



Contents

1.	Information on This Operating Instruction	1
1.1	Pictographs Used	2
1.2	Quality	2
2.	Safety Instructions	2
2.1	Appropriate Use	2
2.2	Safe Handling	3
2.3	Deployment of Qualified Personnel	3
3.	Thermowell Description	3
3.1	Function	3
3.2	Construction and Models	3
3.2.1	Design	3
3.2.2	Thermowell Models	4
4.	Mounting	7
4.1	Process Sealing in General	7
4.2	Process Connection in the Food/Bio/ Pharmaceutical Industries	7
4.3	Installation Position	8
5.	Installation in Potentially Explosive Areas	9
6.	Operation	9
7.	Maintenance/Cleaning, Storage and Transport	9
8.	Dismounting and Disposal	10
9.	Declaration of Manufacturer	11

1. Information on This Operating Instruction

- This operating instruction is an integral product part of the thermowells described.
- It must be freely accessible for the authorised personnel during the entire period of storage and application.
- The operating instruction contains important information on the safe and adequate use of thermowells.
- All persons, which install, apply or control the thermowells, have to thoroughly read, understand and implement the manual.

If you have any problems or questions, please contact your supplier or contact us directly at:



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1.1 Pictographs Used

In this manual, pictographs are used as hazard warnings.

Particular information, instructions and restrictions designed for the prevention of personal or substantial property damage:



WARNING! Is used to warn you against an imminent danger that may result in personal injury or death.

CAUTION! Is used to draw your attention to important recommendations to be observed. Disregarding them may result in property damage.



Passages in the text containing **explanations, information or advice** are highlighted with this pictograph.



The following symbol highlights **actions** you have to conduct or **instructions** that have to be strictly observed.

1.2 Quality

ARMANO thermowells are original accessories for our thermometer range. The models are optimally geared to the various application areas of the temperature measuring technology. They offer maximum functionality and safety when used as intended. A manufacturing process certified according to ISO 9001 guarantees the consistently high level of quality. Of course, defects or transport damage can never be excluded completely. In case of a complaint, it will be processed immediately. A detailed description of the defect helps us to remedy errors quickly and to eliminate avoidable causes. (contact and support see page 1).

1.3 Exclusion of Liability

We accept no liability for any damage or malfunction resulting from failure to follow the instructions in this manual, incorrect installation, inappropriate use of the device, construction types that are not suitable for the process, inappropriate operating conditions, unauthorised or unqualified personnel and unauthorised manipulations in and on the device.

2. Safety Instructions

Thermowells separate temperature sensors from the medium and seal the process towards the environment. During the installation and operation of thermowells, hazards may arise due to certain process conditions and/or toxic, aggressive, explosive or environmentally harmful media. These have to be prevented by observing the safety instructions in this manual and complying with the applicable directives.

2.1 Appropriate Use



WARNING! Thermowells with a construction type or material that is not suitable for the application conditions, which are applied outside their limitations, or which are not installed properly, can cause severe accidents or damage!

- Media, cleaning agents and surrounding atmosphere must not corrode the thermowell materials and sealings.
- Material and design of the thermowell have to be resistant to the process parameters such as pressure, temperature or flow rate.
- The process connection of the thermowell has to be suitable for the process-related requirements.
- The mounting connection at the measuring point has to correspond to the process connection of the thermowell.
- Thermowells have to be free from visible damage or traces of unauthorised manipulation. Damaged or defective models need to be replaced immediately.
- On site, the thermowells must be checked for correct assignment to the measuring point and proper installation.



It is the user's responsibility to ensure that both design, including installation length and wall thickness, and thermowell material are suitable for the specific process conditions. In case of static pressure loads and laminar (steady) flows, we recommend to make use of the option for a thermowell calculation by the ARMANO Messtechnik GmbH. Possible effects of pulsating and turbulent flows must be evaluated and taken into account by the user when selecting the appropriate thermowell design.

2.2 Safe Handling



WARNING! Disregarding work, health and fire protection as well as negligent actions in connection with hazardous or hot substances can cause severe injuries, accidents or damage!

- In all work, the existing local laws, standards and regulations concerning the process, for accident prevention, for safety at the workplace and environmental protection must be complied with.
- Mounting and dismantling shall not be carried out during ongoing processes if hazards are imminent due to process conditions, e.g. high pressures and temperatures.
- Prior to installation, the thermowell must be dry, clean and free of impurities.
- During dismantling, make sure that no hazardous substances can leak and that the thermowell has reached almost room temperature. Otherwise, protective measures must be taken (e.g. respirator masks, heat-protective gloves, exhaust systems, filter systems) in compliance with applicable regulations.
- In case of hazardous build-up, proceed in accordance with the applicable regulations depending on the type of substance or type of hazard.
- Check the tightness and integrity of the thermowell and the process connection at regular intervals. The intervals have to be determined by the operator of the plant depending on the plant capacity and process-relevant regulations.



Make sure that first aid equipment suitable for the process hazard is available in the vicinity of work on measuring points and thermowells with potentially hazardous process conditions and substances.

2.3 Deployment of Qualified Personnel



WARNING! Unqualified, untrained personnel can cause severe injuries or damage.

- The installation, commissioning and maintenance of thermowells shall only be conducted by trained personnel, authorised by the operator. In addition to knowledge of assembly techniques to be applied, also necessary expertise on the temperature measuring points and on the process on site is required.
- Existing directives, standards and regulations have to be applied within the scope of the corresponding work. This includes expertise in dealing with hazardous and aggressive media.

3. Thermowell Description

3.1 Function

Thermowells are used to mechanically decouple temperature sensors from the process.

They offer:

- protection from process conditions and media that would damage or destroy the temperature sensor.
- a possibility to replace the thermometer during ongoing processes.

3.2 Construction and Models

3.2.1 Design

- **Thermowells made of solid material** hereinafter referred to as solid drilled
This category also includes drilled thermowells made of solid material with weld-on flange.
- **Thermowells made of tube with weld-in tip and weld-on process connection** hereinafter referred to as fabricated
This category includes also all food probes.

Operating Instructions

Thermowells

3.2.2 Thermowell Models

Weld-in thermowells

				
Thermowell model		SF4	SF4.1	SK4.B
Form (DIN 43 772)		4	–	–
Construction type	solid drilled	✓	✓	✓
	fabricated	–	–	–
Material (standard)		stainless steel 1.4571, 1.7335 (13 CrMo 4-5)		stainless steel 1.4571
Process connection		weld-in		
Connection to the stem		female thread	male thread	lateral retaining screw for plain stems
Data sheet		8.8110	8.8111	8.8151

Thermowells with flange connection

			
Thermowell model		SF4F	SF4.1F
Form (DIN 43 772)		4F	–
Construction type	solid drilled	✓	✓
	fabricated	–	–
Material (standard)		stainless steel 1.4571	
Process connection		with flange	
Connection to the stem		female thread	male thread
Data sheet		8.8112	8.8113

Operating Instructions

Thermowells

Threaded thermowells

					
Thermowell model		SF5	SF6/SF7	SF8	SF9
Form (DIN 43 772)		5	6, 7	8	9
Construction type	solid drilled	–	✓	–	✓
	fabricated	✓	–	✓	–
Material (standard)		stainless steel 1.4571, 2.0401 (brass)	stainless steel 1.4571, 1.7335 (13 CrMo 4-5)	stainless steel 1.4571	stainless steel 1.4571, 1.7335 (13 CrMo 4-5)
Process connection		male thread			
Connection to the stem		female thread		male thread	
Data sheet		8.8120	8.8121	8.8130	8.8131

				
Thermowell model		SK1	SK2	SK3.B
Form (DIN 43 772)		based on DIN 42 772 form 5	based on DIN 42 772 form 6, 7	–
Construction type	solid drilled	–	✓	–
	fabricated	✓	–	✓
Material (standard)		stainless steel 1.4571		
Process connection		male thread		
Connection to the stem		clamping ring fitting for plain stems		lateral retaining screw for plain stems
Data sheet		8.8140	8.8141	8.8150

Operating Instructions

Thermowells

Thermowells with connections for food/bio/pharmaceutical industries

					
Thermowell model	SL1	SL11	SL12	SL3	SL6
Form (DIN 43 772)		–		–	–
Construction type	solid drilled	–		–	–
	fabricated	✓		✓	✓
Material (standard)	stainless steel 1.4435				
Process connection	Clamp connection			conical coupling and groove nut DIN 11 851	Varivent® for Varinline® case
	ISO 2852, for tubes according to ISO 2037 and BS 4825	DIN 32 676, series A, for tubes according to DIN 11 850	Tri Clamp for tubes according to BS 4825 and O.D.-Tube, ASME BPE and ISO 1127		
Connection to the stem	male thread				
Data sheet	8.8160				

Accessories for the mounting of thermowells

					
Type	HR	S2	AV1	AV2	S1
	neck tube	welding piece	connection screw fitting	connection screw fitting	welding piece with female thread
Application	for weld-in and threaded thermowells	for weld-in thermowells	for threaded thermowells	for threaded thermowells	for threaded thermowells
Material	stainless steel 1.4571				
Data sheet	8.8301	8.8301	8.8201	8.8201	8.8201

4. Mounting



Observe the instructions in chapter 2 of this manual. Prior to the installation of a thermowell, ensure that

- the construction type is suitable for the measuring point.
- you do not install the thermowell during an ongoing process or you can safely intervene in the process.
- the thermowell is not damaged.
- the thermowell is clean and free from any adhering impurities.
- the installation of thermowells is carried out in accordance with the general technical regulations for the selected connection type.

4.1 Process Sealing in General

- Cylindrical screw fittings: gaskets made of appropriate material (standard: aluminum or copper gaskets)
- Conical screw fittings: (e.g. NPT) sealing in the thread by using appropriate sealants, e.g. PTFE tape
- Also possible: sealing weld seam provided the medium is suitable
- Flange connections: Use a version suitable for the flange geometry
- All sealing materials have to be compatible with the specific process. Necessary approvals and resistances are to be regarded.

4.2 Process Connection in the Food/Bio/Pharmaceutical Industries

Connections in the food/bio/pharmaceutical industries as well as aseptic connections can only be applied in a hygienic design if the port to the process has a hygienic design as well. During mounting, it must be ensured that complete self-draining of the medium is possible. After draining processes, no residues shall remain at the junction.

- Dead spaces have to be avoided or kept very small. It must be ensured that cleaning media reach all parts up to the junction with the required operating temperature. Areas that cannot be cleaned, or in which residues remain, are to be precluded.
- Form and materials of sealings and the engineering design of the sealing grooves on the process side have to comply with the approvals and the regulations, standards and directives applying at the installation location. Installation gaps shall tend to zero to avoid bacterial growth in the best possible manner.



EHEDG certifications for temperature sensor and thermowell connections only apply in connection with sealings and junctions on the process side, which are compliant with the following EHEDG guidelines:

Doc. 10: "Hygienic design of closed equipment for the processing of liquid food"

Doc. 37: "Hygienic design and application of sensors"

Particularly note:

- Provided they were installed and commissioned correctly, thermowells with EHEDG approval do not have to be disassembled for cleaning purposes, i.e. they are CIP-compliant (Cleaning in Place). Cleaning is carried out with the pipe cleaning. In case of tank installations, it must be ensured that the cleaning equipment is aimed towards the connection area and sprays it directly.
- Thermowell connections are only certified according to EHEDG if the length of the dead space (L) is shorter than the diameter of the connection (D) minus stem diameter (dF): $L < (D - dF)$! (Doc. 10)
- For clamp connections, the EHEDG certification is only valid in combination with sealings approved for EHEDG. The approval is limited to the tube dimensions (nominal widths), for which suitable sealings are available on the market. (Until the entry into our data sheets, a list with information on available nominal widths is available via the contact addresses on page 1 of this operating instruction.)



Thermowell connections with EHEDG certification comply with the EHEDG position paper for approved couplings, using special sealings, which are listed as applicable or welded in (available on the EHEDG website www.ehedg.org).

A list of potential suppliers of special sealings is available at the ARMANO Messtechnik GmbH. Only if the thermowell is mounted correctly on the connection port, cleanability as described in the EHEDG approval can be ensured.

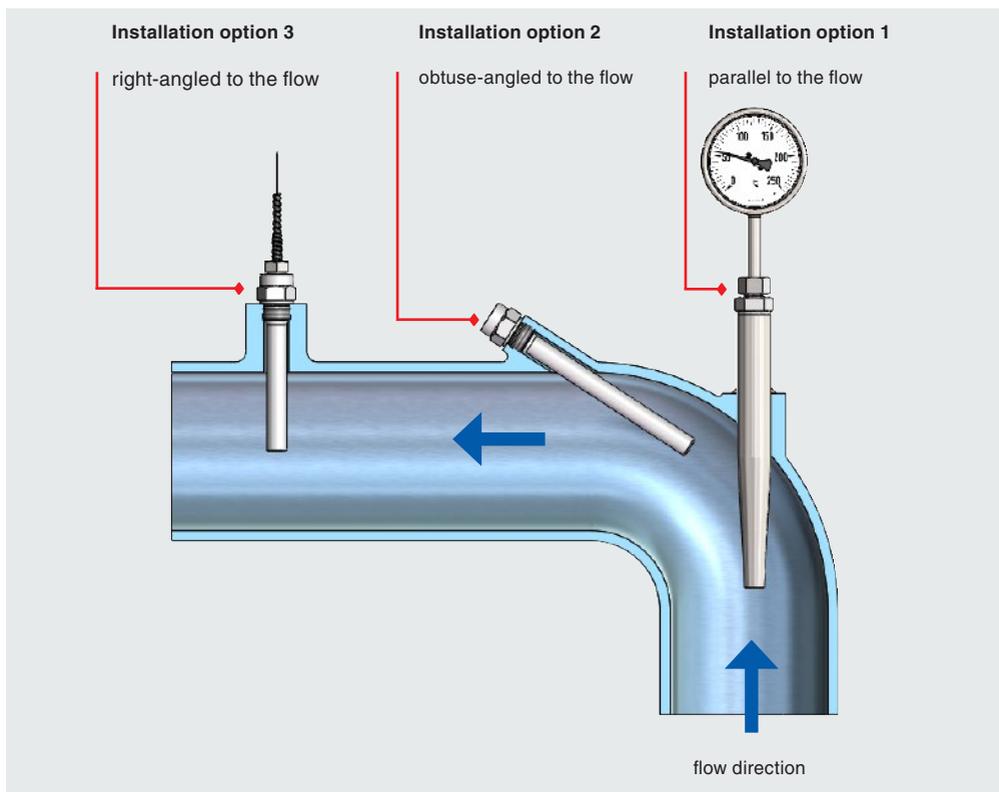
4.3 Installation Position

 Please ensure that the thermowell is installed in such a way that the active length of the corresponding thermometer can be completely immersed in the medium. Please refer to the data sheets and technical information of the thermometer.



For the installation in piping systems, various installation positions are possible.

- **Installation position 1:**
parallel to the flow
tip opposite to the flow direction
installation into the pipe bend allows for larger active stem lengths
- **Installation position 2:**
obtuse-angled to the flow,
tip opposite to the flow direction
- **Installation position 3:**
right-angled to the flow
unfavourable for high flow rates
the immersion depth should not be larger than half the pipe diameter
the pipe diameter has to be widened if necessary



5. Installation in Potentially Explosive Areas

Information on zone separation:

If a zone separation shall be provided by the instrument, a thermowell with a minimum wall thickness of 1 mm has to be used. If the wall thickness of the thermowell is between 0.2 mm and 1 mm, the devices must not be subjected to ambient stresses that may have an adverse effect on the partition.

The thermowells and process connections have to comply with the requirements of DIN EN 60079-26 and ensure a tightness to degree of protection IP67 according to DIN EN 60 529.

Grounding/electrical bonding:

 Please regard the installation regulations of your system, grounding/electrical bonding may be required.



Please also refer to the relevant operating instructions for information on the requirements of the thermometers used.

Thermal resistances depending on the thermowell in the electrical temperature measurement:



Please refer to operating instruction B71 for the corresponding thermal resistances.

Commissioning:

Before commissioning, all Ex-relevant components have to be checked for their suitability, integrity and correct assembly by qualified personnel.



Please also refer to the instructions in chapters 4, 6 and 7 for the installation, operation and maintenance.

6. Operation

Safe operation is ensured, when

- the thermowell was designed according to the process requirements,
- the thermowell was installed properly,
- no defects or damage were detected during the regular inspections of the measuring point according to chapters 2 and 7.

7. Maintenance/Cleaning, Storage and Transport



CAUTION! Material damage and loss of warranty!

Any interventions and repairs by the customer that involve a change in the thermowell itself or the specified connection type, leads to the loss of any warranty.

Maintenance:

Thermowells generally do not require any maintenance. However, the thermowells and their fastening and sealing materials have to be checked regularly and, in accordance with chapter 8, replaced if necessary.



Depending on the specific chemical and mechanical load of the measuring point, it is the operator's responsibility to determine intervals for checking and/or replacing thermowells, seals and fastening material.

Cleaning:

Non-installed and safely accessible parts of thermowells can be cleaned with a cloth or a soft bristled brush and appropriate cleaning agents.

Installed parts can be integrated into the pipe or tank cleaning, or they can be disassembled and cleaned separately before maintenance and cleaning intervals, in accordance with chapter 8.



WARNING! Unsuitable cleaning agents and parameters (pressure/temperature) can corrode the thermowell sealings, and possibly also the thermowell and fastening material, thus causing the release of dangerous or hot media that can lead to serious injuries, accidents or environmental damage!

Storage and transport:



CAUTION! Improper transport and inappropriate storage can destroy the device and cause considerable property damage.

Please inspect the transport packaging and the delivered items immediately upon their receipt to determine their integrity, completeness and conformity with the delivery documents. Any deficiencies are to be reported immediately.

- Storage and transport should be carried out under dry conditions and under suitable environmental conditions for the materials used.
- Protection from the weather/indoor storage is recommended.
- According to the version, threads, pipes, sealing surfaces and surface areas must be protected against mechanical damage/do not throw!
- If possible, use the original packaging with adequate padding material.

 Thermowells with health and environmentally hazardous contaminations, which cannot be removed must be safely packed and labelled before storage and transport, in accordance with the regulations for the specific medium.

8. Dismounting and Disposal



WARNING! Risk of injury!

Thermowells must never be removed from running systems with potentially hazardous process conditions! Otherwise, there is a risk of hazardous or hot media being released and causing serious injuries, accidents, damage or environmental damage!

Dismounting:

Prior to the deinstallation of the thermowell, ensure that

- the process is shut down properly,
- the process is unpressurised,
- there is almost ambient temperature,
- the electrical energy supply is switched off.

Disposal:



NO DOMESTIC WASTE!

Thermowells usually consist of only one metallic component, which can be disposed of as sorted metal scrap.

In the case of material mixtures, e.g. plastic coatings or adherence or contamination with process residues, please regard local prevailing laws and regulations.

9. Declaration of Manufacturer

Herstellereklärung

Declaration of Manufacturer

Für die nachfolgend bezeichneten Erzeugnisse

We hereby declare for the following named goods

SCHUTZROHRE
gem. Übersicht 8000

THERMOWELLS
according to model overview 8000

wird hiermit erklärt, dass diese Produkte keine druckhaltenden Aus-
rüstungsteile im Sinne der

that these products are no pressure equipment parts within the
meaning of

RICHTLINIE 2014/68/EU DES EUROPÄISCHEN PARLAMENTS
UND DES RATES VOM 15. Mai 2014
zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über
Druckgeräte – kurz: **Druckgeräterichtlinie**

DIRECTIVE 2014/68/EU OF THE EUROPEAN PARLIAMENT AND
THE COUNCIL from May 15, 2014
on the approximation of the laws of the Member States relating to
pressure equipment – short: **Pressure Equipment Directive**

sind, weil sie kein Gehäuse enthalten, in dem ein unter Druck stehendes
Fluid ($PS > 0,5$) enthalten ist oder transportiert wird (Volumen $V > 0$).

because they do not contain a housing containing or transporting
(volume $V > 0$) a pressurised fluid ($PS > 0.5$).

Unsere Schutzrohre werden entsprechend der „Guten Ingenieur-
praxis“ ausgelegt und gefertigt.

Our thermowells are designed and manufactured according to
"Sound Engineering Practice".

Diese Erklärung wird verantwortlich für den Hersteller:

This declaration is issued under the sole responsibility of the manufacturer:

ARMANO Messtechnik GmbH

abgegeben durch / by
Grünhain-Beierfeld, 2019-04-17



Bernd Vetter
Geschäftsführender Gesellschafter / Managing Director

ARMANO

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