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CRM-LPT User Guide (Rev D)

General Information

Default passcode is 51

The *femto*-TECH CRM-LPT is a precision air quality and radon detection instrument with a modern and professional look. We are proud to say the CRM-LPT is made in the USA by highly skilled engineers and technicians. It detects airborne alpha particles based on the field proven pulsed ion chamber technology of the legacy *femto*-TECH models (R210F, RS410F, CRM-510, and CRM-510LP).

New for this model is the addition of carbon dioxide, carbon monoxide, air quality, and particle matter which are included at no extra cost. These new sensors allow you to offer your customers more for their money by giving them a more detailed report on other potentially harmful gases along with radon. Due to it's new environmental sensors and a precision electrometer / open grid ion chamber design the CRM-LPT is highly suited for a wide range of air quality and radon measurement applications without the concern for interference from background gamma or beta radiation sources.

The modern light weight aluminum design and the low current requirements of the electrometer and control circuits make the CRM-LPT a light weight, portable, self-contained continuous radon monitor that can measure and record practically unlimited amounts of radon / air quality test data while having long battery life. Using modern technology, we were able to shrink the size by approximately one half (compared to a 510) while still maintaining the excellent sensitivity that *femto*-TECH monitors are known for.

The micro-controllers incorporated in the CRM-LPT provides the operator with a highly flexible radon / air quality detection and data logging system while increasing ease of use via the touch screen interface. In addition to the measurement and storage of radon data, the highly sophisticated on-chip peripheral capabilities of the micro controller and large storage used in the CRM-LPT provides for the measurement and storage of temperature, barometric pressure, relative humidity, carbon monoxide, carbon dioxide, air quality (including potentially harmful soil gases), particle matter (PM2.5 / PM10), and movement (tilts). This multi-dimensional data acquisition capability provides the tester with a data base for evaluating the validity of radon and vapor intrusion measurements. The CRM-LPT also has bluetooth and USB-C connectivity which is compatible with our *femto*-TECH Rad-Lab app available for free on iPhone, Android, Windows and MacOS operating systems.

CRM-LPT Specifications

All tolerances are +/- 10% or better

Radiation Detected	Radon-222 Alpha
Detector	Pulsed Ionization Chamber
Dynamic Range	0.1 to 200.0 pCi/L (1 to 7500 Bq/m^3) **200 pCi/L (*7500 Bq/m3*) was the listed range during device approval testing but the device is capable of higher levels than this listed range. We may update this in the future.*
Units	pCi/L or Bq/m^3
Sensitivity (Nominal)	0.4 cpm / pCi/L | 24 cph / pCi/L | 96 cph @ 4 pCi/L *1.1 cph / Bq/m^3 | 65 cph @ 100 Bq/m^3*
Operating Range	35 to 105ºF (2 to 40ºC) | 5 - 90% non-condensing humidity
Sampling Mode	Passive Air Diffusion
Environmental Sensors	Temperature, Humidity, Barometric Pressure, Carbon Monoxide, Carbon Dioxide, Particle Matter (PM2.5 / PM10) and Air Quality (VOC)
Tamper Detection	Passcode protection, environmental sensors, and an accelerometer are used to detect potential tampering of the monitor and testing environment.
Self Check	Self checks are automatically performed on the battery, electrometer, and storage to increase reliability. Self Check speed is greatly improved from the 510. Self Check generally takes less than 10 seconds.
Sound	Piezo Speaker with option to silence button sounds.
Display	3.5” (88mm) Capacitive Touch Display
Data Storage	Practically unlimited test storage because of the relatively small data size per test. There is also cloud storage via the Femto-Tech app.
User Interface	Touch Screen and a Multi-Function Momentary Button
Connectivity	USB-C and Bluetooth
Femto-Tech Rad-Lab Software Compatibility	Phones / Tablets: Apple iOS | Android Computers: Windows | Apple (MacOS)
Power	Lithium Ion Battery | Rechargeable via USB-C Port This monitor can go months on a single charge with average use.
Tripod Compatibility	1/4-20 threaded insert on bottom panel
Size / Weight	6.4 x 6 x 2.75 inches (163 x 153 x 70 mm) 2.4 pounds (1.1kg)

Multi Function Button (Front Panel Button)

This button is used to turn on / off the device, return to home screen in many situations, or cancel actions such as self-test. Typically acts as a “home screen” button but can stop action and reset in some cases. Press and hold during self-test to end the self-test, reset the monitor, and return to the home screen.

- **If you accidentally go into a menu and want to back out, press this button until the monitor changes to the home screen. Some situations may take more than one press.**
- **Press and hold this button to force the monitor back to sleep (in most situations).**

Turn On / Off the Device

1. Press and release the front panel button located on the front panel near the USB-C port.
2. Wait a couple seconds for the screen to turn on and display the home screen. You will have the option to select Protocol Test, Custom Test, Device Settings, and Device Information. This screen also displays the battery level, date/time, bluetooth status, and the custom test setting.
3. The device will automatically power off from the home screen with no activity for a couple of minutes. You can also manually turn off the device by holding the front panel button until the display turns off.

Protocol Test

Protocol test mode is used for protocol testing (48 or 60 hour). The monitor will automatically stop and store the data after the predetermined test time is completed. Data is stored to the SD card in one hour increments. The data can be retrieved from the device using the Femto-Tech Rad-Lab app. Follow the Rad-Lab instructions to download the test data. Unwanted data from the tests can be ignored using Rad-Lab from the beginning or the end of a test.

<u>Start a protocol test:</u>

1. Press the Protocol Test button on the home screen. When prompted select Yes or No depending if the house was in closed house conditions for the previous 12 hours. This will determine if the test runs for 48 or 60 hours. The self test will begin immediately after the selection is made.

2. The device will automatically run a self check to ensure proper operation. This will check the system storage, the battery, and the electrometer.

3. After the self check the screen will change to the test data screen which will show the radon and air quality data. At this point, you can either let the device go to sleep (the screen will dim in a few seconds and then turn off to save power) or press the Sensor Information button which will display the data of the other equipped sensors.

4. After the predetermined 48 or 60 hours is complete, the device will automatically store all the data and turn itself off.

5. To retrieve data, turn on the monitor and connect to the app either using bluetooth or connecting the USB-C to your computer. Download the app from our website or your phones app store. You can also scan the QR code with your phone by pressing the bluetooth button on the home screen.

<u>End a test early:</u>

1. If you need to stop the test early you can do this by pressing the button on the front panel. After the screen turns on, you will be prompted with a warning screen. Select “Enter Passcode” to go to the passcode screen. **The default passcode is 51.** If you have set your own passcode, you will enter it instead. Press the Enter button to continue.

2. You will now be back to the main test data page. Press the Stop Test Button. This will take you to a confirmation screen that shows the amount of time left for the test. Press Yes to stop the test or press No to return to the previous screen. If Yes is pressed, the monitor will store all the data up to the last completed hour and will power off.

<u>Test ended early because of low battery:</u>

1. If the monitor determines the battery is too low it will automatically store the most recent hourly data and end the test. This is done to save the battery from damage. If the battery is too low to restart the screen, you may hear a couple of beeps when trying to start the monitor. Please charge battery if this happens. When the battery is this low, it could take 12+ hours to fully recharge the battery.

Custom Test

The custom test mode works just like the protocol test mode except the user can program the amount of hours they want the test to run. The custom test mode has a few different intended uses described below:

- Users that want the same amount of hours for all of their testing should set the custom hours by pressing the “Change Custom Test Length” in the settings menu. After setting the custom hours, the tests can be started faster with a single press of the custom test button.
- Users that want to manually stop the test can select “Manual Stop” after pressing the “Change Custom Test Length” button in the settings menu. This will give the monitor a similar feel to our legacy devices such as the CRM-510(LP)
- Users that want to run long term tests can either use “Manual Stop” or set the desired test length up to approximately one year.

Similar to the protocol mode, custom test mode data is stored to the SD card in one hour increments. The data can be retrieved from the device using the *femto*-TECH Rad-Lab app. Follow the Rad-Lab instructions to download the test data. Unwanted initial data from the tests can be ignored using Rad-Lab.

***For setting the hours, see the Settings Instructions.

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30 Minute Sample Test

Press device settings. Press change custom test length. Press 30 minute sample. Device goes back to home screen. Custom test is now set-up for the 30 minute sample test. Press custom test then press yes. Self test will start, after self test completes the LPT starts 30 minute sample. Once it is completed LPT shuts off. The LPT screen will show the radon results. On the LPT press device settings. Press last test result. This shows radon test average. Rad-Lab app download the sample test and that will show you the rest of the test results.

Device Information

This is where you can view the calibration data, review your previous test data, find out how many tests is stored on the device, and other information about the device. Select what you want to view using the on-screen buttons.

Calibration Data

femto-TECH has chosen to use the touch screen display to show the calibration data instead of a sticker. We believe this is more secure than a sticker because a sticker can easily be modified. This also eliminates human error such as “typos” that could occur while the sticker is being made. By using the screen for the calibration data, the data is pulled directly from the monitors storage which greatly reduces the chance for mistakes. The calibration can be viewed by pressing device info from the main menu or by waking the monitor while a test is running.

Device Settings

*****All settings will be stored even after the monitor is turned off.**

SAE/Metric
Slide the switch to the desired setting. The units will be displayed on the right of the switch.

Custom Hours
After pressing the “Change Custom Test Length” button you will be asked if you want to end the test yourself (manual stop) or enter the amount of hours the device will run before the device automatically stops the test. The hours can be set from 1 to 9999 hours (a little over a year). If you select the manually stop option the test will run until you stop it or 9999 hours is completed, whichever comes first. Data is stored in one hour increments for all options. We recommend leaving the monitor on charge for long term tests.

New Password
Press the new password button. Enter the old password (51 for a new device). Press 5, Press 1, Press Enter. Now enter the new password. It will accept any 2, 3, or 4 digit number.
*****Warning! After you select your passcode the old passcode is erased. Make sure to write down the new passcode or use one that you will easily remember.**

Home Screen Passcode
This is where you can add a passcode to the home screen. Slide the switch to on to turn on the passcode for the home screen. When you want it off go into the same screen and slide the switch to off. Anytime the LPT goes to sleep or is turned off you will have to enter your passcode when you turn it back on.

Time/Date
Press the Time or the Date button to change the time or date settings. Follow the directions on the screen. Press enter after each selection.

Date - Enter the year (4 digits), month (1-12), then the day (1-31) in that order.

Time - Enter the hours (1-12), minutes (1-59), and select AM or PM using the corresponding number. (1) for AM or (2) for PM.

Advanced Settings
(Under Device Settings Button)

Sound

The sound option is mainly to turn on or off the beeps when you press buttons. Important sounds will still occur such as those that happen during self test or certain errors. Slide the sound switch to the desired position.
On is default.

Daylight Savings
This option will automatically add or subtract an hour depending on the time of year. Use “Auto” if you live in an area that observes daylight savings. Otherwise set to “Off”.
Auto is default.

End of Test Action (Manual Stop Action)
This is only used when manually stopping the test. You can choose if the monitor completely turns off after ending the test or if the monitor resets and returns to the home screen.
*****This could cause you to charge the device more often.**
Sleep is default.

Screen Time Out (Display Timeout)
This determines if the screen turns off in a normal amount of time after no activity or slower than normal. If you think it turns off too quickly, move the switch to slow.
*****This could cause you to charge the device more often.**
Fast is default.

Radon Entry Correction
There is generally a few hour build up of radon entering the monitor before it reaches equilibrium. Radon entry correction uses our high sensitivity to quickly estimate the true radon level and make the adjustment necessary to make the monitor read the correct radon level at the first data log point. If you want the monitor to show the radon build up, you should turn this feature off. Some people like to see the build up for diagnosis purposes.
On is default.

Restore Default
Restores all advanced settings to the factory default settings.

Charging and Battery

Use the supplied USB-A to USB-C cable to charge the CRM-LPT. Most standard USB ports found in cars, computers, wall adapters, and portable chargers will be compatible with the supplied cable. You may leave the unit on charge as long as you want. The charging circuit is designed to keep the battery at full charge without overcharging.

If you are performing a test in hourly mode that will last over 2 weeks, we recommend leaving the unit on charge for the entire length of the test. The supplied battery has a lot of capacity which means if it is completely discharged, it could take 12 hours or more to reach a full charge. If the battery was that low, in some cases it will need to be charged twice. The second time unplug the charging cable from the LPT and plug it back in. If it is possible charge overnight both times.

If the battery is too low to restart the screen, you may hear a couple of beeps when trying to start the monitor. To avoid battery damage, please charge battery immediately if this happens.

Bluetooth

To extend battery life, we chose to use low energy Bluetooth on this device. It is only intended for close range use. Please keep your phone near the monitor while the data is being downloaded.

Bluetooth will automatically be waiting for connection when the device is powered on and a test is not running. Use Rad-Lab to connect to the device.

Pressing the bluetooth icon on the main menu will display a QR code which can be used to download the Rad-Lab app. Aim your phone camera at the QR code and click the link displayed on the phone. Most smart phones will automatically open the link.

If you have any questions, comments, or concerns please contact us at **support@femto-tech.com** *or 937-746-4427 and we will be glad to help. Thank you for choosing femto-*TECH.