Radar filling level meter for liquids and bulk solids suitable for use in applications with aggressive fluids or with hygienic requirements

- Continuous filling level measurement up to 120 m, 4...20 mA, 2-wire
- Available process connections: mounting bracket, thread (G, NPT ¾" and 1½"), flange (DN 50, 2" ASME), clamp (2")
- Excellent radar signal focusing and high measurement dynamics
- Adjustable via the display/configuration module and keys, alternatively via Bluetooth

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

Type 8619
multiCELL – multi-channel/ multi-function transmitter/ controller

Type 8692
Digital electro-pneumatic positioner for integrated mounting on process control valves

Type 8647
AirLINE SP – electropneumatic automation system

Type ME44
I/O module, IP20

Type description

The device Type 8140 is a non-contact radar level meter for continuous level measurement. The device is available with different antennas, connection types and sizes, making it useful for a wide range of applications.

The variant with integrated antenna, available with G or NPT connection, is particularly suitable for level measurement of liquids and bulk solids, especially in small tanks. The variant with plastic horn antenna, available with mounting bracket, is recommended for level measurement in open channels or streams. The variant with an encapsulated antenna system is available either with a clamp connection (DIN 32676, ISO 2852) for hygienic requirements or with a flange connection (DIN 2501/EN 1092-1).
For high-temperature and high-pressure applications, a device with a metal horn antenna is also available.

The excellent focus of the radar signal and the high measurement dynamics allow excellent measurement results even in small, narrow and high containers, as the risk of signal interference by installations, constructions and vessel walls is significantly reduced. Signal damping, e.g. due to signal length, foaming or low dielectric constant values of liquids, become much less important.

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

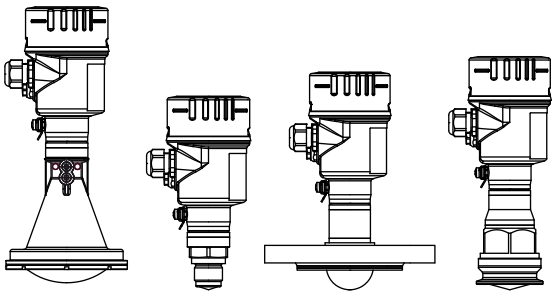
Table of contents

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

1. General technical data

1.1. About the device

The device is equipped with a plastic horn antenna, an integrated horn antenna or with an encapsulated antenna system. The latter variant is available with flange or hygienic connection. The technical data depends on the radar level meter variant.



1.2. All variants

Product properties	
Material	
Make sure the device materials are compatible with the fluid you are using. Further information can be found in chapter "3.1. Bürkert resistApp" on page 8.	
Non-wetted parts	
Cover	Stainless steel 316L (1.4404), glass (inspection window)
Housing	Stainless steel 316L (1.4404)
Grounding terminal and screw	Stainless steel 316L
Seal	Between housing and cover: EPDM
Cable gland	PA
Blind plug	PA
Dimensions	Further information can be found in chapter "4. Dimensions" on page 9.
Weight	Approx. 2...17.2 kg (depending on process connection and antenna)
Measured quantity	Distance between the end of the sensor antenna and the product surface.
Damping (63 % of the input variable)	0...999 s, adjustable
Operating mode	The configurable operating mode depends on the country in which the device is used. • Operating mode 1: EU, Albania, Andorra, Azerbaijan, Australia, Belarus, Bosnia and Herzegovina, Canada, Liechtenstein, Moldavia, Monaco, Montenegro, New Zealand, Northern Macedonia, Norway, San Marino, Saudi Arabia, Serbia, Switzerland, Turkey, Ukraine, United Kingdom, USA • Operating mode 2: Brazil, Japan, South Korea, Taiwan, Thailand • Operating mode 3: India, Malaysia, South-Africa • Operating mode 4: Russia, Kazakhstan
Product accessory	
Display/configuration module	LCD in full dot matrix
Performance data	
Blocking distance	Depending on the operating conditions • Operating mode 1, 2 and 4: 0 mm • Operating mode 3: ≥ 250 mm
Measuring range resolution	1 mm
Measurement deviation	According to EN 60770-1: ≤ 1 mm for liquids (measuring distance > 0.25 m). Further information can be found in chapter "5.1. Measurement deviation diagram" on page 12.
Non-repeatability [1.]	≤ 1 mm
Measuring frequency	W-Band (80 GHz technology)
Measuring cycle time [2.]	Approx. 200 ms
Step response time [2.] [3.]	≤ 3 s
Temperature drift	< 0.03 %/10K related to the 16.7 mA span

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

Electrical data	
Operating voltage (U_n)	12...35 V DC
Power source (not supplied)	Limited energy circuit (power max. 100 W) according to IEC 61010-1, e.g.: • Class 2 power supply unit (according to UL1310) • SELV power supply unit (safety extra-low voltage) with suitable internal or external limitation of the output current • PELV power supply unit (protective low voltage) with suitable internal or external limitation of the output current
DC reverse polarity protection	Yes
Residual ripple (at DC)	• For 12 V< U_n < 18 V: ≤ 0.7 V_{eff} (16...400 Hz) • For 18 V< U_n < 35 V: ≤ 1.0 V_{eff} (16...400 Hz)
Overvoltage category according to IEC 61010-1	Category III
Protection class according to IEC 61010-1	Class III
Starting current	≤ 3.6 mA; ≤ 10 mA for 5 ms after switching on
Load resistor	(U_n - U_{min})/0.022 A
Output	4...20 mA/HART
Output signal range	3.8...20.5 mA/HART (default setting)
Signal resolution	0.3 µA
Output current	Max. 22 mA
Fault signal	Current output: mA value unchanged, ≥ 21 mA or ≤ 3.6 mA (adjustable)
Voltage supply cable	• Cable diameter: 5...9 mm or 6...12 mm • Wire cross-section: – Massive wire, stranded wire: 0.2 mm² (AWG 24)...2.5 mm² (AWG 14) – Stranded wire with end sleeve: 0.2 mm² (AWG 24)...1.5 mm² (AWG 16)
Process/Pipe connection and communication	
Electrical connection	Cable gland M20 × 1.5
Wireless communication: Bluetooth	
Communication interface	Bluetooth LE 4.1
System requirements	• For smartphone/tablet: – Operating system: iOS 8 or newer – Operating system: Android 5.1 or newer – Bluetooth: 4.0 LE or newer • For PC/notebook – Operating system: Windows 10 or newer – DTM Collection: 10/2020 or newer – Bluetooth: 4.0 LE or newer
Number of participants	Max. 1
Typical effective range	25 m (82 ft) [4.]
Approvals and conformities	
Directives	
CE directive	Further information on the CE Directive can be found in chapter "2.3. Standards" on page 7.
NAMUR recommendation	• NE21- Electromagnetic compatibility of equipment • NE43 - Signal level for fault information from measuring transducers • NE53 - Compatibility of field devices and display/adjustment components • NE107 - Self-monitoring and diagnosis of field devices
Explosion protection	ATEX/IECEx [5.] : EN IEC 60079-0:2018, IEC 60079-26:2021, EN 60079-11:2012 Further information can be found in chapter "2.4. Explosion protection" on page 7.
Foods and beverages/Hygiene	On request • 3-A Sanitary Standards Inc. [5.] • EHEDG (Type EL CLASS I) [5.] • FDA declaration of conformity [5.] • 1935/2004/EC declaration [5.] Further information can be found in chapter "2.5. Foods and beverages/Hygiene" on page 8.

Others	• Radio licenses [5.]: Europe (in EC declaration), New Zealand, USA, South Korea, Australia, Canada, Brazil, Malaysia, Serbia, Japan, Thailand, India, Taiwan, Morocco, Ukraine, South Africa
Environment and installation	
Ambient temperature	Operation and storage: - 40...+ 80 °C (- 40...+ 176 °F)
Temperature derating	Depending on antenna system Further information can be found in chapter "5.2. Temperature derating diagram" on page 13.
Relative air humidity	Max. 95 %
Height above sea level	• By default: max. 2000 m With connected overvoltage protection: max. 5000 m
Degree of protection according to IEC/EN 60529	IP66/IP67 with cable plug mounted and tightened M20 × 1.5
Pollution degree	Degree 4 (when used with fulfilled housing protection)

1.) Already included in the measurement deviation
2.) With operating voltage U_n ≥ 24 V DC
3.) Time span after a sudden distance change from 1...5 m until the output signal reaches 90 % of the final value for the first time (IEC 61298-2).
4.) Depending on the local conditions
5.) Approval of VEGAPULS6X product range from VEGA

1.3. Variant with plastic horn antenna

Product properties	
Material	
Non wetted parts	
Mounting strap	Stainless steel 316L (1.4435)
Fixing screw	Stainless steel 316L (1.4435)
Wetted parts	
Antenna	Antenna cone: PBT-GF30
Focus lens	PP
Beam angle [1.]	3°
Measuring range	0...120 m
Product accessory	
Adapter flange	Non wetted parts: • Adapter flange fixing screw made of stainless steel 304 Wetted parts: • Adapter flange made of PP-GF30 black • Sealing of the adaptor flange made of FKM (COG VI500)
Medium data	
Process temperature	- 40...+ 80 °C (- 40...+ 176 °F)
Process pressure	Vessel pressure: - 1...1 bar (- 100...100 kPa/- 14.5...14.5 psig) for variant with adapter flange
Process/Pipe connection and communication	
Process connection	Mounting bracket 170 mm (supplied as standard) or 300 mm (accessory)

1.) Outside the specified beam angle, the energy level of the radar signal is 50 % (- 3 dB) less.

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

1.4. Variant with integrated antenna and thread connection

Product properties	
Material	
Wetted parts	
Process connection	• PVDF for G 1½" PN 3 variant • Stainless steel 316L for other variants
Antenna	• PVDF for G 1½" PN 3 variant • PEEK for other variants
Seal	• Antenna system : – None for variant G 1½" PN 3 (process connection and antenna in one piece) – FKM for other variants • Process : – FKM for variant G 1½" PN 3 – NBR with aramid fibres for other variants
Beam angle [1.]	• 14° for variant G ¾" or NPT ¾" • 7° for variant G 1½" or NPT 1½"
Measuring range	• 0...10 m for variant G ¾" or NPT ¾" • 0...30 m for variant G 1½" or NPT 1½"
Medium data	
Process temperature [2.]	• -40...+80 °C (-40...+176 °F) for variant G 1½" PN 3 • -40...+150 °C (-40...+302 °F) for the other variants
Process pressure	Vessel pressure: • -1...3 bar (-100...300 kPa/-14.5...43.5 psig) for variant G 1½" PN 3 • -1...40 bar (-100...4000 kPa/-14.5...580.2 psig) for the other variants
Process/Pipe connection and communication	
Process connection	Thread G or NPT, ¾" or 1½"

1.) Outside the specified beam angle, the energy level of the radar signal is 50 % (-3 dB) less.
2.) Take into account reduced ambient temperature. Further information can be found in chapter "5.2. Temperature derating diagram" on page 13.

1.5. Variant with encapsulated antenna system and flange connection

Product properties	
Material	
Wetted parts	
Process connection	Flange plating: PTFE
Antenna	Antenna encapsulation: PTFE
Seal	PTFE
Beam angle [1.]	6° for variant DN 50
Measuring range	0...30 m for variant DN 50
Medium data	
Process temperature [2.]	-60...+150 °C (-40...+302 °F)
SIP process temperature	+150 °C (+302 °F), vapour stratification up to 2 hours
Process pressure	Vessel pressure: -1...25 bar (-100...2500 kPa/-14.5...362.6 psig)
Process/Pipe connection and communication	
Process connection	Flange DN 50 according to EN1092-1/DIN 2501 or 2" according to ASME

1.) Outside the specified beam angle, the energy level of the radar signal is 50 % (-3 dB) less.
2.) Take into account reduced ambient temperature. Further information can be found in chapter "5.2. Temperature derating diagram" on page 13.

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

1.6. Variant with encapsulated antenna system and hygienic connection

Product properties	
Material	
Wetted parts	
Antenna	Hygienic antenna encapsulation: PEEK
Seal	EPDM
Surface quality	Antenna encapsulation: Ra < 0.76 µm
Beam angle [1.)]	6°
Measuring range	0...30 m
Medium data	
Process temperature	- 20...+ 150 °C (- 4...+ 302 °F)
SIP process temperature	+ 150 °C (+ 302 °F), vapour stratification up to 2 hours
Process pressure	Vessel pressure: - 1...16 bar (- 100...1600 kPa/- 14.5...232.1 psig)
Process/Pipe connection and communication	
Process connection	Clamp 2" according to DIN 32676 or ISO 2852

1.) Outside the specified beam angle, the energy level of the radar signal is 50 % (- 3 dB) less.

2. Approvals and conformities

2.1. General notes

- The approvals and conformities listed below must be stated when making enquiries. This is the only way to ensure that the product complies with all required specifications.
- Not all available variants can be supplied with the below mentioned approvals or conformities.

2.2. Conformity

In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

2.3. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

2.4. Explosion protection

Approval	Description
	Optional: Explosion protection [1.)] Ex marking of the components according to: **ATEX:** CSANe 22ATEX1019X • II 1G Ex ia IIC T6...T1 Ga • II 1/2G Ex ia IIC T6...T1 Ga/Gb • II 2G Ex ia IIC T6...T1 Gb **IECEx:** IECEx CSAE 22.0011X • Ex ia IIC T6...T1 Ga • Ex ia IIC T6...T1 Ga/Gb • Ex ia IIC T6...T1 Gb Any unauthorized modifications made to the device will invalidate the Ex certification.

1.) Approval of VEGAPULS6X product range from VEGA

2.5. Foods and beverages/Hygiene

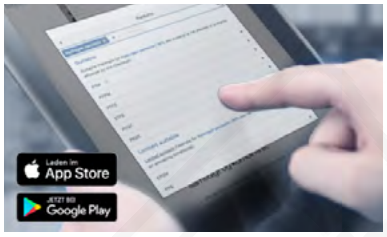
Approval	Description
	3-A Sanitary Standards Inc. [1.)] The products comply with 3-A Sanitary Standards Inc (3-A SSI) as per certificate.
	EHEDG [1.)] **(European Hygienic Engineering and Design Group) (Type EL CLASS I)** The products comply with EHEDG (European Hygienic Engineering and Design Group) (Type EL CLASS I) as per certificate.

Conformity	Description
FDA	**FDA** [1.)] **– Code of Federal Regulations** The devices comply in their composition with the Code of Federal Regulations published by the FDA (Food and Drug Administration, USA).
	EC Regulation 1935/2004 [1.)] **of the European Parliament and of the Council** All wetted materials are compliant with EC Regulation 1935/2004 according to the manufacturer's declaration.

1.) Approval of VEGAPULS6X product range from VEGA

3. Materials

3.1. Bürkert resistApp



Bürkert resistApp – Chemical resistance chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

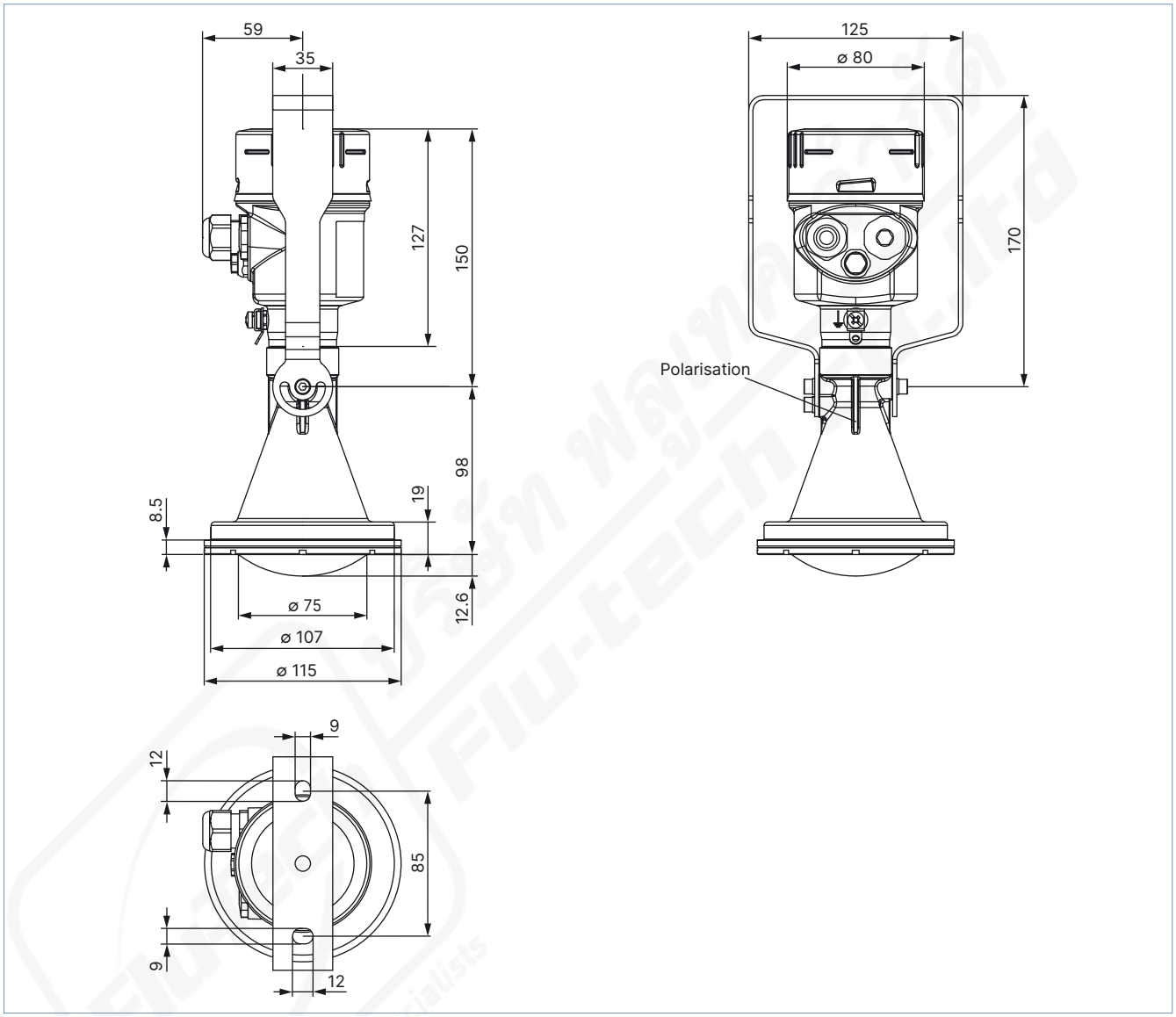
Start chemical resistance check

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

4. Dimensions

4.1. Variant with plastic horn antenna

Note:
Dimensions in mm, unless otherwise stated

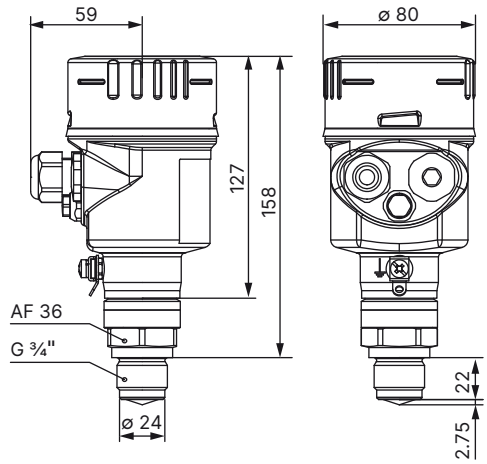


DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

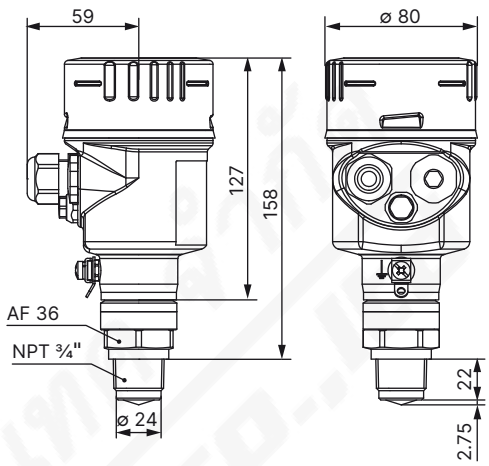
4.2. Variant with integrated antenna and thread connection

Note:
Dimensions in mm, unless otherwise stated

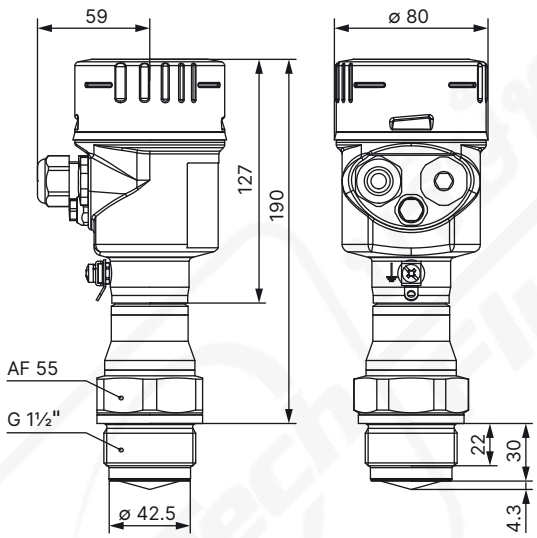
Variant G ¾" (DIN 3852-E)



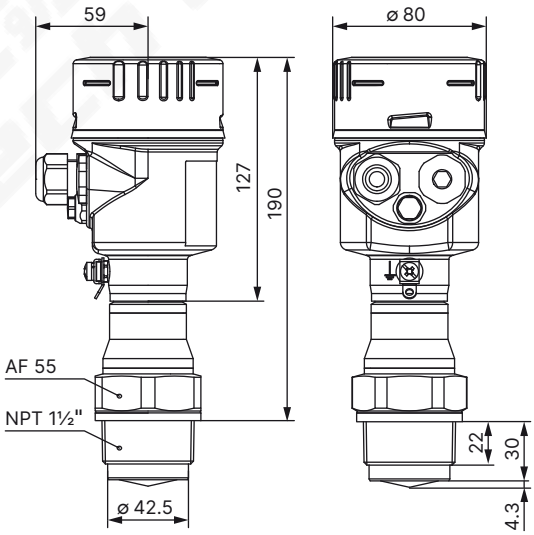
Variant NPT ¾" (ASME B1.20.1)



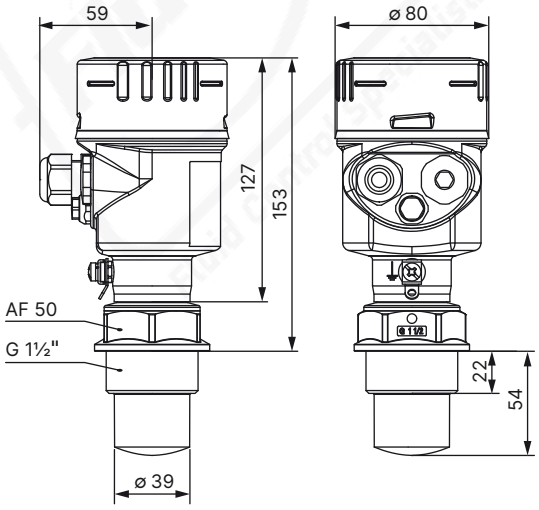
Variant G 1½" (DIN 3852-E)



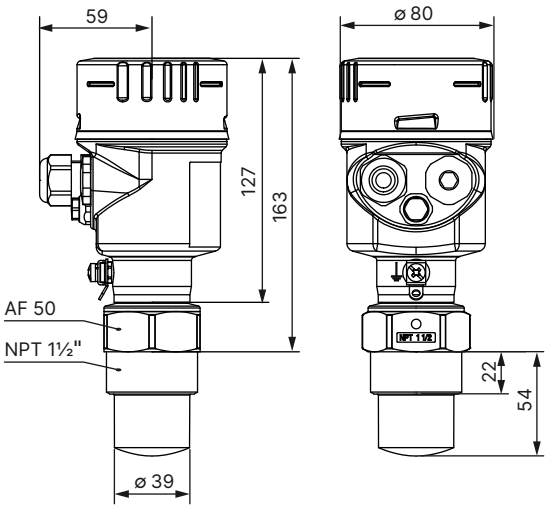
Variant NPT 1½" (ASME B1.20.1)



Variant G 1½" PN 3 (DIN 3852-E)



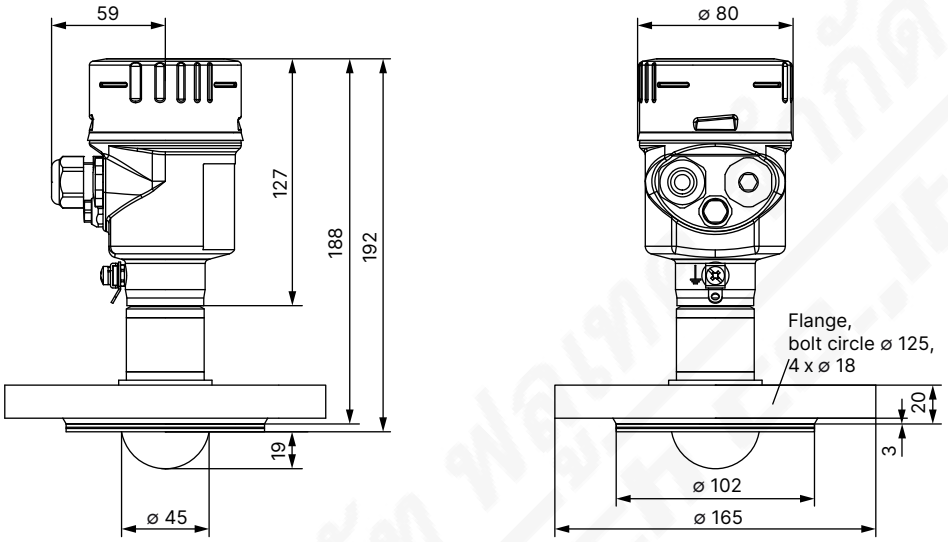
Variant NPT 1½" PN 3 (ASME B1.20.1)



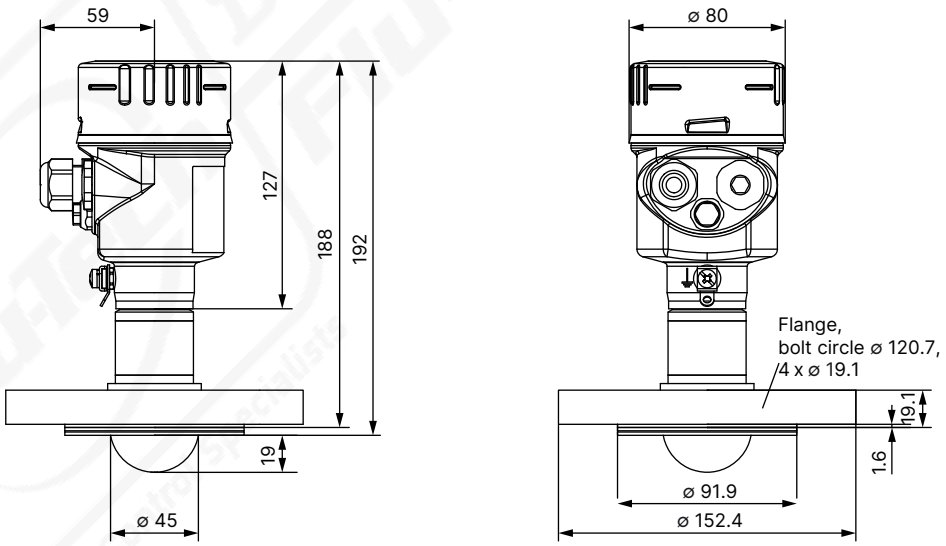
4.3. Variant with encapsulated antenna system and flange connection

Note:
Dimensions in mm, unless otherwise stated

Variant flange EN1092-1, form B1, DN50 PN40



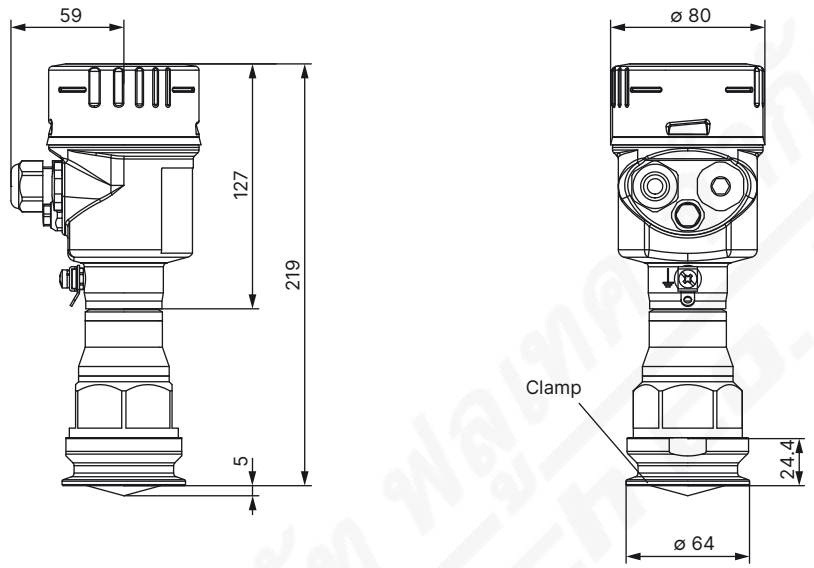
Variant flange ASME-B16.5, form B1, 2" 150 RF



4.4. Variant with encapsulated antenna system and hygienic connection

Note:
Dimensions in mm, unless otherwise stated

Variant clamp 2" PN16, DIN 32676, ISO 2852



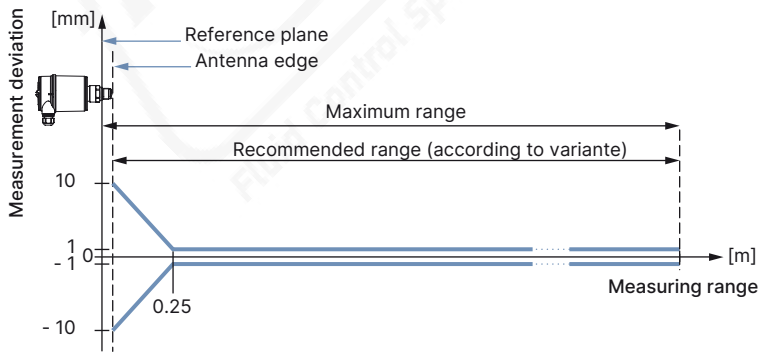
5. Performance specifications

5.1. Measurement deviation diagram

Note:
The drawing shows the measurement deviation of Type 8140 with thread and integrated horn antenna the following process reference conditions according to EN 61298-1 and applies to all variants:

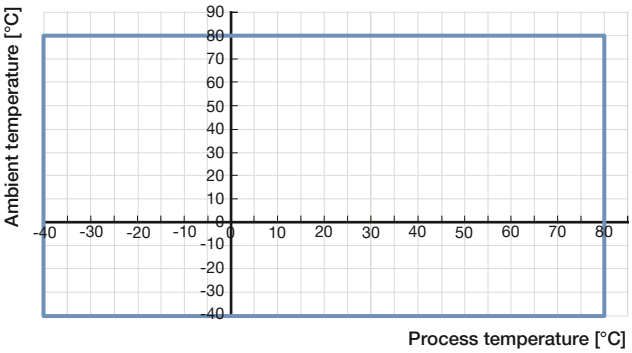
- Temperature: + 18...+ 30 °C (+ 64...+ 86 °F)
- Relative humidity: 45...75 %
- Air pressure: 860...1060 mbar
- Installation reference conditions:
  - Distance to installations: > 200 mm
  - Reflector: flat plate reflector
  - False reflections: biggest interfering signal, 20 dB smaller than the useful signal

In case of deviations from reference conditions, the installation-related offset can be up to ± 4 mm. This offset can be compensated by the adjustment.

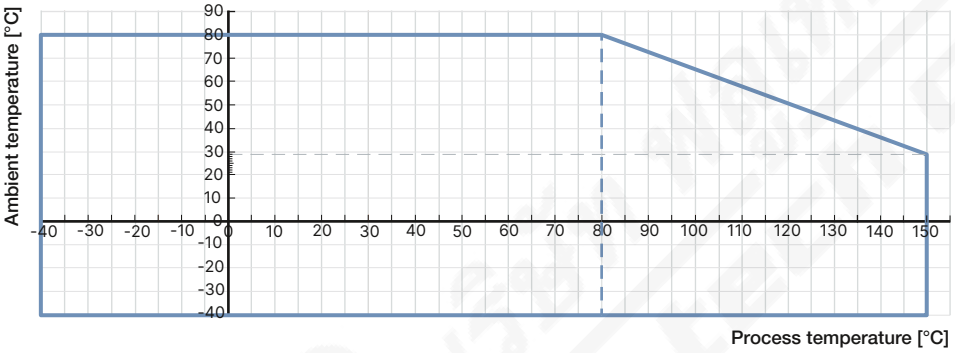


5.2. Temperature derating diagram

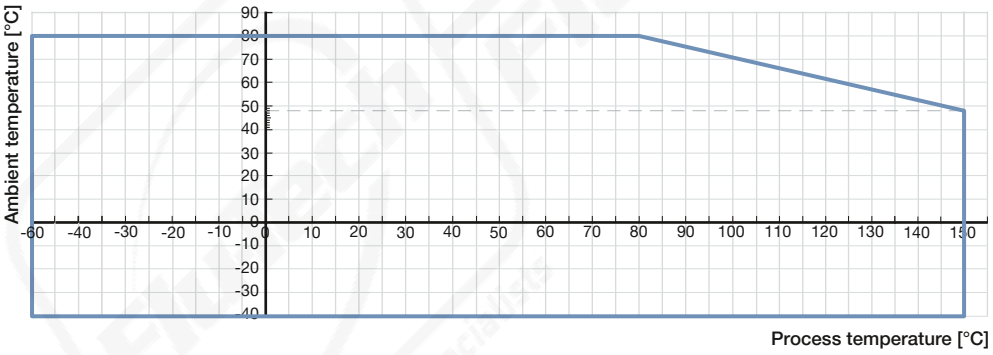
Variant with plastic horn antenna



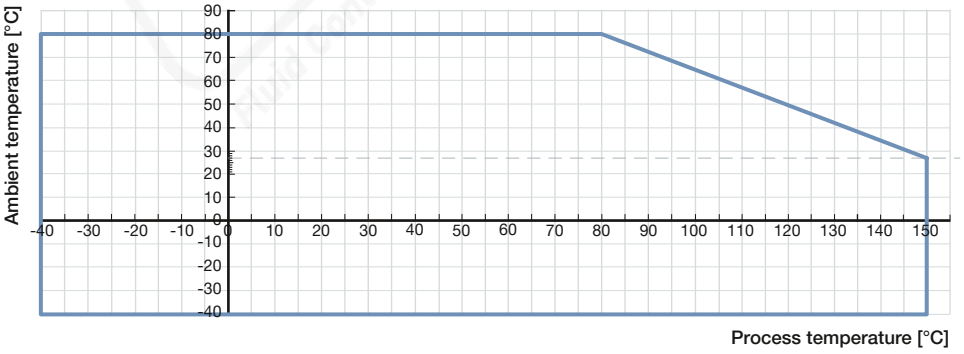
Variant with integrated antenna and thread connection



Variant with encapsulated antenna system and flange connection



Variant with encapsulated antenna system and hygienic connection



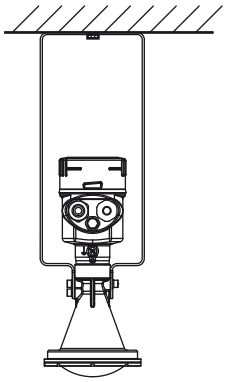
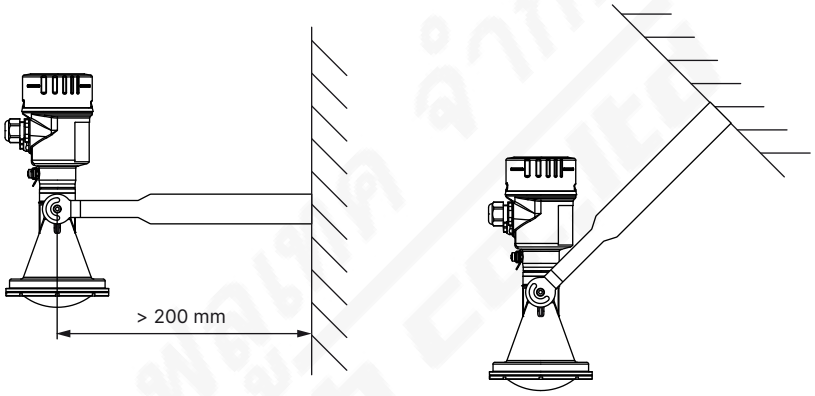
DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

6. Product installation

6.1. Mounting options

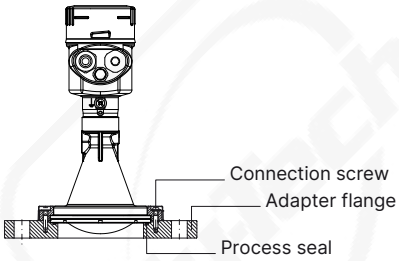
Variant with plastic horn antenna with mounting bracket

The mounting bracket allows simple mounting of the instrument on a wall, ceiling or boom. Especially in the case of open flumes, this is a simple and effective way to align the sensor to the surface of the liquids.

Mounting bracket - Ceiling mounting	Mounting bracket - Wall mounting
The instrument is normally mounted vertically with a bracket on the ceiling. This allows the sensor to swivel up to 180° for optimal alignment and rotate for optimal connection. 	Alternatively, the bracket can be mounted horizontally or diagonally. 

Variant with plastic horn antenna with flange

An adapter flange is available for mounting the device on a socket.

Adapter flange
The adapter flange is available from DN 100. It is permanently connected with the radar sensor and sealed. 

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

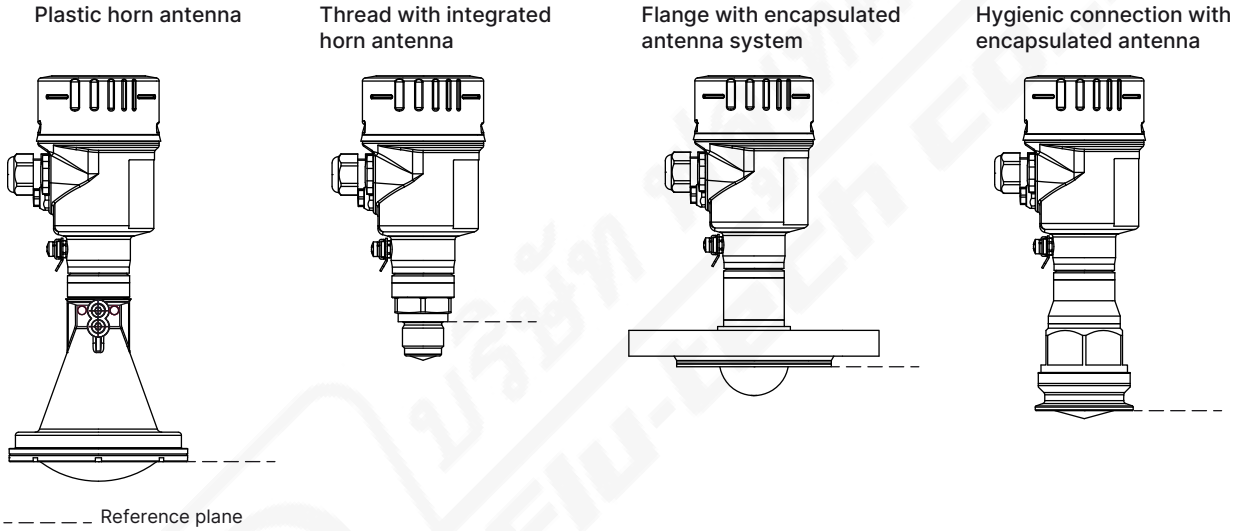
7. Product operation

7.1. Measuring principle

The radar measuring device for the measurement of liquid or bulk solids levels consists of a housing with electronics and a process connection with antenna. The antenna of the radar sensor emits a continuous radar signal. This is reflected by the liquid or bulk solids surface and received by the antenna as an echo. Radar waves propagate at the speed of light. The frequency difference between the transmitted and received signal is determined by special algorithms in the sensor electronics. The filling level is calculated and converted into a corresponding output signal and transmitted as a measured value.

The measuring range of the radar level measuring device Type 8140 begins physically at the end of the antenna. However, the min./max. adjustment begins at the reference plane. The reference plane is different depending on the sensor variant.

- Plastic horn antenna: the reference plane is the sealing surface on the lower edge
- Thread with integrated horn antenna: the reference plane is the sealing surface at the bottom of the hexagon
- Flange with encapsulated antenna system: the reference plane is the lower edge of the flange plating
- Hygiene connection with encapsulated antenna: the reference plane is the highest contact point between sensor process fitting and welded socket



DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

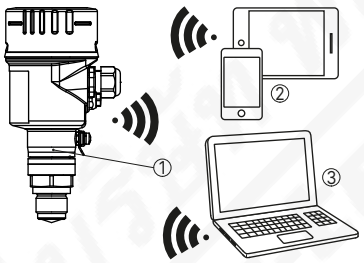
7.2. Product operation notes

Operating techniques

The device operates without the display/configuration module, but it is required for device configuration (i.e. set or restore parameters, configure information to be displayed, enter access codes...) and also for visualizing continuously the measured and processed data.
The display/configuration module can be positioned in 90° increments inside the level meter and removed at any time. It is not necessary to interrupt the power supply to carry out this operation. The entered parameters are generally saved in the measuring device Type 8140.

Set up with display/configuration module

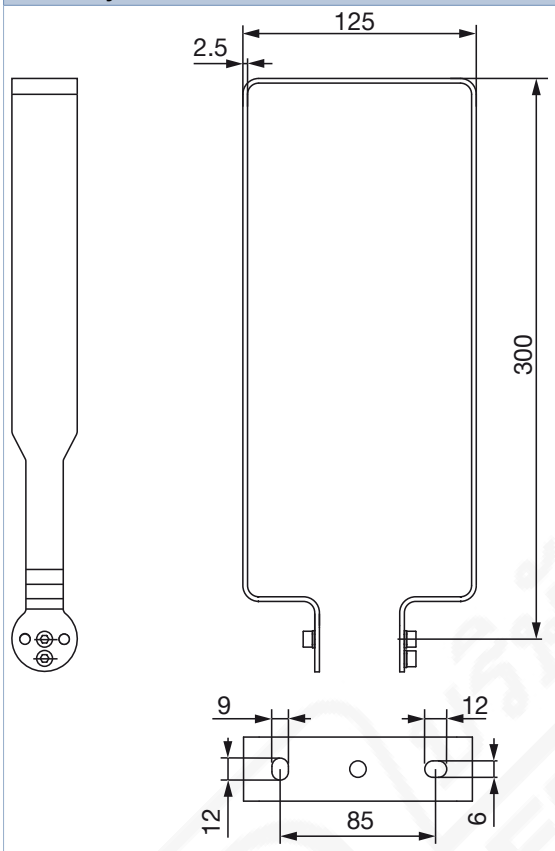
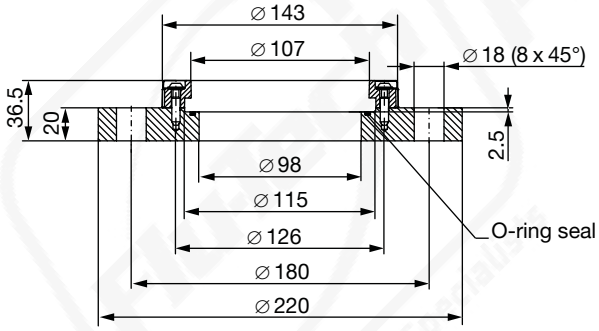
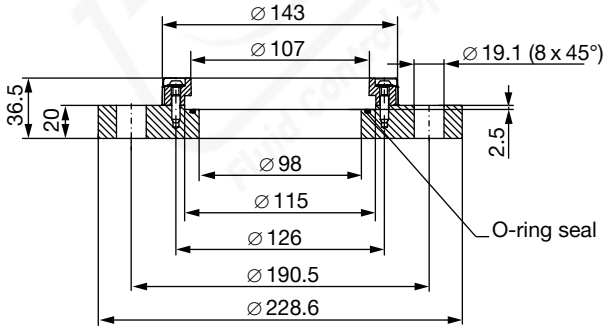
<table>
<tr><th>Display/configuration module</th><th>Description</th></tr>
<tr><td> 
</td><td>The measuring device can be configured:
• Using the 4 navigation keys on the display/configuration module and the display, on which the menus and submenus can be viewed. A magnetic pen is used to operate the keys through the closed cover.
• Wirelessly, with the display/configuration module equipped with a Bluetooth interface, via standard adjustment tools:
– Smartphone/tablet (iOS or Android operating system)
– PC/notebook with Bluetooth USB adapter (Windows operating system)

<table>
<tr><th>Wireless connection to standard operating devices</th><th colspan="2">Description</th></tr>
<tr><td rowspan="4"> 
</td><td>1</td><td>Radar filling level meter</td></tr>
<tr><td>2</td><td>Smartphone/tablet</td></tr>
<tr><td>3</td><td>PC/notebook with Bluetooth USB adaptor</td></tr>
<tr><td colspan="2">Operation is via a free app from the “Apple App Store”, the “Google Play Store” or the “Baidu Store”.
Alternatively, adjustment can also be carried out via PACTware/DTM and a Windows PC.</td></tr>
</table>
</td></tr>
</table>

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

8. Product accessories

Note:
The accessories for the variant with plastic horn antenna must be ordered separately, see chapter "9.4. Ordering chart accessories" on page 19.

Accessory	Description
	Mounting bracket 300 mm
	Adapter flange DN 100 PN 16 FKM / PPH
	Adapter flange ASME (ANSI B16.5) 4" 150PSI FKM / PPH

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

9. Ordering information

9.1. Bürkert eShop

Bürkert eShop – Easy ordering and quick delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

Order online now

9.2. Bürkert product filter

Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements?
Use the Bürkert product filter and find suitable articles for your application quickly and easily.

Try out our product filter

9.3. Ordering chart

Note:
The following variants are supplied with display/configuration module equipped with a Bluetooth interface.

Description	Operating voltage	Process connection	Output	Electrical connection	Article no.
Plastic horn antenna	12...35 V DC	Mounting bracket, 170 mm	4...20 mA/HART (2 wires)	Cable gland M20 × 1.5	574925
Thread with integrated antenna	12...35 V DC	G ¾, PN 40	4...20 mA/HART (2 wires)		574926
		NPT ¾, PN 40			574927
		G 1½, PN 40			574928
		NPT 1½, PN 40			574929
		G 1½, PN 3			574930
		NPT 1½, PN 3			574931
Flange with encapsulated antenna system	12...35 V DC	DN 50 EN1092-1/DIN2501, 40 bar	4...20 mA/HART (2 wires)		574932
		2" ASME B16.5 150 RF			574933
Hygienic connection with encapsulated antenna system	12...35 V DC	Clamp 2"	4...20 mA/HART (2 wires)		574934

Further variants on request			
Material e.g. FFKM, PFA		**Pressure** e.g. 1...6 bar, 1...10 bar	
Process connection e.g. compression flange, adapter flange DN 150, ANSI, JIS, clamp 3"		**Additional** Without display/configuration module[1.)]	
Temperature e.g. - 40...+ 250 °C, - 40...+ 450 °C with metallic horn antenna		**Approval** ATEX/IECEx-Certification	

1.) When only ordering devices without a display/configuration module, make sure that you have at least one display/configuration module to configure the device. Otherwise you must also order one (see chapter "9.4. Ordering chart accessories" on page 19)

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025

9.4. Ordering chart accessories

Description	Article no.
Spare part	
Stainless steel cover with glass viewing window and seal made of EPDM (for devices with inserted display/configuration module)	575956
Stainless steel cover and seal made of EPDM (for devices without display/configuration module)	575957
Set with two adaptors M20 × 1.5 /NPT ½", two neoprene flat seals for cable gland or plug and two screw plugs M20 × 1.5	551782
Mounting accessory	
Mounting bracket, 300 mm	559839
Adapter flange, DN 100, PN 16, FKM / PP-GF30	560437
Adapter flange, ASME (ANSI B16.5), 4", 150 PSI, FKM / PP-GF30	560436
Configuration accessory	
Removable display/configuration module (with instruction sheet)	575953

DTS 1000604793 EN Version: C Status: RL (released | freigegeben | validé) printed: 04.04.2025