

X76CTM
S E R I E S

C O N T I N U O U S

TANK M O N I T O R



RONAN

X76CTM

S E R I E S



The Ronan Model X76CTM Continuous Tank Monitoring System provides state of the art and highly reliable supervision for hydrocarbon fuels, chemicals, and other liquids stored in underground and aboveground single or doublewall tanks. The system meets and exceeds EPA State and Federal regulatory requirements for leak detection. The continuous leak detection, volumetric measurement for inventory management, remote communication, local display and historical parameter recording capabilities, makes the X76CTM the most advanced and reliable system of its kind on the market.

The system is housed in a NEMA 4, IP45 enclosure and provides intrinsically safe interface to probes and sensors located in hazardous areas. It features local LCD readout, hardcopy printouts of alarms, inventory reports, leak test reports, and all system parameters, with the ability to interface to a remote host.



X76CTM

S E R I E S

- ◆ Continuous Statistical Leak Detection (CSLD)
- ◆ Remote Data Communication
- ◆ Alarm Recording Capability (up to 3000 events)
- ◆ 0.1 and 0.2 gph In-Tank Leak Detection
- ◆ Interstitial and Piping Sump Leak Sensing (for up to 16 sensors programmable)
- ◆ Two Independent Serial RS232 Communication Ports
- ◆ Four Programmable Auxiliary Relay Outputs
- ◆ Comprehensive Inventory Management
- ◆ Fax Capabilities
- ◆ Weather Proof Enclosure NEMA 4
- ◆ Modbus Interface Protocol

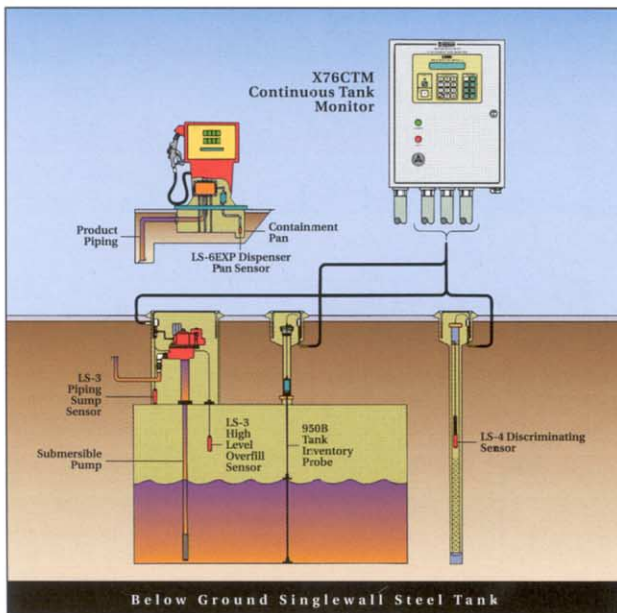
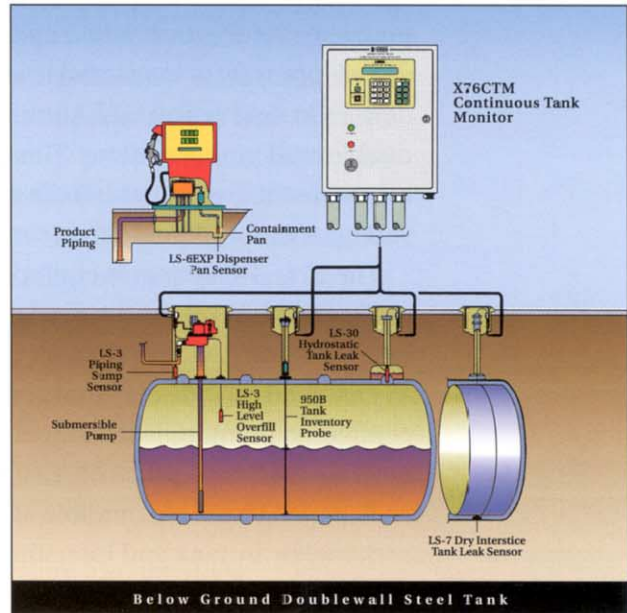


The X76CTM utilizes two types of magnetostrictive level gauging probes: the Model 950B for hydrocarbon application, and the Model 951B for chemical liquid applications. The probes are supplied with product and water interface floats constructed from materials which are compatible with requirements of the application.

The 950B is constructed from 316 stainless steel, anodized aluminum, Urethane and Delrin, to provide years of trouble-free service in hydrocarbon liquid.

The 951B Probe is constructed of a 316 stainless steel guide tube and floats, and teflon jacketed transducer. Compatible for chemical applications.

Both probes transmit levels and temperature data to the X76CTM controller for conversion into net and gross product and water volume.



The Ronan Model LS-3 and LS-3s Hydrocarbon Vertical Liquid Sensors, and the LS-3ss are suitable for liquid chemical application, and are designed to detect changes of liquid levels in reservoirs or intrusion of liquid in normally dry containment zones, caisson compartments and annulus of doublewall tanks where positioning of a vertical sensor applies.

The LS-3 and LS-3s are constructed from 304 and 316 stainless steel, polysulfone, Buna-N and PVC materials. The LS-3ss, constructed of 304 and 316 stainless steel and Teflon, is suitable for chemical applications where corrosion is a concern.

All LS-3 sensors have user selectable logic, i.e. normally open or normally closed, and may be installed in wet or dry environments for years of trouble-free service.



LEAK DETECTION

The Ronan X76CTM Leak Detection and Inventory Management System features in-tank precision level measurement and interstitial monitoring that meets and exceeds EPA regulatory compliance requirements. The system is designed to accept up to 8 in-tank magnetostrictive probes and up to 16 digital inputs from interstitial level sensing devices in doublewall tank annulus and double-wall piping systems. The in-tank magnetostrictive probes handle a wide variety of fuel and fluid measurements.

The X76CTM system is equipped with audio and visual alarm annunciation and interfaces with the user through a 2 line by 24 character LCD display that can be configured in multiple languages and provides hard copy prints on a 24 character wide paper. Visual and audible alarms are triggered by in-tank and interstitial out-of-

limit conditions. Four on-board relays can be programmed to control the operation of a submersible pump when a preprogrammed level limit has been exceeded, or an interstitial, piping sump, or secondary containment sensor has detected a breach. The relays, or a combination of them, can also be used for remote alarm annunciation.

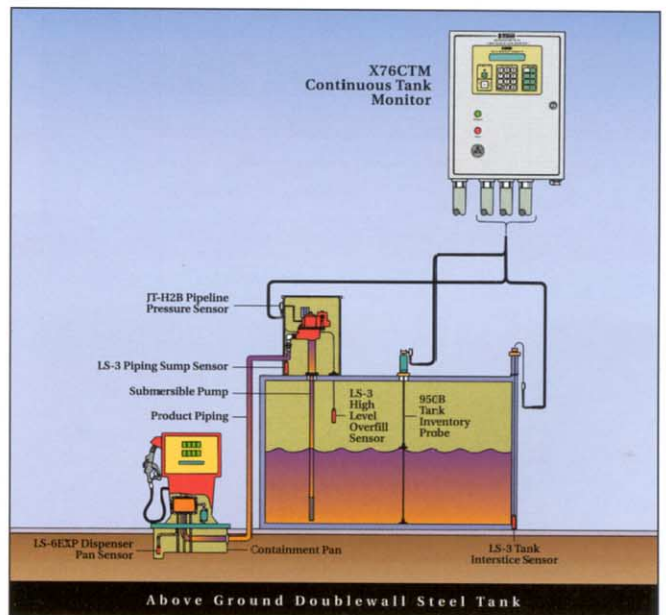
The X76CTM is third-party certified to meet and outperform the US EPA Standards. The X76CTM is UL and ULC listed, providing intrinsically safe interface to all probes located in Hazardous Areas Class I, Division 1, Groups C & D Environment.

The X76CTM with its alarm recording and remote communication capabilities, on-board relays, and sixteen secondary containment sensor inputs will provide complete compliance on secondary containment system without the need for additional modules or software.

The Ronan Models LS-7 and LS-7s Horizontal Liquid Level Sensors are utilized to detect the intrusion of liquid in normally dry interstitial doublewall tanks, containment zones, and caisson compartments where horizontal positioning of the sensor is required or preferred.

The Model LS-7s allows sensor function testing from ground level by integral pull-to-test cable. The LS-7 and LS-7s of all PVC encapsulated construction will provide years of trouble-free service.

4





For 24 hour high volume product transfer application, the X76CTM provides Statistical Tank Evaluation and Leak Test (S.T.E.A.L.T.) as a standard feature. The system's software provides the most accurate Continuous Statistical Leak Detection (CSLD) algorithm available today, allowing for 24 hour uninterrupted automatic leak detection without the need for tank shutdown.

The X76CTM continuously conducts leak tests during quiescent tank conditions where temperature and level are below preset interference threshold conditions. All successful tests, as well as the interrupted test, are logged into memory. The CSLD information is used to form a highly

accurate leak rate measurement history, calculating the continuous leak rate by application of Ronan's unique statistical algorithm technique. Leak test results based on these calculations are stored in on-board nonvolatile memory for hard copy printout or transportation to a host.

CSLD eliminates the need to shut down operations to perform leak tests. All tests are constantly performed and results are automatically stored in the memory available for hard copy printout. CSLD leak detection technology is accurate and reliable for any size of storage facility.

STATISTICAL TANK LEAK TEST

The Ronan X76CTM provides comprehensive inventory management information essential for the most economical product distribution and supply. This inventory information is available in real time on the system's LCD display, as well as in hard copy from the integral printer based on special report functions accessible through the front panel keyboard.

The system logs all product drops and product extraction in historical memory. It calculates the length of inventory availability based on past statistical usage rate.

The system also provides the status of current net and gross volume of each tank at any given time and a total throughput for a preprogrammed timespan or the total throughput since the last shift report. Product labels and product codes, date of usage, percent of tank volume and ullage are available for hard copy printout.

INVENTORY MANAGEMENT

SYSTEM REPORTS

A number of reports are available to assist the tank owner to show proof of compliance with the EPA tank monitoring requirements, as well as most economical product inventory management. The CSLD report is available at automatic intervals or it may be manually requested, providing instant proof of tank leak compliance.

In addition to the statistical in-tank leak detection, the system provides current alarm reports that indicate breach of liquid into containment area, sump alarm, or doublewall pipelines and dispenser ponds. Current inventory status, product transaction reports, and statistical fuel usage are all essential for the most economical inventory management.

This information provides for timely product delivery, minimum inventory control, and fuel transaction reconciliation at the end of each shift, day, or preselected period.

Reports for tank parameter, alarm annunciation, and auxiliary relay function assignment, provide verification of system's setup and configuration selection.

Ronan Engineering
21200 Oxnard Street
Woodland Hills CA 91367

**** CSLD report ****
06/25/98 13:29:20

CSLD REPORT

T2 Test 1:35 rate=0.020
06/25/98 13:29:20

T2 Test 0:53 rate=
06/25/98 10:39:02

T2 Test 1:19 rate=
06/25/98 06:24:59

Test 0:41 rate=
06/24/98 11:38

Test 1:22 ra
06/24/98 11:38

Test 1:14 r
06/24/98 11:38

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Tank Report ****
06/02/98 10:39:02

Tank #1

Model O/C2(8)100
Manufact. 100

TANK REPORT

Shape round-end
Diameter 92.00 in
Length 361.94 in
Tilt 0.00
Capacity 9726.81 gal
Product Regular
Manifolded No

Probe mt:7100
Serial# BU655658
Length 96.0
Offset 0.1

RTD#1 at 15
RTD#2 at 3
RTD#3 at 4
RTD#4 at 4
RTD#5 at 4

Wire speed

*** Alarm

Low alarm
Lolo ala
High al
HiHi al
High w

Leak

1 SupPipeSump
State: Normal
Logic: Norm,Open

2 SupFullSump
State: Alarm
Logic: Alarm

3 SupAnnular
State: Norm,Open
Logic: Norm,Open

4 Rel
State: Not assigned
Logic: Norm

5 Rel
State: Not assigned
Logic: Norm

6 Rel
State: Not assigned
Logic: Norm

7 Rel
State: Not assigned
Logic: Norm

8 Rel
State: Not assigned
Logic: Norm

9 Rel
State: Not assigned
Logic: Norm

10 Rel
State: Not assigned
Logic: Norm

11 Rel
State: Not assigned
Logic: Norm

12 Rel
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Logic: Norm

13 Rel
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Logic: Norm

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Logic: Norm

17 Rel
State: Not assigned
Logic: Norm

18 Rel
State: Not assigned
Logic: Norm

19 Rel
State: Not assigned
Logic: Norm

20 Rel
State: Not assigned
Logic: Norm

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Annunciator settings ****
06/02/98 10:34:59

on contact Relay: RemoteCTA
Horn: No
Scripts: none

Alarm on delivery: Not assigned
Relay: Yes
Horn: Yes
Scripts: none

Alarm on delivery: Not assigned
Relay: Yes
Horn: Yes
Scripts: none

Alarm on delivery: Not assigned
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Horn: Yes
Scripts: none

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Horn: Yes
Scripts: none

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Scripts: none

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Scripts: none

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Horn: Yes
Scripts: none

Alarm on delivery: Not assigned
Relay: Yes
Horn: Yes
Scripts: none

Alarm on delivery: Not assigned
Relay: Yes
Horn: Yes
Scripts: none

Alarm on delivery: Not assigned
Relay: Yes
Horn: Yes
Scripts: none

Alarm on delivery: Not assigned
Relay: Yes
Horn: Yes
Scripts: none

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Relays settings ****
06/02/98 10:37:14

1 UnleadedPSD
Logic: Norm,Open
Timeout: 30 s

2 UnleadedPSD
Logic: Norm,Open
Timeout: 30 s

3 RegularPSD
Logic: Norm,Open
Timeout: 30 s

4 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

5 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

6 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

7 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

8 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

9 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

10 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

11 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

12 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

13 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

14 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

15 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

16 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

17 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

18 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

19 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

20 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

21 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

22 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

23 RemoteCTA
Logic: Norm,Open
Timeout: 30 s

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Inventory report ****
06/02/98 11:20:55

Tank #3

Product Super

Level 0.0 in

Water, lvl 6825.8 gal

Net 6885.8 gal

Gross 0.8 gal

Water, grs 6885.8 gal

Total 6885.8 gal

Ullage 95%, 2354.7 gal

Temp 73.34 F

Temp 73.34 F

Temp 73.34 F

Temp 73.34 F

Temp 73.34 F

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Contacts settings ****
06/02/98 10:36:19

1 SupPipeSump
State: Normal
Logic: Norm,Open

2 SupFullSump
State: Alarm
Logic: Alarm

3 SupAnnular
State: Norm,Open
Logic: Norm,Open

4 Rel
State: Not assigned
Logic: Norm

5 Rel
State: Not assigned
Logic: Norm

6 Rel
State: Not assigned
Logic: Norm

7 Rel
State: Not assigned
Logic: Norm

8 Rel
State: Not assigned
Logic: Norm

9 Rel
State: Not assigned
Logic: Norm

10 Rel
State: Not assigned
Logic: Norm

11 Rel
State: Not assigned
Logic: Norm

12 Rel
State: Not assigned
Logic: Norm

13 Rel
State: Not assigned
Logic: Norm

14 Rel
State: Not assigned
Logic: Norm

15 Rel
State: Not assigned
Logic: Norm

16 Rel
State: Not assigned
Logic: Norm

17 Rel
State: Not assigned
Logic: Norm

18 Rel
State: Not assigned
Logic: Norm

19 Rel
State: Not assigned
Logic: Norm

20 Rel
State: Not assigned
Logic: Norm

21 Rel
State: Not assigned
Logic: Norm

22 Rel
State: Not assigned
Logic: Norm

23 Rel
State: Not assigned
Logic: Norm

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Shift report ****
06/02/98 11:29:19

Last report printed:
06/02/98 11:03:09

Tank #3

Product Super

Level 0.0 in

Water, lvl 61.0 in

Net 0.0 in

Gross 6885.8 gal

Water, grs 6885.8 gal

Total 6885.8 gal

Ullage 95%, 2354.7 gal

Temp 73.34 F

Temp 73.34 F

Temp 73.34 F

Temp 73.34 F

Ronan LDM
21200 Oxnard Str
Woodland Hills CA 91367

**** Active alarms ****
06/02/98 11:20:25

C02 SupFullSump alarm

C05 RegFullSump alarm

Tank# 3 No tank alarms

06/02/98 11:10:59

06/02/98 11:10:59

06/02/98 11:10:59

06/02/98 11:10:59

06/02/98 11:10:59

06/02/98 11:10:59

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X76CTM

S E R I E S

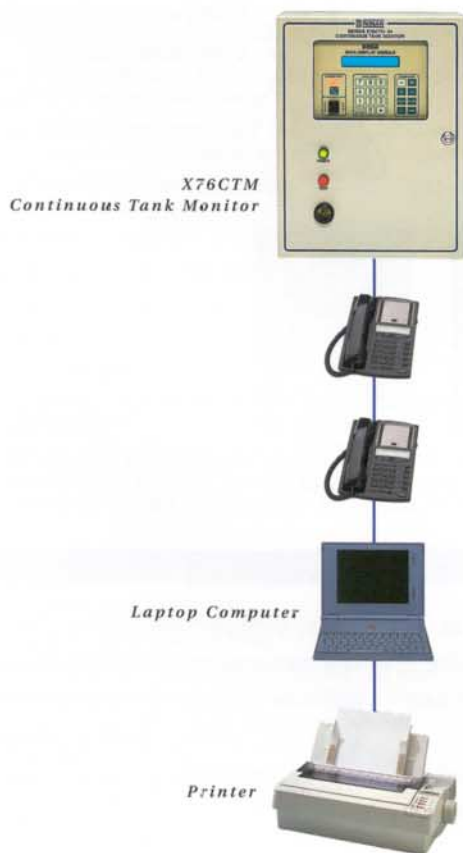
The Ronan X76CTM features two independent RS232 serial ports terminated on the enclosure panel with waterproof serial communication connectors. Serial port one is used for configuration parameter setup, transmission of compliance reports, system alarms, and product transaction to a remote host. The same port may be utilized to download software upgrades via a local laptop or personal computer, or a remote connection via dial-up modem and public telephone lines for remote access from the Ronan factory technical assistants or owners' main facilities.

The second port may be used to interface to the Ronan X76TM-2000 Tank Monitor, or interface to a site dispenser controller and point of sale computer.

COMMUNICATION CAPABILITY

The serial port assignments and communication protocol are set up through front panel keypad commands or via serial commands available in the X76CTM when connected to a local or remote PC.

The X76CTM provides Modbus ASCII, or Modbus RTU protocols for data transfer interface protocols in industrial applications.



The system is designed to communicate via public telephone lines and dial-up modem with a remote host at speeds of up to 19,200 baud. The system also supports leased lines.

REMOTE COMMUNICATION

The command prompts, residing in the X76CTM, are downloaded to the host computer for simple navigation and queries for tank status, configuration settings, or software upgrade. The remote host user can select any of the prompts to review site activities, request leak detection compliance reports, or make system configuration changes.

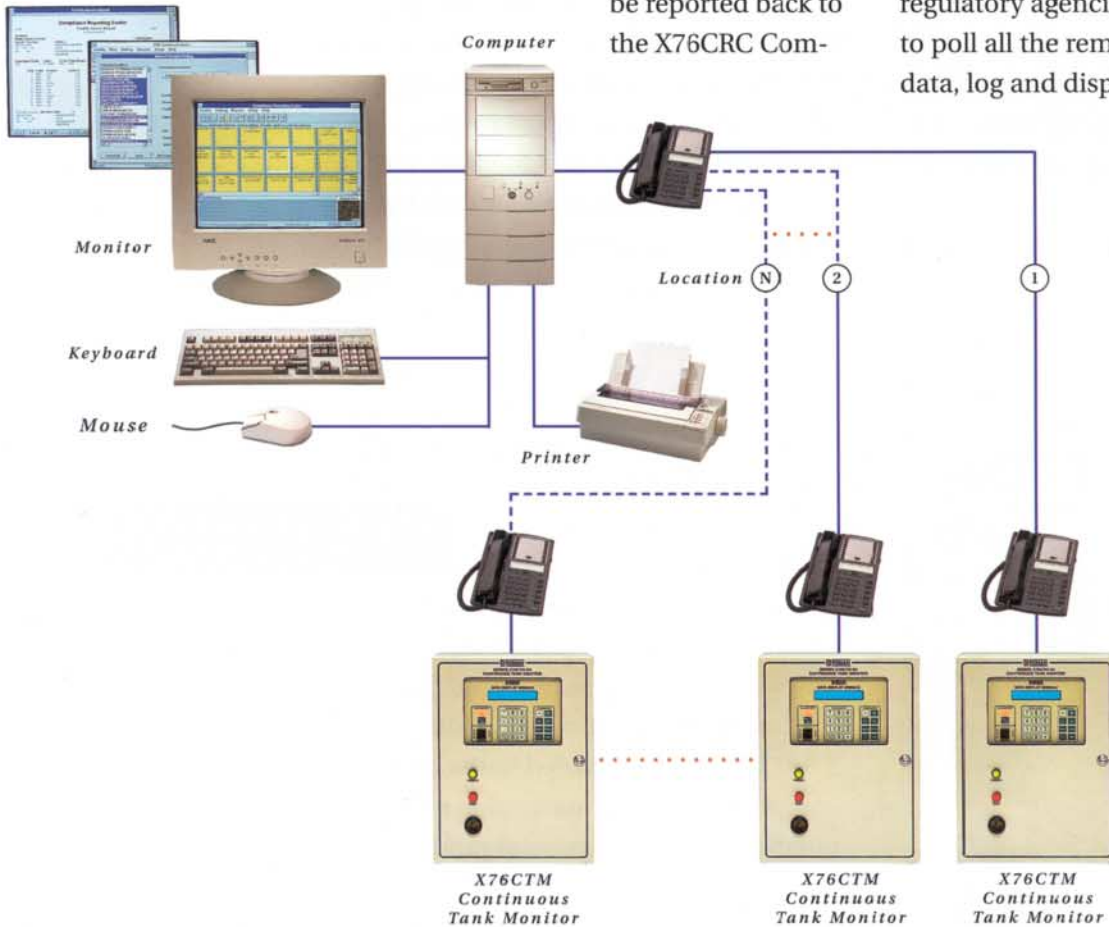
Console access is user password protected for complete control against unauthorized access.

**CENTRAL DATA
ACQUISITION/REPORTING**

The Model X76CTM Continuous Tank Monitor is part of Ronan Engineering's wide variety of automated facility monitoring systems. Tank leak testing, alarm conditions, system status, and environmental compliance data can be reported back to the X76CRC Com-

pliance Reporting Center, which acts as a central depository. The multiple X76CTM remote sites, connected to a host operating on the X76CRC software, eliminate the need for manual canvassing of facilities. To obtain the required data for various regulatory agencies, the X76CRC is used to poll all the remote X76CTMs to collect data, log and display alarms, and provide

current system status conditions to generate environmental management reports. In addition, the X76CRC can be used as a watchdog to automatically call supervisors or maintenance companies when alarm conditions dictate.



Maintenance

Remote Configuration

Software Upgrade

8

The single module design approach makes for simple installation and maintenance. No additional modules are required to meet all requirements for extended features.

All system configurations, such as tank parameters, report scheduling, leak detection threshold, alarms, and relay function assignments can be configured from a remote host using public telephone line and dial-up modem or direct lease line.

The system provides state of the art communication capabilities that allow software upgrade and customization via remote access, thereby reducing field service calls.



SPECIFICATIONS

System Model X76CTM

Power Requirements: 115/230 Vac, 50/60 Hz \pm 10%
Power Consumption: 50 VA
Operating Temperature: 32°F to 125°F (0°C to 52°C)
Mounting: NEMA 4, indoor or outdoor area; Wall mount
Display: Alpha-numeric LCD, 2 lines x 24 characters per line
Probe Inputs: One (1) to eight (8)
Auxiliary (Contact) Inputs: Up to 16 passive inputs 24 Vdc, 12 mA, intrinsically safe
Remote Communication Ports: Two (2) RS232C serial interface ports
Auxiliary Relay Outputs: Four (4) SPDT, 120 Vac maximum, 7.5 A maximum
Data Entry Keypad: Three section membrane
Printer: Alpha-numeric paper, 5 Vdc, impact, 2 1/2" wide x 75' long (24 characters wide)
Dimensions: 12" wide x 15 1/2" high x 6 3/32" deep
Alarms: LED and Sonalert; 80 db @ 10'
Listing: UL, ULC

Gauging Probe, Model 950B

Power Requirements: 24 Vdc intrinsically safe, pulsed, supplied by control chassis
Operating Temperature: -40°F to 130°F (-40°C to 54°C)
(Consult factory for other temperature ranges)
Probe Material: 316 stainless steel. (Consult factory for other material types)
Float Material: Ceon-D
Repeatability: .02% of full range
Accuracy: .05% of full range
Resolution: \pm .001"
Site Characteristics: 4" schedule 40 riser
Wiring: Two (2) conductor shielded cables, maximum length 2500'
Listing: UL, CSA approved, intrinsically safe for use in hazardous locations: Class I, Division 1, Groups C & D Class II, Division 1, Groups E, F & G. Class III, Division 1

Leak Sensor, Model LS-3, LS-3s, LS-3ss

Housing: 304 stainless steel
Mounting: 1/2" NPT male thread
Switch: Type: SPST, N.O., or N.C. Rating: 10 VA;
Float Material: Buna-N, (LS-3, LS-3s) 316 stainless steel, (LS-3ss); Pressure: 50 psi maximum; Leads: 20 AWG
Test Mechanism: Stainless steel cable (LS-3s)
Application: Vertical position liquid detection
Listing: UL

Tank Leak Sensor, Model LS-7, LS-7s

Housing: PVC (Geon 87241)
Liquid Specific Gravity: .70 minimum
Switch: Type: SPST, N.C.; Rating: 10 VA; Float Material: PVC, (LS-7, LS-7s); Pressure: 50 psi maximum; Leads: 20 AWG
Test Mechanism: Stainless steel cable (LS-7s)
Application: Horizontal position liquid detection
Listing: UL

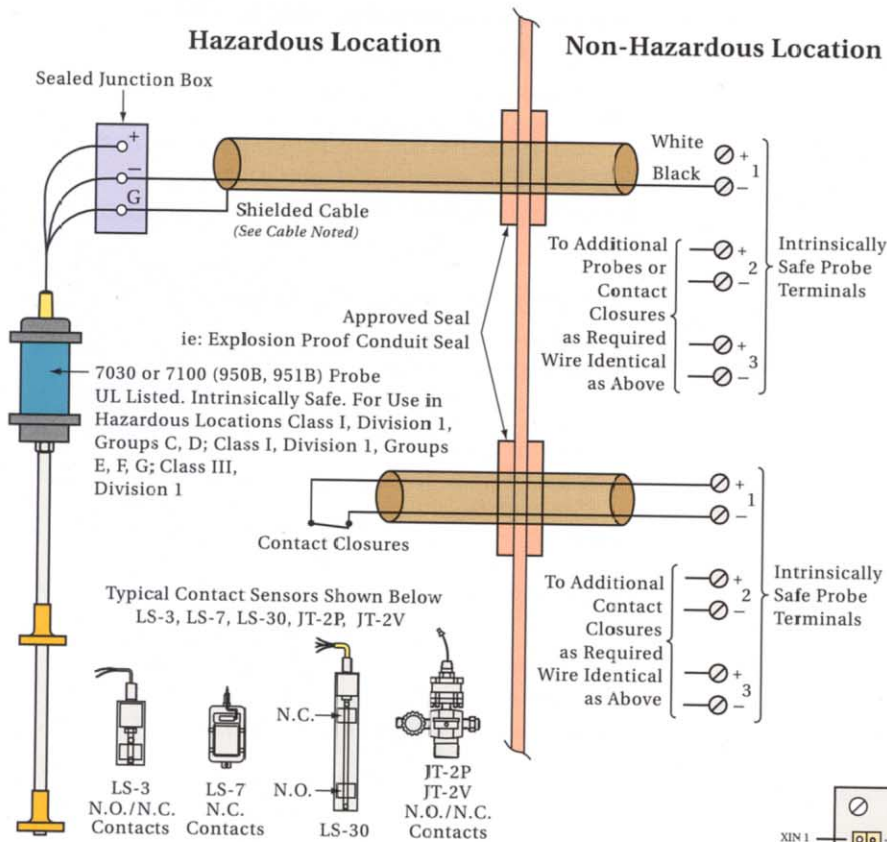
Hydrostatic Leak Sensor, Model LS-30

Housing: 304 stainless steel
Mounting: 1/2" NPT male thread
Switch: Type: DPDT, N.C. top, N.O. bottom; Rating: 10 VA;
Float Material: Polysulfone; Pressure: 50 psi maximum; Leads: 20 AWG
Application: Vertical position High/Low level detection, 4" separation
Listing: UL

Tank Leak Sensor Models JT-2P, JT-2V

Housing: Aluminum body with 1/4" stainless steel inlet, explosion proof, hermetically sealed, NEMA Types 7 and 9
Manifold: Brass, 1" NPT male thread (JT-2P, JT-2V)
Classification: Class I, Groups A, B, C & D; Class II, Groups E, F & G
Switch: Type: SPDT, N.O. (Shelf condition); Rating: 10 VA
Electrical Connection: 1/2" NPT with PVC insulated 18 AWG color coded leads
Pressure: Connection: 1/4" NPT; Adjustment: Allen wrench through port; Proof Pressure: 299 psi
Gauge: 0-30 psi (JT-2P), 0-20" Hg (JT-2V)
Temperature Range: -40°F to 180°F (-40°C to 82°C)
Listing: UL

ELECTRICAL WIRING



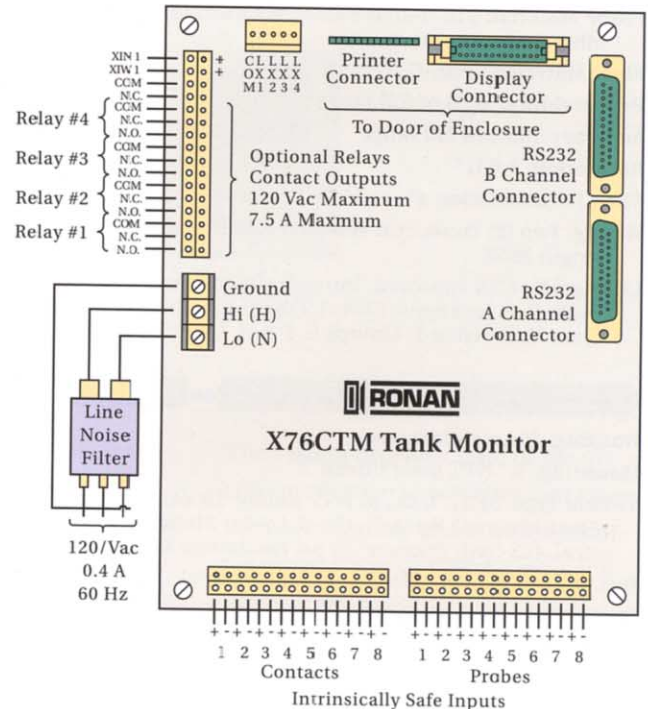
NOTE:
The spare magnetostrictive level probe inputs can be programmed to accept typical contact sensor input.

CABLE NOTES:

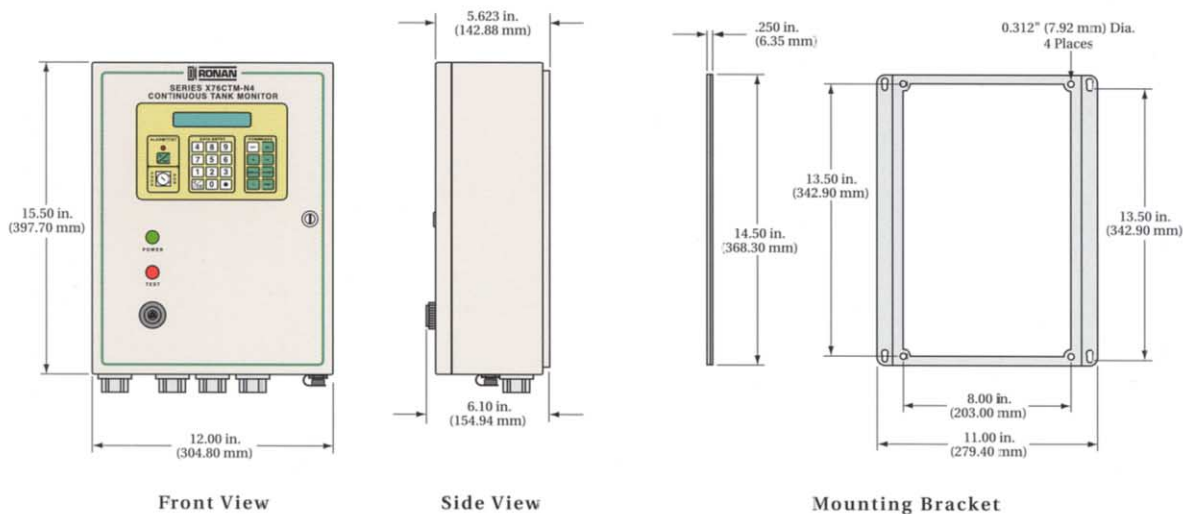
1. Cable sets that run together must be installed per ISA Standard #RP126.
2. For transducer cable lengths up to 1000 feet, shielded cable (#8441 Belden or equivalent) or heavier gauge can be used, cable capacitance shall be < 60 pF per foot. Cable inductance shall be < 0.2 μH per foot.
3. For contact cable lengths up to 1000 feet, unshielded twisted pair cables are recommended. Cable capacitance shall be < 60 pF per foot. Cable inductance shall be < 0.2 μH per foot.
4. For transducer and/or contact cable lengths exceeding 1000 feet; and up to 2500 feet, twin axial Belden cable #9182 (UL 2606) must be used.

INTRINSICALLY SAFE TERMINAL NOTES:

1. Probe terminals may only be connected to UL listed 950:xxxB model probes (xxx = probe length).
2. Contact terminals may only be connected to passive contacts.
3. Wiring shield cover must be installed securely in place prior to applying operating power.



DIMENSIONS/ORDERING INFORMATION



SYSTEMS

- X76CTM-N4-()
- 1 = Continuous Tank Monitor (115 Vac)
 - 2 = Continuous Tank Monitor (220 Vac)
 - 3 = Continuous Tank Monitor (115 Vac) with Modem
 - 4 = Continuous Tank Monitor (220 Vac) with Modem

SENSORS

- LS-()
- 1 = 1" O.D. Vertical Liquid Sensor
 - 3 = Vertical Liquid Sensor
 - 3s = Vertical Liquid Sensor with Pull-to-Test Cable
 - 3ss = Stainless Steel Vertical Liquid Sensor
 - 4 = Discriminating Sensor
 - 7 = Horizontal Liquid Sensor
 - 7s = Horizontal Liquid Sensor with Pull-to-Test Cable

STANDARD LENGTH PROBES (950B and 951B)

- RN-()-()
- 048-060 = 4' Tank Gauging Probe
 - 072-084 = 6' Tank Gauging Probe
 - 096-108 = 8' Tank Gauging Probe
 - 120-132 = 10' Tank Gauging Probe
 - 144-156 = 12' Tank Gauging Probe

- RNT-()-()
- 048-060 = 4' Stainless Steel Tank Gauging Probe
 - 072-084 = 6' Stainless Steel Tank Gauging Probe
 - 096-108 = 8' Stainless Steel Tank Gauging Probe
 - 120-132 = 10' Stainless Steel Tank Gauging Probe
 - 144-156 = 12' Stainless Steel Tank Gauging Probe

WARRANTY

Ronan warrants equipment of its own manufacture to be free from defects in material and workmanship, under normal conditions of use and service, and will replace any component found to be defective, on its return, transportation charges prepaid, within one year of its original purchase.

This warranty carries no liability, either expressed or implied, beyond our obligations to replace the unit which carries the warranty.



RONAN ENGINEERING COMPANY

Leak Detection Measurements Division

21200 Oxnard Street, Woodland Hills, CA 91367 U.S.A. • 800-327-6626 • Fax 818-992-6435
1 Tilley Road, Crowther Industrial Estate, Washington, Tyne & Wear U.K., NE38 OAE • 191-416-1689 • Fax 191-416-5856
32 Bermondsey Road, Toronto, Ontario, Canada M4B 1Z5 • 416-752-0310 • Fax 416-752-8072
Unit 10, 8 Leighton Place, Hornsby, N.S.W. 2077 Australia • 02-9477-7344 • Fax 02-9477-6151

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