User Manual
ROX000334731, Rev AF
December 2023

Roxar™ CorrLog™ & SandLog™ User Manual

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1 Introduction

This introduction is a description of the Roxar Flow Measurement (RFM) AS User Manual for the aforementioned products, which describes how the manual is structured and how they are to be used. This section also contains contact information if assistance is needed.

This User manual covers the following corrosion monitoring equipment:

- CorrLog (corrosion measurement instrument for ER- (Electrical Resistance), LPR- (Linear Polarization Resistance), Galvanic probe measurements)
- SandLog (erosion/sand measurement instrument for Roxar SAND/Erosion probes)
- Communication interefaces:
  - "FB"; Roxar fieldbus
  - "Term"; RS-232 terminal interface
  - "420"; 4-20 mA
  - "Term420"; Combined RS-232 terminal interface and 4-20 mA

⚠ WARNING

Followed by the actual warning description.

1.1 How to use this manual

This user manual contains nine sections:

1. INTRODUCTION
2. MAIN DATA
3. TECHNICAL DESCRIPTION
4. PREPARATION AND INSTALLATION
5. OPERATING INSTRUCTIONS
6. MAINTENANCE
7. SPARE PARTS LIST
8. REFERENCES
9. ASSEMBLY DRAWINGS

Note
Each section contains detailed descriptions made to separately fulfil the needs for different personnel and interests.

INTRODUCTION is a description of the Roxar User Manual for the above-mentioned products, which describes how the manual is structured and how it shall be used. This section also contains contact information if assistance is needed.

MAIN DATA such as weight, outline dimensions, including restrictions and information about how to order, are covered herein.

TECHNICAL DESCRIPTION gives more specific descriptions of the different items of the various products. This section is the "textbook" of the manual, where the different

measuring techniques are fully described, together with recommendations for use of the different types of equipment.

PREPARATION AND INSTALLATION describes all necessary preparations to be carried out before installation of the different parts of this equipment, including checklists and observations. This section also contains, if applicable, a complete installation procedure for the actual equipment.

OPERATING INSTRUCTION contains checklists, precautions, consequences, hazards, observations, operator qualifications, and reporting during operational conditions.

MAINTENANCE describes all necessary precautions and maintenance operations which normally can be done by the user. This includes those which are recommended to be carried out by Roxar in order to ensure safe, reliable, and economical operation. This section contains detailed procedures for routine inspection, periodic maintenance, corrections and minor repair with recommended spare parts, consumables, reporting requirements, relevant document references and, if applicable, requirements for special skills and minimum crew.

SPARE PARTS LIST gives all necessary spare parts for the different equipment during operation.

REFERENCES provides other documents that might be helpful when installing or configuring the SandLog or CorrLog instruments.

ASSEMBLY DRAWINGS provides images of the relevant assembly drawings for these products.

1.2 Normative references

This document has been issued in compliance with the most common international standards for user manual documentation, including the NORSOK standards, commonly used in the North Sea. The NORSOK standards commonly used in the North Sea are jointly developed by the Norwegian Oil Industry Association (OLF) and the Federation of Norwegian Engineering Industries (TBL) and administrated by the Norwegian Technology Standards Institution (NTS).

1.3 EMC

EMC Directive (2014/30/EU)

Harmonized standard: EN 61326-1:2013

1.4 Definitions

Term	Definition
4-20 mA	A standard instrument interface.
ATEX	Equipment intended for use in Potentially Explosive Atmospheres (ATEX) EU DIRECTIVE 2014/34/EU concerning equipment and protective systems intended for use in potentially Explosive Atmospheres.
Combi Probe	Sand/ER combination probe.
CorrLog	Instrument designed to connect to ER-, LPR-, and galvanic probes to measure corrosion and corrosion rates as well as changes in oxygen level.

Term	Definition
Handheld Terminal	Handheld Terminal is used to transfer data to PC for off line installations of CorrLog and Sandlog instrument EX and ATEX/ UKEX certified unit.
CSA	CSA- International. Organization approved for Ex-certification according to EX- standards for USA, Canada etc. (Nationally Recognized Testing Laboratory; NRTL).
Roxar Fieldbus	Proprietary Ex certified fieldbus that provides power and communications to Roxar loggers as CorrLog, SandLog and FSMLog. Not to be confused with standard Fieldbus (IEC 61158).
Fieldbus master (FBM)	RFM Fieldbus master. Interface unit between PC/Interface software and SandLog and CorrLog.
Field Interface Unit (FIU)	RFM Field Interface Unit. Interface unit between PC/Interface software and SandLog and CorrLog.
Fieldwatch	Software that supports different RFM instruments, including system setup and administration, data storage, calculations and presentation of corrosion and erosion results.
Galvanic probe	Galvanic probe; typical steel and brass electrode (RFM or other manufacturer).
I.S. circuits	Intrinsic safe circuits. Circuits with less available energy than needed to trigger an explosion within specified gas and dust conditions.
LPR-Probe	2 or 3- electrode Linear polarization resistance probe (RFM or other manufacturer).
MultiCorr	Handheld terminal that can connect to different RFM instrumentation to set up instrument and download measurement data. EX-Certificate: NEMKO EX 95D111X (not ATEX/UKEX-certified).
MultiTrend	Software that supports different RFM instruments, including system setup and administration, data storage, calculations and presentation of corrosion/erosion results.
Presafe	Organization approved for ATEX/UKEX certification of products. (Notified body)
Probe cable	Cable between CorrLog (or SandLog) and probes. **Note** Only specified types of cables and restricted cable lengths are allowed due to restrictions to inductance of the cable.
RFM	Roxar Flow Measurement AS
RS-232	A serial communication standard.
Sand/ER combination probe	Probe designed to measure both sand/erosion and corrosion.
SandLog	Instrument designed to connect to RFM sand probes to measure sand erosion in pipelines. Instrument can also handle sand/ER combination probe.
Sand probe	Probe that measure erosion in pipelines based on electrical resistance measurements.

1.5 Assistance

RFM is part of an international group of companies with worldwide distribution of our products. We are one of the major suppliers of corrosion and erosion monitoring technology. In case of repair service or further assistance, please contact the Roxar Global Service Centre directly or see our website: Emerson.com/Roxar.

Roxar Flow Measurement AS

Emerson

Gamle Forusveien 17

4031 Stavanger

Norway

Roxar Global Service Centre email: Roxar.GSC@Emerson.com

2 Main data

MAIN DATA gives equipment information regarding any restrictions in guarantee and use. Weight, outline dimensions, including information about how to order the different equipment, based on typical data sheets are covered herein.

2.1 Guarantee restrictions

Visually inspect all components for shipping damage. If shipping damage is found, notify carrier at once. Shipping damage is not covered by the warranty.

⚠ WARNING

Read and follow all instructions, warnings and cautions to avoid personal injury or property damage during system operation. Roxar is not responsible for damage or injury resulting from unsafe use of product, lack of maintenance, incorrect installation of equipment and/or system operation. Contact Roxar when in doubt about any applications and safety precautions described herein.

2.2 Equipment data—instrument overview

Table 2-1: Product range

Instrument	Probe type	Interface	Variant
SandLog	Roxar Sand Probe(1)	• Fieldbus interface • Terminal interface • 4-20 mA interface • 4-20 mA and Terminal combined interface	• ROX000282475 • ROX000282478 • ROX000282476 • ROX000282479(2)
	Roxar Sand/ER-Probe (erosion and corrosion)(1)		
CorrLog	ER-probe(1)	• Fieldbus interface • Terminal interface • 4-20 mA interface • 4-20 mA and Terminal combined interface	• ROX000282480 • ROX000282483 • ROX000282481 • ROX000282484
	LPR (2 electrodes)(1)	• Fieldbus interface • Terminal interface • 4-20 mA interface • 4-20 mA and Terminal combined interface	• ROX000282480 • ROX000282483 • ROX000282481 • ROX000282484

Table 2-1: Product range *(continued)*

Instrument	Probe type	Interface	Variant
	LPR (3 electrodes)(1)	• Fieldbus interface • Terminal interface • 4-20 mA interface • 4-20 mA and Terminal combined interface	• ROX000282480 • ROX000282483 • ROX000282481 • ROX000282484
	Galvanic probe(1)	• Fieldbus interface • Terminal interface • 4-20 mA interface • 4-20 mA and Terminal combined interface	• ROX000282480 • ROX000282483 • ROX000282481 • ROX000282484

(1) Probes from both Roxar and other suppliers are covered.
(2) Only one probe can be connected to each instrument.

Example: ROX000282480

PN ROX000282480 is a CorrLog instrument with a fieldbus interface. It supports one ER-, LPR-, or a Galvanic probe.

2.3 SandLog data sheet

(PN: ROX000282475, ROX000282478, ROX000282476, ROX000282479)

Type	Roxar CorrLog
Manufacturer	RFM
Manufacturer mode code	PN: ROX000282475, ROX000282478, ROX000282476, ROX000282479
Logging interval	2 minutes to 24 hours
Weight	7.7 lb. (3.5 kg)
Operating temperature limits	-40 °F (-40 °C) to 158 °F (70 °C) (For terminal versions: -40 °F (-40 °C) to 140 °F (60 °C))
EX classification	Ex II 1 G Ex ia IIC T4 Ga CSA C/US Class I, Div. 1, groups A, B, C, D T4
ATEX certificate	Presafe 16 ATEX 8222X
IECEX certificate	IECEx PRE 16.0042X
Approval	EMC according to EMC directive (2014/30/EU)
Housing	AISI 316L

Type	Roxar CorrLog
Dimension	10.63 in. (270 mm) x 10.24 in. (260 mm) x 3.03 in. (77 mm)
Enclosure protection	IP 66, deluge proof
Cable connection	Connector/Cable gland
Mounting	4 x M10 bolts
Signals	
Communication	RFM fieldbus/RS-232/4-20 mA
Sensitivity ER-element	10-100 ppm of element thickness
Storage capacity	1500 readings, each including result, probe number, hour, day, month, year
Power supply	3 x lithium AAA batteries for offline monitoring **⚠ WARNING** Only approved batteries can be used in Ex-Zones.
	Through fieldbus cable for online versions
	4-20 mA loop for online versions System is powered from the 4-20 mA loop

2.4 CorrLog data sheet

Type	CorrLog
Manufacturer	RFM
Manufacturer model code	PN: ROX000282480, ROX000282483, ROX000282481, ROX000282484
Logging interval	2 minutes to 24 hours
Weight	7.7 lb. (3.5 kg)
Operating temperature limits	-40 °F (-40 °C) to 158 °F (70 °C) (For Terminal versions: -40 °F (-40 °C) to 140 °F (60 °C))
EX classification	Ex II 1 G Ex ia IIC/IIB T4 Ga CSA C/US Class I, Div. 1, groups A, B, C, D T4
Approval	EMC according to EMC directive (2014/30/EU)
Housing	AISI 316L
Dimension	270 x 260 x 77mm
Enclosure protection	IP 66, Deluge proof
Cable connection	Connector/cable glands
Mounting	4 x M10 bolts

Type	CorrLog
Signals	
LPR function	1% of measured current and voltage for LPR measurements
ER-probes	10-100 ppm of element thickness
Current resolution galvanic probes	0. 01 µA
Storage capacity	1500 readings, each including result, probe number, hour, day, month, year
Power supply	3 x Lithium AAA batteries for offline monitoring. **⚠ WARNING** ONLY APPROVED BATTERIES CAN BE USED IN EX-ZONES.
	Through fieldbus cable for online versions
	4-20 mA loop for online versions System is powered from the 4-20 mA loop

2.5 Ex safety

2.5.1 Recapitulation of marking

Certification marking for battery-powered CorrLog and SandLog

The certification marking for the battery-powered CorrLog versions:

- ROX000282483
- ROX000282484

The certification marking for the battery-powered SandLog versions:

- ROX000282478
- ROX000282479

All shall be as indicated in Figure 2-1.

Figure 2-1: Battery-Powered CorrLog and SandLog marking

Certification marking for the non-battery powered CorrLog and SandLog

The certification marking for the non-battery powered CorrLog versions:

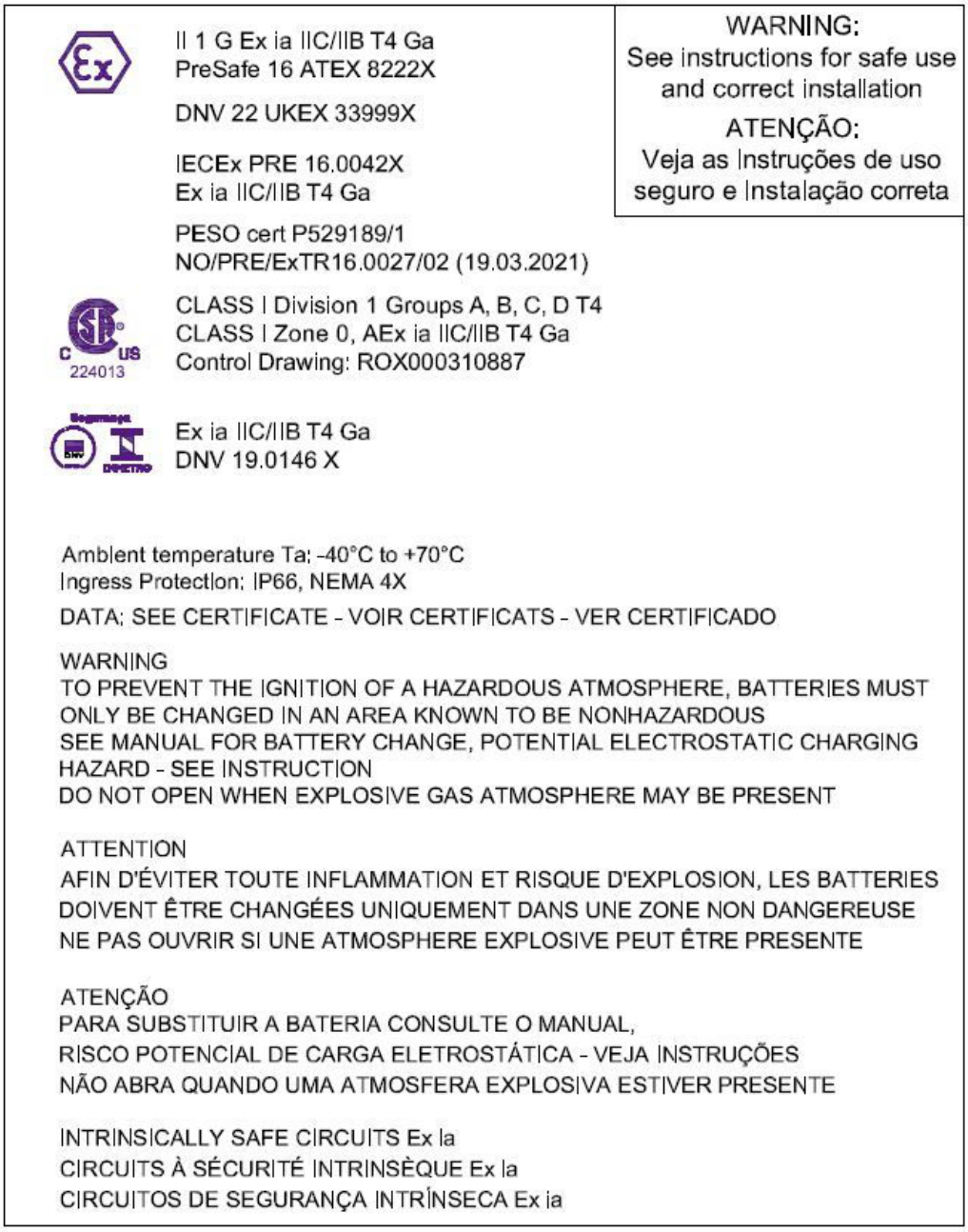
- ROX000282480
- ROX000282481

The certification marking for the non-battery powered SandLog versions:

- ROX000282475
- ROX000282476

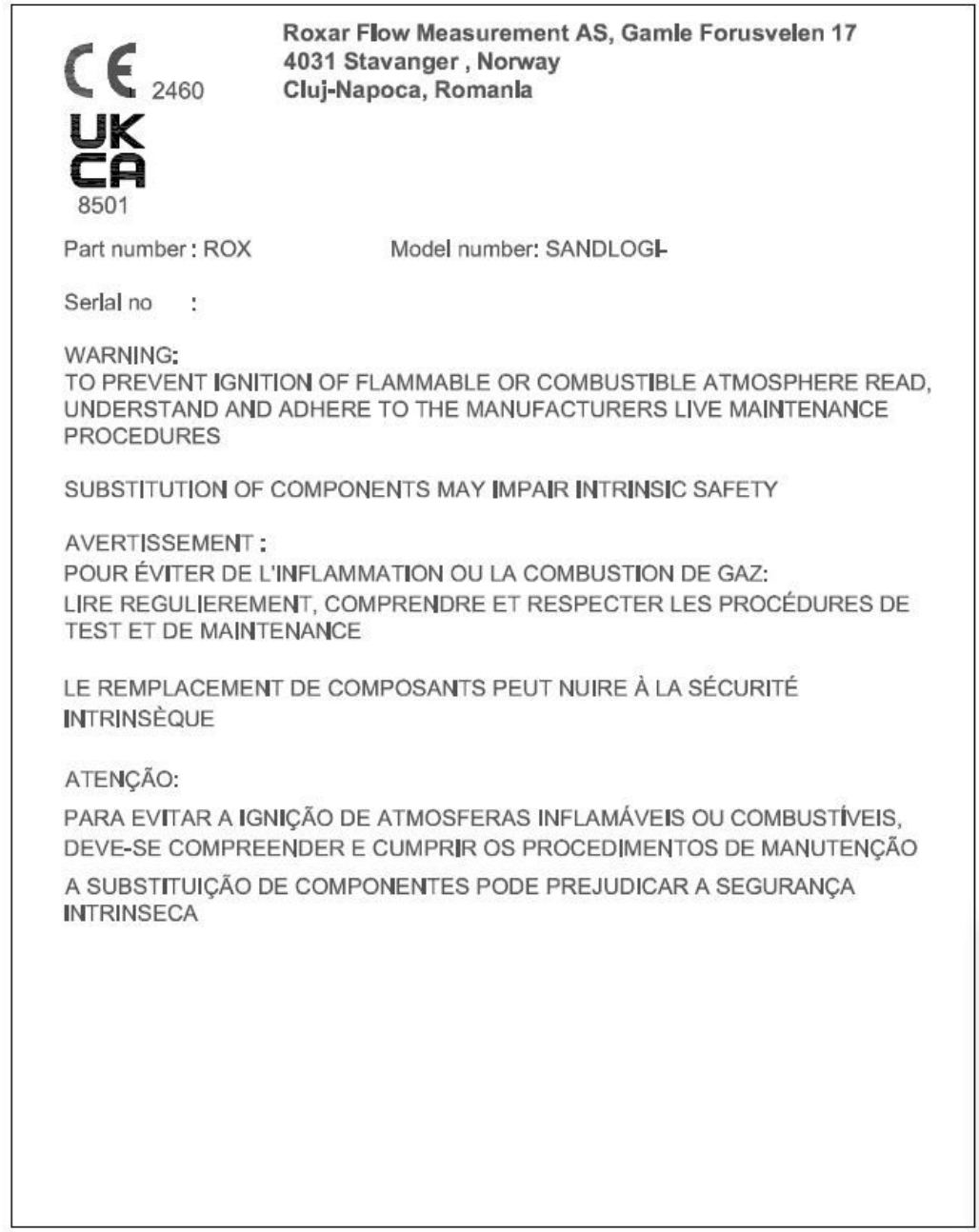
All shall be as indicated in Figure 2-2.

Figure 2-2: Non-Battery Certitification for SandLog and CorrLog marking



Information marking

The serial number and type marking shall be as indicated below:



2.5.2 Fieldbus board

Input and output parameters for the CorrLog and SandLog connection to RFM Fieldbus

Table 2-2: Parameters for connection to Fieldbus

Fieldbus connection terminals J 2: 1-2	
Maximum input voltage	U_i: 16,2 V
Maximum input current	I_i: 258 mA
Maximum input power	P_i: 1,05 W
Maximum internal capacitance	C_i: 4,2 nF
Maximum internal inductance	L_i: 10 µH

Table 2-3: Fieldbus connection terminals J2: 5-6 for input

Maximum input voltage	**Value**
Maximum input voltage	U_i :8,1V
Maximum input current	I_i: 258 mA
Maximum input power	P_i : 0,52 W
Maximum external capacitance	C_i: 4,2 nF
Maximum external inductance	L_i: 10 H

Table 2-4: Fieldbus connection terminals J2: 5-6 for output

Definition	**Value**
Maximum output voltage	U_O: 5,41V
Maximum output current	I_O: 72 mA
Maximum output power	P_O: 0,24W
Maximum external capacitance	C_O: 8 µF
Maximum external inductance	L_O: 450 µH

⚠ WARNING

The Fieldbus interface must be connected to the Roxar FIU or EX-approved unit that complies with the entity parameters.

2.5.3 4-20 mA loop board

Table 2-5: 3.5.3 4-20 mA Loop Board

Connector terminals J2: 1-2	
Maximum input voltage	U_i: 30 V
Maximum input current	I_i: 130 mA
Maximum input power	P_i: 1,00 W
Maximum internal capacitance	C_i: 35,2 nF

Table 2-5: 3.5.3 4-20 mA Loop Board *(continued)*

Connector terminals J2: 1-2	
Maximum internal inductance	L_i: negligible

⚠ WARNING

The 4-20 mA loop interface must be connected to an EX-approved 4–20 mA interface compatible with entity parameters.

2.5.4 Terminal board

Table 2-6: Connector terminals

Connector terminals J2: 1-2-3:			
Maximum input voltage	U_i:16VDC	Maximum output voltage	U_O: 12 V
Maximum input current	I_i: 50 mA	Maximum output current	I_O: 2 mA
Maximum input power	P_i: 121 mW	Maximum output power	P_O: 6 mW
Maximum internal capacitance	C_i: negligible	Maximum external capacitance	C_O: 1.41 µF
Maximum internal inductance	L_i: negligible	Maximum external inductance	L_O: 5 mH

⚠ WARNING

The 4-20 mA loop interface must be connected to an EX–approved RS-232 interface compatible with entity parameters.

2.5.5 4-20 mA loop and terminal board

Table 2-7: 4-20 mA loop and terminal board

4-20 mA Loop & Terminal Board	
Maximum input voltage	U_i: 30 V
Maximum input current	I_i: 130 mA
Maximum input power	P_i: 1,00 W
Maximum internal capacitance	C_i: 35,2 nF
Maximum internal inductance	L_i: negligible

Table 2-8: Terminal interface connector terminals J2: 1-2-3

Terminal interface connector terminals J2: 1-2-3			
Maximum input voltage	U_i: 16VDC	Maximum output voltage	U_O: 12 V

Table 2-8: Terminal interface connector terminals J2: 1-2-3 *(continued)*

Terminal interface connector terminals J2: 1-2-3			
Maximum input current	I_i: 50 mA	Maximum output current	I_O: 2 mA
Maximum input power	P_i: 121 mW	Maximum output power	P_O: 6 mW
Maximum internal capacitance	C_i: negligible	Maximum external capacitance	C_O: 1,41 µF
Maximum internal inductance	L_i: negligible	Maximum external inductance	L_O: 5 mH

Note
The 4-20 mA loop interface shall only be connected to an EX- approved 4-20 mA interface compatible with entity parameters.

2.5.6 Probe connections for CorrLog and SandLog

Table 2-9: Probe connection for IIB and IIC

Probe connection for	
Maximum output voltage	U_O: 5.9 V
Maximum output current	I_O: 2.075 A
Maximum output power	P_O: 0.7 W
Maximum external capacitance	C_O: 10 nF for IIC and 1 µF for IIB
Maximum external inductance	L_O: 7 µH for IIC and 31.8 µH for IIB
External probe cable	12.6 µH/Ω for IIC and 42.5 µH/Ω for IIB

Note
External probe cables types 1003194 6x 0,43mm^2 by Kabelflex® GMbH and type LIHCH 15 x 0,75mm^2, in lengths up to 20m, are tested and certified for use together with the external probes and gas group IIC. These cables need not be subjected to further consideration with the above specified safety parameters.

2.5.7 Probes

Any probe connected to the instrument shall comply with the electrical parameters in 4-20 mA loop board.

Other cables and probes may be connected.

Ensure that any probe/cable connected to the instrument comply with the electrical parameters in Ex safety.

Note
The probe cable length is restricted due to maximum external inductance.

2.6 Ordering information

Table 2-10: Ordering information

Unit	Roxar part number	Comment
CorrLog		
CorrLog with fieldbus interface	ROX000282480	
CorrLog with terminal interface	ROX000282483	
CorrLog with 4-20 mA interface	ROX000282481	
CorrLog with terminal interface and 4-20 mA interface	ROX000282484	
Probe cable		Out of scope of this manual. Consult Roxar for recommendations.
ER-probe		
LPR-probe		
Galvanic probe		
Access fitting and tools		
SandLog		
SandLog with fieldbus interface	ROX000282475	
SandLog with terminal interface	ROX000282478	
SandLog with 4-20 mA interface	ROX000282476	
SandLog with terminal interface and 4-20 mA interface	ROX000282479	
Probe cable and housing		Out of scope of this manual. Consult Roxar for recommendations.
Sand probe		
Combination probe (ER/Sand probe combination in one unit)		
Access fitting and tools		
Field interface unit	ROX000298185	Consult Roxar for recommendations.
Fieldwatch multitrend		PC software used to configure the system, store and present corrosion, erosion trends.

3 Technical description

This section gives a more specific description of the different items of the various products. Different measuring techniques are fully described, together with recommendations for use of the different types of equipment.

3.1 General information

Monitoring internal corrosion in process equipment/piping and pipelines is normally done for the following:

- Long term monitoring to assess corrosion over time and hence integrity of the assets
- Rapid detection of changes in corrosion rates, as a tool to optimize corrosion inhibitors injection and process parameters, in order to minimize corrosion problems
- Planning of maintenance and system replacement activities

Some typical corrosion monitoring techniques, supported by the CorrLog instrument, are presented in ER-probe measurement and LPR-probe measurement sections of this manual.

Sand production is often associated with production of oil and gas. Excessive sand production can cause serious problems due to:

- Sand erosion of process piping and equipment
- Possible problems in the oil and gas producing reservoir if too much sand is produced
- Operational problems due to sand collected in process equipment such as separators

Efficient sand monitoring is often used to optimize the oil and gas production in order to find the maximum production rates where sand production is at an acceptable level, and to give early warning to allow corrective actions if sand production rates suddenly increase.

The Roxar Sand and Eroprobe, supported Erosion Monitoring Probe, supported by the the SandLog instrument, is briefly described in Sand probe measurement principle.

The CorrLog and SandLog systems can be combined in one integrated system, which will often provide at technically and commercially attractive solution for the client

3.2 General instrument functionality

3.2.1 Communication

- Communicate with Roxar Fieldbus, PC/MultiTrend or Fieldwatch-software for system setup and measurement downloads
- Communicate with CorrLog-SandLog Terminal for system setup and measurement downloads
- 4-20 mA available for corrosion probes and sand probe. The system has predefined setup. Measurement is proportional to the accumulated corrosion on probes for ER- and Sand probe. Measurement is proportional to the corrosion rate for LPR-probe and current for galvanic probe.
- Probe type is selected by switch on instrument electronics at 4-20 mA system

3.2.2 Measurements SandLog

- SandLog supports one Sand probe (or Sand/ER combination probe)
- Drive a small current, typical ~200 mA, through the probe elements
- Measure the probe resistance for up to 4-measure and 2-reference element based on Ohm's law
- Measure housekeeping data as supply/battery voltage, instrument temperature
- There is no need for manual calibration of the instrument. The electronics has built-in online calibration algorithm.

3.2.3 Measurement CorrLog

- CorrLog supports one ER-, LPR- or Galvanic probe
- Supports one probe at a time
- Drive a small current, typical ~200 mA, through the ER-probe
- Measure the probe resistance for measure and reference element based on Ohm's law
- Measure the current in the Galvanic probe
- PR-probe. Set up polarization voltage ~20 mV. Measure polarization voltage and current.
- For the 3-electrodes LPR-probe both positive and negative polarization are measured
- Measure housekeeping data as supply/battery-voltage
- There is no need for manual calibration of the instrument. The electronics has built-in online calibration algorithm.

3.2.4 Real time clock

- Instrument can take measurements on defined sample intervals
  (Except the 4-20 mA systems that take measurements each time sufficient energy has accumulated from the 4-20 mA loop)
- All measurements have a time-stamp
- The instrument does not have a dedicated backup battery for the real time clock. After battery change (for Term version), disconnection from fieldbus power or fieldbus failure (for Fieldbus version) the time and date setup might be needed.

3.2.5 Data storage

- Up to 1500 ER-probe measurements
- Typical 500 Sand probe measurements
- Measurements storing device will not lose data if power is lost. > 5-year data retention is specified.
- Setup parameters as probe type and sample interval are not affected by loss of power

3.3 Sand probe measurement principle

The SandLog supports the Roxar multiple elements sand/erosion probe, that is based on the electrical resistance method.

ER-probes measure the corrosion rate as an increase in electrical resistance over time for an exposed steel element in the probe face. The ER-probe also has a reference element that is not exposed to the environment. The ER measurement is the relative change in resistance for the measurement element compared to the resistance of the reference element. The MultiTrend software calculates the sand erosion from the changed ratio of resistance in the probe's two elements, which can be plotted as a plot with sand erosion versus time. The sand erosion rate is found from the slope of this curve (metal loss/time) normally in the format of mm/year or mmy (mils/year).

A unique feature of the Roxar Sand and Erosion Monitoring system is that sand production is quantified based on the measured sand erosion rate, given input to the MultiTrend of some vital production parameters (flow rates, etc.). The Roxar Sand and Erosion Monitoring System provides both early detection of changes in sand production rates as well as adequate quantification of quantities of sand produced.

3.4 ER-probe measurement principle

ER-probes measure the corrosion rate as an increase in electrical resistance over time for an exposed steel element in the probe face. The measurement element may be a strip, tube, or wire. The ER-probe also has a reference element that is not exposed to the environment. The ER measurement is the relative change in resistance for the measurement element compared to the resistance of the reference element. ER readings will normally increase over the exposure time of the element until the circuit is broken.

The MultiTrend software calculates the corrosion metal loss from the changed ratio of resistance in the probe's two elements, which can be plotted as a plot with metal loss versus time. The corrosion rate is found from the slope of this curve (metal loss/time) and normally presented in the format of mm/year or mmy (mils/year).

ER-probes are suitable for oil, gas, and water environments.

3.5 LPR-probe measurement principle

The LPR-probe consists of two or three exposed electrodes in steel quality equal or similar to that of the pipe wall. The LPR technique is based on electrochemical principles and measures the electrical current response for a small polarization of the probe’s working electrode potential. When the polarization voltage and the current are known, the polarization resistance can be calculated directly in the instrument. The corrosion rate is inversely proportional to the polarization resistance. The measurement gives the instantaneous corrosion rate directly.

The LPR-probes require an electrically conductive environment, and are normally used in systems with high water content.

3.6 Galvanic probe measurement principle

The galvanic probe consists of two dissimilar metal electrodes, normally brass and carbon steel. When electrically connected, there will be a galvanic coupling between the two electrodes, resulting in a galvanic current. In aqueous systems with low oxygen level, the oxygen reduction at the brass electrode will be the factor limiting the galvanic current, which will change rapidly with changes in oxygen level. The galvanic probe is therefore

commonly used to detect changes in oxygen level, for example, in systems subject to oxygen scavenger systems.

Do not use galvanic probes to quantify the absolute oxygen level in water systems. Only use as a tool to detect changes in the oxygen level.

4 Preparation and installation

This chapter describes all necessary preparations to be carried out before installation of the different parts of this equipment, including checklists and observations. This section also contains a complete installation procedure for the actual equipment. All preparations and installation guidelines until the equipment is ready for normal operation are described in this chapter for the following equipment:

- CorrLog instrument
- SandLog instrument
- Probe interfaces
- Communication interfaces:
  - Roxar Fieldbus interface
  - Terminal interface
  - 4-20 mA Interface
  - Terminal and 4-20 mA Interface

The following related topics are not covered in this document:

- Probe installation on pipelines
- MultiTrend and Fieldwatch software installation

Refer to the Certificate and Control drawing cited in References as the SandLog and CorrLog control unit drawing at ROX000310887: SandLog and CorrLog Control Drawing.

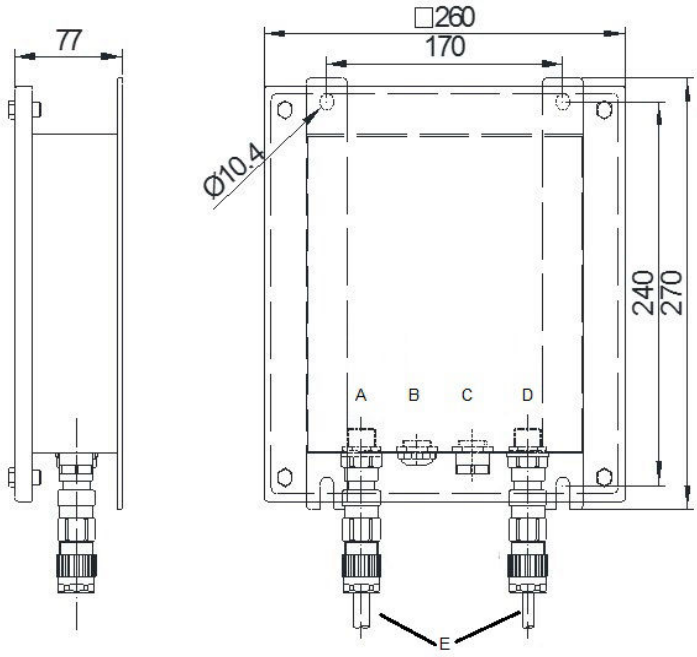
⚠ WARNING

The CorrLog and SandLog instruments have cable glands for probe connections, 4–20 mA and fieldbus interface. For example, you have to open the box in order to terminate the cables. A HOT WORK PERMIT is needed during probe/interface connection procedure.

4.1 Mounting: footprint of CorrLog and SandLog

The instrument must be mounted on a vertical plate, bracket or equivalent. Ensure cable glands point downward. Apply bonding according to site requirements. Earth must be connected to one of the mounting screws of the instrument bracket.

Figure 4-1: Footprint of CorrLog and SandLog



A. Probe cable interface
B. Blind plug
C. Drain plug
D. Fieldbus interface
E. Cable glands (must be pointing downwards)

4.2 Probe termination: SandLog

4.2.1 SandLog probe termination

Table 4-1: SandLog probe terminations

Sand probe wire color	Cable color	Termination rack pin number	Sand probe signal name
Black	White/yellow	J5-1	I_{ret}
Orange/yellow	Green/brown	J5-2	I_1
Orange/white	Green/white	J5-3	I_2
Orange/red	Red/blue	J5-4	I_3
Orange/black	Pink/gray	J5-5	I_4
Gray	White	J3-5	E_{1A}
Yellow	Brown	J3-6	E_{1B}
Green	Green	J4-1	E_{2A}

Table 4-1: SandLog probe terminations *(continued)*

Sand probe wire color	Cable color	Termination rack pin number	Sand probe signal name
Brown	Yellow	J4-2	E_{2B}
Blue	Gray	J4-3	E_{3A}
Red	Pink	J4-4	E_{3B}
Orange	Blue	J4-5	REF_{4A}
Pink	Red	J4-6	E_{4B}
White	Black	J3-1	REF_{A}
Lilac	Lilac (Violet)	J3-2	REF_{B}
N/A	N/A	J3-3	Not connected
N/A	N/A	J3-4	Not connected

4.2.2 Combination Sand/ER-probe termination

Table 4-2: Sand/ER-probe terminations

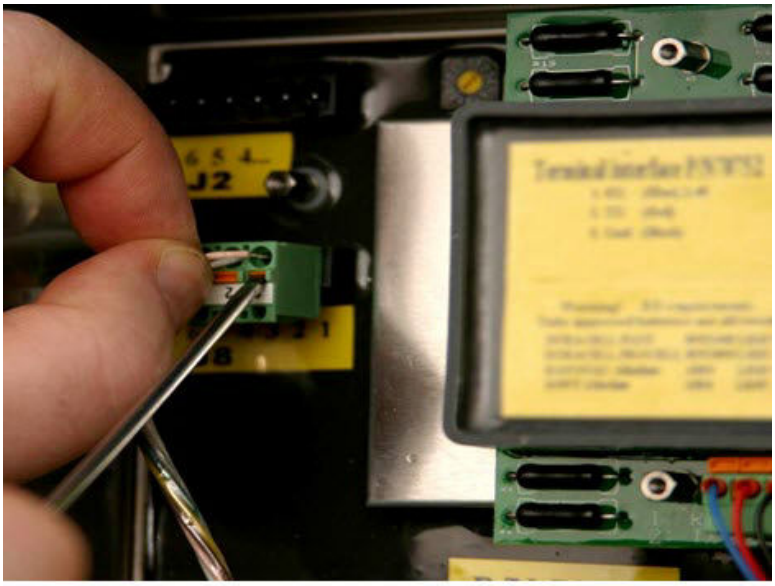
Sand probe wire color	Cable color	Termination rack pin number	Sand probe signal name
Black	White/yellow	J5-1	I_{ret}
Orange/yellow	Green/brown	J5-2	I_1
Orange/white	Green/white	J5-3	I_2
Orange/red	Red/blue	J5-4	I_3
Orange/black	Pink/gray	J5-5	I_4
Gray	White	J3-5	E_{1A}
Yellow	Brown	J3-6	E_{1B}
Green	Green	J4-1	E_{2A}
Brown	Yellow	J4-2	E_{2B}
N/A	N/A	J4-3	E_{3A}; Not connected
N/A	N/A	J4-4	E_{3B}; Not connected
Blue	Gray	J4-5	E_{ERA}
Red	Pink	J4-6	E_{ERB}
Orange	Blue	J3-3	$REF2_{A}$
Pink	Red	J3-4	$REF2_{B}$
White	Black	J3-1	REF_{A}
Lilac	Lilac (Violet)	J3-2	REF_{B}
Orange	Blue	J3-3	$REF2_{A}$
Pink	Red	J3-4	$REF2_{A}$

Procedure

1. Strip 5mm of the cable using a wire stripper.

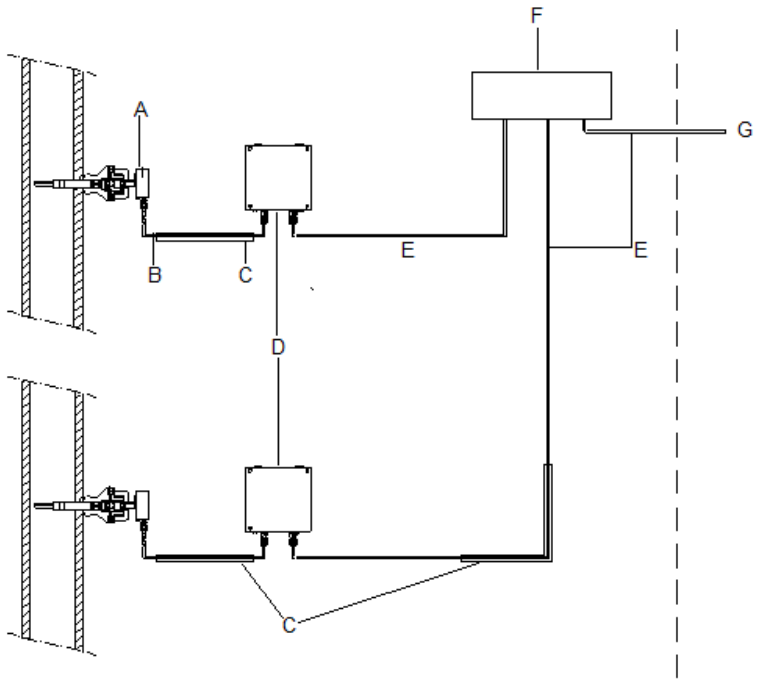
2. Press down the spring with a screwdriver as shown in Figure 4-2.
3. Position the cable and release the screwdriver.
4. Give the cable a slight pull to ensure it is securely connected.

Figure 4-2: Cable termination inside the logger



Note
Sand probes can be delivered in many configurations.

Figure 4-3: Hazard zone (left of horizontal dotted line)



A. Roxar Sand Probe
B. Sand probe cable and housing
C. Cable gate recommended (for intrinsically safe. circuits)
D. SandLog instrument
E. Fieldbus cable
F. Junction box (optional)
G. To Fieldbus master

Note
For the SandLog instrument, mount the instrument with the glands pointing downwards. For details, refer to Mounting: footprint of CorrLog and SandLog.

Note
The maximum total length including all Junction box instrument distances is 300 m. The maximum length from the Junction box to the instrument is 15 m. Longer distances may be possible for particular system configurations, consult Roxar for advice.

Note
The Junction box is useful if two or three instruments are located close, within ~10 m radius. These instruments can be connected to the same fieldbus loop. Avoid multiple nodes with long cables within the same fieldbus loop. Such setup will cause reflection problems within the fieldbus communication.

4.3 Probe and probe cable termination for the CorrLog

4.3.1 Probe cable for the CorrLog

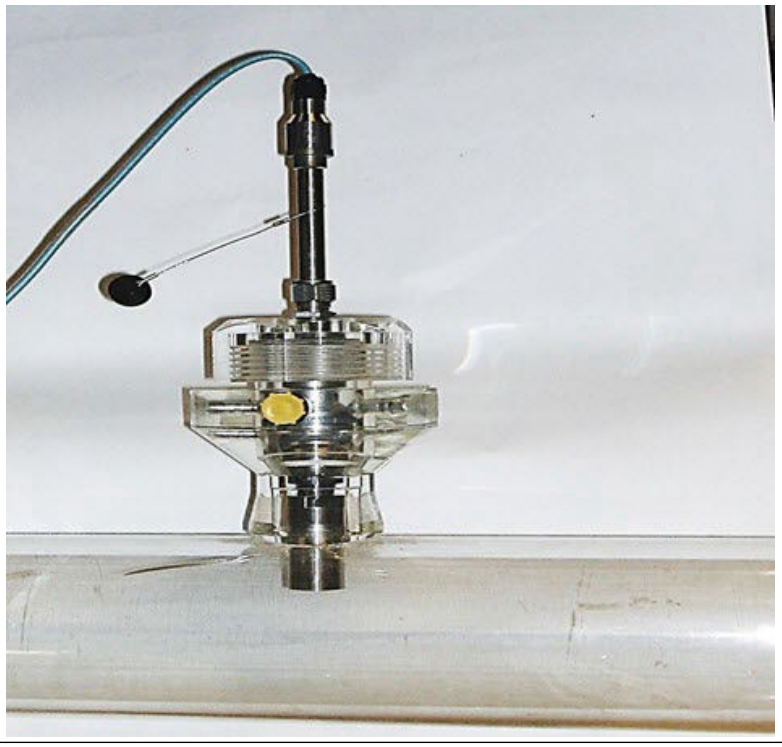
Table 4-3: Amp 6 cable terminations

Cable color	Amp 6 pin
Pink	A
White	B
Yellow	C
Gray	C
Green	D
Brown	F

Application	Image
For long-term connection with probes installed in 2-in. high-pressure access fitting. This connection is not pressure proof and is not recommended be used in combination with pressure proof cover. L5 refers to 5 m cable length.	
Standard Amphenol 6 pin connector for direct connection to “low-pressure” probe or probe adapter	

Application	Image
For connection with probe installed in fitting with pressure proof protective cover. (This connection is pressure proof and can be used on pressure proof cover).	
For connection with probe installed in fitting with pressure proof protective cover. (This connection is pressure proof and can be used on pressure proof cover). This unit is used when mechanical access fittings with hydraulic adapters are used. The long shaft is needed to reach to probe contact.	

Figure 4-4: Demo Hydraulic fitting/pipeline showing: Probe, hydraulic hollow plug, and probe cable:



4.3.2 CorrLog instrument: ER-probe termination

Table 4-4: ER-probe termination

Connector	Probe cable	ER-probe—low pressure, high pressure
Amp 6 pins	Cable color	Termination in CorrLog
A	Pink	J8-1 (IE+)
B	White	J8-2 (EiA)
C	Yellow	J8-3 (EiB)
C	Gray	J8-4 (RefA)
D	Green	J8-5 (RefB)
F	Brown	J8-6 (IE-)

4.3.3 CorrLog instrument: Galvanic probe termination

Table 4-5: Galvanic probe termination

Galvanic probe wire color	Termination rack pin number	Galvanic probe signal name
Probe dependent	J2-5	Galv+ (Steel)
Probe dependent	J2-6	Galv- (Brass)

Table 4-6: Galvanic probes (Termination in logger)

Connector	Probe cable	RFM galvanic low pressure	RFM galvanic high pressure
Amp 6 pins	Cable code		
A	Pink		
B	White	J2-6 (Brass)	J2-6 (Brass)
C	Yellow	J2-5 (Steel)	J2-5 (Steel)
C	Gray		
D	Green		
F	Brown		

Note
The termination sheet for other probes can be found in Table 4-5 and the connection sheet of the probe (refer to Probe and probe cable termination for the CorrLog). Contact Roxar for more information on termination sheets for galvanic probes.

4.3.4 CorrLog instrument: LPR-probe termination

Table 4-7: LPR-probe terminations in CorrLog

LPR-probe wire color	Termination rack pin number	LPR-probe signal name
Probe dependent	J2-1	Counter
	J2-2	Ref
	J2-3	Working- I
	J2-4	Working-V

Table 4-8: Termination in CorrLog for Roxar LPR-probes

Connector	Probe cable	LPR RFM 2/3; low pressure high pressure
Amp 6 pins	Cable code	
A	Pink	J2-1 (counter)
B	White	J2-2 (ref)
C	Yellow	J2-3 (working-I)
C	Gray	
D	Green	
F	Brown	J2-4 (working-V)

Note
Terminations for other probes can be found in Table 4-7 and the connection sheet of the probe cable. In addition, Roxar provides termination sheets on request.

4.4 Communication interface connections

4.4.1 Fieldbus interface connection

Table 4-9: Fieldbus terminations for unarmoured fieldbus cable

Fieldbus wire color	Pair	Fieldbus card termination and pin number	Signal name
Blue	1	Fieldbus card; J2-5	Data A
White	1	Fieldbus card; J2-6	Data B
Orange	2	Fieldbus card; J2-1	Charge A
White	2	Fieldbus card; J2-2	Charge B

Table 4-10: Fieldbus terminations for armored fieldbus cable (RFM pn. 63215; 63216)

Fieldbus wire color	Pair	Fieldbus card termination and pin number	Signal name
Blue	1	Fieldbus card; J2-5	Data A
Black	1	Fieldbus card; J2-6	Data B
Blue	2	Fieldbus card; J2-1	Charge A
Black	2	Fieldbus card; J2-2	Charge B

4.4.2 4-20 mA interface connection

Table 4-11: 4-20 mA interface terminations for armored field cable

4-20 mA wire color	Pair	4-20 mA card termination and pin number	Signal name
(site dependent)	n	J2-1	+ (plus)
(site dependent)	n	J2-2	- (minus)

4.4.3 RS-232/Terminal interface

Table 4-12: Terminal terminations

Terminal wire color	Terminal card and pin number	Signal name
Red	J2-2	TX (logger TX)
Blue	J2-1	RX (logger RX)
Black	J2-3	Gnd

Note
These wires are strapped during production and normally not affected during installation.

4.4.4 RS-232 terminal interface and 4-20 mA interface connection

Note
These wires are strapped during production and normally not affected during installation.

Table 4-13: Terminal terminations

Terminal wire color	Terminal cards and pin number	Signal name
Red	J2-2	TX (logger TX)
Blue	J2-1	RX (logger RX)
Black	J2-3	Gnd

Table 4-14: 4-20 mA interface terminations

4-20 mA wire color	Pair	4-20 mA card termination and pin number	Signal name
(site dependent)	n	J3-1	+ (plus)
(site dependent)	n	J3-2	- (minus)

4.5 Terminal system

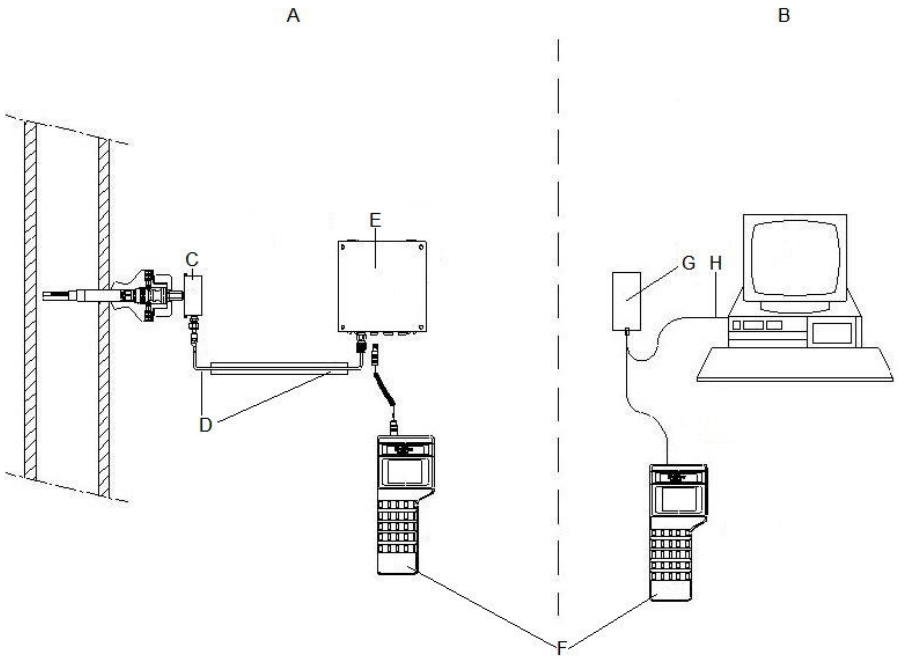
The PC will typically be a stationary PC/laptop located in a control room or an office.

Figure 4-5: CorrLog terminal with MultiCorr terminal for data retrieval

MultiCorr/terminal dump data to PC with software

The following figure shows an example of a CorrLog installation in an offline terminal system:

Figure 4-6: CorrLog installation in an offline terminal system



A. Hazardous zone
B. Safe zone
C. Probe
D. Probe cable
E. CorrLog instrument
F. Terminal/MultiCorr for setting up instrument and downloading measurement data
G. Combined handheld terminal charger and PC communication unit
H. Combined handheld terminal charger and communication cable

Note
You must mount the instrument with the glands pointing downwards. Use 4XM10 bolts for footprint/mounting. The horizontal spacing is 6.6 in (170 mm) and the vertical spacing is 9.4 in. (240 mm).

4.5.1 Configuration of SandLog and CorrLog with the new "CorrLog-SandLog Terminal"

For more information, refer to CorrLog with ER-probe and terminal interface: MultiTrend setup.

Ordering information for the new terminal: Roxar P/N 22780-KIT (OBSOLETE).

4.6 4-20 mA system

- Select the probe type. Setting 4,5,6 may be useful for debugging. You do not need to calibrate the instrument.

- The instrument is powered from the 4-20 mA loop.
- The measurement interval depends on probe type and current. One to five minutes is typical. No setup is needed.

Note
Typically, it takes 30 minutes from powering up till the first measurement is taken and probe has effect on 4-20 mA loop signal.

- Scaling: See Communication interface connections.

Table 4-15: Probe selection

Main board switch	Probe selection	SandLog	CorrLog
0	Ignored		
1	Ignored		
2	ER-probe		X(1)
3	Sand probe	X	X
4	4 mA	X	X
5	12 mA	X	X
6	20 mA	X	X
7	LPR 300 mm2		X
8	LPR 500 mm2		X
9	Galvanic		X
A.F.	Ignored		

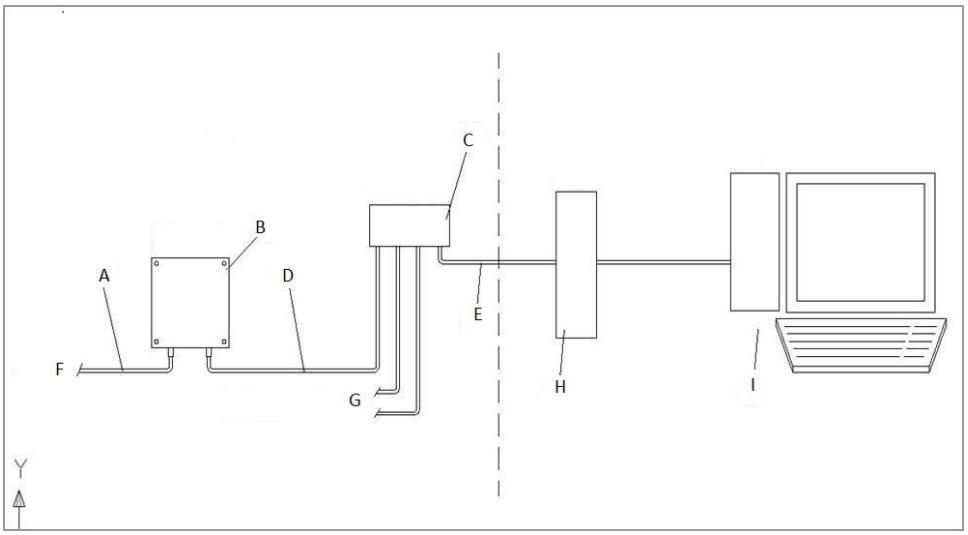
(1) Useful selections are marked with X.

The following figure shows the location of the main switchboard:

Figure 4-7: Location of main switchboard

The following figure shows a typical installation of the CorrLog instrument with a 4-20 mA interface:

Figure 4-8: CorrLog with 4-20 mA interface with Hazard zone on left and Safe zone on right



A. Probe cable
B. CorrLog or SandLog instrument
C. Optional junction box (supported by customer)
D. 4-20 mA cable (Instrument has M20 Glands; cable diameter 9.5-16 mm as default configuration)
E. 4-20 mA (supported by customer)
F. To Probe
G. To SandLog/CorrLog or MultiLog
H. I.S barrier (Example: Zener barrier: P+F z728.F or I.S. galvanic isolator: P+F KFD0-CS-Ex1.5OP)
I. Plant distributed control system

4.7 Setting the logger fieldbus address

Use the following to set the Logger fieldbus address directly by the switch.

Procedure

1. Only one logger can be present on the fieldbus interface (loop 1 and loop 2).
2. From MultiTrend, enter the Address menu. Set the logger address to 255 (broadcast).

Table 4-16: Set fieldbus address switch

Main board switch	Fieldbus address selection
0	Set address by software
1	Reserved
2	2
3	3
4	4
5	5

Table 4-16: Set fieldbus address switch *(continued)*

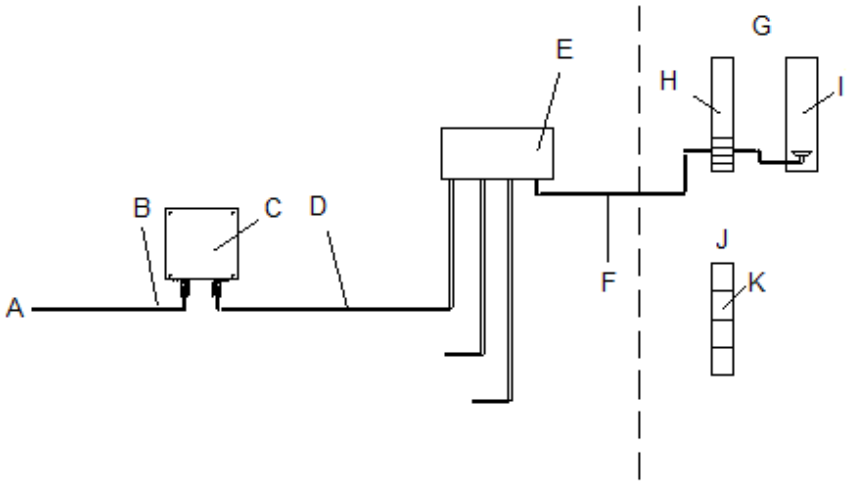
Main board switch	Fieldbus address selection
6	6
7	7
8	8
9	9
A-F	10-15

3. Enter **Advanced** commands. Set fieldbus address to intended value (a number between 0 and 31).
4. Press **[Send]**.
5. Enter **Address** menu. Set logger address to given value.
6. Try **[Get Status]** command to verify the address change.

Figure 4-9 shows an example of a CorrLog installation in an online fieldbus system.

Mount the CorrLog or SandLog instrument with the glands pointing downwards. Use 4XM10 bolts for footprint/mounting. The horizontal spacing is 170 mm and the vertical spacing is 240 mm.

Figure 4-9: CorrLog installation in an offline terminal system: Hazard Zone on left, Safe Zone on right



A. To the probe
B. Probe cable
C. CorrLog or SandLog instrument
D. Junction box (optional)
E. Fieldbus cable (maximum total length from Junction box to Logger: 15 m)
F. Fieldbus cable (maximum total length 300 m including all notes)
G. I.S. power termination
H. Fieldbus termination rail (i.s. circuits)
I. Fieldbus Interface Unit PN ROX000298185
J. Non I.S. power termination
K. Fieldbus termination rail (non I.S. and power circuits)

Note
Roxar recommends the Junction box if several loggers are located near each other (within a 15 m radius) with a Junction box. One fieldbus loop can cover up to three probes.

Note
If requested, a fieldbus cable's maximum length can be expanded up to 600 m.

Note
A fieldbus termination rail supports the following:

- 240 and 130 Vac available
- Communication PC with MultiTrend to Fieldbus Master: RS-232; < 15m RS485; On request, ethernet solutions are available for longer distances.

4.8 Combined terminal and 4-20 mA system

This system is installed like the Terminal system, refer to Terminal system.

This system also has a 4-20 mA output interface. It is recommended to install as described in 4-20 mA system.

4.8.1 Configuration of SandLog and CorrLog with the new "CorrLog-SandLog Terminal and 4-20 mA"

For these instructions, refer to CorrLog with ER-probe and terminal interface: MultiTrend setup.

4.9 Configuration of MultiTrend software

This topic provides two examples of configuration with MultiTrend software:

- CorrLog with ER-probe and terminal interface
- SandLog with sand probe and fieldbus interface

The installation of MultiTrend software is beyond scope of this document.

For more details regarding system setup, see References. Roxar strongly recommends that you read at least Chapter 5.5 and 5.6 in Ref 1.

4.9.1 CorrLog with ER-probe and terminal interface: MultiTrend setup

Procedure

1. Start MultiTrend and give a name to the product.
2. From the top-line menu, select **Mode** → **(Advanced) Service Mode**.
3. Select the mouse and left-click on the **Instrument** folder.
4. Right-click on the Connected symbol, then select **New** → **Interface** → **Serial**.
5. Select a free com-port on the PC and click **Finish**. You can use default parameters.
6. The objects can be created first and can be either arranged or connected later.

   You can use the MultiCorr terminal to define SandLog and CorrLog instrument identity, probes, sample rate, time and date.

   Note
   Only one probe is allowed on the CorrLog and SandLog instrument. When measurement data is collected with MultiCorr and transferred to MultiTrend, the software reads new instrument/probe setup and creates instruments and probes automatically the first time data is downloaded. Use MultiTrend to apply probe data as initial probe thickness, probe name and tag number.

   The following steps show MultiCorr commands:

7. **Main menu** → **3 - Terminal Mode**
8. 2 - ML Terminal (or Sand Terminal if Sand Log)
9. 1 - Logger Manage
10. 3 - Logger Setup

11. 1 - Set time & date
12. 4 - Clear memory (remove old readings)
13. 6 - Setup
14. 1 - Probe Setup (Enter ID, Probe type ....)
15. Enter ID/Address on logger
16. Enter the number of different probe types, such as set "1" to intended probe type, and set "0" elsewhere.

Note
Analog probe is not supported.

17. 1 - Measure
18. 2 - Automatic measurement (Enter the sample interval)
19. [ENT – to accept values]
20. [EXIT – to leave menu]

Note
Refer to the *MultiCorr User Manual* for further details in References.

Figure 4-10: MultiTrend setup for Terminal and one CorrLog with ER-probe

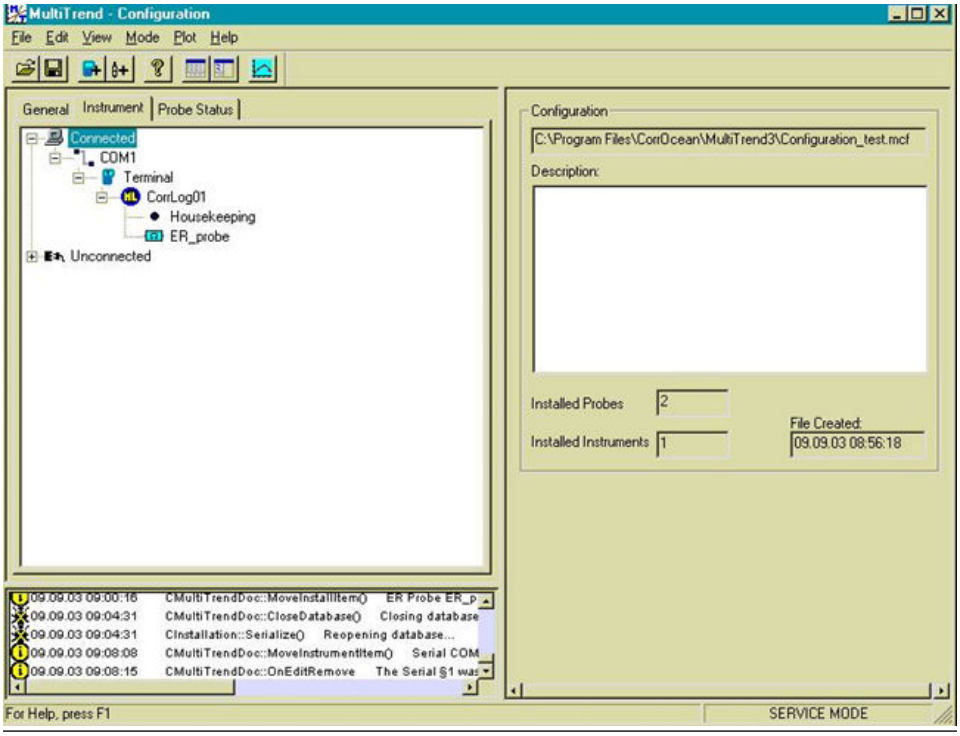
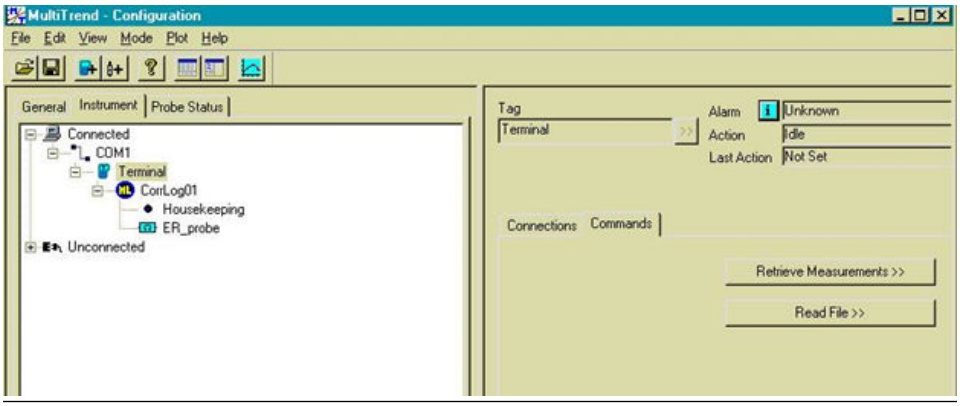


Figure 4-11: Measurement data transfer from terminal to MultiTrend



21. Set up terminal for data transfer – start transfer.
22. Click **Retrieve Measurements in MultiTrend**.
23. On the next window, click **Store Selected** before you remove the window to save the data.

Note
The MultiCorr terminal is not for sale in Europe after July 1, 2003. (ATEX-regulations). Owners of the instrument can use the instrument according to User Manual. ATEX Approved “CorrLog- SandLog Terminal” replaces the MultiCorr instruments in Europe, see SKF Handheld terminal.

4.9.2 SandLog with Sand probe and Roxar fieldbus interface: MultiTrend setup

Procedure

1. From the top-line menu, select **Mode** → **(Advanced) Service Mode**.
2. Select the mouse and left-click on the Instrument folder.
3. Right-click on the Connected symbol, then select **New** → **Interface** → **Serial**.
4. Select a free com-port on the PC and click **Finish**. You can use default parameters.
5. Right-click on the COM-PORT symbol, then select **New** → **Interface** → **Fieldbus Master**, enter name.
6. Right-click on the Fieldbus Segment symbol, then select **New** → **Instrument** → **SandLog**, enter name.
7. Right-click on the SandLog symbol, then select **New** → **Probe** → **Sand Probe**, enter name.

Note
Address defined on SandLog in MultiTrend must be the same as address set on the switch port on the connected instrument. The switch is located on the main instrument board.

8. Left-click and select **Command** → **Advanced Command** → **Set Address and ID** to switch the address.

   If the switch is set to ”0” the address can be programmed by broadcast command. Set the ID equal to the address. Advanced Service Mode is needed to set up

addresses. This option is only useful if only one of the instruments on a fieldbus-loop has address 0.

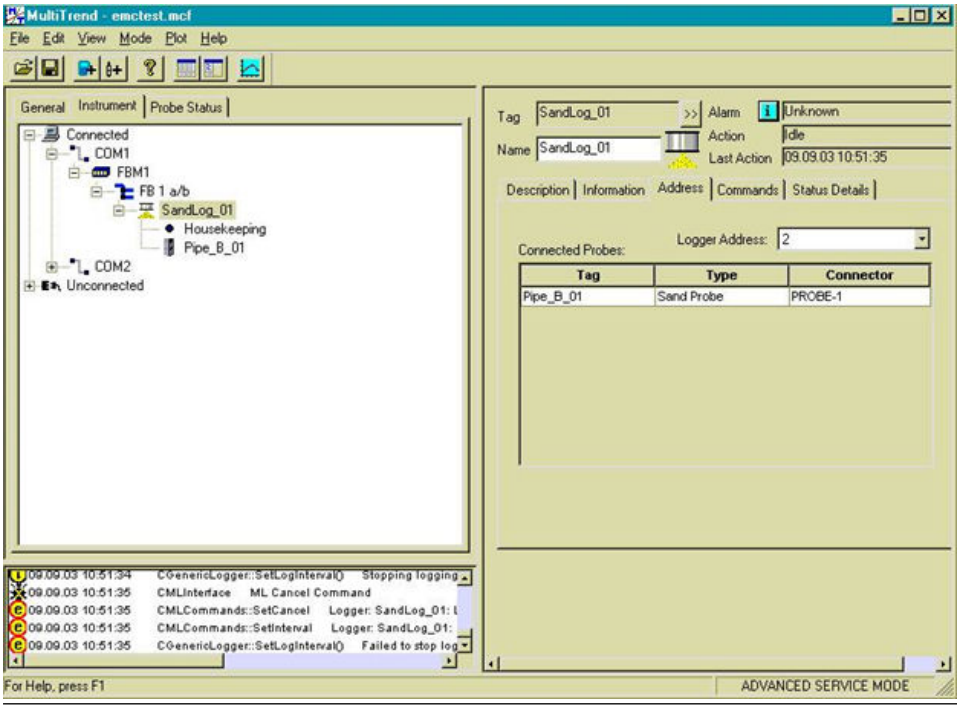
Note
Only one probe is accepted on the CorrLog and SandLog instrument. If multiple probes are defined, only the first known probe is accepted; all other probes are ignored. The Sand/ER combination probe is the only exception to this rule.

9. Left-click "Command". This option allows you to set both instrument measurement interval and data retrieval.
10. Change mode to Online Mode (top-line menu: **Mode**).

    Data is measured and downloaded to MultiTrend at specified intervals.

Note
The objects in MultiTrend can be created first, then arranged and connected later.

Figure 4-12: MultiTrend SandLog set up with fieldbus



4.10 Configuring the Roxar Fieldwatch software

An example of configuration in Fieldwatch is given, for ER-probe with CorrLog fieldbus interface. The configuration is very similar for other probes. The steps are the same as those presented in this section. The main difference is with choosing the probe type.

Note
The installation of Fieldwatch software is beyond scope of this document. For more details regarding system setup, refer to Ref 5, Chapter 6 cited in References.

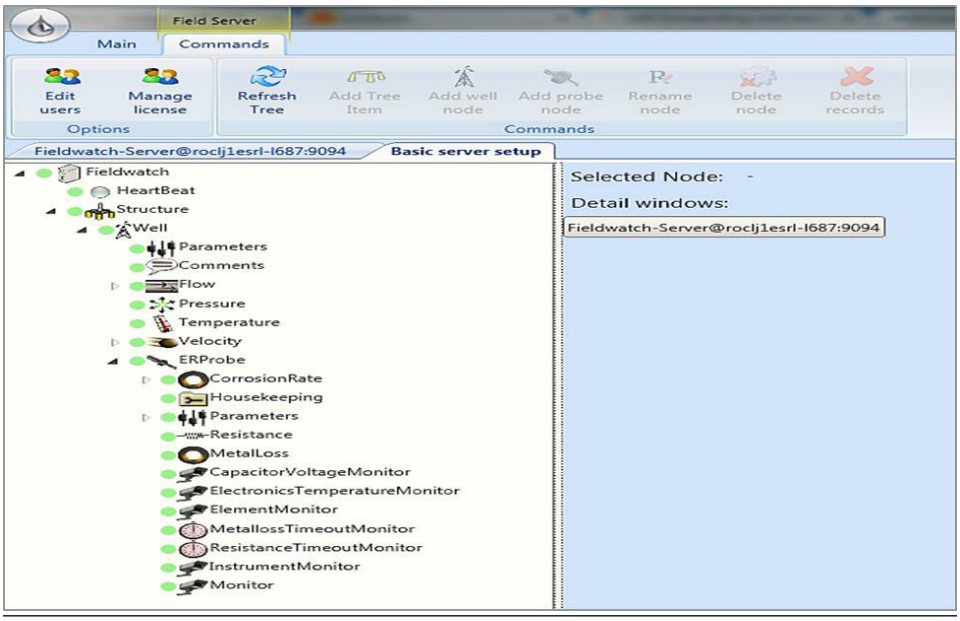
4.10.1 Fieldwatch set up for CorrLog with ER-probe and the Fieldbus interface

You must first set up users and grant them appropriate rights. For more information, refer to the *Fieldwatch Administrator's Manual* (especially Chapter 6).

Procedure

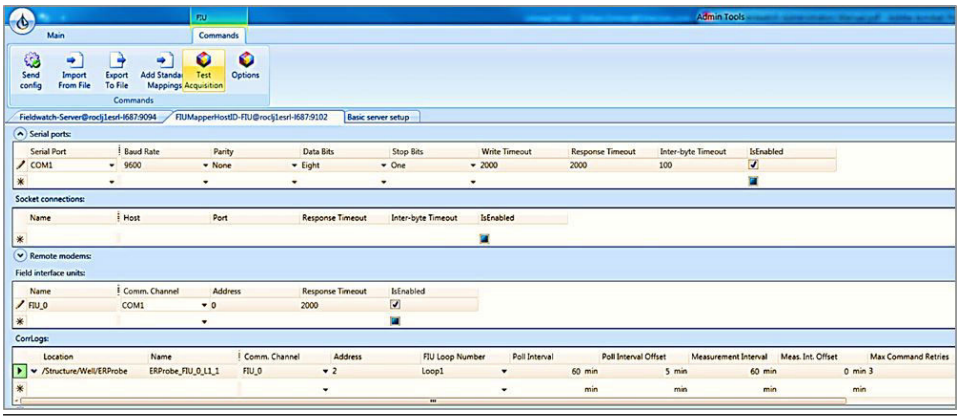
1. Create a Structure using the **Add Tree Item** button in AdminTools.
2. Go to Structure and create a well by using **Add well** node.
3. Add the instruments using **Add probe node**.

Figure 4-13: Fieldwatch structure in AdminTool



4. Use the add standard mapping button to create the standard setup for fieldbus communication.
5. Set up the communication protocol (serial or TCP).
6. Set up the FIU details (comm. Channel, address, timeout).
7. Set up the logger details (comm. Channel, address, loop number, measuring interval, etc.). The following figure shows an example of communication setup, using serial port COM1 via a Field Interface Unit (FIU):

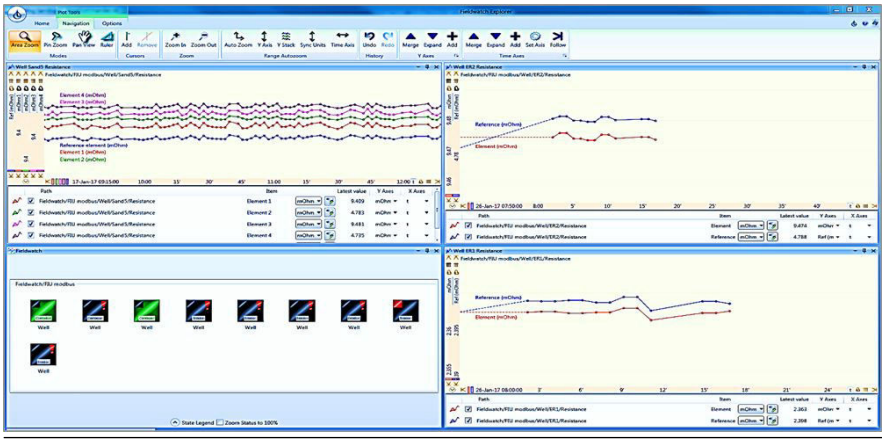
Figure 4-14: Fieldbus communication setup in Fieldwatch–FIU Mapper



a) Use the Send config option to the FIU mapper.

b) Use Field Explorer to view the probe status, graphs and alarms as cited in Ref 6 of References.

Figure 4-15: Example of Fieldwatch Explorer view



5 Operating instructions

This chapter contains checklists, precautions, consequences, hazards, observations, operator qualifications and reporting during operational conditions for the following products:

- CorrLog
- SandLog

After installation of CorrLog and SandLog instruments, they may be operated in two different ways:

- Manually by use of a handheld terminal for probe setup and data collection
- Automatically by use of online monitoring system; PC with MultiTrend software

5.1 Operation during normal service

After installation described in Chapter 4, the SandLog or CorrLog has been installed with a probe and an interface: Roxar fieldbus, terminal or 4-20 mA. The sample interval is set and the logger takes periodic measurements.

5.1.1 Roxar fieldbus interface

During installation described in Preparation and installation, the instrument, probe and measurement interval is defined.

MultiTrend software is used to present data for the operator. By following this example, you will plot the resistance of probe-element1 and accumulated metal loss.

Example Resistance:

- Point on selected Probe and right-click the mouse: **Plot** → **Resistance** → **Element1**

Example Metal loss:

- Point on selected Probe and right-click the mouse: **Plot** → **Metal loss** → **Element1**

Figure 5-1: Resistance plot sand probe

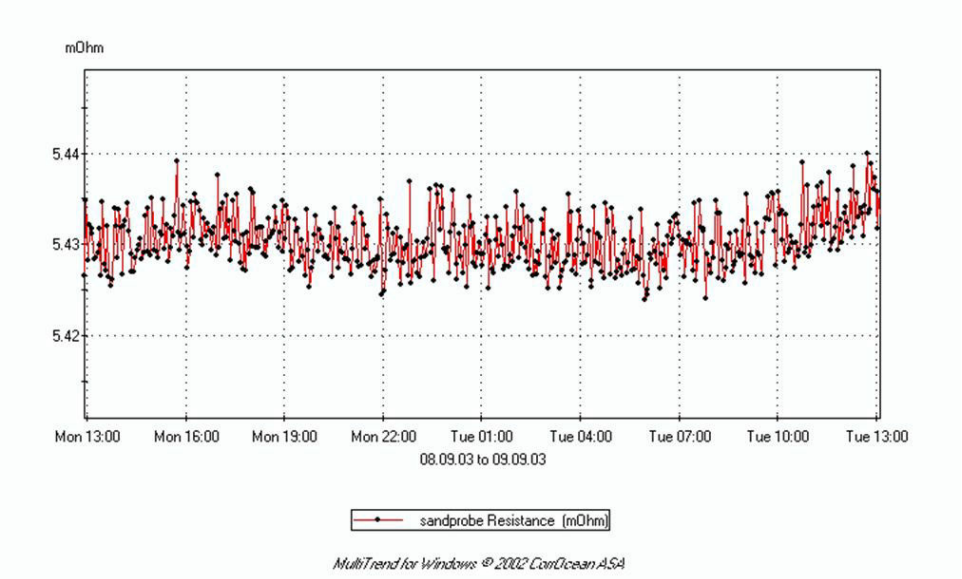
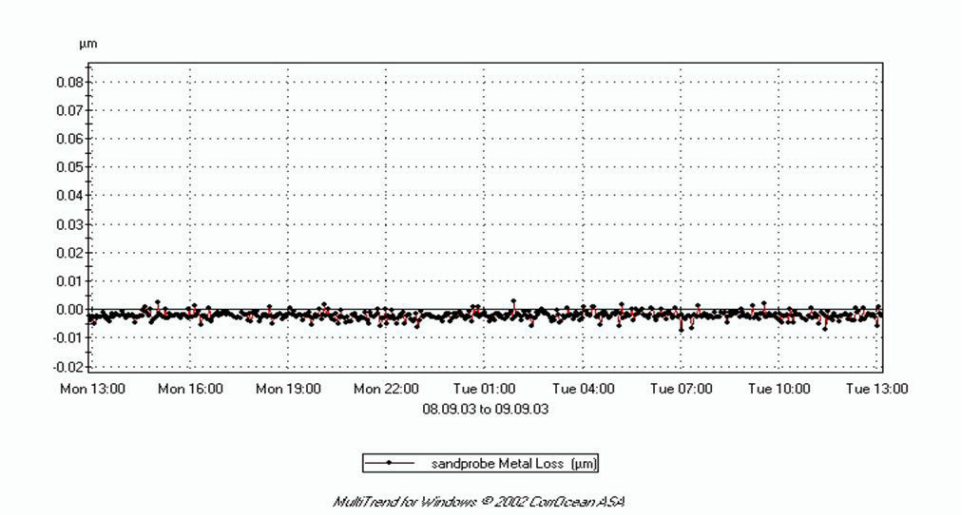


Figure 5-2: Metal loss plot on sand probe



The resistance of the elements is dependent of temperature in addition to thickness. The metal loss data compare the measurement elements with an equivalent reference element, not exposed to erosion environment, that is, this plot will eliminate most of the temperature effects.

The MultiTrend software has built in algorithms for temperature compensation to further improve data. See Ref 1 in References.

5.1.2 Terminal interface: MultiCorr

See the MultiCorr User Manual (referenced in References) for further details.

1. Download data from the CorrLog.

2. Connect MultiCorr to the CorrLog, turn on MultiCorr.
3. From the main menu:
    a. Select 3 - Terminal mode
    b. Select 2 - if CorrLog
    c. Select 2 - Transfer data
    d. Select 2 - from Logger; wait until data is transferred
    e. Press EXIT. (Leave submenu)
    f. Select 1 - Logger Manage
    g. Select 3 - Logger Setup
    h. Select 4 - Clear Logger Memory (Delete the data manually!)
    i. Turn off MultiCorr.
4. Connect MultiCorr to PC. Run MultiTrend and prepare data transfer from terminal.
5. From the main menu:
    a. Select 3 - Terminal mode
    b. Select 2 - if CorrLog
    c. Select 2 - Data Transfer
    d. Select 1 - Transfer data to PC/MultiTrend

    Note
    Sync these commands.

6. In MultiTrend: Press Retrieve Measurements.

    Note
    You can now select/unselect different probes and you must press ”STORE SELECT” button in MultiTrend to save the data.

    Note
    MultiCorr can define new instruments and probes. i.e. new instruments and probes might appear in MultiTrend after data is transferred.

    a. Ensure data transfer succeeded. i.e. check/plot the newest downloaded data.
    b. Select 6 - Clear Data in terminal.
    c. Turn off MultiCorr.

5.1.3 SKF Handheld terminal

The SKF Handheld Terminal replaces the MultiCorr terminal where the ATEX certification is required. The named Handheld Terminal is an IECEX and ATEX certified handheld running Roxar software.

Technical specifications

The SKF Handheld Terminal must be charged before use, for full charge. Five hours is needed if batteries have been fully discharged. The Terminal battery will be fully

discharged after nine days without use. Data uploaded to the terminal is stored on a permanent disk and will not be erased due to discharged or removed battery.

For further technical details and specifications, see the User Manual included with the SKF Handheld Terminal.

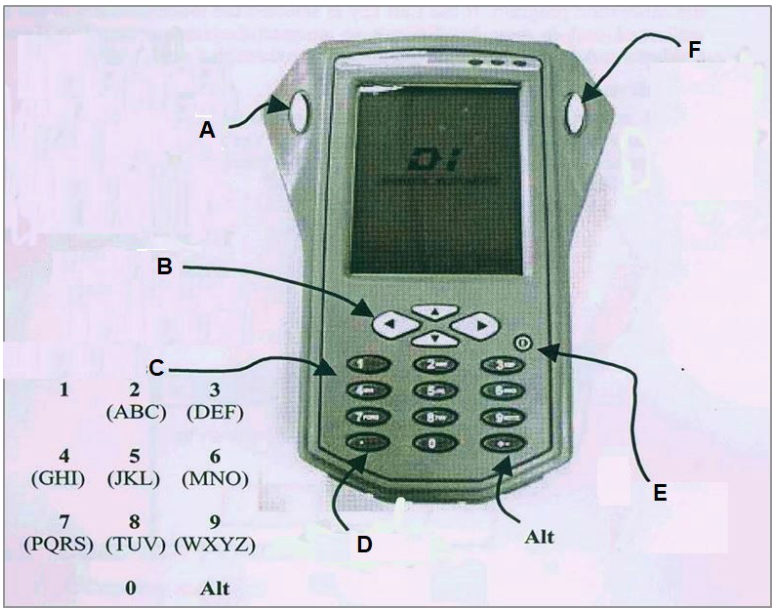
Operating instructions

The SKF Handheld Terminal is operated with the key or by pressing the visually presented buttons on the screen.

- Using the Keyboard: Press numeric key to select button, use Tab key to select next button. The Enter button activates the button.
- Using touch screen: Use the stylus or a capped pen to activate the buttons or to choose edit boxes.

Figure 5-3: Stylus

Figure 5-4: SKF handheld terminal



A. Tab
B. Arrow keys (LEFT, RIGHT, UP, DOWN)
C. Numeric keys
D. Delete
E. On/Off switch
F. Enter

Configuring the SKF handheld terminal

If the battery pack is removed or the battery has been fully discharged, the following steps must be performed when turning the Terminal on:

1. Calibrate Display. Follow the instructions on screen.
2. Set clock, choose the **Set Clock** button found at the bottom of the screen to set correct date and time.

Configuring CorrLog and the SandLog logger using the SKF handheld terminal

1. Connect the terminal to the logger with the correct cable.
2. Turn Terminal on, choose the **Get Status** button to retrieve logger ID to verify that a connection to the logger has been established.
3. Enter Log Setup dialog. Perform the following steps:
    a. Choose desired log interval.
    b. Configure the probe setup according to logger physical connections.
    c. Set clock to correct date and time.
    d. Close the setup dialog; perform a Get Status, and then enter the Log Setup dialog to verify that the configuration is as desired.

4. Press the **Get Data** button to access the transferred data from the Logger.

Table 5-1: Included cables in 22780-KIT

Old P/N	Item
P/N CA-26	PC<-> Terminal
P/N 22781	Terminal<->Sandlog (2700 Series)
P/N 22782	Terminal<->CorrLog/SandLog (22720 Series)

Transfer data to MultiTrend

See the *MultiTrend User Manual* on how to use the handheld terminal with MultiTrend. The operation is identical except that no actions on the terminal are needed to upload data to MultiTrend.

5.1.4 4-20 mA interface

This interface is available for CorrLog with ER-, LPR- and Galvanic probe and SandLog with sand probe. And the combined Sand/ER-probe.

The 4-20 mA signal is a linear function of corrosion or erosion on the element.

Table 5-2: 4-20 mA interface

Probe	4-20 mA range		Signal range		Equation
ER	4	20(1)	0 No corrosion	½ probe element left	f = k* (elem/ref-1)+4
LPR	4	20	0 mm/year	2.5 mm/year	f = k* (i/v) +4
Galvanic	4	20	0 µA	1020 µA	f = k*i +4
Sand	4	20	0 No erosion	½ probe element left	f = k* (elem/ref-1)+4

(1) 19.97 mA indicates probe failure.

5.2 Reporting and hazards

The CorrLog and SandLog instruments are EX-intrinsic safe. No hazards are expected during normal operating conditions.

The probes itself are covered in Ref 3 (cited in References) and not covered here.

5.3 Qualification requirements and training program for operators

Table 5-3: Operator qualifications during normal service

Part number	Name	Operator skills
ROX000282475	SandLog with Roxar fieldbus interface	Operators will need a brief introduction(1) to MultiTrend/Fieldwatch. This is often done during installation.
ROX000282478	SandLog with Roxar terminal interface	Operators will need a brief introduction to MultiCorr, MultiTrend/Fieldwatch. This is often done during installation.

Table 5-3: Operator qualifications during normal service *(continued)*

Part number	Name	Operator skills
ROX000282476	SandLog with 4-20 mA interface	
ROX000282479	SandLog with combined Roxar terminal interface & 4-20 mA interface	Operators will need a brief introduction to MultiCorr, MultiTrend/Fieldwatch. This is often done during installation.
ROX000282480	CorrLog with Roxar fieldbus interface	
ROX000282483	CorrLog with Roxar terminal interface	
ROX000282481	CorrLog with 4-20 mA interface	
ROX000282484	CorrLog with combined Roxar terminal interface & 4-20 mA interface	Operators will need a brief introduction to MultiCorr, MultiTrend/Fieldwatch. This is often done during installation.

(1) Course in MultiTrend is available.

5.4 RFM training program

During system installation, Roxar usually gives the customer the training necessary for operating the system.

Additionally, Roxar provides courses on request and client-specific courses can be held at the client's premises as agreed.

5.5 Troubleshooting

Table 5-4: Troubleshooting

Problem	Explanation
SandLog-CorrLog with terminal interface (ROX000282478, ROX000282479, ROX000282483, ROX000282484)	
SandLog-CorrLog (Logger) “time out” during terminal communication	When battery level is below a limit, the logger will not be able to wake up. Replace batteries
The logger wakes up in a normal manner, but “time out” start to appear during communication, i.e. during measurement download.	The batteries have enough power to boot the system, but is not able to keep the system alive for some period. In extreme cold environment, < -20 °C, this situation also might occur with half used batteries. Replace batteries.
SandLog-CorrLog with fieldbus interface (ROX000282475, ROX000282480)	

Table 5-4: Troubleshooting *(continued)*

Problem	Explanation
No response from the logger	If upgraded from terminal or 4-20 mA system: • Check cables. • Wait a couple of minutes before any communication on the fieldbus. The instrument has to charge for a couple of minutes before it can boot. • If system still does not wake-up, then disconnect fieldbus interface from mainboard for ~4 minutes. Restore, and try again.
SandLog-CorrLog with 4-20 mA interface (ROX000282476, ROX000282481)	
Signal out of range	Check 4-20 mA cable. **Note** It might be useful to set the probe-switch in a test position to distinguish between transmitter/ 4-20 mA error and probe errors. Refer to 4-20 mA interface connection.
Wrong measurement value Value in the range 4-20 mA, but not as expected	• Check probe selection switch. • Check probe cable. **Note** At start-up, wait at least 45 minutes. Initial start-up time is ~45 minutes before probe measurement is performed. Next update will take place within ~2 minutes. **Note** It might be useful to set the probe-switch in a test position to distinguish between transmitter/ 4-20 mA error and probe errors. Check the connections by referring to 4-20 mA interface connection.

6 Maintenance

This chapter describes all necessary precautions and maintenance operations, which normally can be done by the user, including those that are recommended to be carried out by Roxar, in order to ensure safe, reliable and economical operation. This chapter contains detailed procedures for routine inspection, periodic maintenance, corrections and minor repair with recommended spare parts, consumables, reporting requirements, relevant document references and, if applicable, requirements for special skills and minimum crew.

6.1 General

The SandLog and CorrLog instruments are designed to reduce the need of maintains to a minimum. No calibration is needed during lifetime.

The terminal/battery powered system will need replacement of batteries.

In addition, upgrades from offline systems to online systems are available.

6.2 Battery replacement

New batteries will give a battery voltage on at least 4.5 V. Replace batteries at voltage: 3.6 V. [(1)] When the logger is located in a cold environment (below 0°C), replace batteries before the winter or at 4.0 V.

Table 6-1: Battery replacement

Setup (Logger with terminal interface)	Measurement interval	Estimated batter lifetime
CorrLog with ER-Probe	12 hours	~3 years
CorrLog with LPR-Probe	12 hours	~2 years
CorrLog with Galvanic probe	12 hours	~2 years
SandLog with Sand Probe or Combi Probe	12 hours	~1 year
SandLog with Sand Probe or Combi Probe	1 hour	~1 month

⚠ WARNING

In EX–zones, a HOT WORK PERMIT is needed during this operation.

⚠ WARNING

Only the approved battery is allowed in EX–zones: Energizer Ultimate Lithium L92AAA.

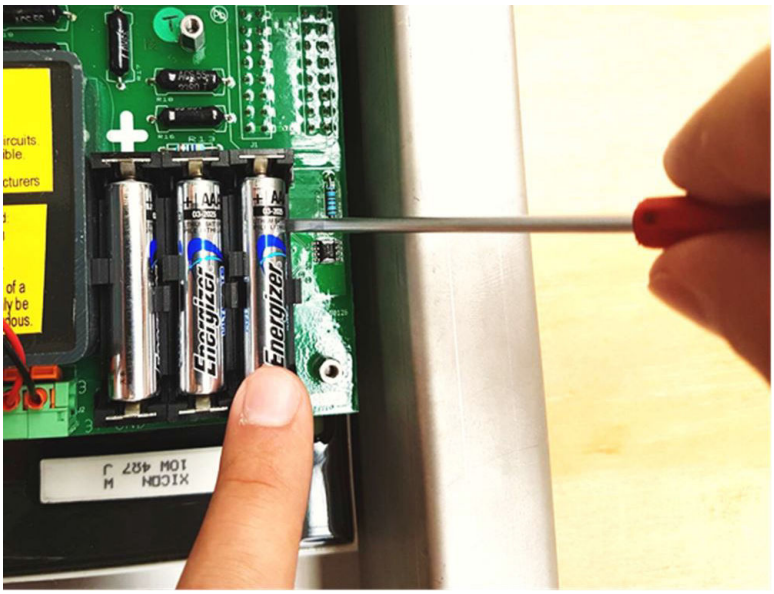
Follow these steps to replace a battery:

Equipment: Gas detector, hand tools as Allen key 5 mm, screwdrivers, MultiCorr with cable to check instrument functionality after battery change. You might need to set time and date after battery replacement.

(1) Value "Positive Battery" in MultiCorr or CorrLog-SandLog Terminal status display. Due to backward compatibility the Housekeeping digit for Positive battery voltage in FSMTrend version up to 3.04 is not correct in mV. Replace batteries at 2100.

1. Hot work permit needed! Follow the site requirement, use gas detector, etc.
2. Remove Cover from SandLog or CorrLog instrument.
3. Remove old batteries.
4. Replace with new batteries; Check date-stamp on the batteries, ensure that the batteries are in good condition and that batteries are of approved type. Do not use batteries with a test strip.
5. Ensure that the battery polarity is correct.
6. Replace cover on the instrument.

Figure 6-1: Replacing the battery



6.3 Storing, preservation, and maintenance of preservation

Term	Description
Packing	Instruments are to be packed in cardboard boxes, which are marked with Instrument Type, Part No. and Serial No. The boxes will also be marked with other information (for example, P.O. No., P.O. Item No., Stock No., Tag No.), if the purchaser requires.
Preservation	Do not insert batteries in a battery-powered system (remove if present).
Storage	Instruments must be stored indoors in a dry area. Instruments are to be stored in the original cardboard box, and not to be unpacked until just before installation.
Storing removed equipment	If an instrument is removed and is to be installed again later, the instrument first must be cleaned carefully. Insert plugs into glands. Open the box and remove any humidity. Remove the batteries. Instruments must be stored indoors in a dry area.

Term	Description
Maintenance during storage	No action.

7 Spare parts list

This section gives all necessary spare parts for the different equipment during operation.

The components are identified and described so that the necessary spare parts may be obtained. All lists are illustrated.

The spare parts list includes:

- Reference to figure and position number
- Description with material statement
- The RFM parts number

Table 7-1: Spare parts

Reference to figure	Description	Roxar part number	Other ID
1	Box-cover gasket, neoprene	PN 10262	
2	CorrLog instrument card, moulded	PN 70755	
	SandLog instrument card, moulded	PN 70755-S	(similar to 2)
	Roxar fieldbus interface	PN 70751	(similar to 5)
	Terminal interface	PN 70752	(similar to 5)
	4-20 mA interface	PN 70753	(similar to 5)
5	Terminal and 4-20 mA interface	PN 70754	
7	Drain plug; M20	PN 60272	
8	Blind dome; M20	PN 59702	
9	Nut for drain plug; M20 x 1.5	PN 60273	
10	Cable kit for terminal interface	PN 71593	
11	Batteries	ROX000334673	Energizer Ultimate Lithium L92 AAA
12	Gland probe, CorrLog	PN 60540	Hawke 501/453/ UNIV/O
	Gland probe, SandLog	PN 59601	Hawke 501/453/ UNIV/O
	Gland fieldbus	PN 59601	Hawke 501/453/ UNIV/O
15	MultiCorr – instrument cable	PN 16798	

Note
The numbers in the following images of the CorrLog and SandLog spare parts lists refer to Table 7-1.

Figure 7-1: CorrLog and SandLog spare parts example 1

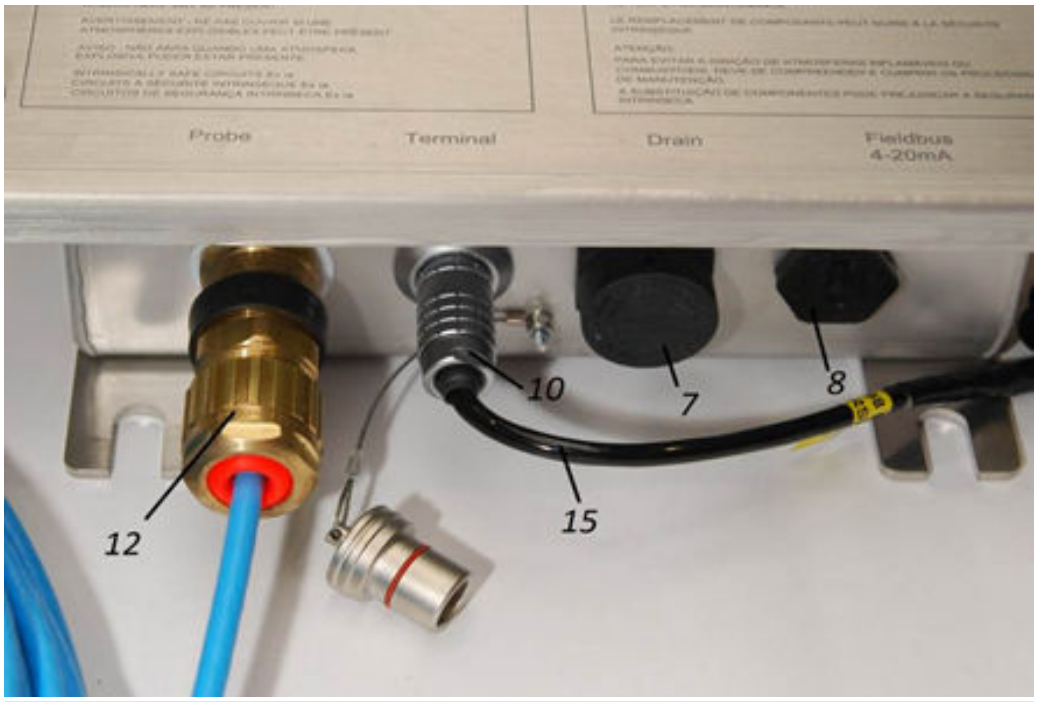


Figure 7-2: CorrLog and SandLog spare parts example 2

Figure 7-3: CorrLog and SandLog spare parts list

8 References

Reference	Part number	Title	Section links
Ref 1	4174-16959-I-MU-0003	*MultiTrend User manual* (This manual is available as a PDF file in MultiTrend, activated by pressing **Help**.)	• Configuration of MultiTrend software • Roxar fieldbus interface
Ref 2		*MultiCorr MKII User manual*; 1995.	• Terminal interface: MultiCorr
Ref 3	ROX000340091	*Corrosion Probes, User Manual*	• CorrLog with ER-probe and terminal interface: MultiTrend setup • Reporting and hazards
Ref 4	ROX000310887	SandLog & CorrLog Control drawing (for USA, Canada)	• Preparation and installation
Ref 5	ROX000163511	*Roxar Fieldwatch Administrators Manual*	• Configuring the Roxar Fieldwatch software
Ref 6	ROX000145393	*Roxar Fieldwatch Explorer - User Manual*	• Configuring the Roxar Fieldwatch software

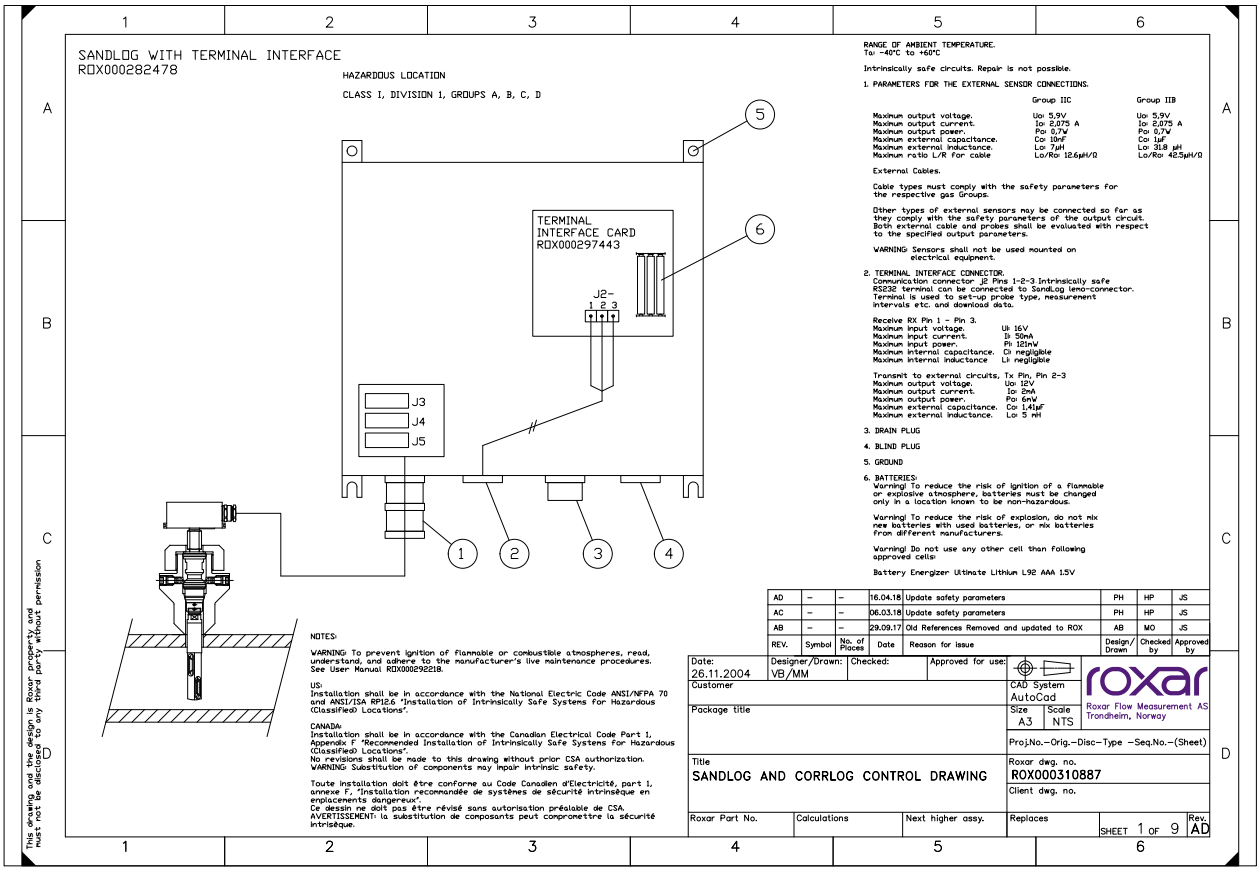
A Assembly Drawings

This section contains Roxar assembly drawings referenced throughout the document.

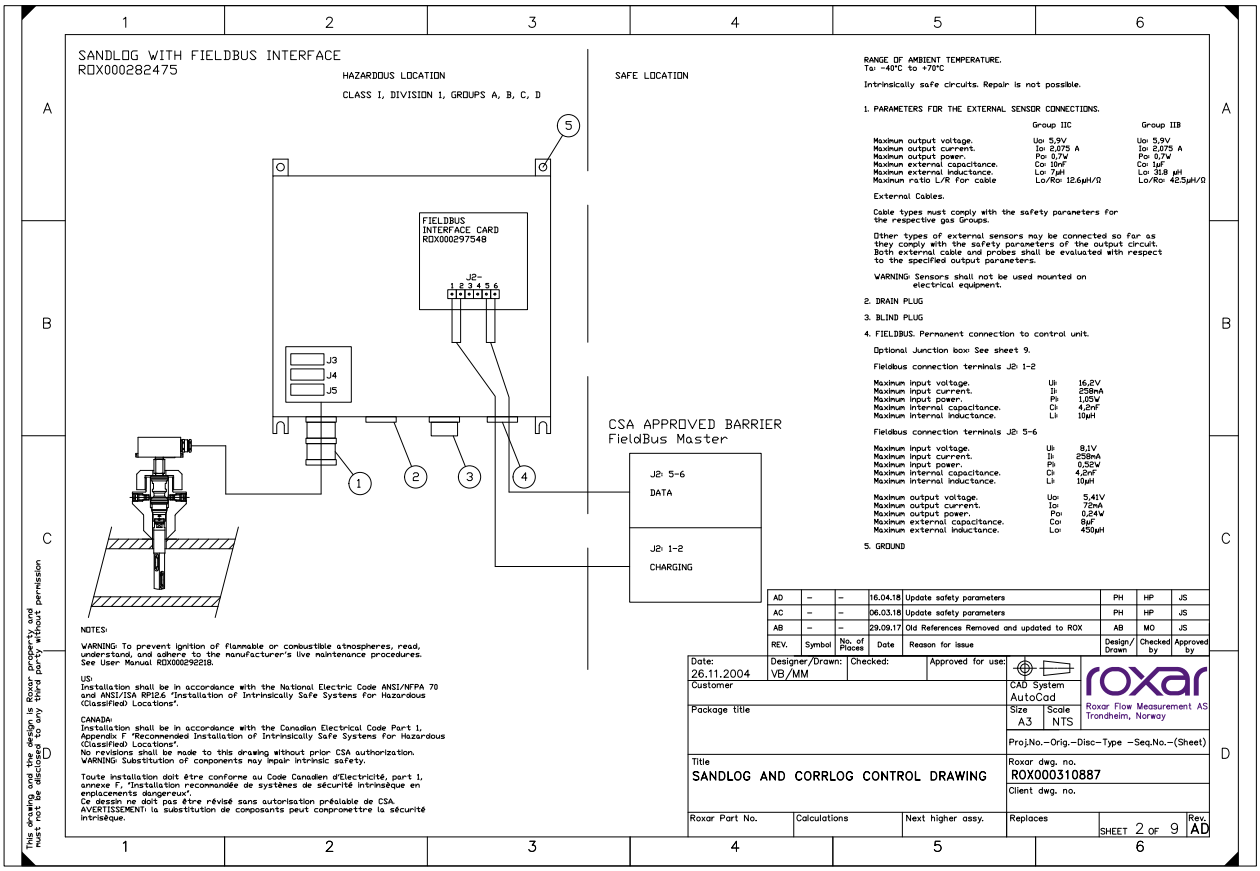
This appendix contains the following drawings:

- ROX000282478: SandLog with Terminal Interface
- ROX000282475: SandLog with fieldbus Interface
- ROX000282476: SandLog with 4-20 mA Interface
- ROX000282483: CorrLog with Terminal Interface
- ROX000282480: CorrLog with Fieldbus interface
- ROX000282481: CorrLog with 4-20 mA Interface
- ROX000282484: CorrLog with Terminal 4-20 mA Interface
- ROX000282479: SandLog with Terminal 4-20 mA Interface
- ROX000310887: SandLog and CorrLog Control Drawing

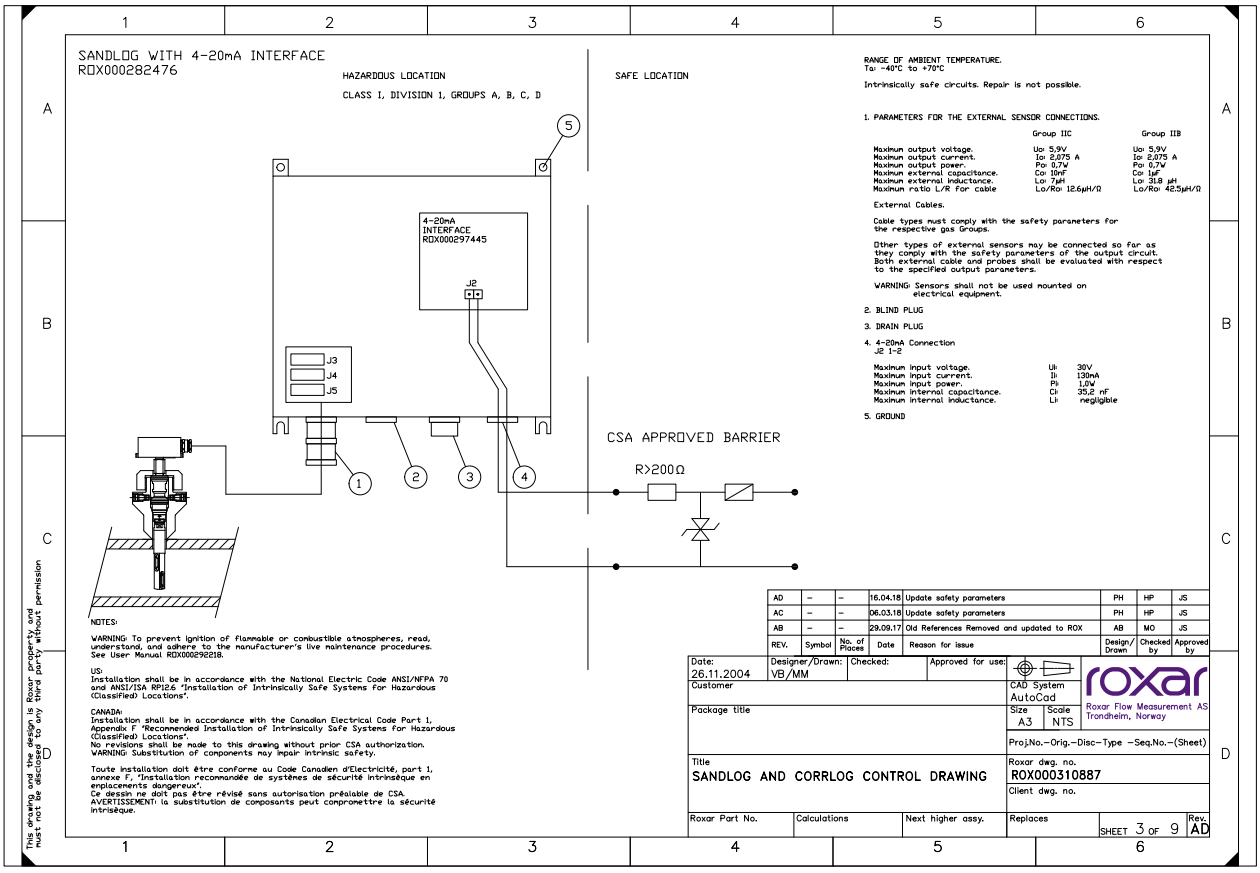
ROX000282478: SandLog with Terminal Interface



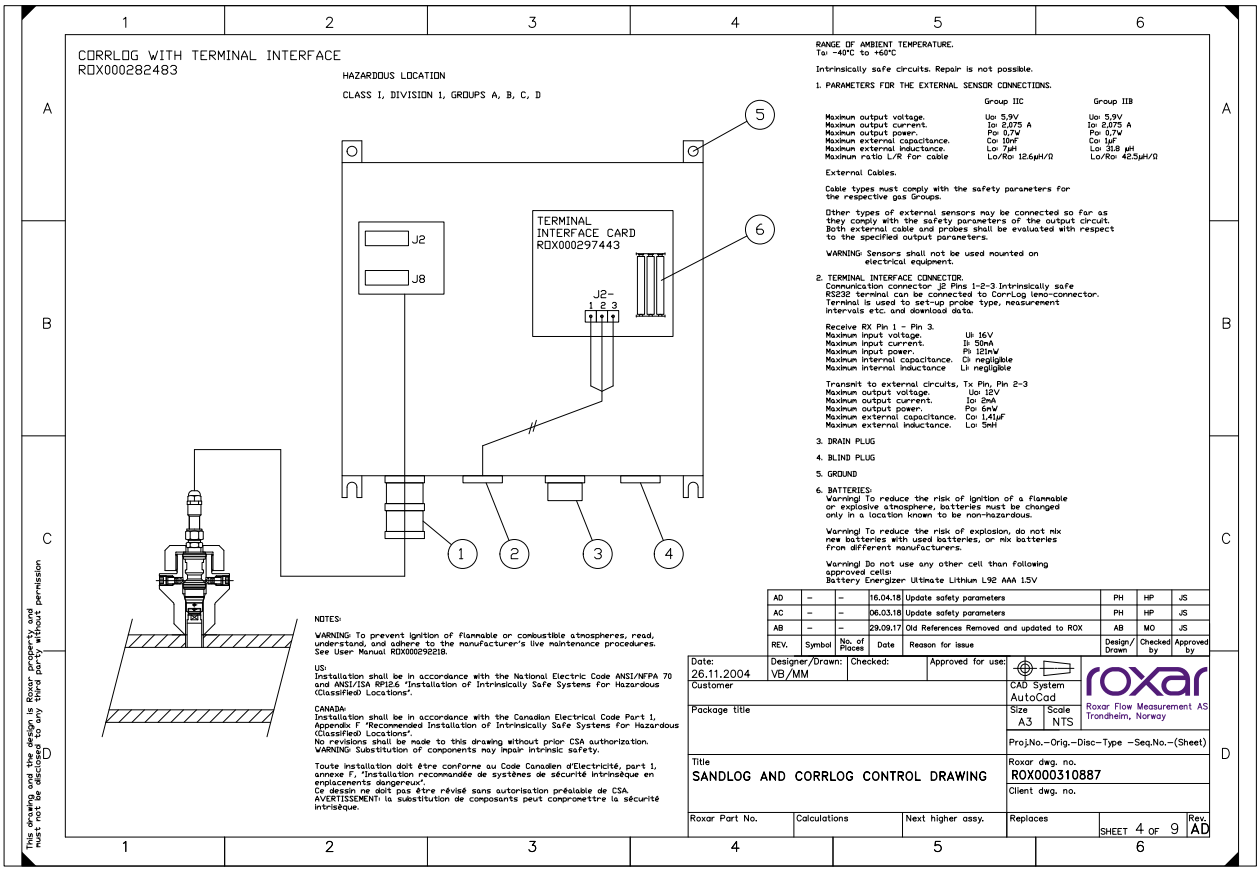
ROX000282475: SandLog with fieldbus Interface



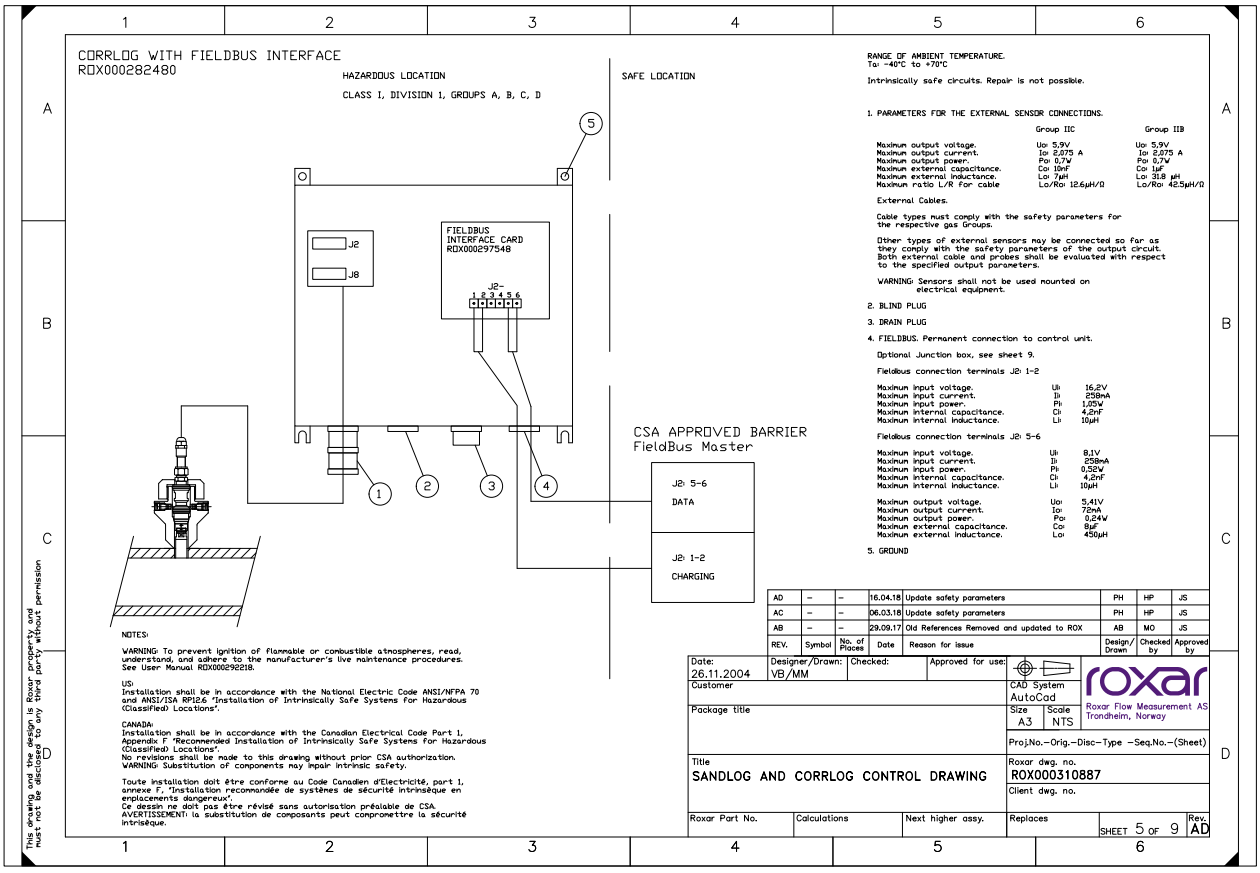
ROX000282476: SandLog with 4-20 mA Interface



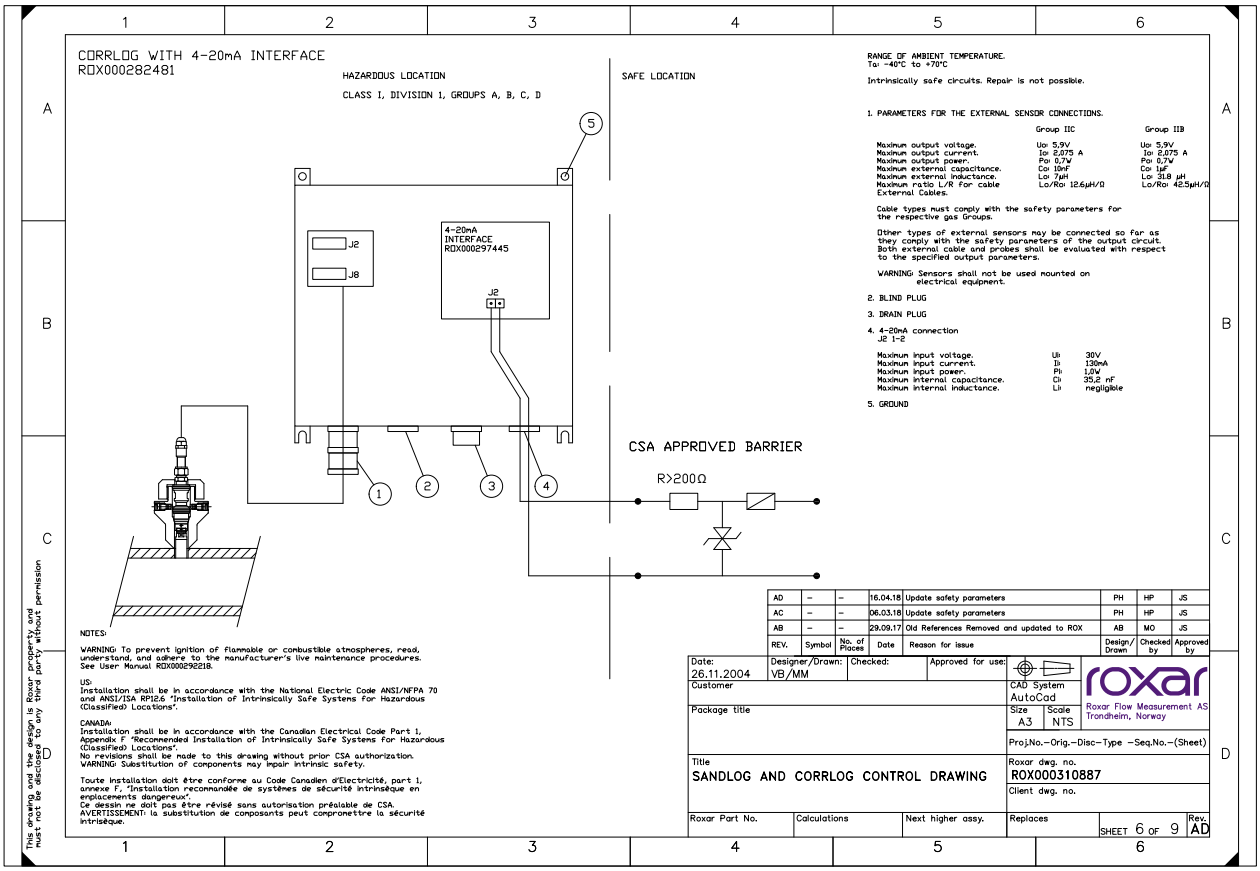
ROX000282483: CorrLog with Terminal Interface



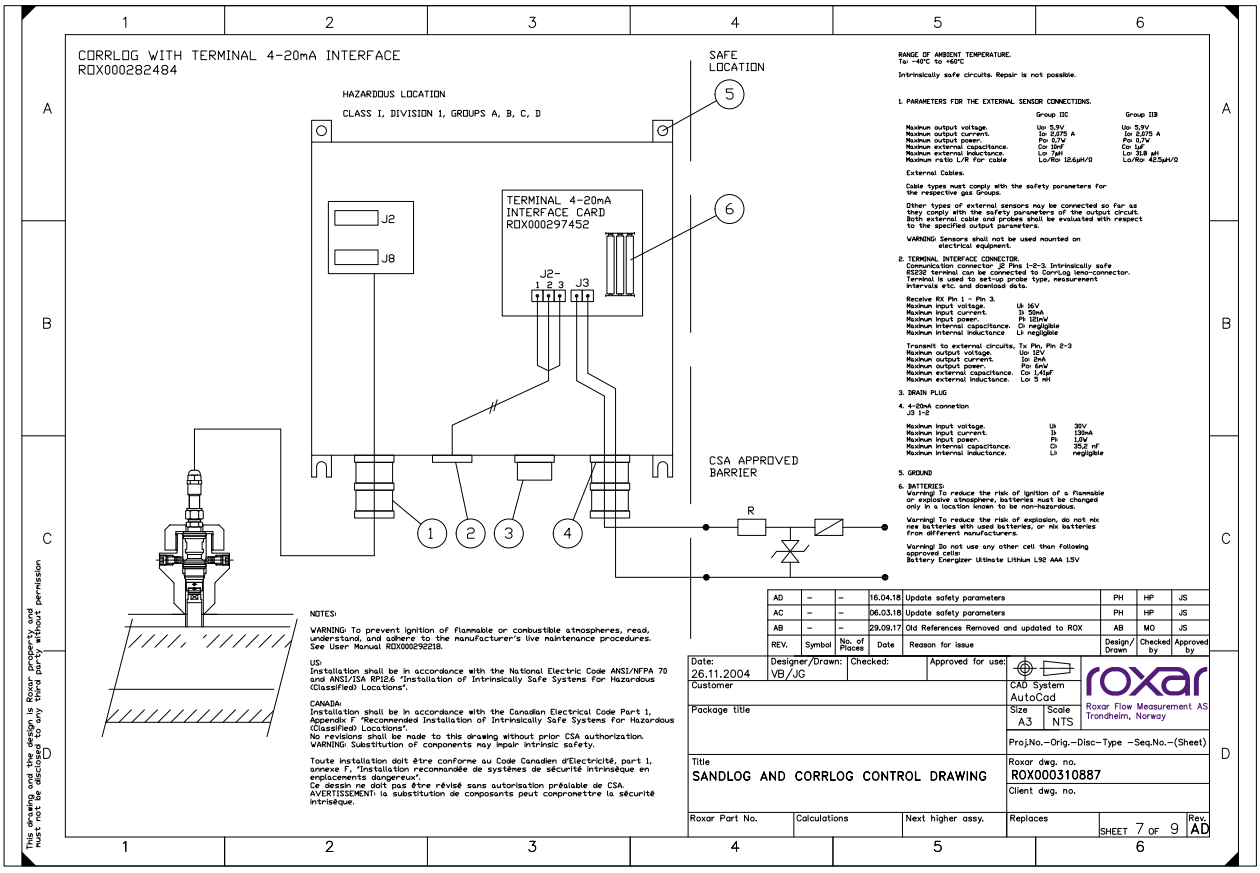
ROX000282480: CorrLog with Fieldbus interface



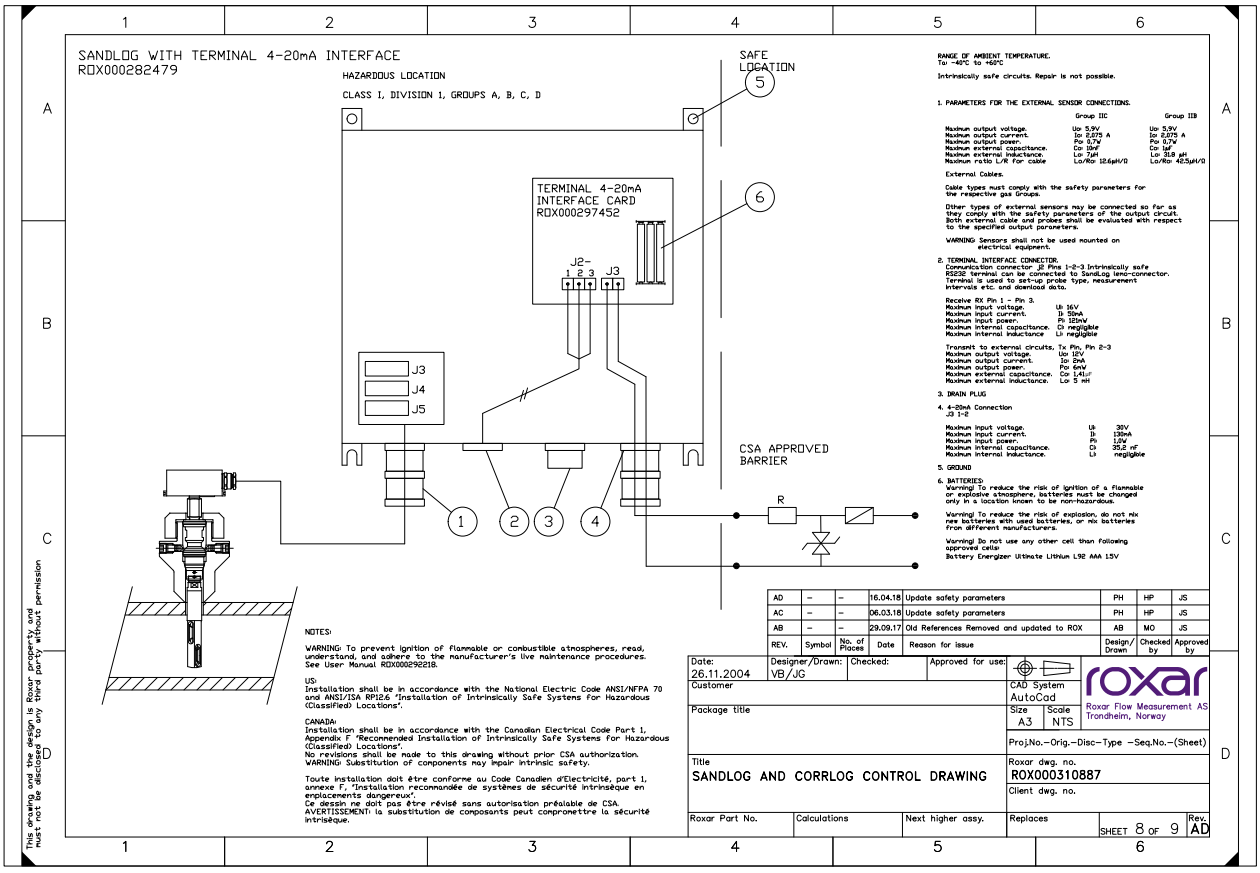
ROX000282481: CorrLog with 4-20 mA Interface



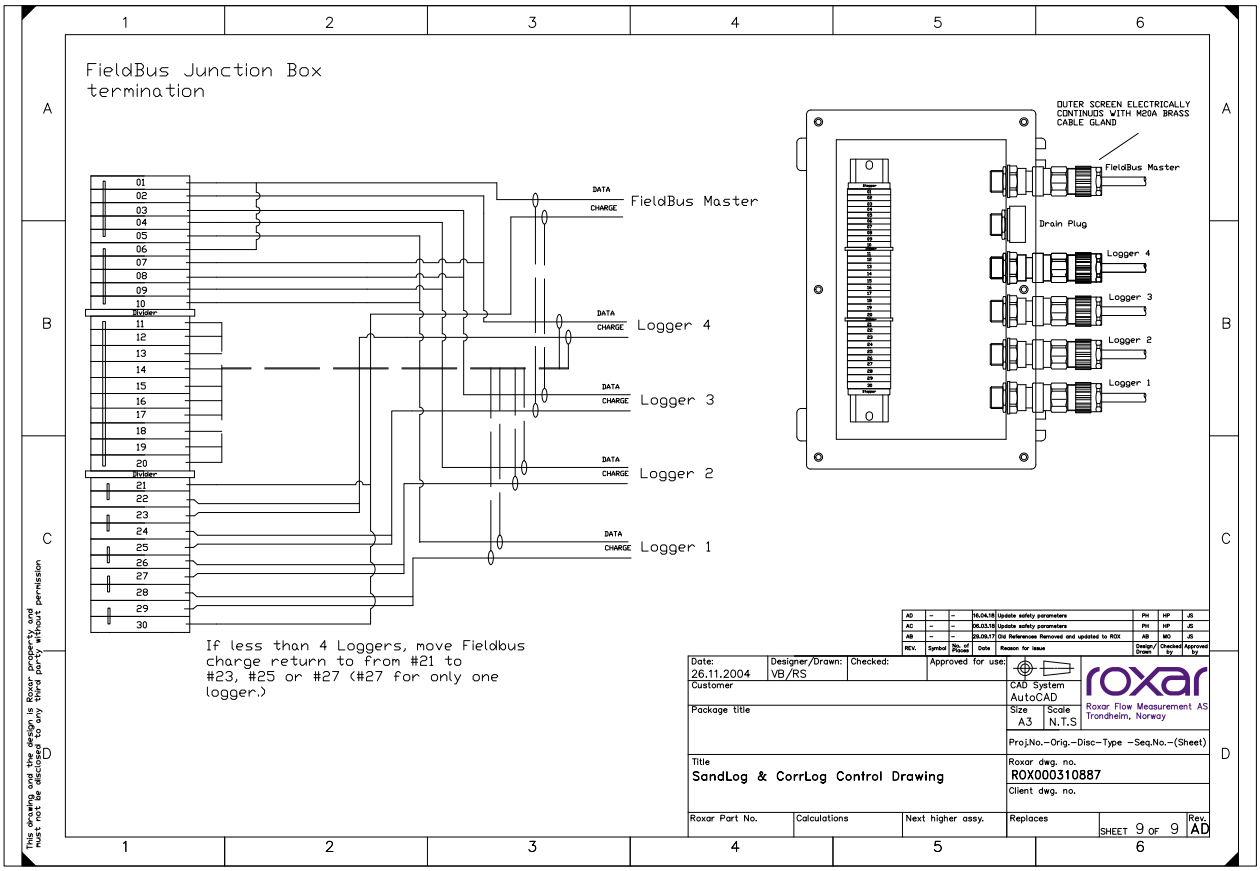
ROX000282484: CorrLog with Terminal 4-20 mA Interface



ROX000282479: SandLog with Terminal 4-20 mA Interface



ROX000310887: SandLog and CorrLog Control Drawing



B Conformity to Ex agreements

Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018
EN 60079-11: 2012

Certification: Ⓔx II 1 G Ex ia IIC T4 Ga -40 °F (-40 °C) ≤ Ta ≤ 158 °F (70 °C)
For Terminal version Ta: -40 °F (-40 °C) ≤ Ta ≤ 140 °F (60 °C))

ATEX Certificate number: Presafe 16 ATEX 8222X

UKEX Certificate number: DNV 22UKEX 33999X

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

- IEC 60079-0: 2017 Explosive atmospheres – Part 0: General requirements; Edition:6.0
- IEC 60079-11: 2011 Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”; Edition: 6.0

Certification: Ex ia IIC T4 Ga -40 °F (-40 °C) ≤ Ta ≤ 158 °F (70 °C)
-40 °F (-40 °C) ≤ Ta ≤ 140 °F (60 °C) for Terminal version

Certificate number: IECEx PRE 16.0042X

According to US and Canada standards:

- UL 60079-0:2019, Sixth Edition
- UL 60079-11: 2013, Sixth Edition
- ANSI/UL 61010-1-2012, Third Edition (May 11, 2012)
- CAN/CSA-C22.2 No. 0-10 (reaffirmed 2015)
- CAN/CSA-C22.2 No. 60079-0:2019
- CAN/CSA-C22.2 No. 60079-11:2014
- CAN/CSA-C22.2 No. 61010-1-12 (May 2012)

Certification: Ex ia IIC/IIB T4 Ga Class I, Div. 1, Groups A, B, C, D T4

INMETRO Applicable standards:

- ABNT NBR IEC 60079-0:2020
- ABNT NBR IEC 60079-11:2013

Certification: Ex ia IIC/IIB T4 Ga

Certificate number: DNV 19.0146 X

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