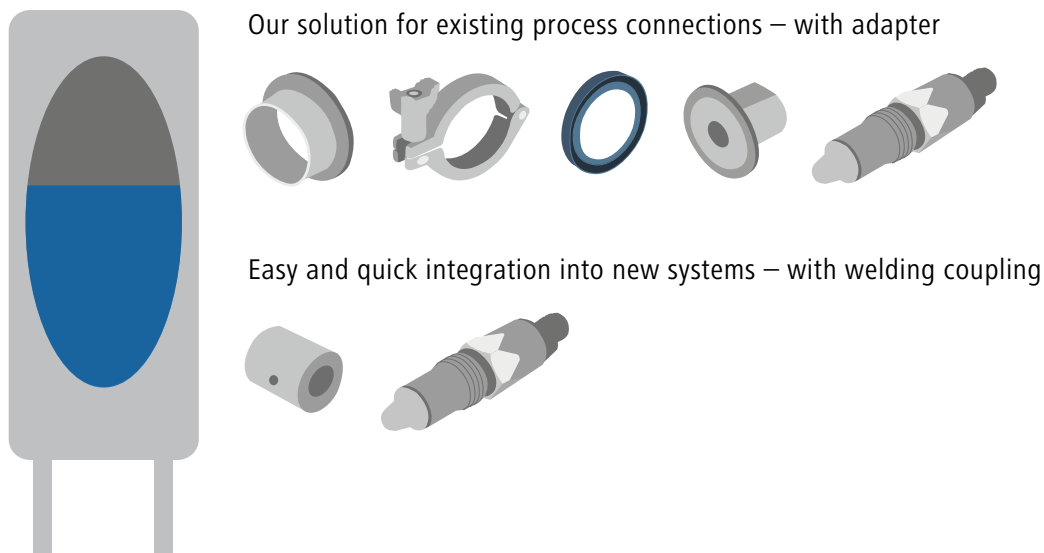


Fig. 3: The optimal solution for new plants – the welding coupling

4 Hygienic Design

4.1 Baumer hygienic connection: no chance for bacteria

The food industry is probably the sector in which process connections have evolved the quickest within the past few years. This development has been driven by EHEDG. The European Hygienic Engineering and Design Group is a consortium of equipment manufacturers for the food industry, food processing companies, research institutes, and public health authorities. The organization does not issue standards; it only recommends design principles and certifies their implementation, to which an increasing number of companies adhere. One specification is that the connections of sensors, cables, or valves should not have indentations or sharp edges where food residues could adhere or bacteria could thrive. And during cleaning with chemicals and steam cleaners, the liquids should drip off easily and not form puddles in the indentations.

Baumer also feels committed to the EHEDG principles and has put much thought into implementing these principles in its process connections. Accordingly, customers can find a large selection of models suitable for hygiene applications in the process sensor portfolio. While other manufacturers limit themselves to mere compliance with the design rules, the Baumer developers have conceived clever designs that increase food safety and thus create an added value for customers. This applies especially to the invasive part of the sensor, which extends into the pipe or the tank and comes in contact with milk, lemonade, or other foodstuffs. This is the weak point of conventional connections. If a coupling is welded to a pipe and a sensor is connected with a tri-clamp to it, then a hollow space is created directly underneath the sensor in which air and bacteria can collect. These can only be washed out using plenty of water and chemicals, while the system cannot be operated during this time.

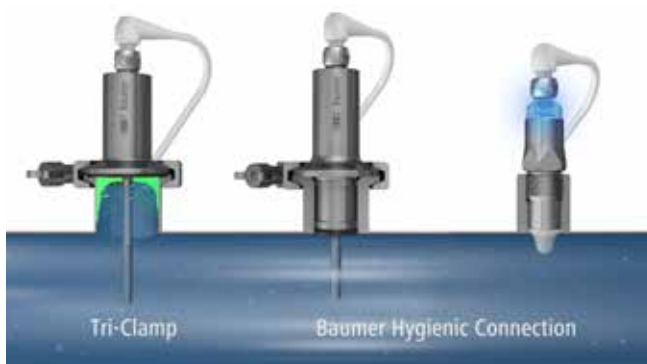


Fig. 4: Maximum food safety without contamination thanks to Baumer Hygienic Connection

The solution: Baumer Hygienic Connection. In this clever design, the welding coupling and the sensor are so perfectly matched to each other that the sensor fills in the hollow space completely, and the front of the sensor is flush with the pipe wall. There are no hollow spaces, and bacteria cannot collect. This saves water, chemicals, and time for cleaning, as well as ultimately money. BHC is EHEDG-certified.

5 Accessories

5.1 Icing on the cake – the correct accessories

Once a plant engineer has decided on the suitable connection with or without an adapter, nothing can go wrong anymore, right? Unfortunately, it can. If the wrong accessories – seals and installation parts – are chosen. Or if a sensor manufacturer does not even offer them. This does not happen at Baumer. For our extensive portfolio of process connections, we also offer all necessary installation parts from a single source. These include seals with membranes that separate the sensor from the medium, for example, from aggressive chemicals. Or O-rings made of different materials such as NBR, EPDM, silicone, and FKM. These materials are specialized for specific applications. For example, silicone is suitable for high temperatures and many chemicals; it is also gas-tight and therefore suited for application in vacuums. However, it is not recommended for hot water and glycol; EPDM is better suited for these applications. For this as well, users can find a wide range of application recommendations at

www.baumer.com/process-sensors

6 Conclusion

The process sensor and process connection are two sides of the same coin. Only when both match can the sensor be easily and securely installed and provide reliable measurement results. Baumer offers plant engineers precise and robust sensors and the widest range of connection variants and adapters on the market. Last but not least: precisely matched accessories such as cables, plugs, or seals.

7 Authors



Peter Fend
Product Management
Baumer Electric AG

Matteo Harter
Product Management
Baumer MDS GmbH

Baumer Electric AG
Hummelstrasse 17
CH-8501 Frauenfeld
Phone +41 (0)52 728 1122
Fax +41 (0)52 728 1144

Baumer Group

The Baumer Group is one of the worldwide leading manufacturers of sensors, encoders, measuring instruments and components for automated image-processing. Baumer combines innovative technologies and customer-oriented service into intelligent solutions for factory and process automation and offers an unrivalled wide technology and product portfolio. With around 2700 employees and 38 subsidiaries in 19 countries, the family-owned group of companies is always close to the customer. Baumer provides clients in most diverse industries with vital benefits and measurable added value by worldwide consistent high quality standards and outstanding innovative potential. Learn more at www.baumer.com on the internet.