



MODEL ML-9500B MICROCOR®

DATA-LOGGER

USER MANUAL



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Introduction

CHAPTER 1

The Microcor data-logger Model ML-9500B and the Model MT-9485A transmitter are a part of a new generation of high-resolution digital instruments, which operate with special high-resolution Microcor probes. The resolution of the system is 18 Bit, or 256 higher than previous electrical resistance measurement instruments. This increased resolution greatly improves response to corrosion upsets, and at the same time allows measurements to be made in virtually any environment. The patented technology combines speed of response, similar to linear polarization resistance, with the universal applicability of electrical resistance measurements. The Microcor Data-logger ML-9500B is shown in figure 1, and the Microcor Transmitter MT-9485A is shown in figure 2.



Figure 1 Model ML-9500B Data-logger

The transmitter must be relatively close-coupled to the probe in order to achieve this improved performance. Consequently, the probe is connected to the transmitter through short probe-connecting adapter, or through a cable of no more than 2 meters (6 feet) length in the case of some retractable probes.



Figure 2 Model MT-9485A Transmitter

The system connection of the transmitter, data-logger, Corrddata Mate data transfer unit, and the PC is shown in figure 3.

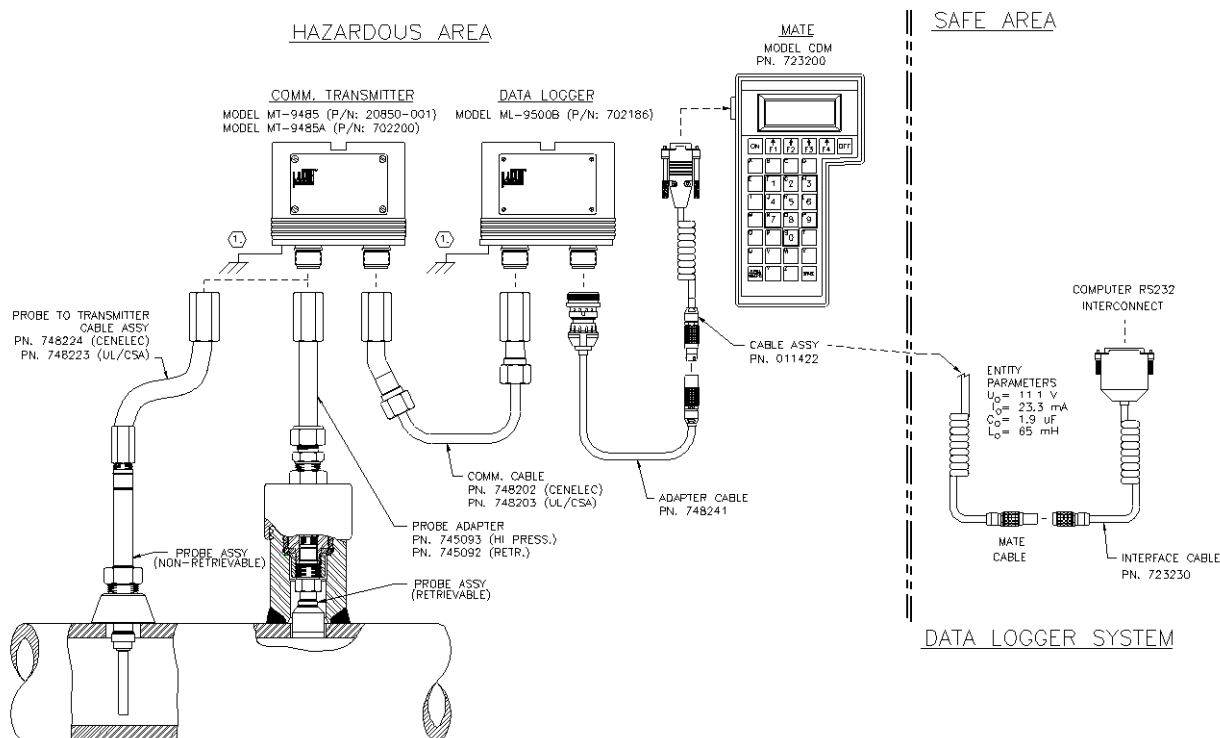


Figure 3 System Configuration

The Microcor transmitters Model MT-9485A are used on their own for continuous on-line monitoring systems. For these on-line systems, the transmitters operate with a 24 VDC power supply and RS 485 communications to allow multi-drop connections between the central corrosion monitoring computer and the transmitters. This minimizes cabling costs. Each transmitter has internal DIP switches to set the Identification Number or Address of the transmitter from 0 to 31 for communications over the two-wire RS 485 bus. For more details on the Model MT-9485A hardware, see the instruction manual for the transmitter. Two types of software packages are available for use with the transmitter alone. For simple systems, see the Microcor software manual. For full on-line corrosion management systems see the ICMS3/ Amulet software manual.

Adding the battery powered Model ML-9500B data-logger to the MT-9485A transmitter with an interconnecting cable, provides for an autonomous data collection system. The Model ML-9500B has the added capability of simplified data collection from the hazardous area with the intrinsically safe Corrddata Mate data collector (see figure 4). The communication operates through an intrinsically safe RS 232 port on the data-logger. This avoids the need to remove the data-logger to the safe area under a hot work permit, in order to transfer data to the PC, as was required with the previous Model ML-9500 data-logger. In non-hazardous areas, the data may still be collected directly with a portable PC and connection cable to the data-logger.



Figure 4 Corrddata Mate programmed as Micromate

For details on the Corrddata Mate hardware configured as with Micromate software, see the manual for this unit. For details on the software and operation of the transmitter/data-logger/Micromate see the manual on the Microcor software.

Specification

CHAPTER 2

Data-logger Model ML-9500B

- Enclosure NEMA 7 and IP 66/ NEMA 4X
- Weight 3.5 lbs (1.6 Kg)
- Dimensions 4.5" (115mm) Diameter by 4.25" (108 mm) High including connectors
- Power supply 3.6 V 16Ah Lithium battery
- Quiescent current data-logger and transmitter 0.4 mA
- Approximate current during probe reading 100 mA for 1 minute
- Approximate current during data transfer 40 mA
- Battery Life at one reading per hour - approx. minimum 6 months
- Battery life at one reading every three hours - approx. minimum 12 months
- Maximum data storage capacity 8,000 readings
- Transmitter Communication RS 485 two-wire 2400 Baud, 8 data bits, 1 stop bit, no parity
- Proprietary communications protocol
- Resolution 18 bit (1 part in 262,144)
- Ambient temperature range -40C to +70C (-40F to 158F)
- Hazardous area classification EExd [ia] IIC T4
- Wall mount and pole mounting bracket included
- Maximum transmitter to data-logger cable length 100 meters (300 feet)

Installation

CHAPTER 3

Important: This manual covers installation and operation of the model 9500B data-logger and model 9485A transmitter only. See Appendix A for compatibility with other data-logger and transmitter model combinations.

Data-logger Enclosure

The Microcor data-logger enclosure is explosion-proof (flameproof), and is sealed with an O-ring so as to be gas-tight when fully tightened

Warning: It is very important to make sure that the data-logger cover is fully tightened down on to the O-ring seal, to avoid in-leakage of water or moist air that may subsequently cause condensation. Water or condensation is likely to cause malfunction of the data-logger and even corrosion of the electronics.

The data-logger cover can be tightened, with the aid of a 2" center by 1/4" pin spanner wrench on the base of the unit, and by hand or with a 3/8" square bar or similar on the cover (see figure 5). The cover of the data-logger can be locked in place with the 5/64 Allen screw. See Figure 6. This is a requirement of the explosion-proof (flameproof) enclosure to prevent accidental loosening of the cover.



Figure 5 Spanner Wrench

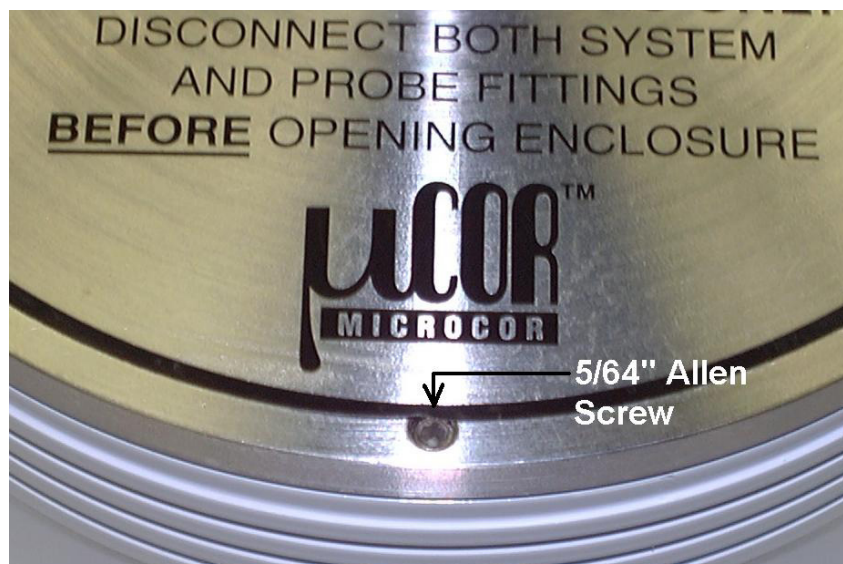


Figure 6 Cover Locking Screw

If the data-logger is to be used in a hazardous area, the transmitter and data-logger are connected with a cable that has explosion-proof (flameproof) connectors, part number 748202-LL for European requirements, and part number 748203-LL for North America, where LL is the cable length in feet. Figure 7 shows the explosion-proof type connectors. When making these connections, take care not to damage the sealing O-rings. A small amount of white grease or silicone grease should be used to lubricate the O-rings to assist assembly. Make sure that the connector nuts are fully tightened over the O-rings, and that the Allen screws are then locked to prevent loosening. The connections may only be made and unmade in a hazardous area with the power shut off to the system. Take care when disconnecting a cable or probe to make sure that the Allen locking screw has been loosened first.

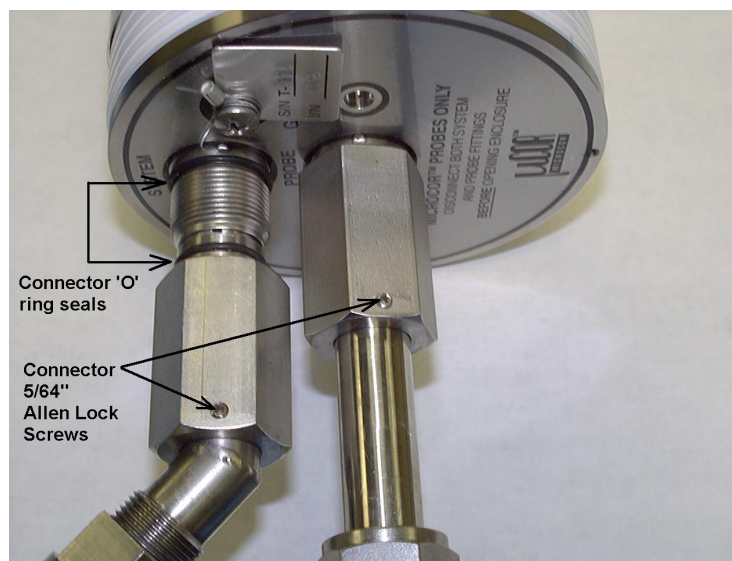


Figure 7 Explosion-proof connectors shown on transmitter

Battery Connection

The Microcor data-logger is shipped with the battery disconnected, and before first use, the battery must be connected. This should only be done in a non-hazardous, clean area. Verify the set screw is loose, and then remove the cover. Plug the battery connector into the connector below the battery support plate, as shown in Figure 5. Replace the cover and fully tighten down on the O-ring, and tighten the set screw (see “Data-logger Enclosure” section on page 6).

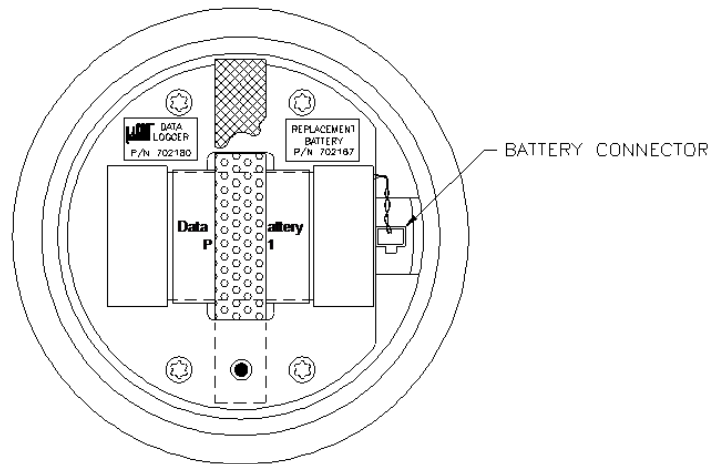


Figure 8 Battery Connection Location

If the data-logger and transmitter are used in a non-hazardous area, then a non explosion-proof cable can be used part number 748209- LL where LL is the length in feet. This is shown in figure 9.

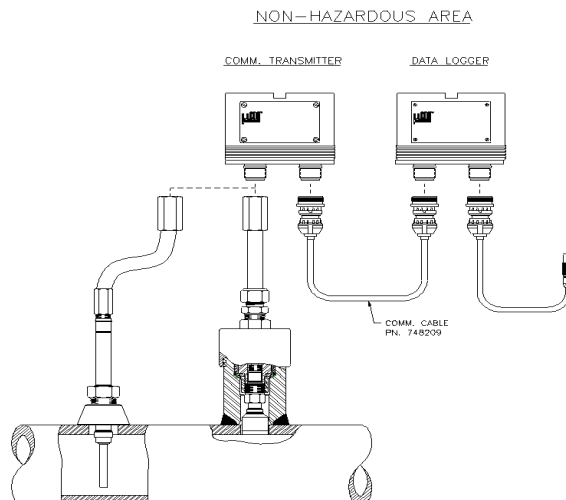


Figure 9 Transmitter & Data-logger Connections

Data transfer between the data-logger and a portable PC or a handheld intrinsically safe Corrddata Mate data transfer unit, is made via the data transfer port on the data-logger as shown in figure 5. If the data-logger is installed in a non-hazardous area, a portable PC may be connected directly to the data transfer port from the serial port of the portable PC. A 5 foot cable for this purpose is part number 748243.

If the system is installed in a hazardous area, the intrinsically safe Corrddata Mate data transfer unit, programmed with Micromate software, may be used to program the data-logger and collect data from the data-logger for later transfer to the PC. In both of the above cases, the data-logger does not need to be disconnected from the transmitter.

If you are in a hazardous area and do not have a Corrddata Mate data transfer unit, the data-logger may be disconnected from the transmitter under a hot work permit. The data-logger may then be taken to a safe area to transfer the data to the PC.

Mounting the Data-logger

The data-logger has a mounting bracket included (see figure 10). The large U-bolt enables attachment to the cover of the data-logger, and the smaller U-bolt for attachment of the assembly onto a pole or other strut. The mounting angle permits several mounting configurations including wall mounting. The transmitter normally mounts directly onto the probe. The cable between the transmitter and the data-logger allows the data-logger to be positioned conveniently for data recovery while the transmitter may be attached to the probe even if it is relatively inaccessible. A cable length up to 100 meters (300 feet) may be used for this purpose.

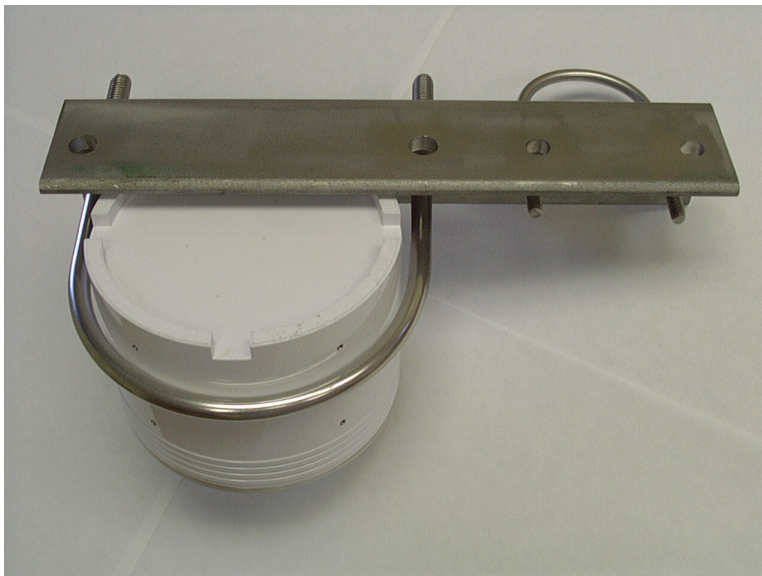


Figure 10 Mounting Bracket

Battery Replacement

The battery life depends on the reading frequency. Typically a reading every three hours provides sufficient data and gives a good battery life. At this frequency battery life will be typically a minimum of 12 months. This may be reduced to as much as 50% at low temperatures of -40C. The replacement battery part number is 702167.

If the data-logger is in a hazardous area, the battery must be removed and replaced in a safe area. Disconnection of the data-logger for this purpose should be done under a hot work permit.

The battery is held in the support plate with a Velcro strap, and can be plugged into the battery socket on the electronics circuit board below the battery support plate (see figure 11).

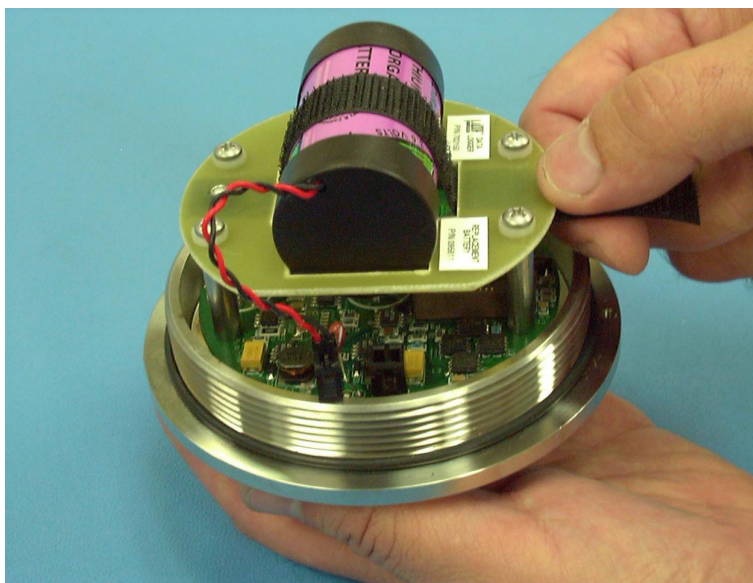


Figure 11 Battery Mounting in Data-logger

Operation

CHAPTER 4

The Microcor data-logger Model 9500B is generally set up and read with the Corrddata Mate or Mate II configured with Micromate software. The Corrddata Mate or Mate II is intrinsically safe and allows the data-logger to be set up and read in a hazardous area, whereas direct connection of a portable PC does not. The Corrddata Mate allows collection of data from multiple data-loggers in the field, for subsequent transfer to the PC, running Microcor software. For detailed operation of this software, refer to the applicable manual.

The Microcor software has four programs as follows:

1. Micrec.exe - For direct on-line recording and display of readings from a single transmitter.
2. Micnet.exe - For direct reading and logging of data from multiple modules.
3. Miclog.exe - For transferring data from a data-logger to the PC
4. Micret.exe - For displaying stored data files

Make sure that the battery in the data-logger has been connected before configuration (see figure 10)

Troubleshooting

If communication cannot be established with the data-logger, replace the battery and recheck the operation.

If abnormal readings, or an excursion occurs that cannot be explained, the system electronics may be verified by connecting the meter prover in place of the probe and checking that the reading corresponds. See "Checking Operation with Meter Prover" in Chapter 3 Installation of the Microcor transmitter manual.

If the meter prover shows the electronics to be operating correctly, then inspect the probe to transmitter connections, and the probe for damage, high resistance, or poor connections.

After initial application of power, the transmitter takes approximately one minute to start up during which time it will send the error code -999,999 when its data is requested.

If there is a probe or probe connection failure an error codes -999,998, or -999,997 may be generated. See the transmitter manual for more details.

Appendix A

Compatibility

The Microcor data-logger model 9500B is designed to be used with the model 9485A Microcor transmitter. If you are using a model 9500A data-logger with a model 9485 transmitter, please see the Users Manual for the model 9500A data-logger (RCS P/N 702150-MANUAL).

When using the model 9500B data-logger, use only cables between the data-logger and the Mate data-collection unit, or between the data-logger and a personal computer that are labeled "FOR MICROCOR ML-9500B DATALOGGERS" Use of other cables will not function properly and may damage the unit. The correct cable part numbers are listed below:

Model 9500A

Data-logger to Mate	Cable P/N 748206
Data-logger to P.C.	Cable P/N 748204

Model 9500B

Data-logger to Mate	Cable P/N 748241
Data-logger to P.C.	Cable P/N 748243

Both model data-logger to Mate cables are included in the Mate unit kit, and labeled appropriately. If cables to connect to a P.C. are required, contact the factory.

The model 9500B data-logger may be used with either a model 9485A transmitter, or with the older model 9485 transmitter. Also, the older model 9500A data-logger may be used with either the model 9485A or 9485 transmitter. However, when using the older 9500A data-logger with the newer 9485A transmitter, battery life in the data-logger will be reduced.

ATEX Certification

Appendix B

EC-TYPE EXAMINATION CERTIFICATE

[1]
[2]

Equipment or Protective System intended for use
in Potentially explosive atmospheres
Directive 94/9/EC



- [3] EC-Type Examination Certificate Number: DEMKO SYST 03 ATEX 135051
- [4] Equipment or Protective System: SYST: ML-9500B Datalogger, CDM Reader, MT-9485 or MT-9485A Transmitter
- [5] Manufacturer: Rohrbach Cosasco Systems Inc
- [6] Address: 11841 E Smith Ave, Santa Fe Springs CA 90670 USA
- [7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.
- [8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.
- The examination and test results are recorded in confidential report no: 03NK07915
- [9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
- EN 50039:1980 E
- [10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.
- [11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of this Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.
- [12] The marking of the equipment or protective system shall include the following:

System:  II 2G EEx d ib IIC T4

On behalf of UL International Demko A/S

Herlev, 2003-12-22


Karina Christiansen
Certification Manager

UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730 Herlev, Denmark

Certificate 03 ATEX 135051

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[13]

Schedule

[14]

EC-TYPE EXAMINATION CERTIFICATE No.

DEMKO SYST 03 ATEX 135051

[15] Description of Equipment or protective system:

The SYST consists of a certified ML-9500B data logger (Certificate Number 03 ATEX 0307915), certified MT-9485, or MT-9485A Transmitter probe assembly (Certificate Number 03 ATEX 015219), and certified CDM data terminal (Certificate Number 03 ATEX 133432). The ML-9500B data logger collects data from a MT-9485 or MT-9485A Transmitter – probe assembly. The data is corrosion control information for pipe lines and tanks. A CDM Reader is used to download the information, and then the information is inputted to a computer in the non hazardous area.

Electrical data

ML - 3.6V size D primary cell lithium battery, part number LSH 20 by SAFT. The battery is in the ML-9500B, and feeds both the ML-9500B Datalogger, and MT 9485A Transmitter.

CDM – 9V from six 1.5V AA Batteries.

The batteries are Duracell MN1500, Energizer E91, EN91 or Rayovac 815 alkaline type.

CDM Output

Pins 2 and 3 to Pin 1

$U_o = 11.1 \text{ V dc}$

$I_o = 23.3 \text{ mA dc}$

$P_o = 65 \text{ mW}$

$C_o = 1.9 \text{ uF}$

$L_o = 65 \text{ mH}$

$U_i = 10.9 \text{ V dc}$

$P_i = 0.3 \text{ W}$

$C_i = 0$

$Li = 0$

Temperature Data

SYST: $-20^\circ\text{C} \leq T_a \leq 50^\circ\text{C}$

[16]

Report No.:

Project Report No.:03NK07915 (Hazardous Location Testing)

Certificate: 03 ATEX 135051

Report: 03NK07915

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Drawings:

Number	Rev./Date	Sheets	Title
702106	J	2	System Diagram

[17] Special conditions for safe use: None

[18] Essential Health and Safety Requirements

Concerning ESR this Schedule verifies compliance with the Ex standards only. The manufacturer's Declaration of Conformity declares compliance with other relevant Directives.

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

On behalf of UL International Demko A/S

Herlev, 2003-12-22


Karina Christiansen
Certification Manager

Certificate: 03 ATEX 135051
Report: 03NK07915

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EC-TYPE EXAMINATION CERTIFICATE

[1]
[2]

Equipment or Protective System intended for use
in Potentially explosive atmospheres
Directive 94/9/EC



- [3] EC-Type Examination Certificate Number: **DEMKO 03 ATEX 0307915**
- [4] Equipment or Protective System: **ML-9500B Datalogger**
- [5] Manufacturer: **Rohrback Cosasco Systems Inc**
- [6] Address: **11841 E Smith Ave, Santa Fe Springs CA 90670 USA**
- [7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.
- [8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.
- The examination and test results are recorded in confidential report no: **03NK07915**
- [9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
**EN 50014:1997 E Incl A1 + A2 EN 50018:2000 E incl A1,
EN 50020:2002 E**
- [10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.
- [11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of this Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.
- [12] The marking of the equipment or protective system shall include the following:

Ex II 2G EEx d [ia] IIC T4

On behalf of UL International Demko A/S

Herlev, 2003-12-22


Karina Christiansen
Certification Manager

UL International Demko A/S

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P1

[13]

Schedule

[14]

EC-TYPE EXAMINATION CERTIFICATE No.

DEMKO 03 ATEX 0307915

[15]

Description of Equipment or protective system:

The ML-9500B data logger collects data from a transmitter – probe assembly. The data is information on corrosion control for pipe lines and tanks. The information can be downloaded to an intrinsically safe device.

Electrical data

3.6V size D primary cell lithium battery, part number LSH 20 by SAFT. The battery is in the ML-9500B, and feeds both the ML-9500B Datalogger, and MT-9485 or MT 9485A Transmitter.

Output

$U_o = 11.1 \text{ V dc}$	$U_i = 11.1 \text{ V dc}$
$I_o = 558 \text{ mA dc}$	$P_i = 0.3 \text{ W}$
$P_o = 1.55 \text{ W}$	$C_i = 0$
$C_o = 1.9 \text{ uF}$	$L_i = 0$
$L_o = 114 \text{ uH}$	

Temperature Range

Ambient temperature range: $-40^\circ\text{C} \leq T_{\text{amb}} \leq +70^\circ\text{C}$

Routine Tests

Each ML-9500B datalogger main enclosure with connectors fitted, shall be subjected to a routine overpressure test of 15.95 bar for at least 10 seconds and no greater than 60 seconds as required by clause 16.1 of EN50018. There shall be no permanent deformation or damage to the enclosure.

Each connector main body shall be subjected to a routine overpressure test of 14.5 bar for at least 10 seconds and no greater than 60 seconds as required by clause 16.1 of EN50018. There shall be no permanent deformation or damage to the enclosure.

[16]

Report No.:

Project Report No.:03NK07915 (Hazardous Location Testing)

Certificate: 03 ATEX 0307915
Report: 03NK07915

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Drawings:

Number	Rev. /Date	Title
702132	E	Datalogger Schematic
702180	B	Data logger Assy
702130	H	PCB ASSY
702179	23 Jan 03	Shield
702178	22Aug 03	Label Warning
702176	E	Nameplate
702131		PCB
748215	C	Connector detail
14540-003	B	Nut
3550-125	D	Connector
3800-009	E	Cover
2050-008	C	Base
2050-009	F	Base Weldment

[17] Special conditions for safe use: None

[18] Essential Health and Safety Requirements

Concerning ESR this Schedule verifies compliance with the Ex standards only. The manufacturer's Declaration of Conformity declares compliance with other relevant Directives.

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

On behalf of UL International Demko A/S

Herlev, 2003-12-22


Karina Christiansen
Certification Manager

Certificate: 03 ATEX 0307915
Report: 03NK07915

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