

Ultrasonic Transducers

XPS10/15F

Operating Instructions · 08/2013



SIEMENS

Safety Guidelines: Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel: This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Unit Repair and Excluded Liability:

- The user is responsible for all changes and repairs made to the device by the user or the user's agent.
- All new components are to be provided by Siemens Milltronics Process Instruments.
- Restrict repair to faulty components only.
- Do not reuse faulty components.

Warning: Cardboard shipping package provides limited humidity and moisture protection. This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

Note: Always use product in accordance with specifications.

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While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

Technical data subject to change.

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About Siemens' Transducers

This product is intended for use in industrial areas. Operation of this equipment in a residential area may cause interference to several frequency based communications.

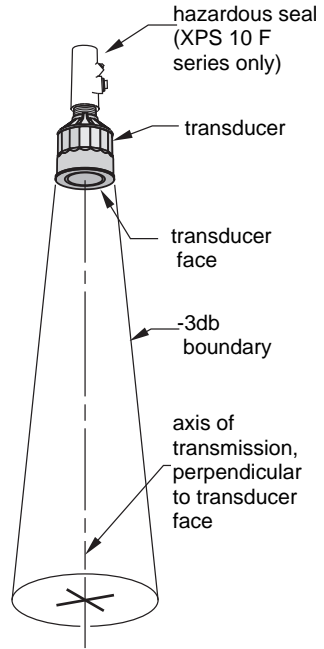
The Echomax XPS F series of transducers operates in association with Siemens ultrasonic level monitoring products.

The transducer operates by converting electrical pulses that are provided by the transceiver into *ultrasonic pulses*. When transmitted, these ultrasonic pulses reflect from the material surface and echo back to the transducer. The echo is converted back to an electrical signal, and is interpreted by the Siemens transceiver using our proven Sonic Intelligence™ algorithms.

The effective acoustical energy is emitted from the transducer face and radiated outward, decreasing in amplitude at a rate inversely proportional to the square of the distance.

Maximum power is radiated axially (perpendicular) from the transducer face in a line referred to as the axis of transmission. Where power is reduced by half (– 3 dB), a conical boundary defining the sound beam, centered about the axis of transmission, is established. The diametric measurement of the cone in degrees defines the beam angle. Impedance matching techniques are used to optimize the transfer of power from the transducer into air and vice versa.

The XPS F series transducers incorporate an integral temperature sensor that reports the air temperature at the transducer to the transceiver. The connection is transparent, in that both the ultrasonic and temperature components of the transducer use the same leads.



Hazardous Area Applications

The Echomax XPS F series of transducers can be used in hazardous areas.

For the XPS 10 F series transducer, a hazardous seal must be used to suit hazardous area classification. This seal is **not** supplied by Siemens.

The XPS 15 F comes equipped with a stainless steel coupling suitable for use in hazardous locations.

Specifications

XPS 10 F Series Transducers

Measurement Range:

- 0.3 – 10m (1 – 33ft)

Frequency:

- 43kHz

Beam Angle:

- 12°

Environmental

- location: ○ indoor/outdoor
- altitude: ○ 2000m maximum
- ambient temperature: ○ -20 to 95°C (-4 to 203°F)
- pollution degree: ○ 4

Construction

- exposure: ○ Kynar^{®1}
- colour: ○ slate gray
- mounting: ○ 1" NPT conduit connection
- options: ○ factory flange to suit ANSI standard
○ submergence shield, where flooding can occur
○ split flange for field mounting to suit ANSI
- cable: ○ 2-wire shielded / twisted, 0.5 mm² (20 AWG) PVC jacket

Supply Source

- Transducer shall only be supplied by a Siemens certified controller.

Weight²

- 0.8kg (1.8lb)

Separation

- 365m (1200ft) from transducer

Approvals

- FM Class 1 Div 1, Group A, B, C and D
- FM Class 2 Div 1, Group E, F, and G
- see nameplate or consult Siemens for other current approvals

¹ Kynar[®] is registered trade mark of ELF Atochem.

² approximate shipping weight of transducer with standard cable length

XPS 15 F Series Transducers

Measurement Range:

- 0.45 – 15m (1.5 – 50ft)

Frequency:

- 43kHz

Beam Angle:

- 6°

Environmental

- location: ○ indoor/outdoor
- altitude: ○ 2000m maximum
- ambient temperature: ○ -20 to 95°C (-4 to 203°F)
- pollution degree: ○ 4

Construction

- exposure: ○ Kynar^{®3}
- colour: ○ slate gray
- mounting: ○ 1" NPT conduit connection
- options: ○ factory flange to suit ANSI standard
○ submergence shield, where flooding can occur
○ split flange for field mounting to suit ANSI
- cable: ○ 2-wire shielded / twisted, 0.5 mm² (20 AWG) PVC jacket

Supply Source

- Transducer shall only be supplied by a Siemens certified controller.

Weight⁴

- 2.0 kg (4.4lb)

Separation

- 365m (1200ft) from transducer

Approvals

- FM Class 1 Div 1, Group A, B, C and D
- FM Class 2 Div 1, Group E, F, and G
- see nameplate or consult Siemens for other current approvals

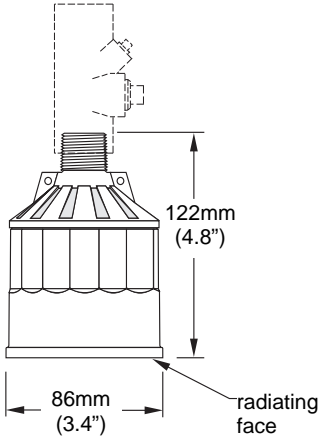
³ Kynar[®] is registered trade mark of ELF Atochem

⁴ approximate shipping weight of transducer with standard cable length

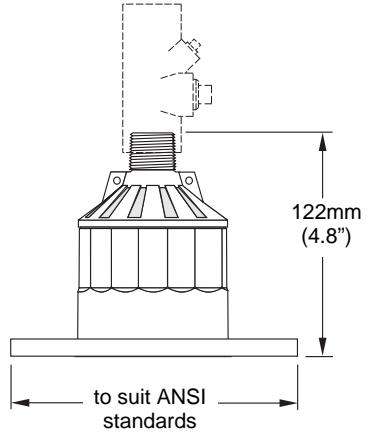
Outline and Dimensions

XPS 10 F Series Transducers

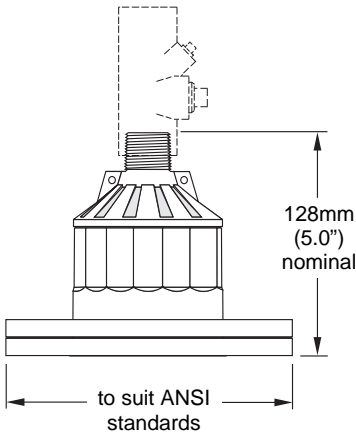
Standard



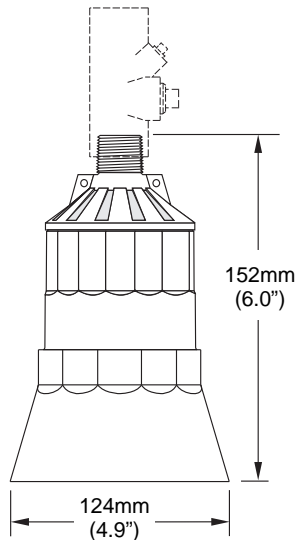
Flange (optional)



Split Flange (optional)



Submergence Shield (optional)



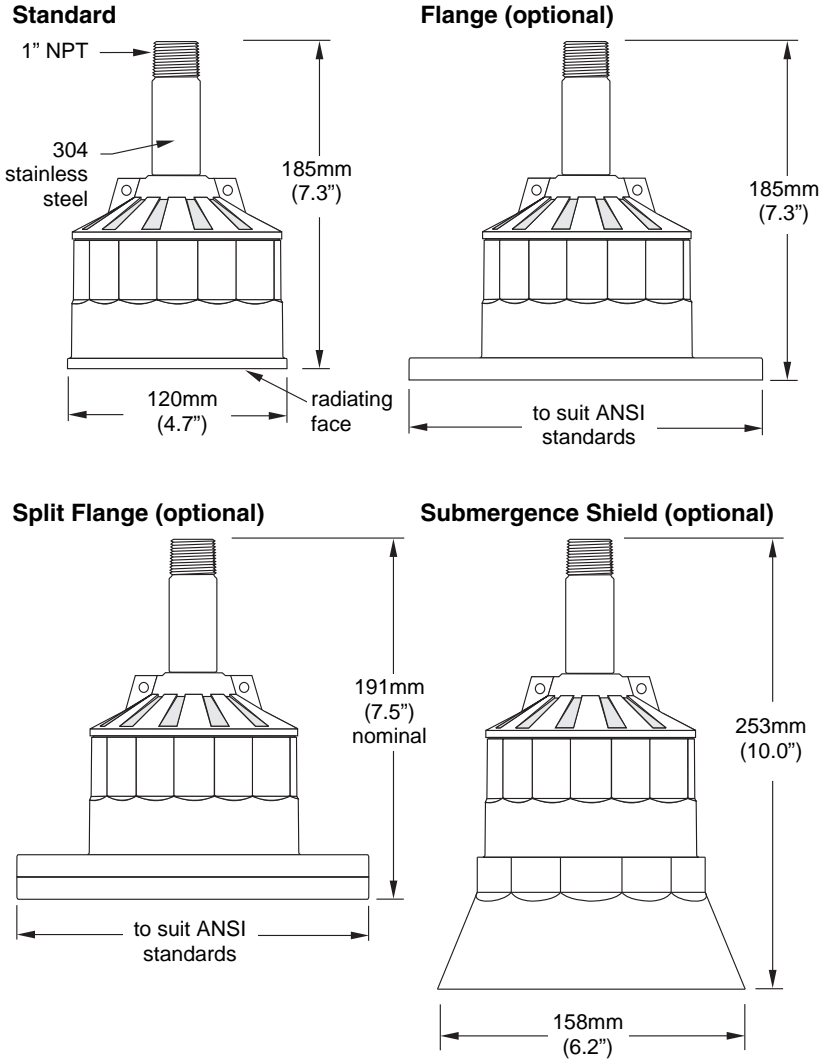
Refer to submergence shield instructions
(Siemens' manual number
7ML19981EG01)

Note:

For the XPS 10 F series transducer, a hazardous seal must be used to suit hazardous area classification. This seal is **not** supplied by Siemens. For more information, refer to page 20.

Outline & Dimensions

XPS 15 F Series Transducers



Refer to submergence shield instructions
 (Siemens' manual number
 7ML19981EG01)

Note:

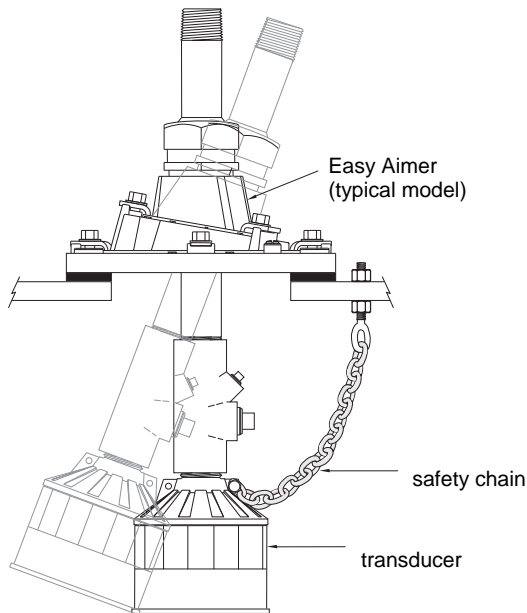
The XPS 15 F comes equipped with a stainless steel coupling suitable for use in hazardous locations.

Mounting

Recommendations

- Special handling precautions must be taken to protect the face of the transducer from any damage.
- Mount the transducer so that it is *above the maximum material level by at least the blanking value (0.3m for XPS 10 F and 0.45m for XPS 15 F)*. Refer to the associated transceiver manual for instructions on setting the blanking value.
- On liquid applications, the transducer must be mounted so that the axis of transmission is perpendicular to the liquid surface.
- On solids applications, a Siemens Easy Aimer should be used to facilitate aiming of the transducer.
- *Do not over-tighten mounting.* Hand tightening of the mounting hardware is sufficient.
- Secure installation by connecting a safety chain from the transducer to a structural member.
- Consider the optional *temperature sensor* when mounting the transducer.

Solids Applications (XPS 10 F shown)



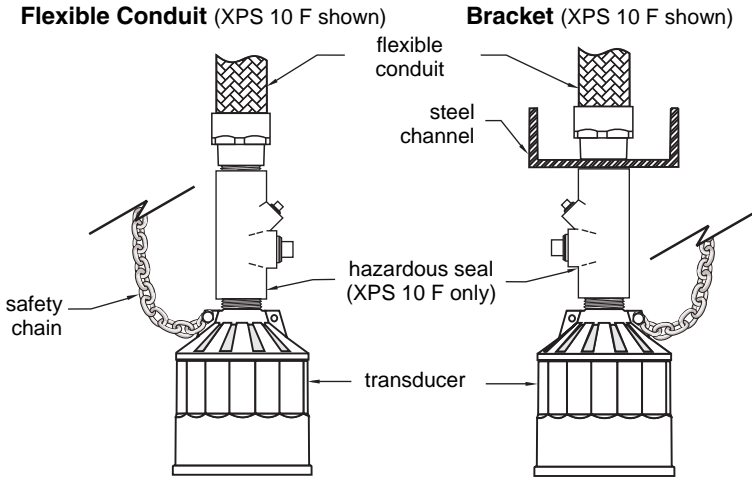
Note:

For the XPS 10 F series transducer, a hazardous seal must be used to suit hazardous area classification. This seal is not supplied by Siemens. For more information, refer to page 20.

Liquid Applications

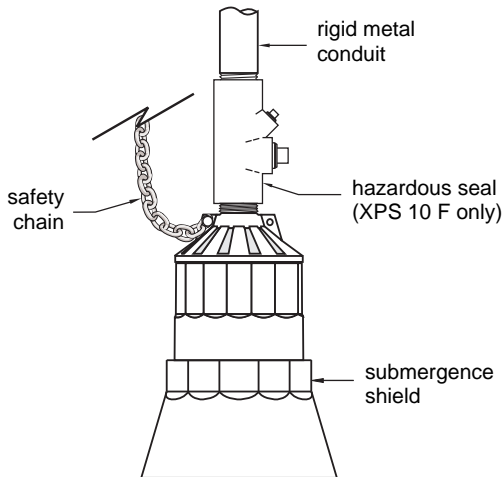
Notes:

- In, the examples that follow, an XPS 10 F Series transducer is shown using a hazardous seal. This seal is **not** supplied by Siemens.
- An XPS 15 F transducer can also be used in these applications, but, because it comes equipped with a stainless steel coupling, no hazardous seal is required.



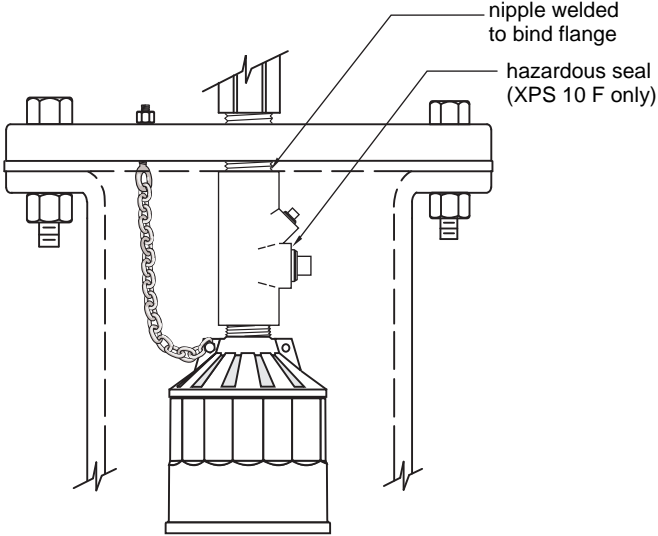
Flexible conduit transducer should not be subjected to wind, vibration or jarring.

Submersible (XPS 10 F shown)



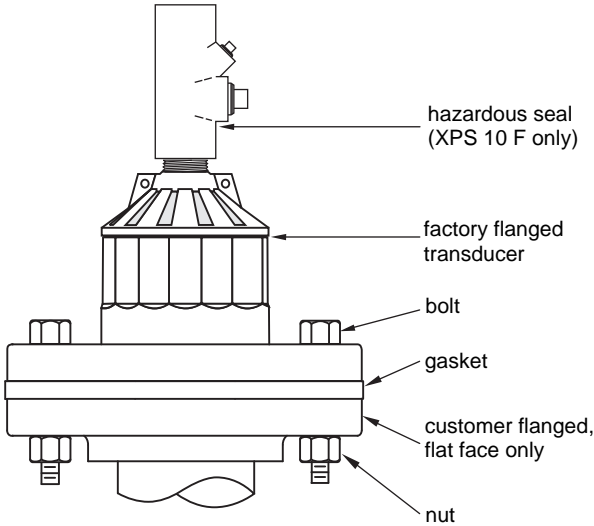
Submersible transducer, used in applications where flooding is possible.

Blind Flange (XPS 10 F shown)



Flange, gasket, hazardous seal and hardware supplied by customer.
Refer to page 13

Flanged (XPS 10 F shown)



Flange, gasket, and hardware supplied by customer.
Refer to page 13

Note: Tighten the flange bolts evenly in order to ensure a good seal between the mating flanges.

Caution: Over-tightening can cause performance degradation.

Interconnection

Note:

Installation should only be performed by qualified personnel and in accordance with local governing regulations.

Recommendations

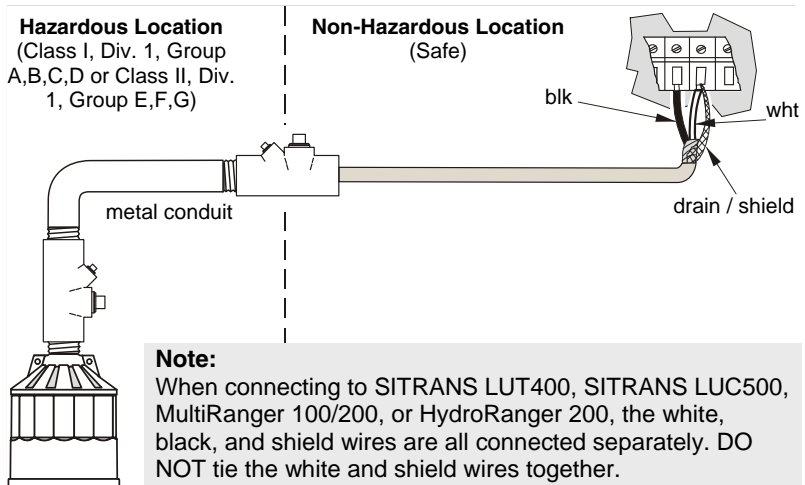
- When using an XPS 15 F transducer, configure the electronic transceiver for an XCT-12. These two transducers use the same settings.
- Do not route cable openly.
- For optimum isolation against electrical noise, run cable separately in a grounded metal conduit.
- Seal all thread connections to prevent ingress of moisture.
- Do not run cable near high voltage or current runs, contactors and SCR control drives.

Note:

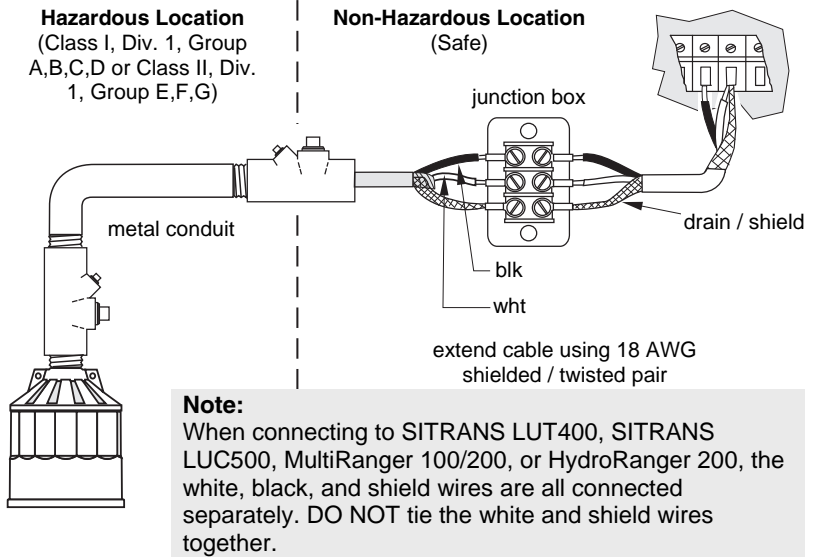
In the interconnection examples that follow:

- an XPS 10 F Series transducer is shown. An XPS 15 F transducer can also be used, but no hazardous seal is required.
- assume that the transducer is located in a Hazardous location (Class I, Div. 1, Group A,B,C,D or Class II, Div. 1, Group E,F,G.) and the transceiver in a Non-Hazardous (Safe) Location.

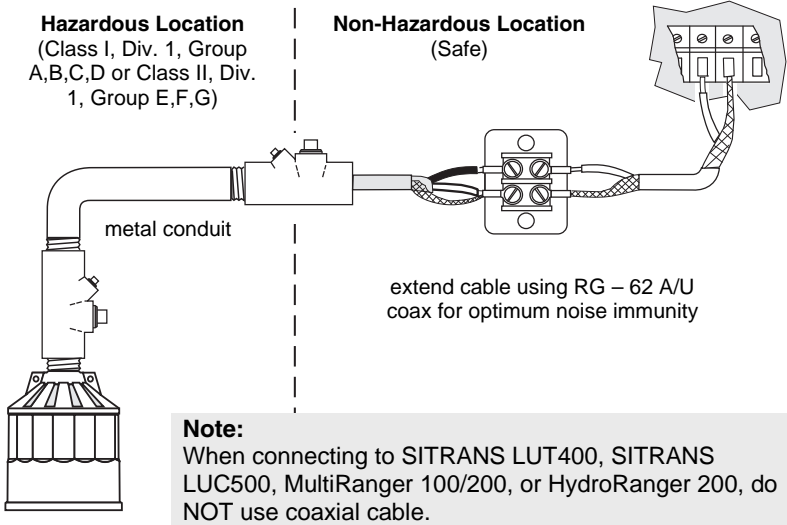
Direct Connection (XPS 10 F shown)



2-Wire Extension (XPS 10 F shown)



Coaxial Cable (XPS 10 F shown)

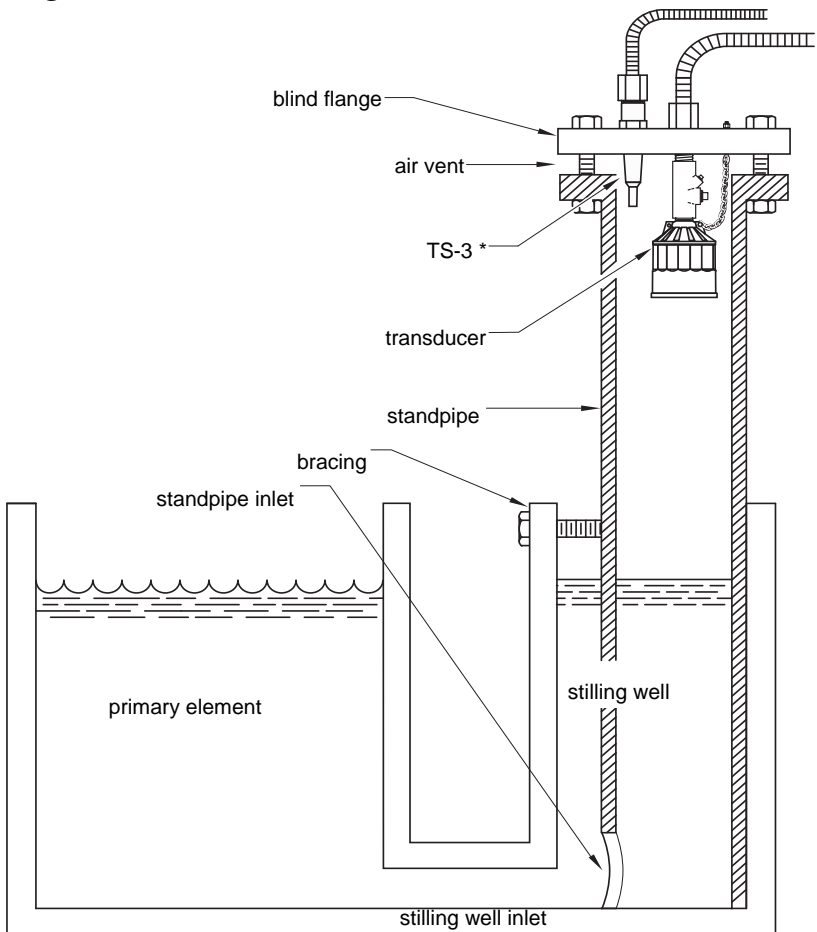


Notes:

- The transducer is to be used only in the manner outlined in this instruction manual.
- Normally, the transducer requires no cleaning or maintenance. However, if performance changes are observed, immediately shut down the level measurement system and perform a thorough inspection, especially on the transducer.
- An XPS 10 F Series transducer is shown in these examples. An XPS 15 F transducer can also be used, but no hazardous seal is required.

Liquid Applications

Stilling Well / OCM



Refer to page 13.

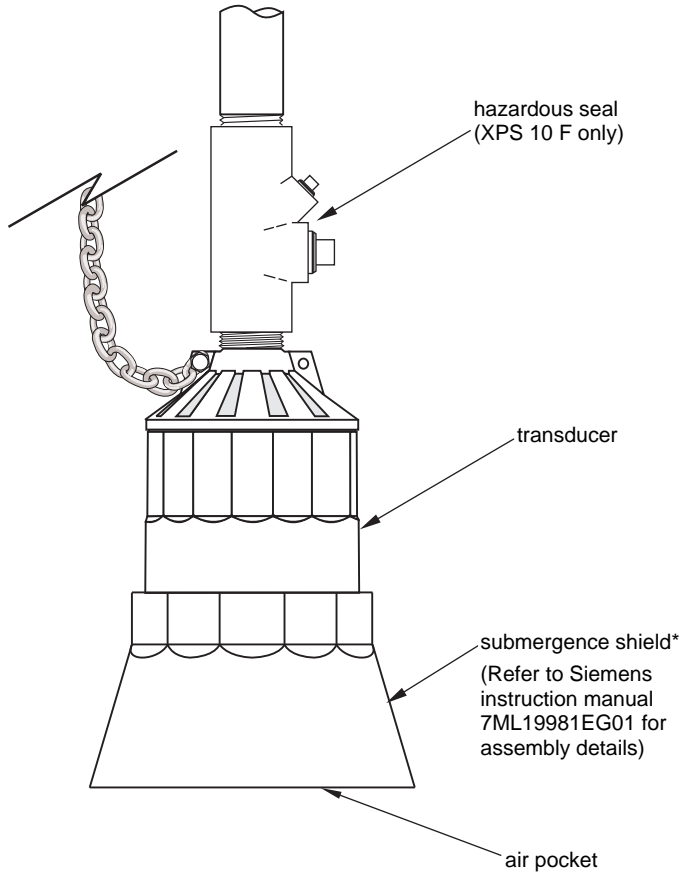
* the use of a TS-3 temperature sensor provides better temperature tracking in applications where the temperature can change quickly.

Submergence

In applications where flooding is possible, the transducer can be fitted with a submergence shield*. The shield acts as a bell to create an air pocket in front of the transducer face. The associated transceiver* interprets this as a flooding condition, and reacts accordingly.

Note:

Refer to transceiver manual for programming requirements.



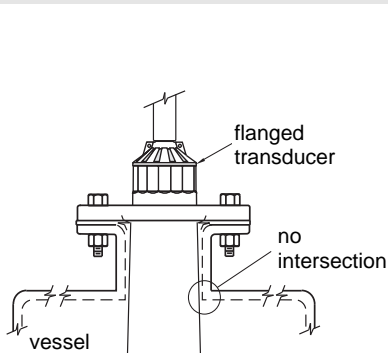
* on applicable models

Standpipes

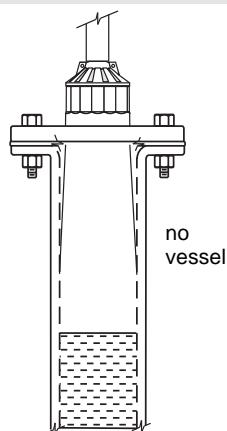
In many applications, access must be made via a standpipe. In such cases, Siemens can provide factory bonded flanged transducers or a split flange kit that will readily mate to the flanged standpipe. Another option is to hang the transducer from a blind flange.

The standpipe length should be as short and the diameter as large as possible. As a rule of thumb, the -3 dB cone of the sound beam should not intersect the standpipe wall in applications opening into a vessel or larger area. Otherwise, additional blanking will be required to compensate for the interference zone created by the opening.

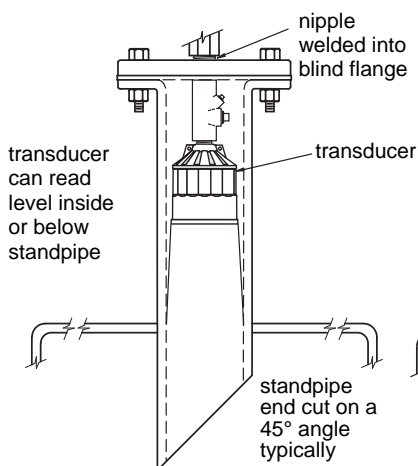
Note: When using a stilling well, make sure there is no build-up, welds, couplings, or other debris on the inside of the well wall. This can affect reliability of measurement.



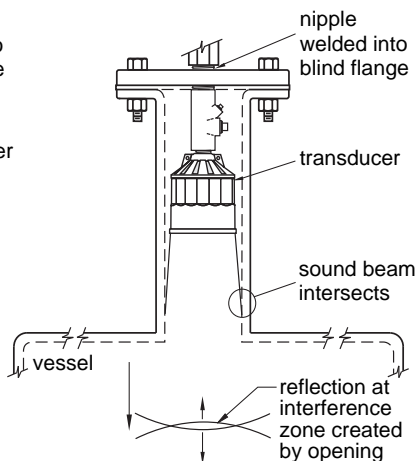
no additional blanking required



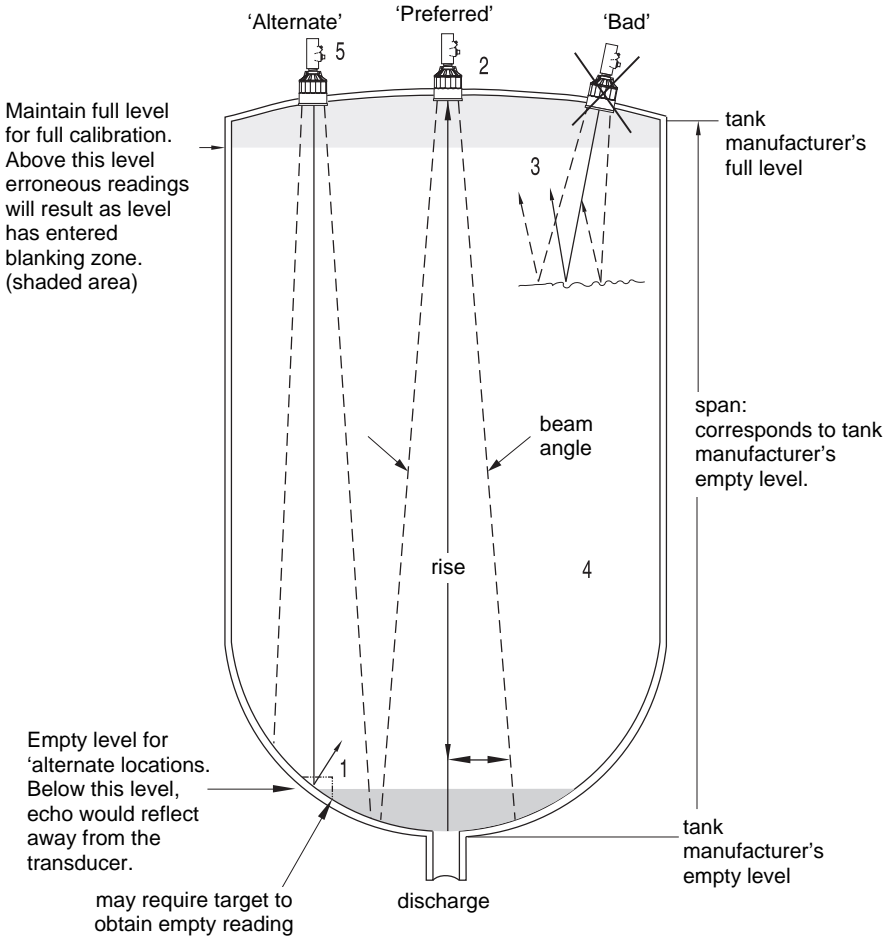
no additional blanking required



no additional blanking required

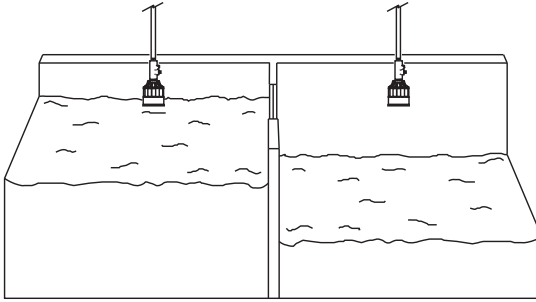


near blanking extension of 150 mm (6") past end of standpipe may be required.

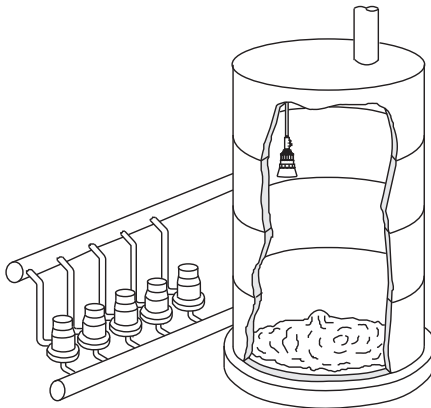


1. Beam should not detect bin bottom. If this occurs, use range extension parameters (on transceivers where available) to omit false echoes. A 6° beam angle (XPS 15 F) represents a rise:run of about 20:1 (10:1 for the 12° beam angle of the XPS 10 F). In most tanks, the transducer should be centered as much as possible (without interference from inlet) for optimum reading range.
2. Sound beam must be perpendicular to liquid surface. If standpipe is used, refer to page 13.
3. Echo has missed improperly levelled transducer.
4. When performing an empty or full calibration, the tank must contain its normal vapour and be at its normal temperature.
5. When used in hazardous areas, the XPS 10 F series transducer (shown) must use a hazardous seal. This seal is **not** supplied by Siemens. The XPS 15 F Series transducer comes equipped with a stainless steel coupling suitable for use in hazardous locations.

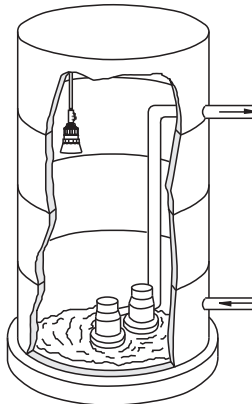
Differential Level



Pump Control



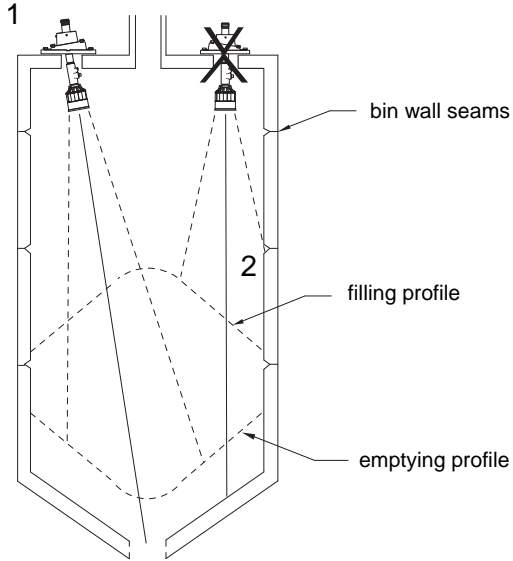
Sewage Lift



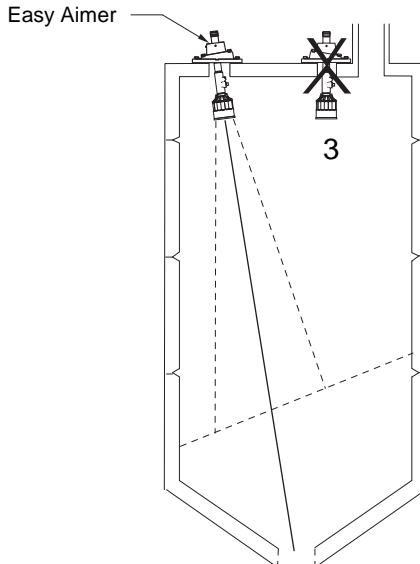
Solids Applications

Typical

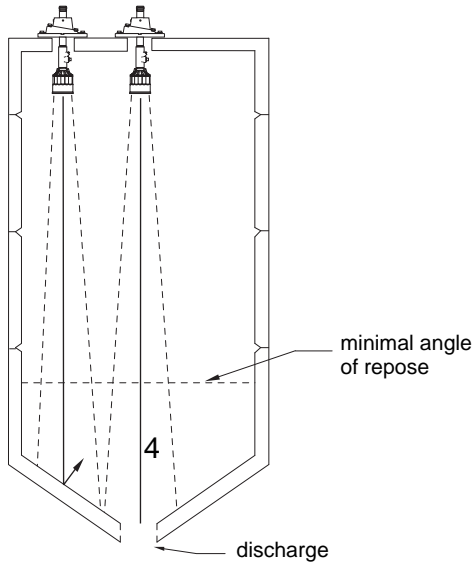
1. Transducer angled to avoid seams in bin wall and aimed at discharge in order to read bin when empty.
2. Avoid intersecting bin wall seams, structural members and wall irregularities.



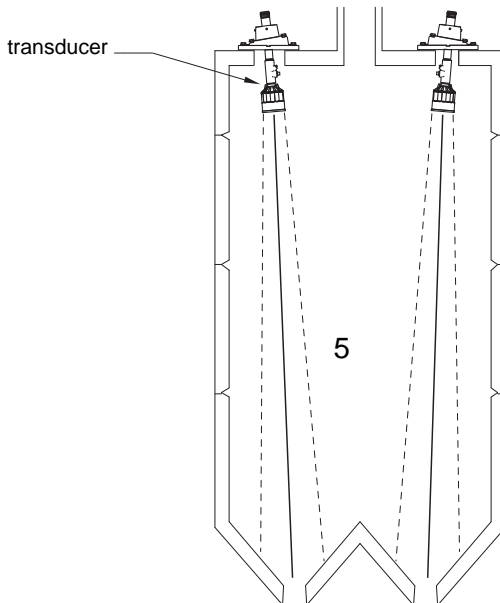
3. Transducer too close to material inlet. Falling material will intersect sound beam and cause erroneous readings or loss of echo.



4. On fluid like solids, aim transducer perpendicular to material surface.



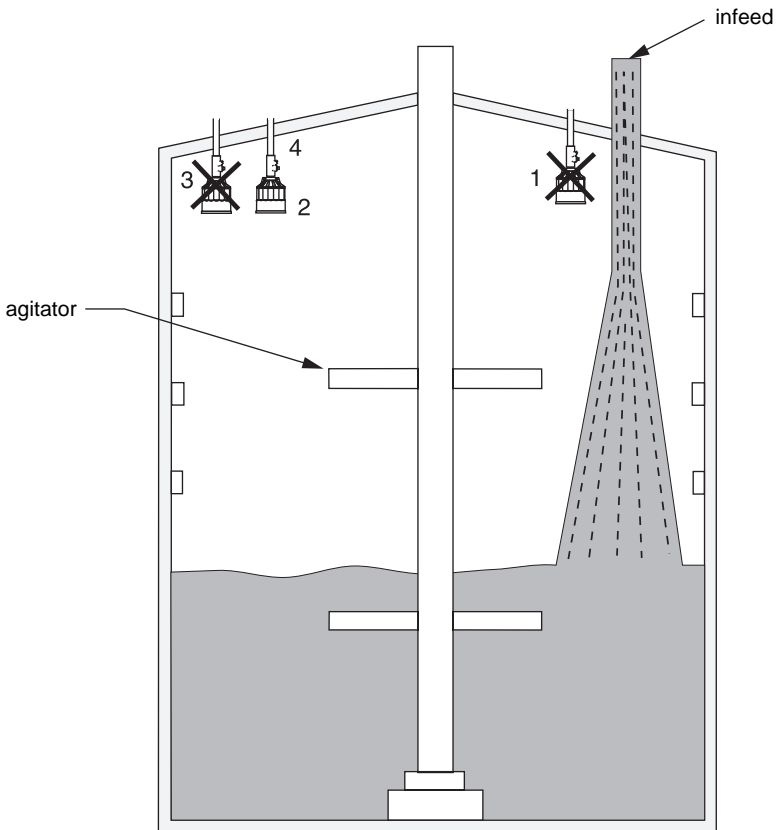
5. On dual discharge bins, aim each transducer at the discharge point.



Special

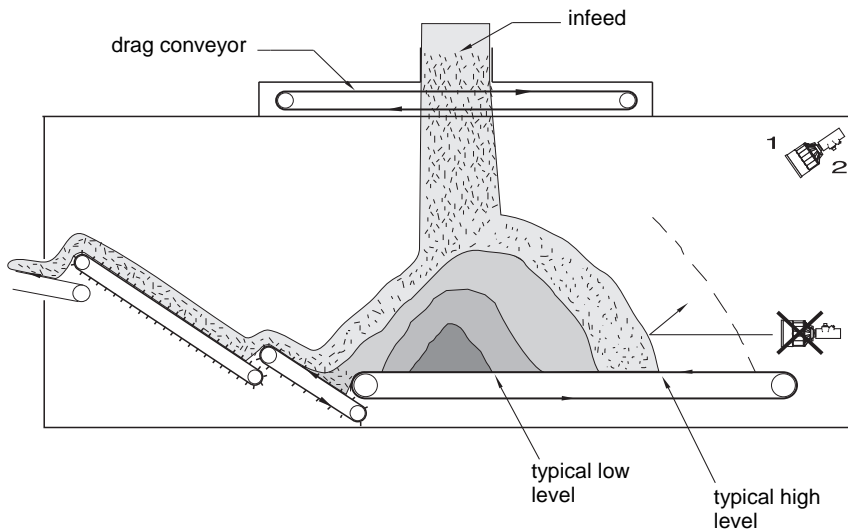
Storage Bin with Agitator

1. Transducer should be kept away from infeed.
2. Where agitators are in use, use the Agitator Discrimination parameter on transceivers where available.
3. Transducer should be aimed away from wall projections.
4. When used in hazardous areas, the XPS 10 F series transducer (shown) must use a hazardous seal. This seal is **not** supplied by Siemens. The XPS 15 F Series transducer comes equipped with a stainless steel coupling suitable for use in hazardous locations.



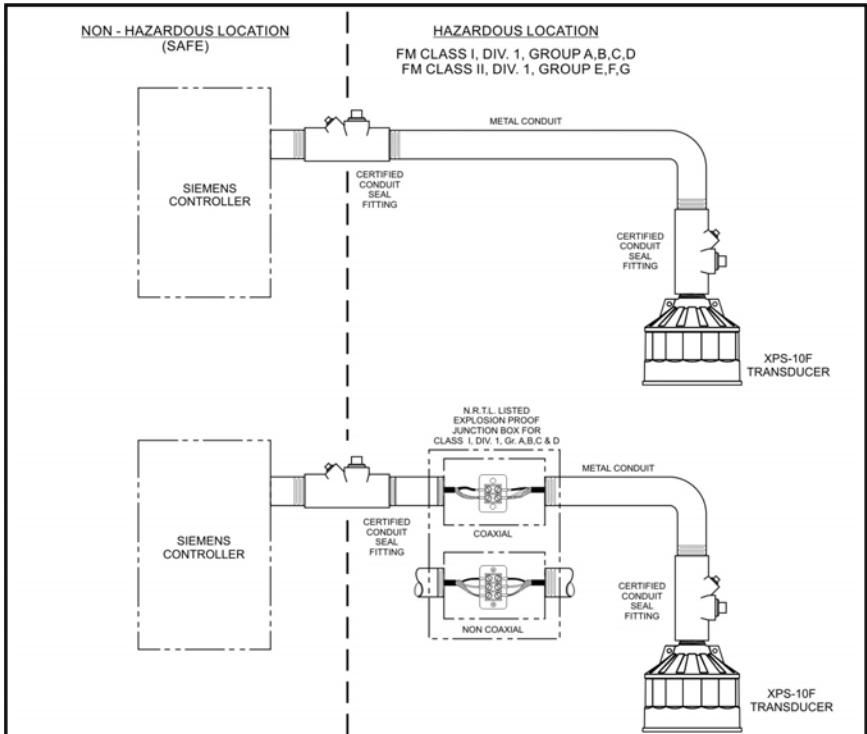
Dryer - Wood Chips

1. Transducer should be mounted perpendicular to slope of wood chips.
2. When used in hazardous areas, the XPS 10 F series transducer (shown) must use a hazardous seal. This seal is **not** supplied by Siemens. The XPS 15 F Series transducer comes equipped with a stainless steel coupling suitable for use in hazardous locations.



Installation Diagram for the XPS 10 F

Installation Diagram



NOTE:
 1) INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (N.E.C.).
 2) NO REVISION SHALL BE MADE WITHOUT PRIOR FMRC AUTHORIZATION.

USE DIMENSIONS ONLY - DO NOT SCALE		1	FOR RELEASE	BG	SN	MARCH 31/98	
DIMENSIONS ARE IN INCHES		Rev.	Revision / ECN Description	Drawn	Appr.	Date	
<p>Third Angle Projection</p>	Product Group	ULTRASONICS		Tolerance Unless Otherwise Noted: UOS	Scale:	Size:	
	Date:	31 MARCH 1998		1 Place Decimal ± 0.03	Angles: ± 0.5°	NTS	A
	Drawn:	B. GRAY		2 Place Decimal ± 0.01			
	Checked:	TIEN VU		3 Place Decimal ± 0.002			
SIEMENS CANADA LIMITED SIEMENS MILLTRONICS PROCESS INSTRUMENTS PETERBOROUGH, ONTARIO, CANADA	Approved:	S. NGUYEN		TITLE: XPS-10F TRANSDUCER INTERCONNECTION DIAGRAM FM DIVISION 1			
	Location:	PETERBOROUGH		DRAWING No: 0-9650019Z-DI-A	Rev.	3	
FOR INTERNAL USE ONLY File No. 00078803		Plot at: 1 : 1		Sheet 1 Of 1			

Notes

Notes

For more information

www.siemens.com/level

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