transducer
XRS-5/XRS-5C

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.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

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 the Transducer

The Echomax® XRS-5 transducer works with Milltronics transceivers and provides the ultrasonic pulse and echo reception that these devices require.

The transducer converts electrical pulses provided by the transceiver to ultrasonic pulses used for measurement and then converts the ultrasonic echoes back to an electrical signal. This signal is interpreted by the Siemens Milltronics tranceiver using the patented Sonic Intelligence® algorithms. The ultrasonic pulse reduces in power by 3 dB in a 10° cone from the transducer face. It is important to keep objects out of this cone to reduce the chance of recording false echos.

The XRS-5 transducer incorporates an integral temperature sensor that reports the ambient temperature to the transceiver. The connection is transparent in that both the ultrasonic and temperature components of the transducer use the same leads. This ensures that the Milltronics transceiver can automatically compensate the speed of sound constant for varying temperatures.
General Guidelines

The equipment may be used in all hazardous zones with all gases with temperature classes T1, T2, T3, T4, T5 and T6. The equipment is only certified for use in ambient temperatures in the range of -20°C to 65°C and should not be used outside this range.

- Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.

- The apparatus shall only be supplied from a circuit containing a suitably-rated fuse having a breaking capacity of 4000A. This fuse is included in Milltronics' transceivers.

- Repair of this equipment shall be carried out in accordance with the applicable code of practice.

- The certification of this equipment relies on the following materials used in its construction:
  - Enclosure: Kynar Flex 2800-02 (former designation 2820) / Chlorosulfonated polyethylene / Nitrile / Ethylene propylene / Chloroprene
  - Encapsulant: LA-9823-76
  - Manual override can be accomplished by using the disconnect switch provided in the building installation of the associated controller.

About this Manual

If you have any questions, comments, or suggestions about the manual contents, please email us at techpubs@siemens-milltronics.com.

For the complete library of Siemens Milltronics manuals, go to www.siemens-milltronics.com.
Specifications

Process Application:
- liquids and slurries
- Measurement range: 0.3 to 8 m (1 - 26 ft) typical (application variables apply)
- Vessel pressure: vented to atmosphere

Operation:
- Beam angle: 10°
- Frequency: 43 KHz
- Temperature sensor: internal
- Supply source: transducer shall only be supplied by Milltronics certified controller

Environmental:
- Location: indoor / outdoor
- Ambient temperatures: -20 to 65 °C (-4 to 149 °F)
- Altitude: 2000 m maximum
- Pollution degree: 4

Construction:
- Housing: Kynar Flex® body and Hypalon face (XRS-5C has SS conduit connection)
- Mounting: XRS-5: 1" NPT or BSP conduit connection
  XRS-5C: 1" NPT

Cable:
- 2 wire shielded / twisted, 0.5 mm² (18 AWG) PVC jacket

Ingress protection:
- IP68

Weight:
- 1.2 kg (2.6 lb)

Options:
- factory flanged to suit ANSI, DIN or JIS standard
- split flange (field mount) to suit ANSI, DIN or JIS standard
- submergence shield (flooding applications)

® Kynar Flex is a registered trademark of Atofina Chemicals, Inc.
Cabling (maximum run):

- 365 m (1200 ft) using RG-62 A/U coaxial cable
- 365 m (1200 ft) using 2-wire twisted pair / braided and foil shielded 20 AWG (0.5 mm²), PVC jacket (EnviroRanger ERS 500, MultiRanger 100/200, and HydroRanger 200 only)

Approvals:

- XRS-5: CE, CSA, FM, CENELEC/ATEX, SAA, see device nameplate
- XRS-5C: CSA, see device nameplate
Installation

Outline and Dimensions

Standard

Submergence Shield

Flange (optional)

Split Flange (optional)

89 mm (3.5")

127 mm (5.0")

124 mm (4.9")

155 mm (6.1")

127 mm (5.0")

133 mm (5.2") nominal

ANSI, DIN, or JIS standards
Mounting

Recommendations

- Mount the transducer so that it is above the maximum material level by more than the blanking value for accurate results. Refer to the associated transceiver manual for information on setting the blanking value.
- The transducer must be mounted so that the axis of transmission is perpendicular to the liquid’s surface.
- Do not over tighten mounting. Hand tightening of the mounting hardware is sufficient.
- Consider the optional temperature sensor when mounting the transducer.

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

Submersible transducer, used in applications where flooding is possible.

Plywood mounting provides excellent isolation, but must be rigid enough to avoid flexing if subjected to loading.
**Blind Flange**

![Blind Flange Diagram]

**Face Flange**

![Face Flange Diagram]

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

**Caution:** Over-tightening can cause performance degradation.
Applications

Notes:
- The transducer is to be used only in the manner outlined in this instruction manual.
- This transducer requires no maintenance, and is recommended for use with liquids only.
- The OCM III requires the use of the TS-2 external temperature sensor. The internal temperature sensor in the XRS-5 cannot be used.

Open Channel Meter

Refer to OCM manufacturer specification for proper point of head measurement.

The OCM III requires the use of the TS-2 external temperature sensor instead of the XRS-5 internal temperature sensor. The use of an external temperature sensor provides better temperature tracking in applications where the temperature can change quickly.
Standpipes and Stilling Wells

In many applications, access must be made via a standpipe. In such cases, Siemens Miltronics can provide factory flanged transducers or 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 level measurement.

![Diagram of standpipe and stilling well configurations](image)

- **No additional blanking required**
- **No vessel**
- **Vent**
- **Blind flange mounting**
- **Transducer can read level inside or below standpipe**
- **Standpipe end cut on a 45° angle typically**
- **Near blanking extension of 120 mm (6") past end of standpipe may be required.**
Water / Wastewater

Differential Level

Pump Control

Sewage Lift
Transducer Placement

The following graphic shows the best placement of the XRS-5 transducer.

Locations

a. Primary location. This is the preferred location and should be used whenever possible. The centre of the tank generally gives the most reliable readings because there are fewer obstructions to provide false echoes.
b. Alternate location. This location is used if the centre of the tank is already in use or if the tank roof is too weak to hold the transducer safely.
c. Poor location. This is a poor installation location. The echos are shown reflecting away from the transducer face.
1. Beam should not detect bin bottom. If this occurs, use range extension parameters (on transceivers where available) to omit false echoes. The XRS-5 transducer operates with a beam angle of 10° and has a rise:run ratio of approximately 12:1. This means that for every 1m (3.3') of tank height, the transducer projects a circular area over the material surface with a radius of 83 mm (32.7”). 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. When mounting the standpipe and flange you must ensure that the transducer face will be parallel with the liquid’s surface.

3. Echo has missed an improperly levelled transducer. As 2, ensure that the standpipe and flange are mounted to set the transducer face level with the measured liquid.

4. Calibrate under normal conditions. When performing an empty or full calibration, the tank must contain its normal vapour and be at its normal temperature.
Interconnection

**Note:** Installation shall only be performed by qualified personnel and in accordance with local governing regulations.

**Recommended installation rules:**

- Do not route cable openly; instead, run cable separately in a grounded metal conduit to protect it from ambient electrical noise.
- Seal all thread connections to prevent the ingress of moisture.
- Do not run cable near high voltage or current runs, contactors or SCR control drives.

In all of the following examples the terminal blocks on the transceiver are described in the transceiver manual.

**Direct Connection**

Connect the transducer directly to the Milltronics transceiver via the 2 conductor shielded cable.

**Note:** When connecting to an EnviroRanger ERS 500, a MultiRanger 100/200, or a HydroRanger 200, the white, black, and shield wires are all connected separately. Do not tie the white and shield wires together.
**Coaxial Connection**

Connect the transducer to the Milltronics transceiver via a junction box and RG–62 A/U coaxial cable. This setup is effective for combined runs up to 365m (1200').

**Note:** When connecting to an EnviroRanger ERS 500, do NOT use coaxial cable; see diagram below for proper procedure.

**2-Wire Extension** (for EnviroRanger ERS 500, MultiRanger 100/200, and HydroRanger 200 only)
Maintenance

Normally, no maintenance is required on the transducer.

However, if performance changes are observed, immediately shut down the level measurement system and perform a thorough inspection, especially on the transducer.
Installation Diagram for XRS-5

NOTES:
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.

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Installation Diagram for XRS-5C

NOTE:
1. FOR CONDUIT MOUNTING: APPLY TIGHTENING TORQUE TO THE STAINLESS STEEL COUPLER ONLY, AND NOT TO THE TRANSDUCER HOUSING, OTHERWISE IT MAY IMPAIR SUITABLY FOR USE IN HAZARDOUS LOCATIONS.
2. DO NOT SECURE TRANSDUCER HOUSING TO STRUCTURAL SUPPORTS WITH METAL CLAMPING DEVICES.
3. INSTALLATION SHALL BE DONE IN ACCORDANCE WITH CANADIAN ELECTRICAL CODE PART 1 REQUIREMENTS.
4. ASSURE ELECTRICAL CONTINUITY AT COUPLING / CONDUIT THREADED JOINT.

USE DIMENSIONS ONLY - DO NOT SCALE

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HAZARDOUS LOCATION
CLASS I, DIV 1, GROUPS A, B, C, D
CLASS II, DIV 1, GROUPS E, F, G

MILLTRONICS CONTROLLER
MILLTRONICS CONTROLLER
CERTIFIED CONDUIT SEAL FITTING
FACTORY INSTALLED STAINLESS STEEL COUPLER (SEE NOTE 1)
XRS-5C TRANSDUCER
XRS-5C TRANSDUCER
CERTIFIED CONDUIT COUPLING
CERTIFIED CONDUIT COUPLING
CERTIFIED CONDUIT SEAL FITTING
FACTORY INSTALLED STAINLESS STEEL COUPLER (SEE NOTE 1)
XRS-5C TRANSDUCER
CERTIFIED JUNCTION BOX
METAL CONDUIT
METAL CONDUIT

NON-HAZARDOUS LOCATION
(SAFE)