Centeron®

Tank Console
Instruction Manual

Model # LDXXXXXXXXXXXXX

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1.0 Introduction

This manual describes how to install, test, and service the Centeron® Tank Console (hereafter referred to as the Console). The Console is part of the Centeron® Level Monitoring System, which includes the Console and up to ten Monitors.

This guide does not include how to install, test, maintain or troubleshoot the Monitors. Refer to the Monitor's instruction manual for its installation and maintenance.

The description herein is based on a standard installation. The Console is to be installed as fixed, permanently connected equipment. This means that the Console should be fastened to a support and electrically connected to its 110 VAC supply by a permanent connection which can be detached only by the use of a tool.

2.0 Product Overview

2.1 Description

The Console is a receiver that contains a local database of Monitor information. The user programs the Console with tank and Monitor configuration data. The Console processes the readings from the Monitors and displays the level and status of the tanks on the Console's display.

2.2 Operation

The Console receives data from a Monitor using RF transmissions. The Level Monitoring System utilizes spread spectrum technology for communication in the 902–928 MHz band in accordance with the Federal Communications Commission's (FCC) Rules.

The Console processes the data received from the Monitor and displays the level in the tank based on the data reported by the Monitor. The user must set up the Monitor in the Console's database before the Console will process the Monitor's data. Appendix A details the method for configuring monitors in the Console's database.

The user can scroll through the monitor database using the Tank Console's pushbutton.

2.2.1 Display Data

The Console's display is separated into three sections for tank data: Level Data, Tank ID, and Tank Status. See Figure 1 for the location of each of the data fields.

Figure 1: Display Data Locations

```
┌─────────────────────────────────┐
│                                 │
│     Level Data & Units          │
│                                 │
│  Tank ID              Tank Status │
└─────────────────────────────────┘
```

2.2.1.1   Level Data

The largest section displays the level data. The level is presented as seven digits followed by the unit of measure displayed. The unit of measure and tank configuration are set using the Tank Console Software. See the Activation section for the details of configuring the tank data.

When the Tank Console is powered and no tank data has been loaded into the Tank Console, the word "Centeron" will appear in the Level Data field. If tank data has been downloaded, the tank data for the first tank will be displayed.

In the case of a switch monitor, the level displayed is a message dependent on which switch or switches of the monitor are closed. Refer to Table 1 for the data displayed by the Console for a switch monitor.

Table 1: Console Display For Switch Monitor Settings

Monitor Switch 1	Monitor Switch 2	Console Level Display
Open	Open	LOW
Closed	Open	HIGH
Open	Closed	HIGH
Closed	Closed	HI HIGH

2.2.1.2   Tank ID

The tank ID is a user configured name for the tank. The tank ID can be up to 15 characters in length. The user can configure the tank ID using the Tank Console Software. See the Activation section for the details of configuring the tank data.

When the Tank Console is powered and no tank data has been loaded into the Tank Console, the Centeron website (www.centeron.net) will appear in the Tank ID field. If tank data has been downloaded, the tank data for the first tank will be displayed.

2.2.1.3   Tank Status

The tank status is displayed in the bottom right corner of the display. The possible status codes are shown in Table 2.

Table 2: Tank Status Codes

Tank Status Code	Description
M	Forced transmission (aka "magnet strike") of the tank's Monitor
B	The battery in this tank's Monitor needs to be replaced. Refer to the Monitor's installation manual regarding the correct battery type and the battery installation procedure.
L	The Console hasn't received a transmission from the tank's Monitor within the appropriate transmit interval. Refer to the Monitor's manual for troubleshooting tips.
(no status code)	The tank's Monitor is operating normally.

2.3 Environmental Specifications

The following environmental specifications should be observed when installing the Console:

- Temperature Range: -40°C to +60°C
- Designed for indoor or outdoor use.
- The NEMA 4X housing is designed to protect the Console circuit board.
- Chemical Exposure: The Console is housed in a NEMA 4X housing.

2.4 Certifications

This equipment complies with Part 15 of the FCC Rules.

2.4.1 FCC Notice—Radio Frequency Communications

The Console generates and uses radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it may cause interference to radio and television reception. The Console has been tested and found to comply with the specifications in Part 15 of Radiators and FCC Rules for Class A Digital Devices.

CAUTION: Robertshaw Industrial Products does not support field changes or modifications to any of the Centeron® Level Monitoring System equipment unless they are specifically covered in this manual. All adjustments must be made at the factory under the specific guidelines set forth in our manufacturing processes. Any modification to the equipment will void the manufacturer's warranty and could void the user's authority to operate the equipment and render the equipment in violation of FCC Part 15, Subpart C, 15.247.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2)

this device must accept any interference received, including interference that may cause undesired operation.

2.4.2   Canada

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

2.4.3   Safety and Regulatory

The Console complies with UL 61010B-1 Electrical Measuring and Test Equipment; Part 1.

3.0 Installation

3.1   RF Site Guidelines

The Console may only be installed vertically with the writing on the front panel upright. The following guidelines will ensure the optimal RF link between the Monitor and the Console.

- Direct line of sight between the Monitor and Console will provide optimum radio reception.

- The Monitor and Console can communicate at distances up to one mile under optimum line-of-sight conditions.

- When obstructions such as walls, buildings, and vehicles exist between the Monitor and Console the distance between these units should be limited to less than 500 feet.

- Multiple obstructions (such as two or more walls or a tank and a wall) between the Monitor and Console should be avoided, if possible.

- Electrically conductive objects such as metal buildings, concrete reinforcement rods, tanks, silos, and vehicles reflect radio signals. This reflection can be either an advantage or disadvantage to good radio reception at a particular installation site:

  1. Metal objects between the Monitor and Console may reflect and scatter RF energy and reduce radio signal strength at the Console.

  2. Metal objects behind the Monitor or Console may increase the radio signal strength at the Console by reflecting radio signals toward the Console.

- Even small metal objects such as tank vents or toolboxes between the Monitor and Console can significantly reduce radio signal strength if they are within a few feet of the Monitor or Console. These objects can reflect radio signals and cause a RF "shadow" which may prevent radio signals from reaching the Console.

- Objects which are not electrically conductive such as wooden or fiberglass buildings, non reinforced masonry, trees, plastic, and glass have less effect on radio signals than metal objects.

- Windows and wooden doors can provide radio signals access into otherwise closed metal buildings. However, "low-E" window glass may have a thin metallic coating which can reflect radio signals.

- Strong electromagnetic fields such as those found in close proximity to power lines, large electric motors, generators, electric fences, and transmitter antennas may interfere with the radio signals received by the Console.

- The Console should be mounted as high as is reasonably possible to improve its ability to receive radio signals.

- Warning: For maximum Monitor reception, mount the Monitor within 500 feet of the Console, avoid mounting either device inside a fully closed metal building, and avoid close proximity to large electrical equipment.

3.2 Handling and Cleaning Guidelines

The Console should be handled with care. The electronics inside of the enclosure are static sensitive. Do not handle the electronics outside of their enclosure without proper static precautions.

The Console should only be cleaned by wiping it with a water-dampened cloth on an as needed basis. No other method should be used.

3.3 Mounting

3.3.1 Site Selection

Select an area for mounting with an available 110 VAC supply in the same physical area. Follow the RF site guidelines outlined in Section 3.1. Choose a mounting location in accordance with good instrument practice, avoiding extremes of temperature, humidity, and vibration.

3.3.2 Mounting

The Console must be rigidly mounted to a support in a fixed location. When mounted, the writing on the cover of the Console should be upright. All directions (top, bottom, left, right) are with reference to this orientation. The Console should be mounted using four (4) #8 panhead screws in the enclosure's mounting holes.

The Console does not require a minimum spacing for ventilation around it. However, proper spacing may be required to allow easy access to and use of the disconnecting device described in the wiring section.

3.3.3 Wiring

Before wiring, unscrew the front cover from the enclosure. If necessary to simplify wiring, disconnect the cables connecting the front cover electronics to RS-232 connector. Store the cover assembly in a safe place during wiring.

All wiring must conform to the NEC and any applicable state and local codes. All wiring connections are labeled on the Display/Supply Board. The requirements for wiring to the Display/Supply connectors are given in Table 3.

Table 3: Display/Supply Board Connector Requirements

Connector Designators	Wire Requirements	Tightening Torque
TB1	12 AWG, maximum, rated for 80 °C, minimum	9 in-lbs

Wiring for power (hot, neutral, and earth ground) should be routed through conduit into the bottom right hole in the enclosure. The installer must install an external switch or circuit breaker to provide a means to disconnect the Console from power. The external switch or circuit breaker must be marked as the disconnecting device for the Console and its installation must conform to all applicable codes. The power connections as labeled on the Display/Supply Board at TB1 and are described in Table 4.

Table 4: Console Power Connections

Board Marking	Connection	Description
HOT	AC Hot / Line	95 – 120 VAC, 60 Hz, 7 VA
NEU	AC Neutral	
⏚	Protective Conductor	Protective Conductor Terminal

After completing the wiring, take the cover assembly and, if it was disconnected, reconnect the RS-232 cable to the Supply/Relay Board.

If the Activation step is not going to be done now, reassemble the box per the step 8 of Activation.

3.4   Activation

The Console can be configured either before or after mounting. The requirements for configuring the Console are:

- AC power supplied to terminal TB1 per the Wiring section above,
- A PC with a serial interface,
- The Tank Console Software (Robertshaw p/n) installed on the PC, and
- A standard RS-232 DB9 cable to interface with the female connector on the Console to the PC's serial port.

The Console can be activated by following these steps:

1. Connect power to the Console per the Wiring section above. Make sure that the cable going from the external RS-232 connector to the Display/Supply board is connected before reassembling the enclosure.

   With no data downloaded to the Tank Console, the word "Centeron" will appear in the Level Data field and www.centeron.net will appear in the Tank ID field. If the Tank Console has tank data downloaded to it, the first tank's data will be displayed on power up.

2. Connect your PC to the Console using a standard RS-232 cable. Note that the Console has a female DB9 connector.

3. Using the Tank Console Software, configure up to 10 tanks on the PC and download the configuration to the Console.

4. Remove the RS-232 cable. The Console is ready to operate.

5. Activate each Monitor. If the Monitor is set up in the Console, the tank information will be shown on the Console's display with the letter 'M' displayed in the bottom right corner to indicate a forced transmission. If the display doesn't update, refer to the Troubleshooting section of this manual.

The Console is now ready to receive Monitor transmissions. Refer to the Monitor Instruction Manual for installation of a Monitor.

4.0 Troubleshooting

If the Console is not operating properly, locate the solution below:

Issue	Resolution
Console's display doesn't update when a Monitor is activated.	Verify Monitor is in the Console's database using the Tank Console Software. Refer to the Activation section of this manual to verify and set up the Monitor as needed.
The Console's display is off.	Verify that the external deactivation device (switch or circuit breaker) is set to supply power to the Console.
	Disconnect power from the Console using the external deactivation device. Remove the Console's cover. Verify that power is wired correctly to the Supply/Relay Board.

5.0 Warranty and Service

5.1 Warranty

Seller warrants title and that products sold to Buyer shall be free from defects in material and workmanship and shall conform to specifications for a period of one (1) year from purchase date for complete units and parts and subassemblies. Warranties on goods sold but not manufactured by the seller are expressly limited to the terms of warranties of the manufacturer of such goods.

Seller makes no representation or warranty of any kind, express or implied, as to merchantability, fitness for particular purpose or any other matter. Upon receipt of definite shipping instructions, Buyer shall return, transportation prepaid, all defective material, or material not conforming to specifications, to Seller, after inspection by Seller, or at Seller's election, subject to inspection by Seller. Material returned by Buyer must be returned in same condition as when received by Buyer. Defective material, or material not conforming to specifications, so returned shall be replaced or repaired by Seller and returned, freight prepaid, without any additional charge, or in lieu of such replacement or repair, Seller, may, at Seller's option, refund the purchase price applicable to such material. Seller agrees to pay return freight charges not exceeding the lowest rail or truck rate which would apply from the original destination on all defective material, or material not meeting specifications. However, Seller shall not be obligated for such charges when material returned proves to be free from defect and to meet specifications. Material which proves to be free from defect and to meet specifications shall be held by Seller for shipping instructions and Buyer shall furnish such instructions promptly upon request.

Seller's liability shall be limited solely to the replacement or repair or to refunding the purchase price applicable to the defective material or material not meeting specifications. Seller shall not be liable for any consequential damages nor any loss, damages or expenses directly or indirectly arising from the use of the material.

5.2   Unit Disposal

The U.S. Environmental Protection Agency regulates the disposal of waste products in the United States. The EPA Regulations are listed in the "Code of Federal Regulations," CFR40, entitled "Protection of Environment." Individual states and local communities also may establish regulations covering the disposal of waste products. These may be more stringent than the federal regulations and may cover the disposal of household waste, which is not included in the federal regulation. Thus, state and local agencies should be contacted for their disposal guidelines.

5.3   Service and Technical Support

If you experience trouble with this equipment, please contact **Robertshaw Industrial Products Technical Support at (865) 981-3118, Monday through Friday, EST 8:00 a.m. to 5:00 p.m**.

> **This unit is to be serviced by certified service personnel only**.