RMLD-CS™

Remote Methane Leak Detector Complete Solution

Operator's Manual

HEATH CONSULTANTS
Your Safety...Our Commitment

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Doc No. 105408 Rev E, RMLD-CS Operator Manual

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Proprietary Notice

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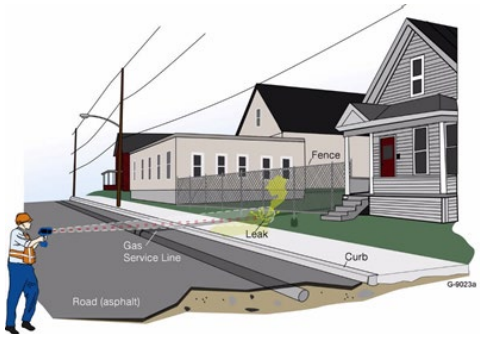
Heath Consultants Incorporated operates under a continual product improvement program and reserves the right to make improvements and / or changes without prior notification.

This manual supersedes all previous manuals for this instrument.

Overview

Remote Detection for Increased Safety

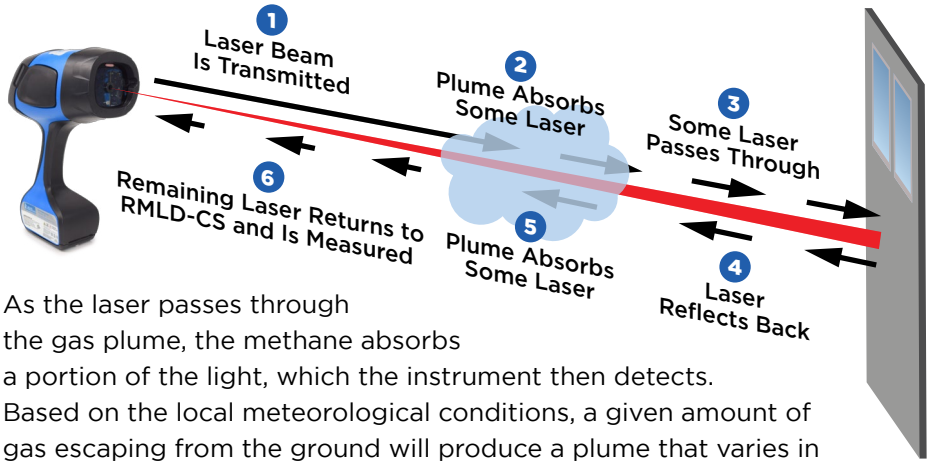
The HEATH Remote Methane Leak Detector - Complete Solution (RMLD-CS) is a highly advanced technology, capable of detecting methane leaks from a remote distance. This technology makes it possible to detect leaks without having to walk the full length of the pipe line, thus creating safer surveys in areas that may be difficult to reach such as busy roadways, yards with dogs, fenced off areas, and other hard to access places.



Safe surveying up to 100' distance.

Tunable Diode Laser Absorption Spectroscopy (TDLAS)

The RMLD-CS employs the same technology as the field proven legacy RMLD, known as Tunable Diode Laser Absorption Spectroscopy (TDLAS) technology.



As the laser passes through the gas plume, the methane absorbs a portion of the light, which the instrument then detects. Based on the local meteorological conditions, a given amount of gas escaping from the ground will produce a plume that varies in size and uniformity of concentration levels. The plume, by nature, is variable and dependent on the soil type, moisture, temperature, wind, venting and leak rate.

Operates under a variety of field conditions including:

- wide temperature range,
- light rain and fog.

Rugged design stands up to normal field use and operating conditions.

Sensitivity or range is not affected by reasonable amounts of dust on the instrument's window.

Features

The RMLD-CS includes many features which reduce costs and improve usage. These advanced features include, but are not limited to:

- User Interface
- Internal Data Logging
- WiFi
- GPS
- Bluetooth BLE
- Color Camera
- Color Display
- Spotter laser
- Self Test
- Rechargeable and Replaceable Battery Pack
- Dual Bay Charger
- Mobile App/3rd Party App Support
- Light Weight
- Ergonomic Housing

Warnings & Definitions

Safety and Warning Information

Read this manual before using the RMLD-CS instrument and accessories. Users must read, understand and follow the instructions for operation and maintenance. Failure to do so can result in serious injury.

This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE indicates practices not related to physical injury.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which if not avoided, could result in minor or moderate injury.

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS indicates specific safety-related instructions or procedures.

WARNING

WARNING: Read and understand this manual fully before use.

WARNING: Follow the manual instructions and testing methods.

WARNING: The visible green Spotter Laser is a Class 2 (II) laser product.

WARNING: Do not stare into beam or view directly with optical instruments.

WARNING: Avoid direct eye exposure to the laser and do not point in the direction of others. Visible and Invisible Lasers are deployed by this instrument.

CAUTION

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

CAUTION: No attempt should be made to repair the instrument. Should the instrument not work properly, or indicate a fault or warning, refer to the troubleshooting section of this manual.

Avertissements et définitions

Informations sur la sécurité et les avertissements

Lisez ce manuel avant d'utiliser l'instrument RMLD-CS et ses accessoires. Les utilisateurs doivent lire, comprendre et suivre les instructions d'utilisation et d'entretien. Le non-respect de cette consigne peut entraîner des blessures graves.

Il s'agit du symbole d'alerte de sécurité. Il est utilisé pour vous alerter des risques potentiels de blessures physiques. Respectez tous les messages de sécurité qui suivent ce symbole pour éviter des blessures ou la mort.

DANGER

DANGER indique une situation dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.

AVERTISSEMENT

AVERTISSEMENT indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.

ATTENTION

ATTENTION indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.

AVIS

NOTICE indicates practices not related to physical injury.

INSTRUCTIONS DE SÉCURITÉ

INSTRUCTIONS DE SÉCURITÉ indique des instructions ou des procédures spécifiques liées à la sécurité.

AVERTISSEMENT

AVERTISSEMENT : Lisez et comprenez entièrement ce manuel avant l'utilisation.

AVERTISSEMENT : Suivez les instructions du manuel et les méthodes d'essai.

AVERTISSEMENT : Le Laser de repérage vert visible est un produit laser de classe 2 (II). Ne jamais fixer le faisceau ni le regarder directement avec des instruments optiques.

AVERTISSEMENT : Évitez l'exposition directe des yeux au laser et ne le pointez pas vers d'autres personnes. Des lasers visibles et invisibles sont déployés par cet instrument.

ATTENTION

ATTENTION : L'utilisation de commandes ou d'ajustements ou l'exécution de procédures autres que celles précisées ici peut entraîner une exposition dangereuse aux rayonnements laser.

ATTENTION : Il ne faut en aucun cas essayer de réparer l'instrument. Si l'instrument ne fonctionne pas correctement, ou indique un défaut ou un avertissement, reportez-vous à la section de dépannage de ce manuel.

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Hazardous Safety and Warning Information

WARNING

WARNING: Do not use the instrument in hazardous areas except those areas and zones for which it is approved.

WARNING: To reduce the risk of ignition of a flammable or explosive atmosphere, battery pack must be removed, inserted and recharged only in a location known to be non-hazardous. Use only replaceable Heath 105727 Battery Pack.

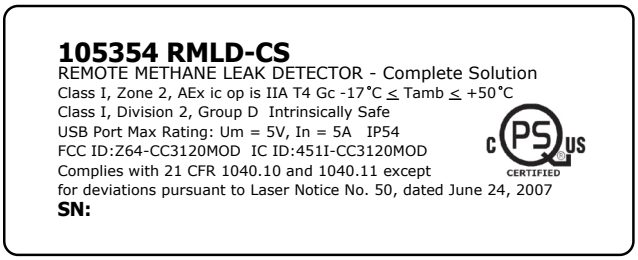
WARNING: Do not disassemble or open or modify this instrument including the 105727 battery pack. All repairs must be done only by an authorized facility as listed in this manual.

WARNING: Do not disassemble, do not short, do not burn or expose to high temperature (≥ 60°C/140°F) the Lithium battery pack used with this instrument. Use the designated charger to charge the battery pack only in non-hazardous area.

WARNING: Do not connect to USB port in a Hazardous area. Only connect to a USB equipment certified to appropriate safety standards such as IEC 61010-1 or equivalent in a non-Hazardous area.

WARNING: Substitution of components may impair intrinsic safety. No user serviceable components contained within this instrument.

Safety Labels on the Instrument & Battery Pack



Symbols Used

Caution

Consult Instructions for use

IP54 Ingress protection

Do not dispose of this product in the unsorted municipal waste stream. Dispose of this product according to local regulations.

Li-ion

Lithium Ion battery pack

Measurement IR Laser Radiation: Class I
Visible (Green) Laser Radiation: Class 2(II)

Do not stare into beam. Avoid direct eye exposure.

FW 1.40-2.33-8

FW 1.57-2.39-10 or Newer

Firmware-specific notes are highlighted as shown. The manual includes information about firmware 1.40-2.33-8, as well as the newer 1.57-2.39-10 which added security level features and new menu options.

Informations sur les dangers, la sécurité et les avertissements

⚠ AVERTISSEMENT

AVERTISSEMENT : N'utilisez pas l'instrument dans des zones dangereuses, à l'exception des surfaces et des zones pour lesquelles il est approuvé.

AVERTISSEMENT : Pour réduire le risque d'inflammation d'une atmosphère inflammable ou explosive, bloc-batteries doivent être retirées, insérées et rechargées uniquement dans un endroit réputé non dangereux. Utilisez uniquement un bloc-batterie Heath 105727 remplaçable.

AVERTISSEMENT : Ne démontez pas, n'ouvrez pas et ne modifiez pas cet instrument, y compris le bloc-batterie 105727. Toutes les réparations doivent être effectuées uniquement par un établissement agréé, comme indiqué dans ce manuel.

AVERTISSEMENT : Ne démontez pas, ne court-circuitez pas, ne brûlez pas ou n'exposez pas à une température élevée ≥ 60ºC/140ºF) le bloc-batterie au lithium utilisé avec cet instrument. Utilisez le chargeur désigné pour charger la batterie uniquement dans une zone non dangereuse.

AVERTISSEMENT : Ne vous connectez pas au port USB dans une zone dangereuse. Connectez-vous uniquement à un équipement USB certifié conforme aux normes de sécurité appropriées telles que IEC 61010-1 ou équivalent dans une zone non dangereuse.

AVERTISSEMENT : La substitution de composants peut nuire à la sécurité intrinsèque. Aucun composant réparable par l'utilisateur n'est contenu dans cet instrument.

Étiquettes de sécurité sur l'instrument et le bloc-batterie

105354 RMLD-CS
REMOTE METHANE LEAK DETECTOR - Complete Solution
Class I, Zone 2, AEx ic op is IIA T4 Gc -17°C ≤ Tamb ≤ +50°C
Class I, Division 2, Group D Intrinsically Safe
USB Port Max Rating: Um = 5V, In = 5A IP54
FCC ID:Z64-CC3120MOD IC ID:451I-CC3120MOD
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007
SN:

c PS us CERTIFIED

WARNING - DO NOT CONNECT TO USB PORT IN A HAZARDOUS AREA

AVERTISSEMENT - NE PAS CONNECTER AU PORT USB DANS UNE ZONE DANGEREUSE

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Your Safety...Our Commitment
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(713) 844-1300
MANUFACTURED BY: HEATH CONSULTANTS INCORPORATED
9030 MONROE RD, HOUSTON, TX 77061
MADE IN USA

LITHIUM BATTERY PACK
DANGER: DO NOT DISASSEMBLE, DO NOT SHORT CIRCUIT, DO NOT BURN OR EXPOSE TO HIGH TEMP (≥60°C/140°F). USE DESIGNATED CHARGER ONLY IN NON HAZARDOUS ENVIRONMENT. USE ONLY ON HEATH 105354 INSTRUMENT.

BLOC-BATTERIE AU LITHIUM
AVERTISSEMENT: NE PAS DÉMONTER, NE PAS COURT-CIRCUITER, NE PAS BRÛLER OU EXPOSER À DES TEMPÉRATURES ÉLEVÉES (≥60°C/140°F). UTILISER LE CHARGEUR DÉSIGNÉ UNIQUEMENT DANS UN ENVIRONNEMENT NON DANGEREUX. UTILISER UNIQUEMENT SUR L'INSTRUMENT HEATH 105354.

Symboles

Attention

Consulter le mode d'emploi

IP54 Indice de protection

Ne jetez pas ce produit dans le flux des déchets municipaux non triés. Jetez ce produit conformément aux réglementations locales.

Li-ion

Bloc-batterie au lithium-ion

Laser IR de mesure
Rayonnement : Classe I
Laser visible (vert)
Rayonnement : Classe 2(II)

Ne pas fixer le faisceau. Éviter l'exposition directe des yeux.

FW 1.40-2.33-8

FW 1.57-2.39-10 et plus récent uniquement

Les notes spécifiques au micrologiciel sont surlignées en bleu comme indiqué. Le manuel comprend des informations sur le micrologiciel 1.40-2.33-8, ainsi que sur le nouveau 1.57-2.39-10 avec des fonctionnalités de niveau de sécurité supplémentaires et de nouvelles options de menu.

Definitions

Beam Skip

Occurs when the IR beam jumps between a near object and a far object. This may cause a false detection. This can also occur on highly reflective surfaces (windows, water, ice, etc.).

Dark Zone

An area not being scanned due to an obstruction. This may be an elevation change, the side of a building, behind a curb, etc.

DMD (Digital Methane Detection)

An advanced detection mode which, when activated, will only alert the operator when there is a probable detection of methane.

Footprint

The surface area covered by the IR beam, which increases with distance. This area is a 22 in diameter at 100 ft when shined against a vertical background.

Infrared (IR)

Optical radiation with wavelengths longer than those of the visible spectrum.

Laser Calibration Drift

A normal characteristic of tunable diode lasers is that the wavelength calibration can drift slowly over time. The RMLD-CS has a built in Self-Test/ Calibration feature to automatically maintain proper calibration.

PPM-M (Parts Per Million Meter)

The product of the methane concentration times the thickness of the plume.

Real Time

An audible mode that will continuously emit a variable beep rate relative to the concentration of gas. The response range covers 10 – 1000 PPMM.

Spotter Laser

The green, blinking laser which guides the operator as to the location of the IR beam. This laser can be activated through the left button located on the keypad.

Tunable Diode Laser Absorption Spectroscopy

A method of gas detection that utilizes a laser that, when directed through a cloud of methane, will be partially absorbed by the gas and the return signal can then be analyzed for gas concentration.

Specifications

General

RMLD-CS Weight
3 lbs (48 oz) (approx.)

Carry Case Dimensions
21 x 17.5 x 9.5 in
(53 x 44 x 24 cm) (approx.)

Display
3.5 in (8.9 cm) color LCD

Storage
Internal SD card (not removable)

Power

Battery Pack
Removable
Rechargeable
Lithium-ion pack, 10.8 VDC 3.2Ah
Operational Power on Battery Pack, 3.1W typical 77° F (25° C)

Battery Pack Run Time
8 hours at 32° F (0° C) (approx.)

Battery Pack Charger
External
110-240 VAC, 50/60 Hz
Universal Dual Bay, Delivers 12W at 77° F (25° C) per battery pack

Charge Time
2-3 hours full charge (approx.)

LED Charging Indicator
Integrated into Dual Battery Pack Charger

Detection/Measurement System

Detection Method
Tunable Diode Laser Absorption Spectroscopy (TDLAS)

Detection Distance
100 ft (30 m) nominal - may vary due to background type and conditions

Measurement Range
0 to 50K PPM-M

Sensitivity
5 PPM-M at distances from 0 to 100 ft (30 m)

Beam Size
Conical in shape with a 22 in (55 cm) diameter at 100 ft (30 m)

Lasers

IR Laser
Class I

Green Spotter
Class 2 (II) <5mW @ 510-530nm
Spot size is .25 in at 50 ft (7 mm at 15 m)

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

Eye Safety Warning
Do not stare into beam or view directly with optical instrument

Avertissement de sécurité oculaire
Ne jamais fixer le faisceau ni le regarder directement avec des instruments optiques

Complies with 21 CFR 1040.10

Display

Size
3.5 in (8.9 cm) LCD Color

Resolution
320 x 240 pixels

Color Camera

Aperture
f/2.6

FOV
94DEG (at 6.0 mm image circle)

GNSS

Compatible With
GPS
GLONASS
BeiDou
Galileo

Communication

USB Dual Mode - flash drive and communications
USB Port Max Rating:
Um = 5V, In = 5 A
Bluetooth 4.2 BLE

WiFi b/g

Alarms

Digital Methane Detection (DMD)
Audible tone and visual alerts when detection threshold exceeded

Adjustable Detection Alarm Level
1 to 999 PPM-M

Real Time (RT)
Continuous beep rate relative to concentration from 10-1000 PPM-M

System Fault / Warning
Audible alarm and visual indication on the display

Testing

Built-In Self Test
Verifies operation and adjusts laser wavelength for maximum sensitivity

Test Gas Cell
Integrated within carrying case

Data Logging

Saves to Internal Memory
FAULT logs
Self Test logs
Captures

Data Collected
Includes, but not limited to:
CH4 PPM-M measurement
GPS location
Timestamp
Battery pack capacity
Battery pack voltage
Serial number of the instrument

Operating Conditions

Operating Temperature
0° to +122° F (-17° to 50° C)

Humidity
5 to 95% RH, non-condensing

Altitude
Up to 6560 ft (2000 m)

Environment of Use
Pollution degree 2 or better
Outdoor use

Regulatory

Ingress Protection
IP54 (water splash and dust resistant)

Compliance
EMC (EN61000-6-2, EN6100-6-4)

Low Voltage Directive
(2014/35/EU)

Radio Equipment Directive
(2014/53/EU)

ETSI EN 301 489-1 v2.2.0

EN 61326-1:2013

47 CFR Part 15 & ICES-003

Hazardous Location Safety

Class I, Zone 2, AEx ic op is IIA T4 Gc
Class I, Division 2, Group D
Intrinsically Safe

Ordinary Location Safety

UL/CSA 61010-1
CAN/CSA-C22.2 No 61010-1-12

Instrument and Accessories

A Complete Kit Assembly

HPN 105301

Includes:

- RMLD-CS Instrument (with battery pack)
- Battery Pack Charger
- Test Gas Cell
- USB Cable
- Carry Strap
- Carry Case

B RMLD-CS Instrument

HPN 105354

- Methane gas detection up to 100' away
- User interface
- Data logging interface
- Battery Pack
- Power connector

C Battery Pack

HPN 105727

- Rechargeable Li-Ion battery pack
- Provides power to the instrument
- Charges independently of the instrument
- Up to eight (8) hours of operating time on a full charge
- Recharge between uses to assure no interruption in use
- Use only with HPN 105358 Battery Pack Charger

D Battery Pack Charger

HPN 105358

- Universal 100 - 240 VAC, 506-60 Hz
- Two (2) slots for dual battery pack charging
- Recharge the instrument's battery pack after use
- LED on the front indicates charging status
- Use only with HPN 105727 Battery Pack

E USB Cable

HPN 105473

- USB2 A to USB micro cable
- Download data from the instrument to a computer
- Serial communications

F Carrying Case

HPN 105530

- Protects the instrument during storage and transport
- Built-in test gas cell for self-test
- Keep instrument in the case while not in use

G Test Gas Cell

HPN 106024

H Universal Power Supply (AC Adapter) and AC Power Cord (US/Canada)

HPN 105359

I AC Power Cord (US/Canada Only)

HPN 105528

Battery Pack, Charger and Charging Procedure

Battery Pack

WARNING

WARNING: To reduce the risk of ignition of a flammable or explosive atmosphere, battery pack must be removed, inserted and recharged only in a location known to be non-hazardous.

WARNING: Only use the HEATH supplied RMLD-CS battery pack charger to recharge the battery pack. Use of any other charger may cause severe damage to the battery pack or electrical circuits. Battery Charger is not part of the hazardous safety certification.

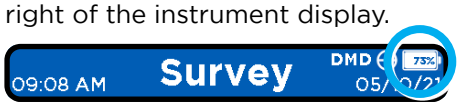
AVERTISSEMENT

AVERTISSEMENT : Pour réduire le risque d'inflammation d'une atmosphère inflammable ou explosive, bloc-batteries doivent être retirées, insérées et rechargées uniquement dans un endroit réputé non dangereux.

AVERTISSEMENT : Utiliser uniquement le chargeur de bloc-batterie RMLD-CS fourni par HEATH pour recharger le bloc-batterie. L'utilisation de tout autre chargeur peut endommager gravement le bloc-batterie ou les circuits électriques. Le chargeur de batterie ne fait pas partie de la certification de sécurité dangereuse.

- Provides the power to the instrument
- Removable
- Rechargeable
- Lithium-ion
- Up to 8 hours of operating time when fully charged.

Remaining battery pack capacity (in percent) indicator in the top right of the instrument display.



NOTICE

NOTICE: Must recharge between uses to assure no interruption in use.

NOTICE: The prolonged storage of the battery pack inside or outside the instrument can lead to battery chemistry being irreversibly damaged leading to permanent failure of the battery pack.

NOTICE: Do not dispose of this product in the unsorted municipal waste stream. Dispose of this product according to local regulations.

When storing the instrument or battery pack for more than a month:

- Charge battery pack to 40-50% *(see Charging Procedure on page 14-15)*

- Store at 60-70° F

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Dual Bay Battery Pack Charger

⚠ WARNING

WARNING: To reduce the risk of ignition of a flammable or explosive atmosphere, battery pack must be removed, inserted and recharged only in a location known to be non-hazardous.

WARNING: Only use the HEATH supplied RMLD-CS battery pack charger to recharge the battery pack. Use of any other charger may cause severe damage to the battery pack or electrical circuits. Battery Charger is not part of the hazardous safety certification.

⚠ AVERTISSEMENT

AVERTISSEMENT : Pour réduire le risque d'inflammation d'une atmosphère inflammable ou explosive, bloc-batteries doivent être retirées, insérées et rechargées uniquement dans un endroit réputé non dangereux.

AVERTISSEMENT : Utiliser uniquement le chargeur de bloc-batterie RMLD-CS fourni par HEATH pour recharger le bloc-batterie. L'utilisation de tout autre chargeur peut endommager gravement le bloc-batterie ou les circuits électriques. Le chargeur de batterie ne fait pas partie de la certification de sécurité dangereuse.

NOTICE

NOTICE: The RMLD-CS power cord on the charger can be changed to fit the type of receptacle used in your location. Non-US power cords must be specified when ordering.

- Charge two battery packs simultaneously
- Includes a Universal Power Supply (AC Adapter) and AC Power Cord (US/Canada only)
- An integrated metal bracket included on the bottom of the charger allows for wall or fixed mounting options.

To wall mount charger use four 8-32 screws to thread into self-clinching nuts on charger chassis. Thread dept is 0.060 in (1.5 mm), max screw intrusion is .150 in (3.8 mm).

NOTICE

NOTICE: Access to both sides of the mounting wall are needed.

NOTICE: For wall mounted or mobile applications, HEATH recommends securing the battery pack to the charger using the captive screws attached to the battery pack.

Charging Procedure

⚠WARNING

WARNING: To reduce the risk of ignition of a flammable or explosive atmosphere, battery pack must be removed, inserted and recharged only in a location known to be non-hazardous.

WARNING: Only use the HEATH supplied RMLD-CS battery pack charger to recharge the battery pack. Use of any other charger may cause severe damage to the battery pack or electrical circuits. Battery Charger is not part of the hazardous safety certification.

⚠AVERTISSEMENT

AVERTISSEMENT : Pour réduire le risque d'inflammation d'une atmosphère inflammable ou explosive, bloc-batteries doivent être retirées, insérées et rechargées uniquement dans un endroit réputé non dangereux.

AVERTISSEMENT : Utiliser uniquement le chargeur de bloc-batterie RMLD-CS fourni par HEATH pour recharger le bloc-batterie. L'utilisation de tout autre chargeur peut endommager gravement le bloc-batterie ou les circuits électriques. Le chargeur de batterie ne fait pas partie de la certification de sécurité dangereuse.

⚠CAUTION

CAUTION: To prevent damage to the battery pack or electrical circuits, always plug the charger into a surge-protected outlet.

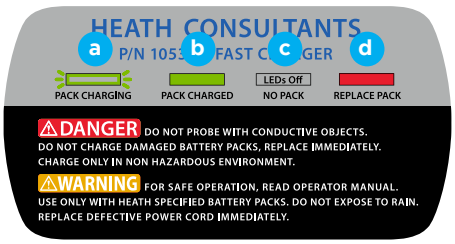
Charge in ambient temperature above 50° F (10° C) to obtain full battery pack capacity

1. Turn instrument OFF.
2. Unscrew the two captive screws located on the bottom of battery pack. Remove battery pack from instrument.

3. Insert battery pack into the charger, ensuring it is all the way down. Optional: Fasten captive screws into charger housing to prevent battery pack from dislodging.

LED panel of charger illuminates to show charging status of the battery pack charging.

a. Flashing Green = charging
b. Solid Green = fully charged
c. No light = battery pack not present or not connected properly
d. Red = fault
   i. Position battery pack into the other bay, if still red, then try another battery pack.
   ii. If the light is still red send to repair or replace.



Charging legend displayed on charger

4. When fully charged, power up the instrument to verify the battery pack capacity on the screen.

Full charge in about 2-3 hours

NOTICE

NOTICE: The prolonged storage of the battery pack inside or outside the instrument can lead to battery chemistry being irreversibly damaged leading to permanent failure of the battery pack.

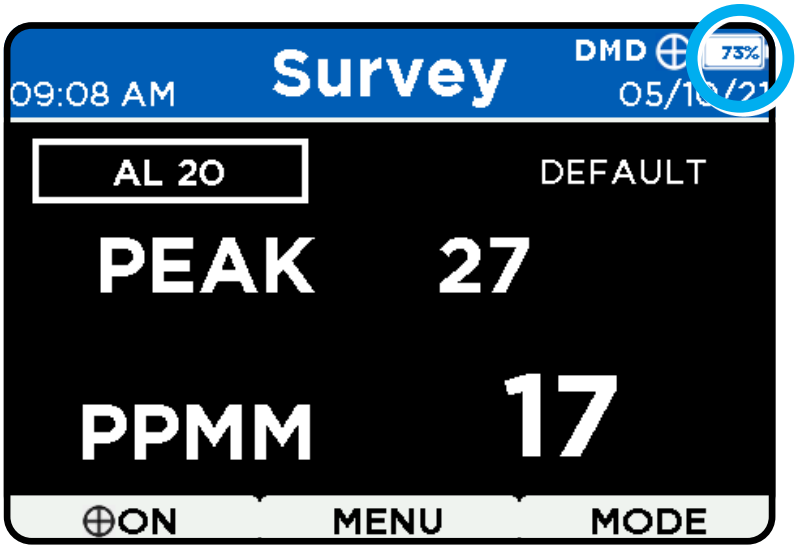
When storing the instrument or battery pack for more than a month:

- Charge battery pack to 40-50%

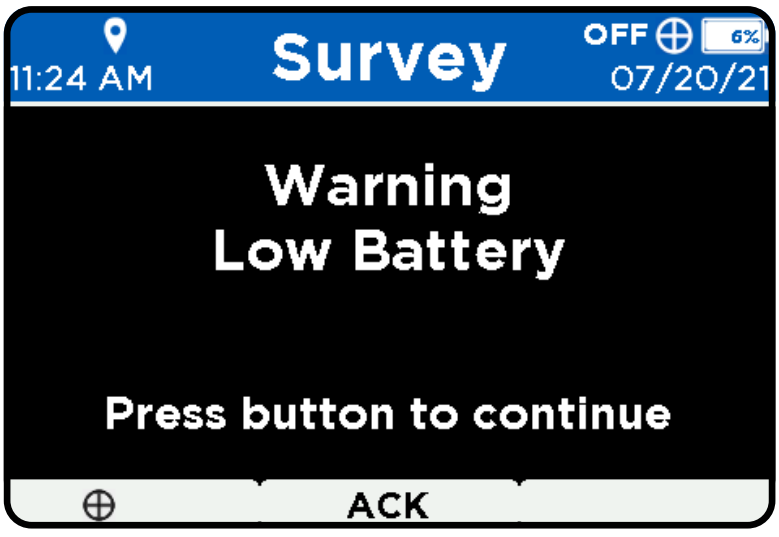
- Store at 60-70° F

Remaining Battery Pack Capacity

Remaining battery pack capacity (in percent) is indicated in the top right of the RMLD-CS screen.



A low battery message appears on screen when the battery is in urgent need of a charge.



Operating the RMLD-CS

Turn Instrument On/Off

The instrument will start booting up. The display sequence is:

- Starting logo
- "Running diagnostics..." at the bottom of the screen
- Upper screen auto populates:
  - User Default
  - Firmware revision
  - Date and Time
- When done the display will show "Self Diagnostics OK"

FW 1.57-2.39-10 or Newer

The first thing the instrument then checks for is a valid passing Self-Test file for the day. If not found, a pop-up window appears instructing the operator to conduct a Self-Test. The Self-Test prompt must be acknowledged.

NOTICE

NOTICE: Boot-up Self Diagnostics is not the same as Self-Test.

See Self-Test details on page 23.

NOTICE: On all screens, the middle button shuts down the instrument when pressed and held for 3 seconds.

WARNING

WARNING: The visible green Spotter laser is a Class 2 (II) laser product.

WARNING: Do not stare into beam or view directly with optical instruments.

WARNING: Avoid direct eye exposure to the laser and do not point in the direction of others. Visible and Invisible Lasers are deployed by this instrument.

AVERTISSEMENT

AVERTISSEMENT :
Le Laser de repérage vert visible est un produit laser de classe 2 (II).

AVERTISSEMENT :
Ne jamais fixer le faisceau ni le regarder directement avec des instruments optiques.

AVERTISSEMENT :
Évitez l'exposition directe des yeux au laser et ne le pointez pas vers d'autres personnes. Des lasers visibles et invisibles sont déployés par cet instrument.

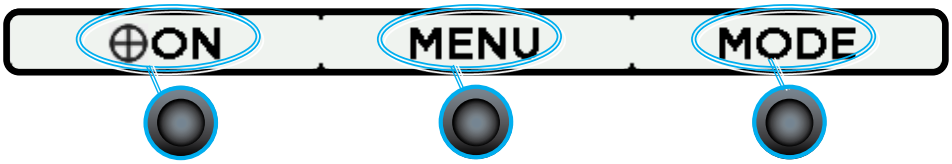
Button Controls

Simple 3-Button Control

Navigate through screens and control features of the RMLD-CS using three (3) buttons which are located below the display.

The available button functions vary depending upon the active screen.

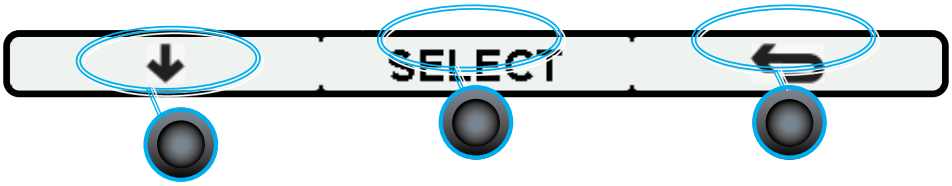
After instrument is powered ON, the control buttons will be as shown below:



- First function (⊕ON) enables/ disables the spotter
- Second function (MENU) displays the available features according to the access level of the user
- Third function (MODE) displays the three (3) screen mode options (Survey, Graph, and Image)

Menu Buttons

When Menu is selected, the buttons change to the ones below letting you view and select available features in the Menu.



- First button (↓), scrolls down through the Menu options
- Second (SELECT), selects the option highlighted
- Third (⮌), returns to the previous level and it also works like an "enter/return" when entering PIN and User Name.

FW 1.57-2.39-10 or Newer

Login Buttons Usage

When entering credentials using the buttons, the process can be easier using a set of secondary buttons for navigation. This set of secondary buttons help with features that require an operator to enter any set of information (credentials).

To activate the secondary buttons, press and hold the left button of the standard button layout.

Standard button layout (Menu Buttons) (above)

Secondary buttons (below)

Continue to hold this button to access the secondary button functions. Once released, the button functions will return to the standard layout.

Cycles backwards through available characters. This is useful when accidentally passing through the desired character.

Jumps to the next character set. The available character set sequence is: Space (␣), Letters (A-Z), Numbers (0-9), Special Characters (!, “, #,...). **For the ID request, only numerical values are acceptable.**

NOTICE

NOTICE: When entering PIN and User Name, be careful not to release the button and hit the back arrow, otherwise all entry is lost and will need to be re-entered.

Special Symbols

Represents the space character; this helps differentiate between space character and an empty/no character.

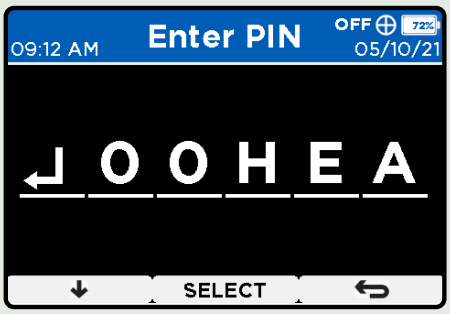
Represents the empty or null character.

Deletes all the characters to its right side and keeps the rest of the left side characters.

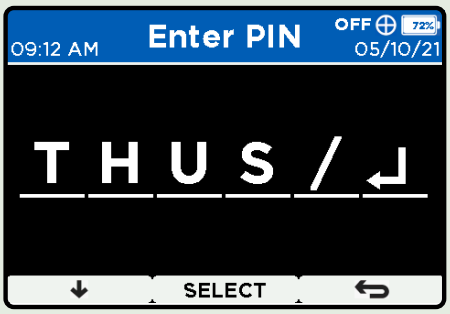
Short cut for the delete ↲ symbol:

Press ↓ button and hold, also press the ↓↓ button until you get the space ␣ character, while still holding the ↓ button press the up arrow ↑ twice until you get the delete symbol.

Examples below when you highlight ↲ and then press SELECT:



All entries will be deleted.



Only the last rightmost character will be deleted.

Display Graphics and Icons

Bluetooth
White indicates a successful pairing is connected.

Red indicates the connection is lost or not present.

No Bluetooth icon indicates no device is currently paired.

Details on page 26.

Audio Mode
Indicates the enabled audio mode. The three possible modes are:

DMD RT OFF

Details on page 24.

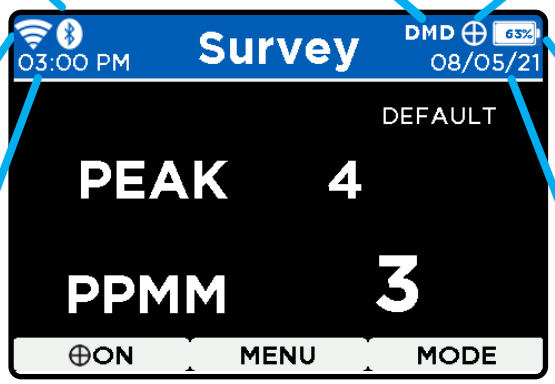
Spotter
White indicates the spotter is enabled, but not yet activated.

Green indicates an activated spotter.

Details on page 25.

WiFi
Indicates that WiFi is enabled.

Details on page 27.

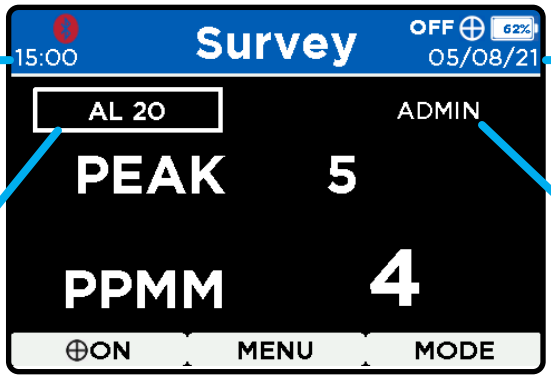


Battery Capacity
Shows percent remaining.

Details on page 15.

Time Stamp
Two formats:
standard (3:00 PM)
military (15:00)

Details on page 37.



Date
Two formats:
MM/DD/YY (08/05/21)
DD/MM/YY (05/08/21)

Details on page 37.

Alarm Level

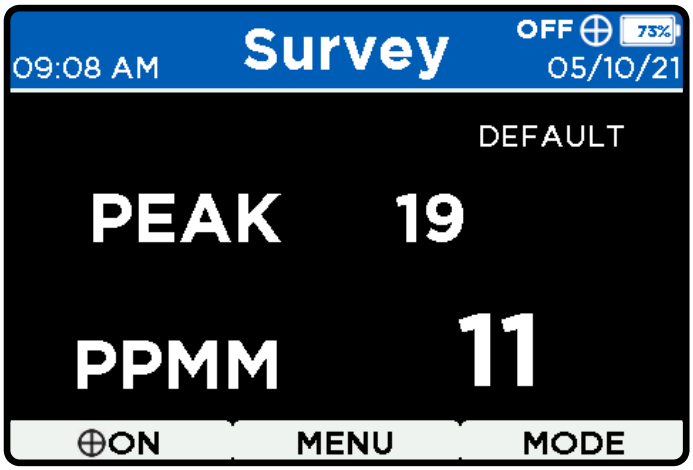
Details on page 25.

Users
Default, Admin, or Custom User

Details on page 34.

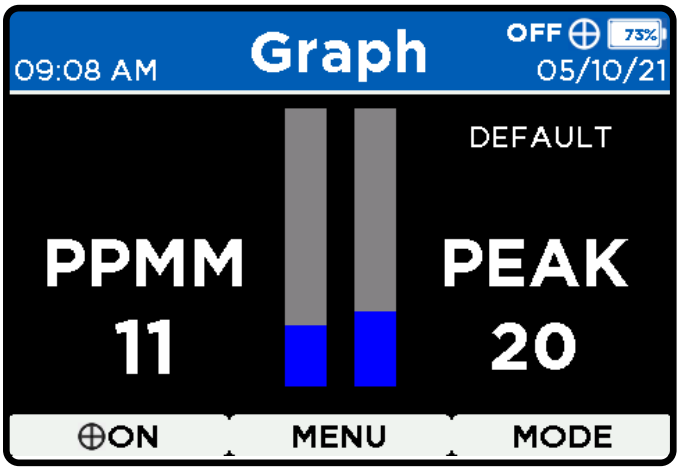
Screen Mode - Survey

The Survey screen mode will display a numerical readout of PPM-M readings. This allows the operator a no-clutter screen while surveying with the instrument.



Screen Mode - Graph

The Graph screen mode will display a bar graph in addition to the numerical readout of PPM-M readings. This allows the operator to easily see the changing values while surveying with the instrument.



During DMD Audio Mode (In Both Survey and Graph Screen Modes)

- Peak and PPM-M values will turn **red** while methane is detected above the alarm level.
- Peak value is held for two seconds before resetting to a lower current reading.
- Peak value will instantly change if a higher reading is obtained by the instrument.

FW 1.57-2.39-10 or Newer

The maximum PPMM value displayed is 50K PPM-M. Any measurement above 50K PPM-M will display ORNG (over-range reading). Readings from 10,000 PPM-M and higher are rounded to the nearest thousand and appended with a "K", i.e., 10K, 12K, 20K.

The active operator (DEFAULT, ADMIN, CUSTOM USERS) will be displayed in the top right corner below the date.

Screen Mode - Image

The IMAGE mode allows the operator to view a live image of where the RMLD-CS is pointed as well as current and peak PPM-M readings. This feature is especially useful in bright sunlight when the green spotter laser may be hard to see.

Pressing the center CAMERA icon button while in image mode will take an image snapshot that is recorded to the internal SD card. A text file will also be recorded onto the SD card, capturing the current instrument readings, time-stamp, GPS, and other information. The image snapshot will be held for 2 seconds before returning to live images.

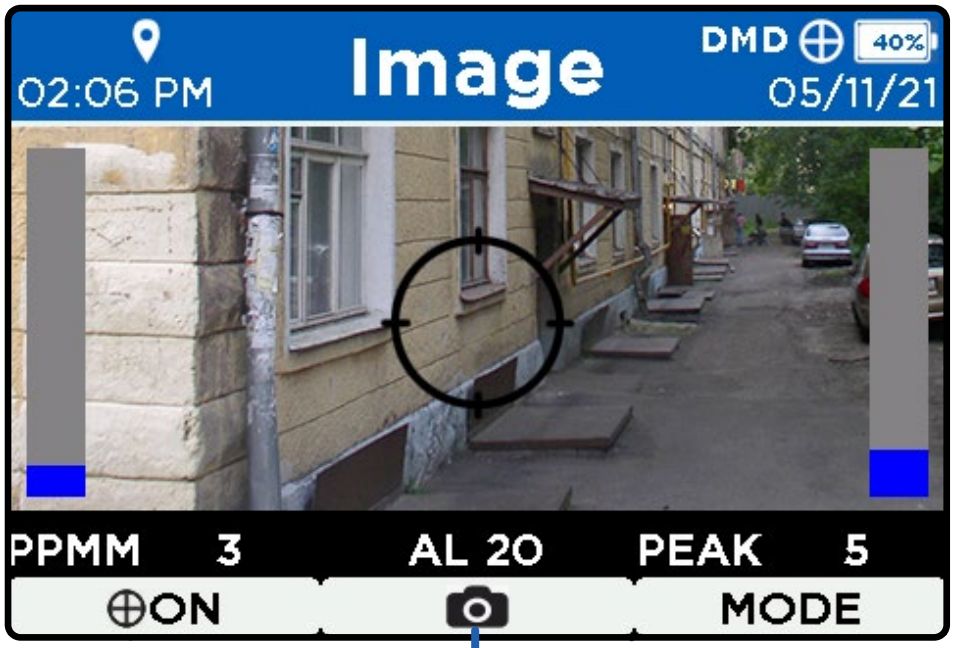
FW 1.57-2.39-10 or Newer

Readings from 10,000 PPM-M and higher are rounded to the nearest thousand and appended with a "K", i.e., 10K, 12K, 20K.

The maximum PPMM value displayed is 50K PPM-M. Any measurement above 50K PPM-M will display ORNG (over-range reading).

NOTICE

NOTICE: ⊕ The center reticle is a general representation of the IR beam location. Beam may not be at exact center of the circled image. Operator must always sweep the area of interest to ensure beam coverage.



Camera Button:

- Saves an image snapshot to internal SD

- Snapshot image remains on display for 2 seconds, and then live image returns

- Additional information is also saved, such as current readings, timestamp, and GPS.

Working with the Menu Items

Available Features

	Menu Features *Firmware 1.40-2.33-8 Or Earlier*	Operator's Access Level Menu Features Firmware 1.57-2.39-10 Or Newer			
		Security Enabled			Security Disabled
	DEFAULT	DEFAULT	CUSTOM USER	ADMIN	ALL USERS
Self-Test *(page 22)*	✓	✓	✓	✓	✓
Audio Mode *(page 24)*	✓	✓	✓	✓	✓
Alarm Levels *(page 35)*	✓	✓	✓	✓	✓
Spotter Control *(page 25)*	✓	✓	✓	✓	✓
USB *(page 26)*	✓	X	X	✓	✓
Bluetooth *(page 26)*	✓	X	✓	✓	✓
WiFi *(page 27)*	✓	X	✓	✓	✓
Data Logging *(page 28)*	✓	✓	✓	✓	✓
Timezone Offset *(page 29)*	✓	*	*	✓	✓
Language *(page 28)*	X	✓	✓	✓	✓
Display Background *(page 29)*	X	✓	✓	✓	✓
Security *(page 30)*	X	**	**	✓	✓
Users *(page 34-36)*	✓	✓	✓	✓	✓
About *(page 37)*	✓	✓	✓	✓	✓

* For the User/Default access level, the Timezone Offset feature is under the Users feature.

** FW 1.57-2.39-10 or newer, gives the option to enable/disable security. All access levels can enable security, only ADMIN can disable.

Doc No. 105408 Rev E, RMLD-CS Operator Manual

Instrument Self Test

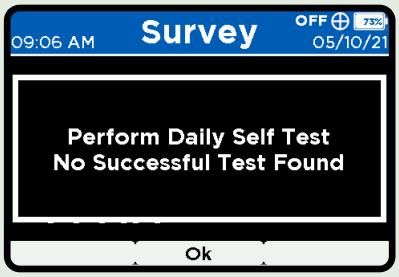
The RMLD-CS has a built-in function to perform a Self Test of the laser wavelength. Perform the Self Test daily before survey to ensure the instrument is operating at maximum sensitivity.
A Self Test log file is recorded and stored on the instrument.
To access the stored files, *refer to pages 40-42.*

Self Test takes 1-3 minutes

No yearly factory calibration required unless instrument repeatedly fails the Self Test or presents other problems.

FW 1.57-2.39-10 or Newer

After the Self Diagnostic, a pop-up screen reminds the operator to perform a daily Self-Test if one has not been successfully performed. Acknowledgment by clicking "OK" is required.



1. Press the MENU button.

2. Select the Self Test option. The screen will display and guide the next steps for the Operator to follow within 10 seconds (enough time for the steps).

3 Place the instrument in its designated area in the carrying case, making sure it is all the way in place and flat.

Status of Self Test is indicated on the display, and by audible tones. A Self Test file is also created.

✓ One (1) beep every second means instrument passed.

X Two (2) beeps every second means instrument failed, and Self Test should be repeated.

! If instrument fails on a third attempt, contact Heath Consultants Factory Service.

NOTICE

NOTICE: Laser wavelength drift is a normal characteristic of the RMLD-CS. The rate of drift is low and Self-Test will sweep the laser's wavelength range to determine the optimum wavelength. Survey work conducted with an instrument which has drifted and was not Self-Tested regularly may need to be redone. If the instrument is still not able to successfully perform a Self-Test after three attempts, contact HEATH for assistance.

What if the instrument failed the Self Test?

The cause is most often due to:
- instrument not properly positioned in the case
- case was moved during test
- laser wavelength has drifted
- battery pack capacity is too low

Ensure sufficient battery pack charge before attempting Self Test procedure.

Make sure the instrument is in its proper position, all the way down, and flat.

After rechecking the above, repeat the Self Test procedure.

⚠CAUTION

CAUTION: Should the instrument not pass after several attempts, do not use the instrument for survey work until the problem is corrected. Contact HEATH for further assistance.

CAUTION: Do not attempt to repair the instrument. Should the instrument not work properly, or indicate a fault or warning, refer to the troubleshooting section *on page 49-50*.

Audio Indications and Modes

Audio Warning Indications

The instrument emits a continuous beep to indicate instrument-level warnings and/or fault conditions. A warning will also be displayed on screen. The most common warnings are:

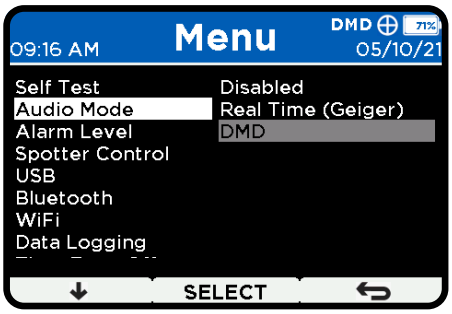
- Low signal return/low light level
- Over saturation of signal
- Low battery pack

If low signal return/low light occurs, then change angle or move in closer to get in range.

If over saturation, then back up from the target or point the RMLD-CS at a less reflective surface.

Should warning(s) persist, follow instructions in the troubleshooting guide on *page 49-50*.

DMD (Digital Methane Detection)



The Digital Methane Detection (DMD) mode is a highly sophisticated detection algorithm that greatly enhances the use of the RMLD-CS.

In most situations, the operator should survey with the DMD mode turned on. To turn on the DMD mode, press the MENU button, select AUDIO MODE, then select DMD.

While using the DMD, no gas detection sound will be heard and the display will not respond until a detection of methane above the Alarm Level occurs. When methane is detected, the audible alarm will sound and the display readings/bar graph will change color to red.

DMD detection is possible when the PPM-M reading is high and there is a low light warning. While the low signal warning is sounding, the RMLD-CS may still be able to detect high gas concentrations.

Alarm Level controls the response of the DMD. The operator can adjust Alarm Level. Your company's survey procedure may require the use of a specific value or procedure to set it. Set the Alarm Level such that the false detection rate is low, while not too high that leaks are missed.

Real Time (Geiger)

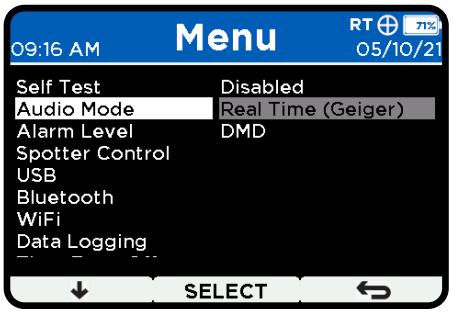
Real Time is very convenient to use for leak spread and leak centering. It is not intended to be used to perform a leak survey.

The Real Time mode of the RMLD-CS emits a continuous yet variable beep rate that is relative to the concentration reading. The faster the instrument beeps, the higher the methane concentration level. Note that the beep frequency increases as you scan at a further distance due to the ambient amount of methane in the air. The usable concentration range used by Real Time is 10–1000 PPMM.

Real Time mode is most effective at shorter distances to help verify a low level detection, and to help isolate the highest gas concentration location.

To verify a low level leak:

1. Stand back about 10 ft (3 m) from the leak with the wind to your back if possible.
2. Sweep the laser back and forth across the leak while maintaining a constant distance.
3. Listen for a consistent increase in beep frequency as the beam sweeps through the leak. Very small leaks will have just a slight increase in beep rate.



To isolate the spot with the highest concentration:

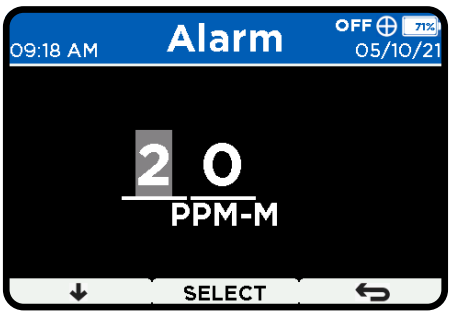
1. Stand back about 10 ft (3 m) from the leak with the wind to your back if possible.
2. Sweep the laser starting from the up-wind side, in and around the leak area.
3. Listen for the fastest beeping.
4. Change your angle slightly and re-scan the leak zone.
5. If the location with the fastest beeps is consistent, then the location of the surface leak is at that spot.
6. If beeps are not consistent then keep working the area. The gas plume may be drifting around causing inconsistent readings. In some cases, the gas plume may be large enough that localization is not very accurate.

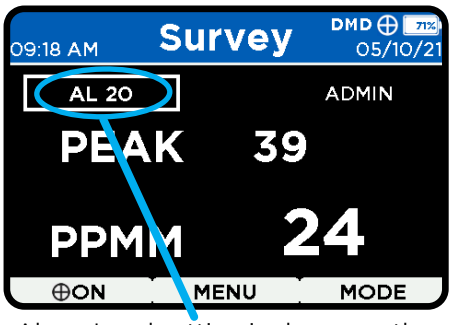
Alarm Levels

To change the Alarm Level, press the MENU button, scroll down and select ALARM LEVEL. Press the down arrow button to increase the digit value. The values are circular and will wrap around. When the digit value is as desired, press SELECT to move to the next digit position. When done, press the return or back button.

NOTICE

NOTICE: A higher Alarm Level setting requires a higher concentration of methane to trigger the DMD alarm.





Alarm Level setting is shown on the display within a rectangle.

Spotter Control

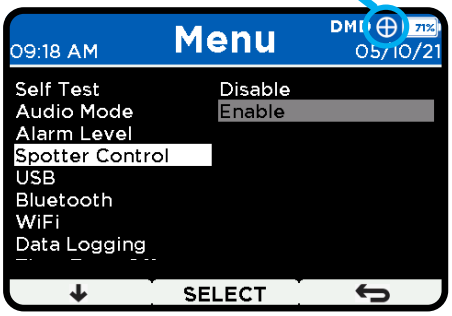
The green spotter laser is under the control of the operator and when enabled, will be on for two minutes if the ⊕ON button is pressed. Once pressed, the green spotter laser will automatically shut off after two minutes, requiring the operator to press the ⊕ON button again for use if needed.

CAUTION

While using the green spotter laser, do not point it towards people's eyes or automobile windshields causing vehicle drivers to be distracted. Under no circumstances should the spotter laser be pointed at flying aircraft or used near airports.

To use the spotter laser:

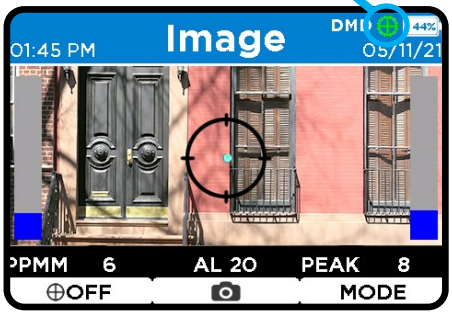
1. Select MENU
2. Scroll down to SPOTTER CONTROL
3. Select ENABLE. The enabled spotter icon will be visible in the top menu bar as a white cross-hair. Spotter Laser is enabled by default.



Enabled (but not yet activated) spotter icon is white.

The left button will now display the spotter ON option.

4. Press the left ⊕ON button to activate the spotter for 2 minutes. When the spotter laser is activated, the icon will change from white to green.



Activated spotter icon is green.

WARNING

WARNING: The visible green Spotter laser is a Class 2 (II) laser product.

WARNING: Do not stare into beam or view directly with optical instruments.

WARNING: Avoid direct eye exposure to the laser and do not point in the direction of others. Visible and Invisible Lasers are deployed by this instrument.

AVERTISSEMENT

AVERTISSEMENT :
Le Laser de repérage vert visible est un produit laser de classe 2 (II).

AVERTISSEMENT :
Ne jamais fixer le faisceau ni le regarder directement avec des instruments optiques.

AVERTISSEMENT :
Évitez l'exposition directe des yeux au laser et ne le pointez pas vers d'autres personnes. Des lasers visibles et invisibles sont déployés par cet instrument.

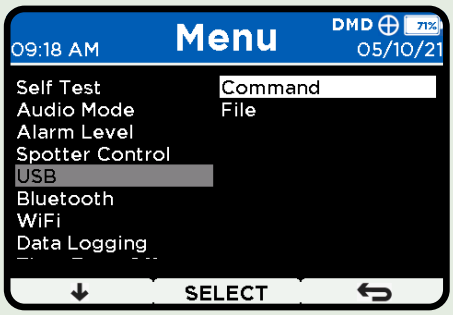
USB

FW: 1.57-2.39-10 or Newer - Security Enabled

This Menu feature is not available for the DEFAULT and CUSTOM USER profiles. However, the ADMIN profile has two configurations to choose from:

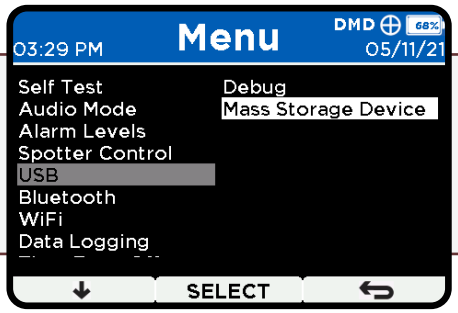
Command Mode
Select to use the USB port as a communication port. Communications settings are 115200, 8, 1, N. This is typically used by ADMIN for instrument configuration.

File Mode
Select to use the USB port for file access as a flash drive. This is the instrument's default mode.



FW: 1.40-2.33-8 or Earlier

Every User has access to both Debug and Mass Storage Device. The Menu feature is as shown at right:



Bluetooth BLE

FW: 1.57-2.39-10 or Newer Security Enabled

Only ADMIN and CUSTOM USERS have access to Bluetooth.

The Bluetooth feature within the RMLD-CS allows operators to connect with the RMLD-CS Mobile App or 3rd party applications and stream data. The RMLD-CS Mobile App is available for both Apple and Android mobile devices and is available at the Apple and Google app stores.

The instrument streams readings, warnings, faults, timestamp, battery pack capacity and various supporting data for usage. Instrument files and datalogs are not accessible using BLE.

To enable Bluetooth streaming, the instrument must be paired with a Bluetooth (BLE) capable device:

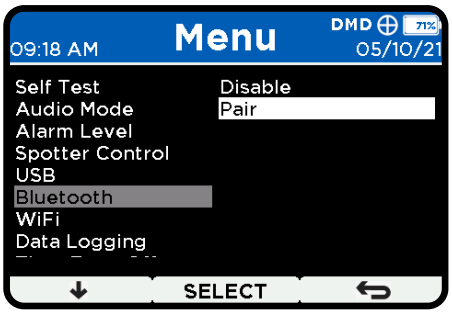
1. Press MENU, then scroll down to and select BLUETOOTH
2. Scroll to and select PAIR. The Bluetooth connection "RMLD-CS <serial number>" will now broadcast for discovery.

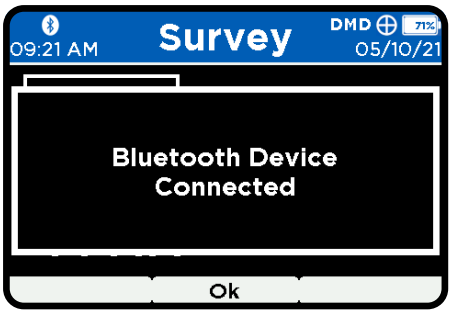
NOTICE

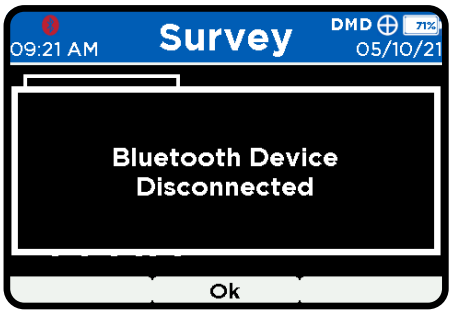
NOTICE: Some devices may not be able to discover the RMLD-CS using the default Bluetooth connection manager on the operator's device. The operator may need to install a compatible Bluetooth manager on their device for successful pairing.

Indicates a successful pairing has connected.

Indicates the connection is lost or not present.







WiFi

FW: 1.57-2.39-10 or Newer Security Enabled

Only ADMIN and CUSTOM USERS have access to WiFi. Only ADMIN can configure settings through the Configuration Portal.

(details on page 42-43)

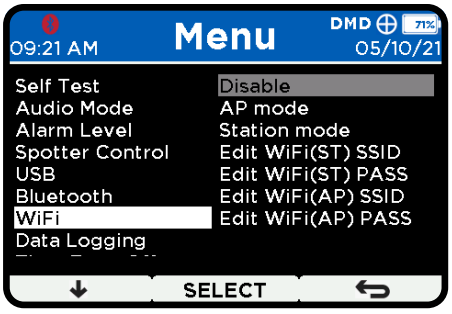
The WiFi feature allows operators to communicate with the RMLD-CS using a web browser such as Chrome, FireFox or Edge.

Instrument files access and streaming telemetry are supported. The instrument can stream out real time warnings, errors, and data (instrument readings).

Connecting via WiFi will also allow the operator to access useful information stored on the instrument's SD card such as Self-Test logs, data logging, fault codes, and screen captures.

The RMLD-CS only supports protected networks with WPA-2 security. The SSID and password may be entered manually through options provided in the main Menu.

To enable the WiFi feature, scroll to WiFi in the menu and select either AP or STATION mode as needed.

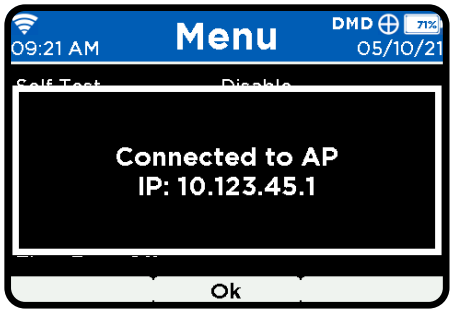


AP Mode

The Access Point (AP) mode is most common, and will broadcast a wireless network directly from the RMLD-CS instrument. The operator must search for this network and connect directly to the instrument using the AP WiFi SSID network name and password. It is highly recommended to change the default AP SSID and password.

When WiFi is successfully enabled:

- A pop-up confirms that WiFi is broadcasting with the IP address 10.123.45.1
- A white WiFi icon is displayed in the status bar.
- The IP address of the RMLD-CS is displayed on the About screen.
- RMLD-CS is actively broadcasting and accepting connections.



FW 1.40-2.33-8 or Earlier

Will display "WiFi Broadcasting IP:10.123.451".

From your PC or mobile device, check the wireless Network connections available and select the appropriate AP SSID (RMLD-CS is default). The AP default password, changeme2, is required for connection (this applies to new PC/laptops and password changes). It is highly recommended to change this password. The PC or mobile device should now be connected to the RMLD-CS.

The web page-based File Server/Configuration Portal can now be accessed. *(details on page 41-42)*

Station Mode

The Station mode will communicate with a wireless router to achieve general network connectivity. Specific Station mode credentials must be entered and saved prior to usage.

Data Logging

The data logging feature allows the instrument to store complete telemetry records of the instrument, while powered on, to an internal SD memory card.

Data telemetry is recorded into log files during operation.
The following measurement information is saved:

- CH4 PPM-M measurement
- Battery pack capacity
- Battery pack voltage
- GPS location
- Timestamp
- Serial number of the instrument
- Various system status fields and values that can help evaluate instrument performance or aid in troubleshooting if a fault condition occurs

To access stored data logs, refer to the various methods outlined on *pages 40-43*.

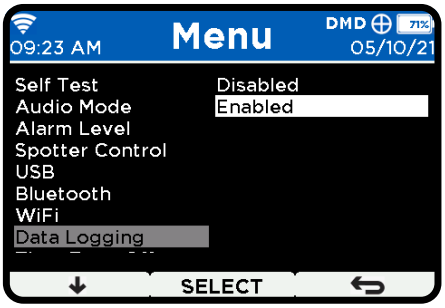
Data Logging defaults to ENABLED when RMLD-CS is powered on.

To enable Data Logging:

1. Press MENU
2. Scroll down to DATA LOGGING and press Select
3. Scroll down to and select ENABLED

To disable Data Logging:

1. Press MENU
2. Scroll down to DATA LOGGING and press Select
3. Scroll down to and select DISABLED



Data logging does not need to be enabled in order for the instrument to record:

- FAULT logs
- SELF TEST logs
- Screen captures

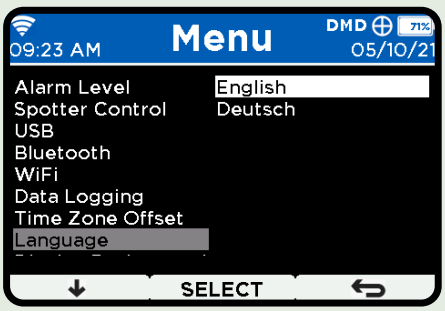
Language

FW 1.57-2.39-10 or Newer

The RMLD-CS supports both the English (default) and German languages.

To change the Language setting:

1. Go to MENU.
2. Scroll to LANGUAGE.
3. Select the desired language.
4. Select the back arrow button when complete.



Time Zone Offset

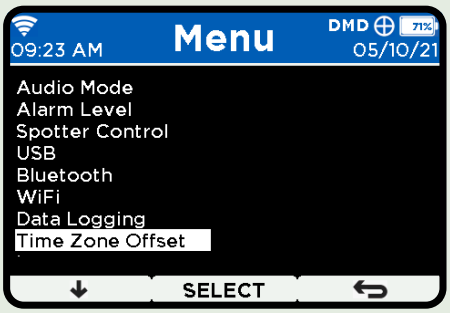
The time zone offset menu option allows the user to select the desired offset from UTC time acquired by the GPS.

1. In the menu, select "Timezone"

FW 1.57-2.39-10 or Newer

In the menu, select TIME ZONE OFFSET

2. Use the arrow buttons to adjust the desired offset
3. Select the back arrow button when complete



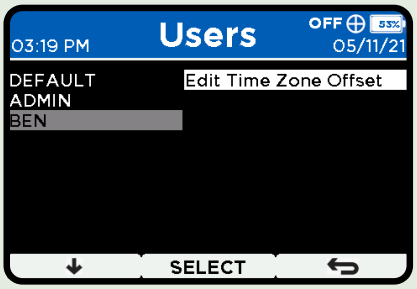
FW 1.57-2.39-10 or Newer

FW 1.40-2.33-8

FW 1.57-2.39-10 or Newer

For CUSTOM USERS accounts, to modify Timezone Offset:

1. Go to MENU.
2. Scroll to the desired User.
3. Select "Edit Timezone Offset", as shown below for USER BEN. The next screen will be Timezone Offset.



Display Background

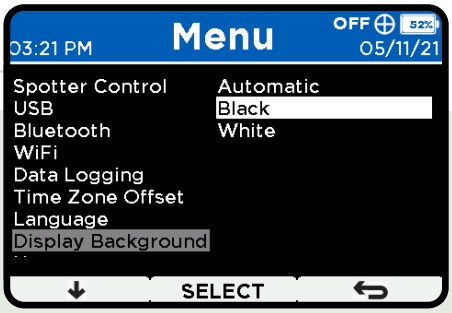
FW 1.57-2.39-10 or Newer

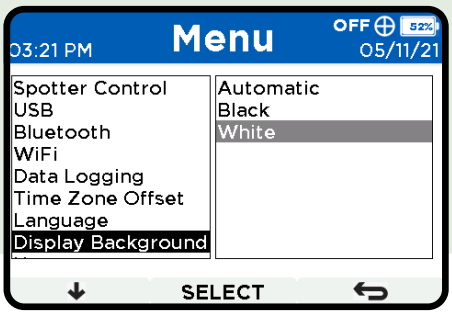
The RMLD-CS offers three (3) choices for the display background color:

- Black (factory default)
- White
- Automatic (uses the configured Timezone Offset)
  Displays white from 8AM - 8PM
  Displays black from 8PM - 8AM

To change display background color:

1. Go to MENU.
2. Scroll down to DISPLAY BACK-GROUND and press SELECT.
3. Highlight your choice and press SELECT.
4. Press the back arrow when done.





Security

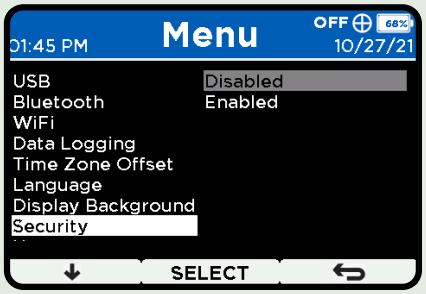
FW 1.57-2.39-10 or Newer

The RMLD-CS offers an optional tiered system of access. Instrument is preset to Security Disable. Things to consider:

- Changing the security access resets instrument to default settings. Prior configurations will be erased.
- Access level profiles apply to enabled security. Disabled security functions similar to FW 1.40-2.33-8
- Only ADMIN can disable security

To enable/disable Security:

1. Go to MENU.
2. Scroll down to SECURITY and press SELECT.
3. Highlight your choice and press SELECT.
4. Press the back arrow when done.



Access Level Profiles & Tiered Permissions - Security Enabled

DEFAULT

The instrument boots-up in DEFAULT mode. For data protection, all electronic communication ports (USB, WiFi and BLE) are disabled. To access data and many of the features, operators needs to log in as an Admin or Custom User with permissions.

CUSTOM USER

Primary profile for authorized field surveyors to operate and use the wired USB, WiFi, and Bluetooth interfaces. Limited internal data is available. The RMLD-CS can hold up to 19 custom user profiles.

ADMIN

Primarily used to create, delete, and modify user's credentials. ADMIN can access all data, control communications and configure the instrument.

	DEFAULT	CUSTOM USER	ADMIN
Intended for	Anyone	Field Operator	IT or Authorized personnel
Streaming Access (USB, WiFi, BLE)	x	✓	✓
File Access (USB + WiFi)	x	✓	✓
Web Access (File Server, Configuration Portal)	x	File Server	✓
Command Options	Help, Command Access Level	Same as Default + Telemetry System	Same as User + Set: WiFi SSID & Password, Update WiFi, Display Fault Record, Clear Fault Record, System Time

All users have the same access levels when security is disabled.

FW 1.57-2.39-10 or Newer - Security Enabled

Terms

User Name
Visible identifiers of USER profiles.

ID
Number-based identifier for their instruments or any company preference (e.g. employee number).

PIN
Same as password.

WiFi SSID
Service Set Identifier, available for both AP and Station Mode. They will typically differ.

WiFi Pass
Password for both AP and Station Mode. They will typically differ.

File Type	Access Level	Max Length	Supported Characters
User Name	User	20	Space, Uppercase Letters and Numbers
ID	ADMIN/User	4	Numbers
PIN	ADMIN/User	12	Space, Uppercase Letters, Numbers and Symbols
WiFi SSID	ADMIN/User	32	All printable characters
WiFi PASS	ADMIN/User	63	All printable characters

Required Credentials

The table below describes the credential requirements applicable to all account profiles (ADMIN and all CUSTOM USER profiles), except for the "User Name" credential, which is only available for USER profiles. The ADMIN and DEFAULT operator profile names are not editable.

NOTICE

NOTICE: Before login, identify the operators per instrument and their tier level access. Only the ADMIN profile has permission to create, setup credentials and delete/add new USER profiles.

ADMIN Profile - First Method

For Firmware 1.40-2.33-8, please refer to Users configurations on page 35-36.

There are two methods for login as ADMIN while security is enabled:

First Method

Through the instrument buttons/MENU.

Second Method (Recommended)

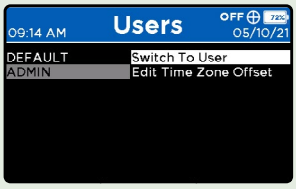
Through the Configuration Portal, using Tera Term (or suitable terminal program), and a WiFi connection.

The first method only requires the RMLD-CS. All configurations are made using the buttons explained earlier *(page 17-18)*. It is an easier setup than the Second Method, but it will take longer working with the buttons, especially if the credentials are composed of many characters.

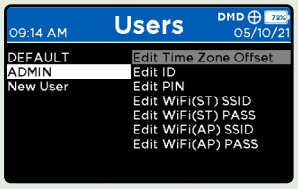
Login

From the Survey or Graph screen mode, select MENU, scroll down to USERS and then select ADMIN. The next screen will ask for your PIN (password) credentials. Enter the PIN.

The default PIN for ADMIN is: **800HEATHUS/$**. You will need it for first time login. **It is highly recommended to change the password.**



When done, press the back arrow. This will take you back to the USERS screen with SWITCH TO USER highlighted. **Make sure to press SELECT or the credentials will not be processed.**



If the PIN was processed the screen will change its features to the options.

FW 1.57-2.39-10 or Newer - Security Enabled

For Firmware 1.40-2.33-8, please refer to Users on page 35-36.

Set Up Credentials

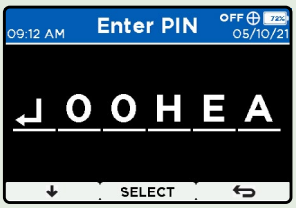
After login-in as ADMIN, new features to modify your profile account as well as others will appear. Before creating New Users, it is recommended to change you ADMIN PIN first and ID. The steps below will apply to User profiles as well

Change PIN

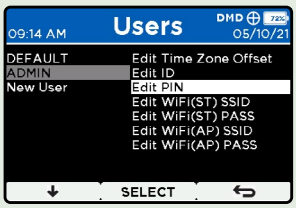
From the MENU screen, select USERS. Select appropriate account profile, then press EDIT PIN. To delete the current PIN, use the delete character (*Check Login Button section*).

NOTICE

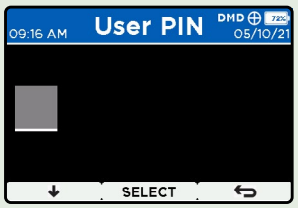
NOTICE: Credentials not necessary for Security Disable.



To delete the old PIN entirely, make sure the delete symbol is at the far left.



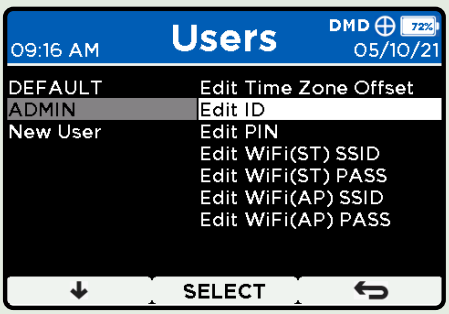
The screen will have an empty space. Enter your new PIN following the guidelines for *Supported Characters on Page 31.*

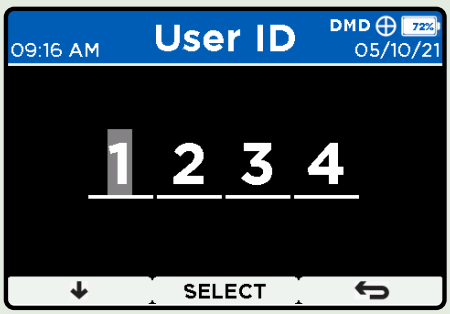


Press the BACK ARROW button to return to the previous menu and accept the PIN entered.

Edit ID

Select the profile account from the MENU and scroll to EDIT ID. Press select and use the down arrow button to scroll through the numeric options-referencing the supported characters table. Pressing SELECT will accept the change and move to the next place holder. When done press the BACK ARROW button to accept the changes and return to the previous menu.





NOTICE

NOTICE: It is required to create credentials before enabling WiFi, otherwise a prompt will appear asking for SSID or password information.

Edit WiFi Credentials

Both the Users and WiFi features under the Menu screen allow an ADMIN to change their and other Users' WiFi credentials.

Choose from Station or AP mode and their SSID and Password options. Press select and use the down arrow button to scroll through the character options. Pressing SELECT will accept the change and move to the next character place holder. When done, press the BACK ARROW button to accept the changes and return to the previous menu.

ADMIN Profile - Second Method (Recommended)

FW 1.57-2.39-10 or Newer - Security Enabled

For Firmware 1.40-2.33-8, please refer to Users on page 35-36.

ADMIN can use USB Command Mode for comprehensive access to the instrument for monitoring and configuration purposes.

USB Command mode allows ADMIN to login to an instrument through Tera Term, and access the Configuration Portal to edit profiles (after a WiFi connection is established - *see page 27 for details*). Other features to access files are covered on the *File Access section*.

Tera Term Requirements

1

Micro USB to USB2 A cable, ~ 2m long, included with the RMLD-CS

2

A serial terminal program such as Tera Term version 4.105 or newer.

Download Link:

https://osdn.net/projects/ttssh2/releases/

Enable Command Mode

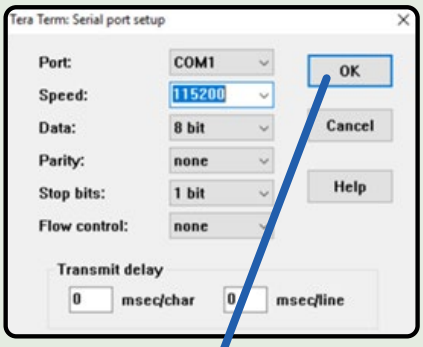
With the instrument powered off,

1. Press and hold the right button, and press and hold the center button for a few seconds.
2. Release both buttons.

The instrument's power sequence will be the same, but "Command Mode Enabled" will appear at the bottom of the display for acknowledgment on start up.

Login Using Tera Term

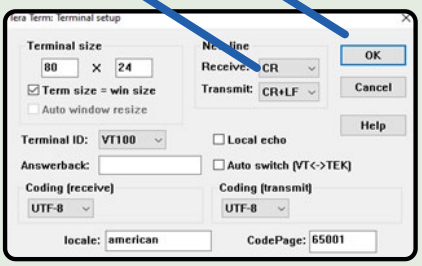
1. Attach the micro USB cable to the RMLD-CS and the USB2 A end to the PC's USB port. Wait for the driver to load when first connecting to a PC.
2. Run Tera Term. Select the respective COM port.
   NOTE: You may need to go to PC's Settings under "Device Manager" to find the assigned com port. The RMLD-CS com port is typically named "USB Serial Device" in Device Manager.
3. Click "Setup" tab then "Serial Port". Set the serial port configuration to: 115200, 8, N, 1, N (as shown below). The com port used may differ from what's shown. Click "OK".



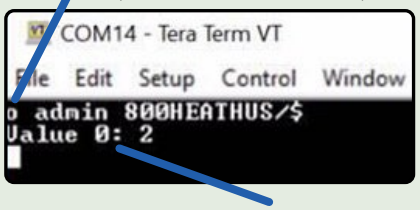
NOTICE

NOTICE: Dialog box may display "Open New" instead of "OK".

4. Click "Setup" tab, then "Terminal". A Dialog box "Tera Term: Terminal setup" will appear. Select "CR+LF" in the "Transmit" drop-down. Click "OK".



5. Type the command **o admin 800HEATHUS/$** (the password will differ if changed) and press enter. This command starts with the small letter "o"(not the number "0").



The return should be "Value 0:2".

6. You are now logged in as ADMIN. ADMIN should display in the upper right on the instrument screen modes Survey and Graph. Exit the Tera Term program and disconnect the USB cable from the instrument.
7. Go to WiFi in Menu to establish connection. *Details on page 27.*
8. Configure user/credential. *Details on page 42-43*.

Users

Users allows multiple operators to utilize the RMLD-CS instrument with customized settings and unique PIN/Password protection to enable use.

FW 1.57-2.39-10 or Newer

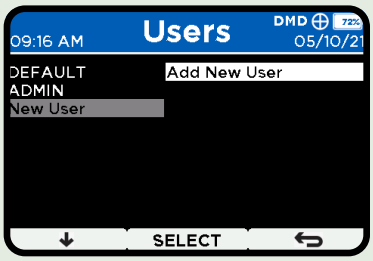
Create A New User, Credential Setup, and Delete A New User

The ADMIN profile allows you to create up to 19 users.
For each user, a Name, ID, and PIN must be created.

Create a New User

Under the Menu option select USERS, scroll down to New User and SELECT Add New User.

Automatically, the instrument will add a new user under the name NEW. It is highly recommended to change the name.



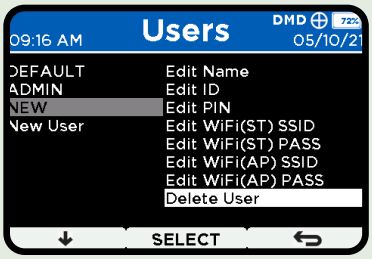
NOTICE NOTICE: When security DISABLED, switch to ADMIN profile to Create New User.

Edit User Name (ID)

Select NEW and scroll down to Edit Name. Delete the NEW name using the delete symbol and change the name like changing the PIN. When done, select the Back Arrow.

Change ID, PIN, and WiFi Credentials

This is the same process as with the ADMIN profile. Select the User profile and credentials to change.



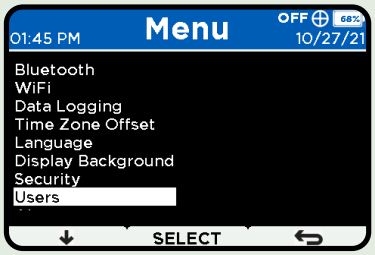
Delete User

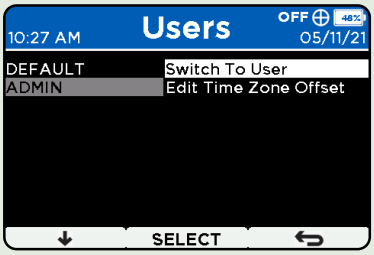
Select the user profile and scroll down and press Select to Delete User.

Navigating Between Users

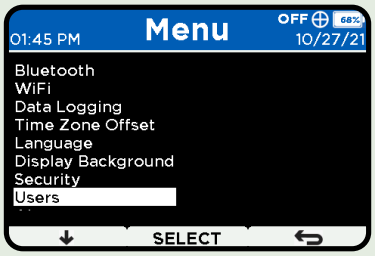
1. Select MENU (from Survey or Graph screen mode)
2. Scroll down to USERS
3. Select the desired User profile name.
4. Enter the PIN or password by pressing the down arrow to select each character, and press select to accept and move to the next character. *(See "Login Button" on page 18 for more details.)*
5. When done, press the back arrow button to accept and return back to the Users screen.
6. Select "Switch To User" to use the new user's profile - otherwise it keeps the previous profile.

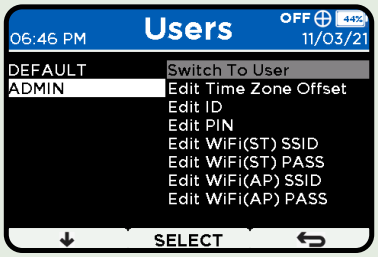
Security Enabled





Security Disabled





NOTICE NOTICE: When security DISABLED, skip steps 4 and 5.

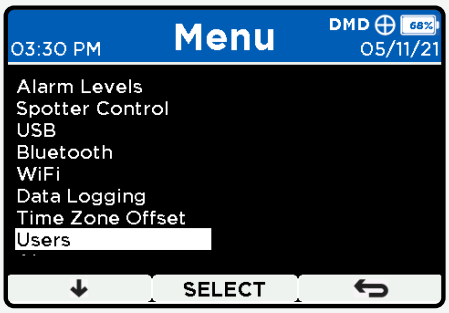
FW 1.40-2.33-8

Credentials Field

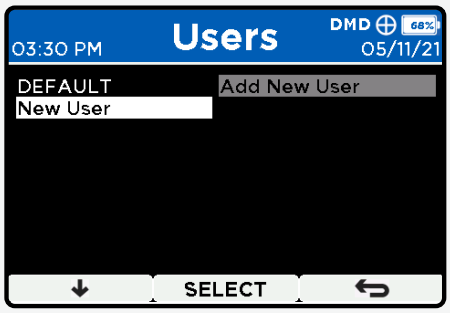
The table below describes the credential fields where applicable:

File Type	Max Length	Supported Characters
User Name	20	Space, Uppercase Letters and Numbers
ID	4	Numbers
PIN	4	Numbers

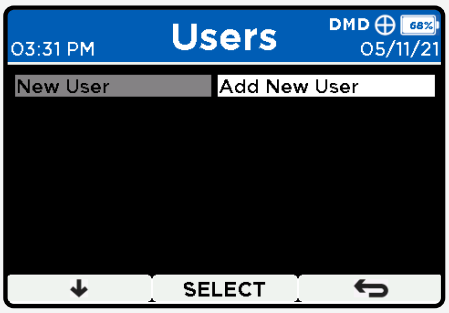
New User



1. Press MENU button, and scroll down to select USERS.

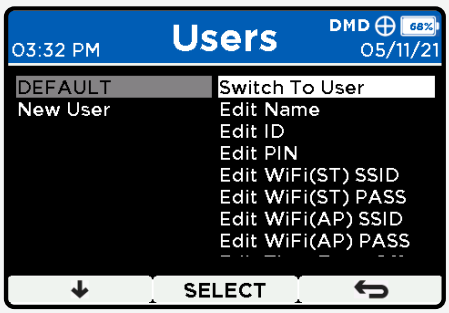


2. Select NEW USER.

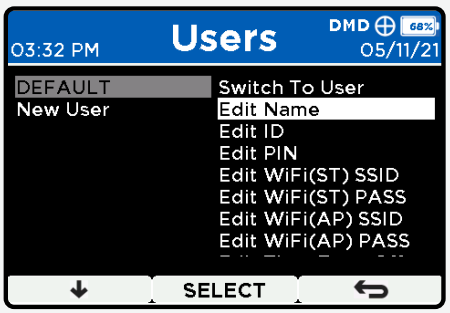


3. Select ADD NEW USER.
4. Press the back arrow to accept and return to the previous menu.

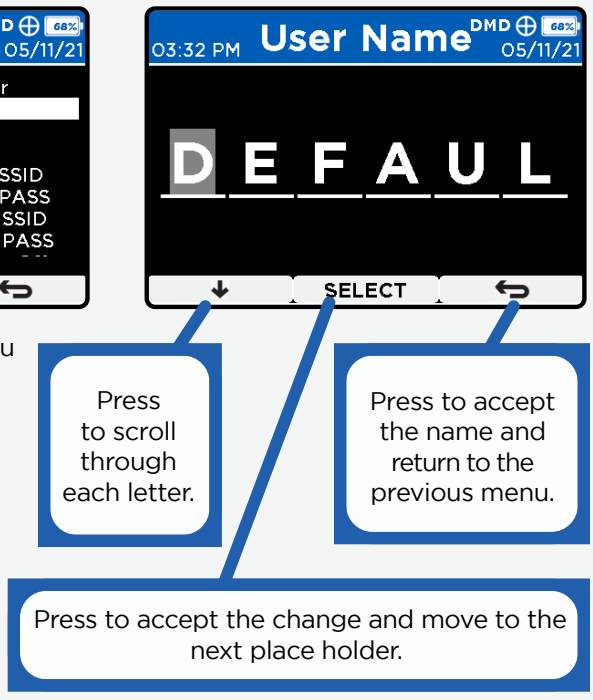
Rename User



1. Select the user to be renamed.

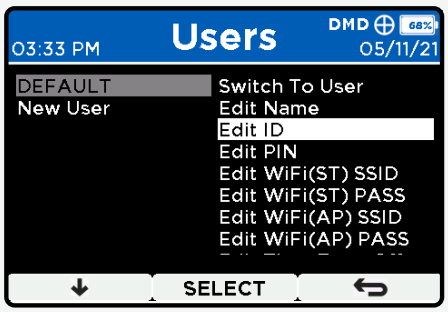


2. Scroll down the sub menu and select EDIT NAME.

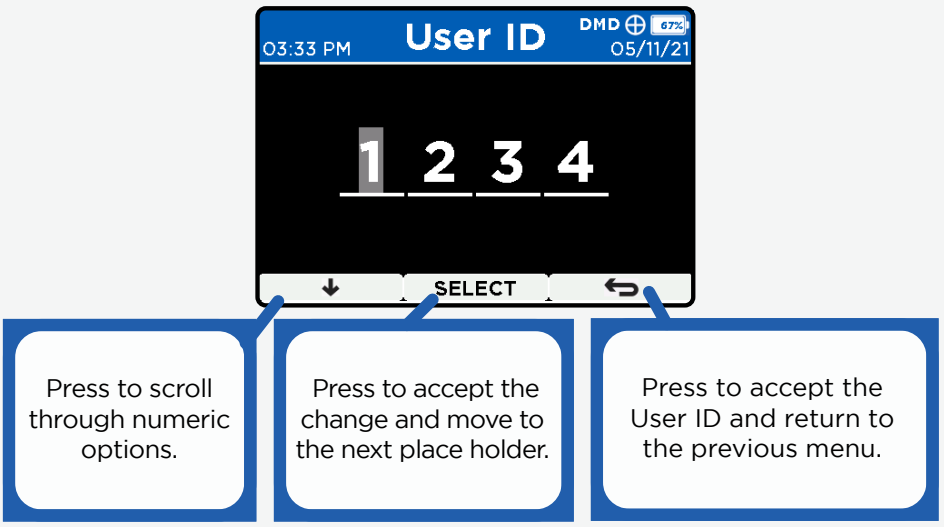


FW 1.40-2.33-8

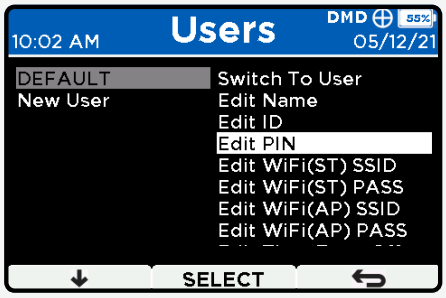
Change User ID



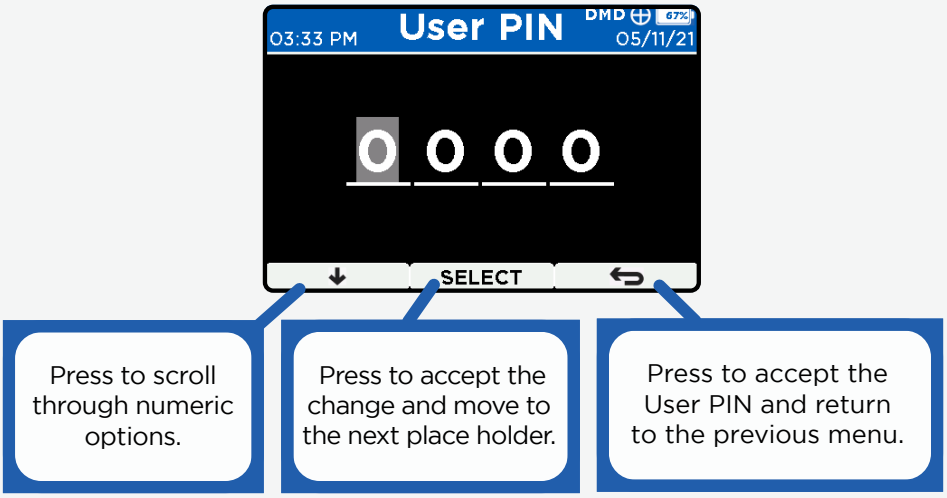
1. Select the user from the menu, and scroll down the sub menu and select EDIT ID.



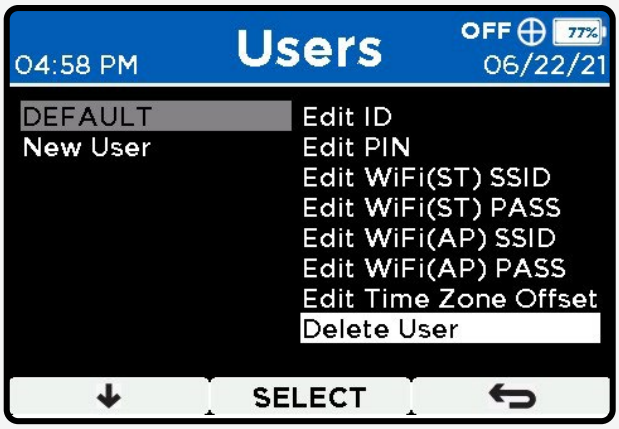
Set User PIN



1. Select the user from the menu, and scroll to scroll to EDIT PIN. Press select and use the down arrow button to scroll through the numeric options.



Delete User

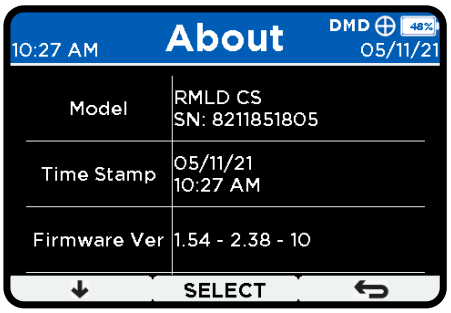


1. Press the MENU button and scroll down to select USERS from the menu.
2. Select the user to be deleted.
3. Select DELETE USER.
4. Press the back arrow to accept and return to the previous menu.

About Screen

The ABOUT menu item displays information relative to the current state of the instrument. Press the MENU button, scroll down to ABOUT and press SELECT.

1. Press the MENU button.
2. Scroll down to ABOUT.
3. Press SELECT.
4. Use the down arrow button to scroll through the available information:
   - Model Name and Serial Number (10 digit number)
   - Time Stamp (HH:MM PM; MM-DD-YY)
   - Firmware Version (x.xx- y.yy – z)
   - GPS (latitude and longitude or "GPS location not locked")
   - Battery Pack Percent Remaining
   - Internal SD Card Storage Remaining



- Error Codes
- Bluetooth Status (off; on (not connected); connected)
- WiFi Status
- Heath Consultants Incorporated Contact Information

FW 1.57-2.39-10 or Newer

- Time Stamp (12 -0R- 24 hr; MM-DD-YY -OR- DD-MM-YY)
- Self-Test (passed or failed)
- WiFi (AP) SSID
- WiFi (ST) SSID

ADMIN Specific Commands via USB Command Mode

FW 1.57-2.39-10 or Newer

The ADMIN user profile supports commands only available to ADMIN. These commands are typically used for instrument configuration.

Once logged in as ADMIN, the available commands may be seen using Tera Term by issuing the "h" or help command as shown. Several of the command functions are also available via the Menu or Portal Configuration.

Commands use letters and the arguments may be letters and/or numbers. Usage is as follows:

Command	Description	Entry followed by the "Enter" key	Action Performed
h	Help Text	h	
o	Privilege level	o admin 800HEATHUS/$ o admin <new password> o <username> <userpassword>	Switch to Admin, default password Switch to Admin, new password Switch to Custom User
d	Data Stream	d 1 d 0	Stream on Stream off
b	Read Build Code	b	

FW 1.57-2.39-10 or Newer

Command	Description	Entry followed by the "Enter" key	Action Performed
va	Set Alarm level	va 0 va 1 20 va 1 <alarmlevel>	Read alarm level Set alarm level to 20 Set to <alarmlevel>
vns	Set WiFi SSID	vns a NEWSSID vns s NEWSSID	Set AP mode SSID Set Station mode SSID
vnp	Set WiFi Password	vnp a NEWPSWD vnp s NEWPSWD	Set AP mode password Set ST mode password
	* Reboot or Update WiFi command (vnu) required to become active		
vnu	Update WiFi	vnu	
vnc	WiFi status	vnc	
vna	WiFi mode control	vna 0 vna 1 vna 2	Disable WiFi module Enable AP Mode Enable Station Mode
vul	Change Language	vul 0 vul 1	English (default) German
vut	Change Time Format	vut 0 vut 1	Month/Day/Year 12 hour Day/Month/Year 24 hour
vts	Bluetooth State	vts 0 vts 1 vts 2	Disable Bluetooth Reset Bluetooth pairings Enable Bluetooth
vtp	Bluetooth Pairing	vtp 1 1	Enable pairing for 2 minutes

3rd Party Application Support

The RMLD-CS supports 3rd party applications. Technical documentation that defines and documents the setup requirements is available upon request from ***Heath Customer Service***.

The RMLD-CS Communications Interface Manual is available. This manual describes the telemetry and its format.

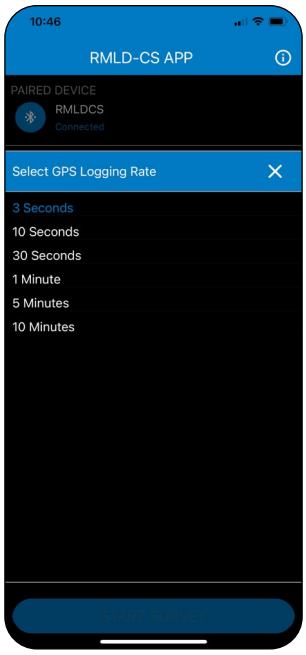
The RMLD-CS App can also be used as a tool to stream and log data. ***See page 39 for more details.***

RMLD-CS App

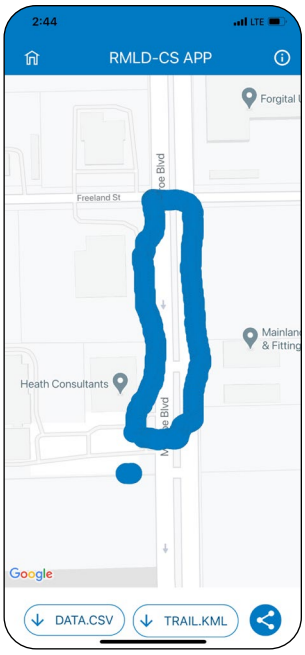
The RMLD-CS Application "App" provides an easy way for users to connect Heath RMLD-CS devices via Bluetooth (BLE) and capture survey data.

This free app includes the following:

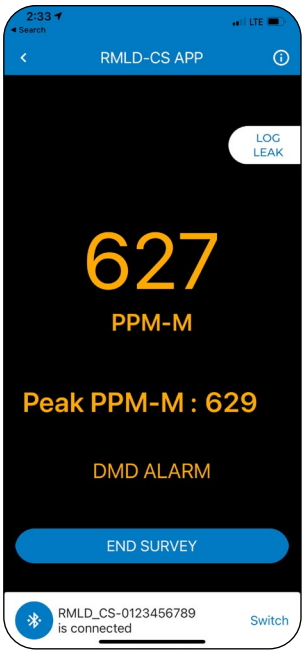
- Search for nearby RMLD-CS devices.
- Connect to a device.
- Select a GPS Logging rate option.
- Start a new survey.
- View the CH4 and Peak CH4 value on the screen.
- Log details of observed leaks including the location.
- Switch between RMLD-CS devices during a survey.
- Pause or end the survey.
- View the trail on a map.
- Download the CSV and KML file, or a zip file containing the CSV and KML of a survey.
- Audible alarms through the mobile application. (DMD, RT, Fault, Warning)
- Low mobile device battery pack level sound indication.
- Disconnected device sound indication.



Breadcrumb Interval



Breadcrumb Trail



DMD Alarm

Compatibility

RMLD-CS Mobile is compatible with Android and iOS mobile devices with the below specifications:

Android

5.5 Inches and above,
OS – 7.0 and above.

iOS

4.7 Inches and above,
OS – 11.0 and above.

Get the App

Click a button below to download the free RMLD-CS app:

GET IT ON Google Play

Download on the App Store

File Access

The RMLD-CS stores data on an internal SD memory card. Data files can be downloaded/ accessed in the following ways:

- USB in File Mode (or Mass Storage Device), as detailed below
- WiFi connection to File Server and Configuration Portal *(details on page 41-43)*

File Access via USB in File Mode

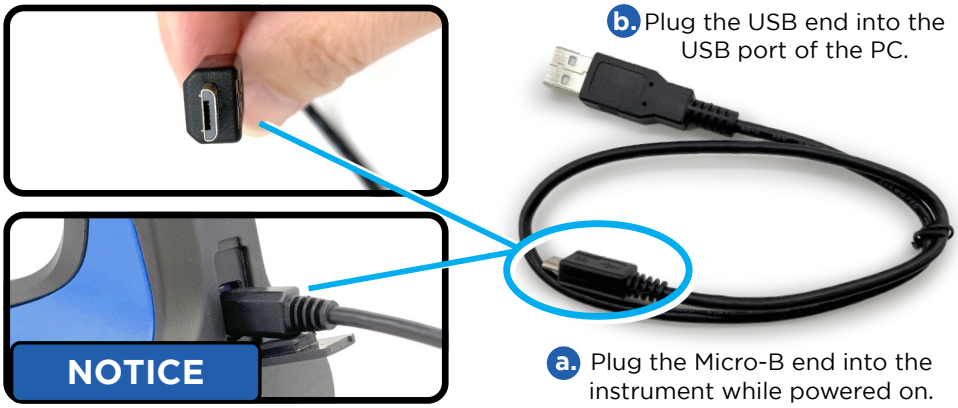
To access recorded/stored data in File Mode (or "Mass Storage Device"):

1. Turn on instrument.

2. Use the provided USB 2.0 A to Micro-B cable to connect the instrument to the PC.

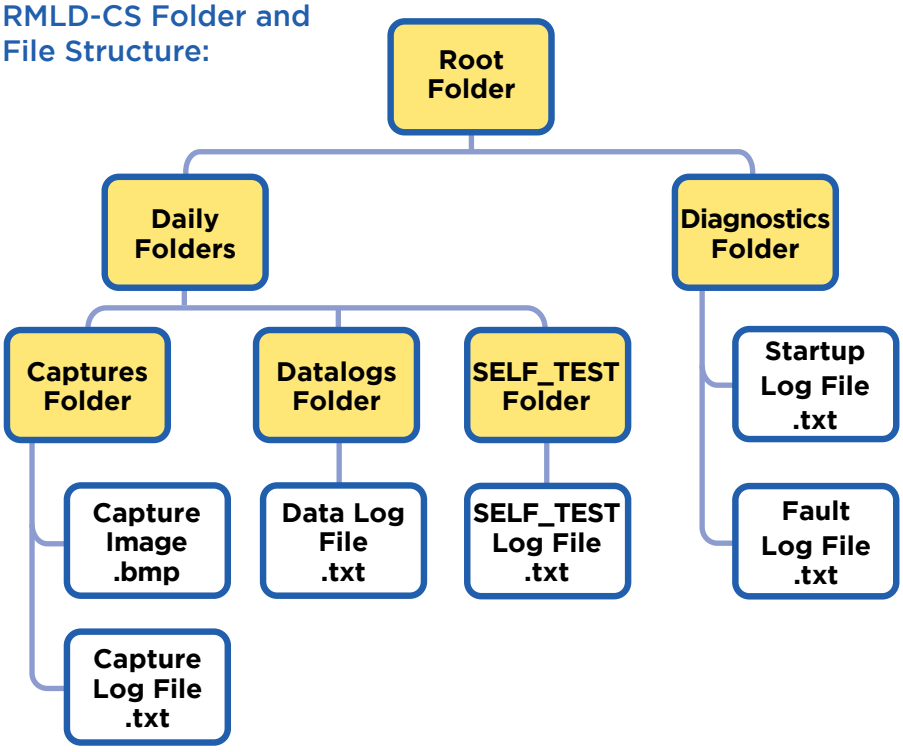
   a. Plug the Micro-B end into the port on the instrument while powered on.
   b. Plug the USB 2.0 A end into the USB port of the PC.

3. A file explorer window should open automatically when the device is ready for access, or simply browse the PC's devices and drives to locate the instrument's USB drive.



NOTICE: Recognition of RMLD-CS may take some time on first plug in as the required drivers are installed. Please allow time for this initial process to complete.

RMLD-CS Folder and File Structure:



File Name Conventions

<SERIAL>-<DATE>-<TIME>-<USERNAME>-<FILETYPE>.<EXT>

SERIAL number of instrument

DATE of file creation (YYMMDD or DDMMYY)

TIME of file creation (12 or 24 hour)

USERNAME of user that was logged on

FILETYPE is the file type name:
- Capture (Log)
- Self-Test
- Datalog
- Startup
- Fault

EXT is the file extension
- **.bmp** for Capture images
- **.txt** for log files

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File Access via WiFi

The WiFi option enables Apple/Android/PC devices to connect to the Configuration Portal through a web browser.

Please refer to *page 27* for step-by-step instructions to enable WiFi and AP Mode.

The RMLD-CS only supports protected networks with WPA-2 security. The SSID and password may be entered manually through options provided in the main menu.

The IP address of the RMLD-CS unit is displayed on the about screen when AP mode is successfully enabled. In AP mode, the RMLD-CS instrument is actively broadcasting and accepting connections. The IP address is used to access the RMLD-CS from a client device on the same network.

The RMLD-CS provides a file server and configuration web portal. One can access these web pages by navigating to their respective URLs in any modern web-browser on a device connected to the same network as the RMLD-CS.

File Server

The web page-based File Server provides access to stored files on the RMLD-CS SD card.

The RMLD-CS File Server grants operators the ability to download and delete files presented using the same internal folder structures that are accessible through the USB port *(shown on page 40)*.

After enabling WiFi and AP Mode on the RMLD-CS *(see page 27 for step-by-step instructions to enable WiFi and AP Mode)*, one can access the File Server in any modern web-browser on a device connected to the RMLD-CS network. To access File Server, once connected to the RMLD-CS network, enter the URL address:

http://10.123.45.1/

The browser will display the date stamped folders on the SD card.

From here, an operator may:

- Select and open date stamped folders.
- Select and download individual files by either left clicking directly on the filename to save to Downloads, or by right clicking on the filename to "Save Link As".
- Delete date stamped folders or individual files using the check boxes and the Delete button.

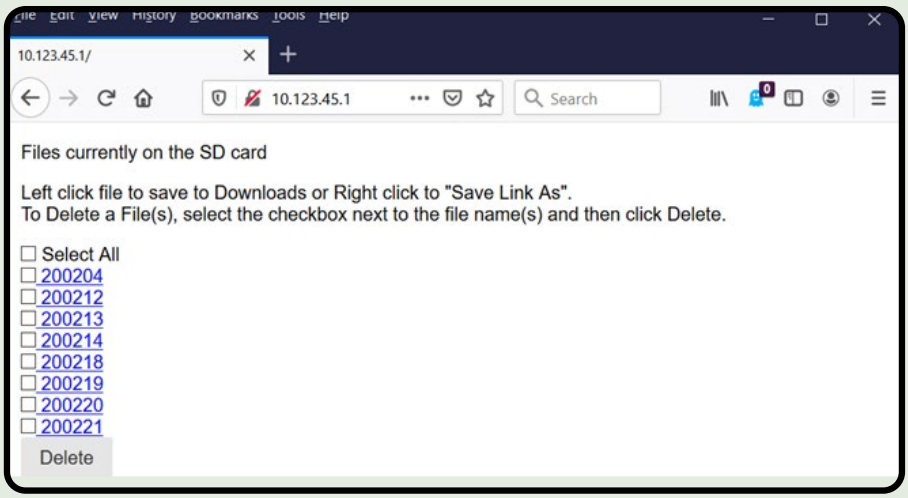
NOTICE

NOTICE: Deletion of files/folders is irreversible as they are permanently deleted.

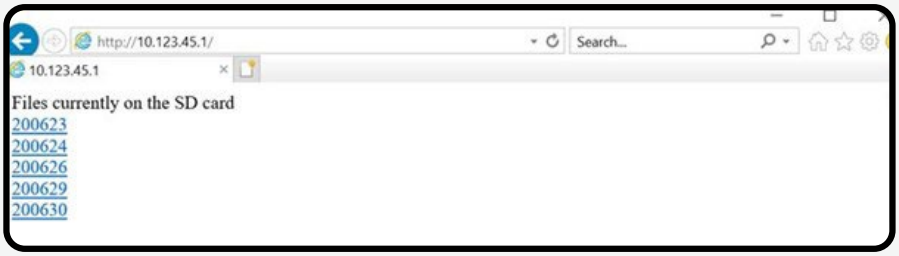
FW 1.57-2.39-10 or Newer

When security is enabled, only ADMIN and CUSTOM USERS have access to File Server. Files can be downloaded and deleted.

When security is disabled all users have access.



FW 1.57-2.39-10 or Newer



FW 1.40-2.33-8

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Configuration Portal

FW 1.57-2.39-10 or Newer

The Configuration Portal provides an easy interface for accessing files and managing custom user profiles.

The German language is supported as an option.

To access, ADMIN must:

1. Log in on the RMLD-CS instrument
2. Connect using WiFi AP mode
3. On a web browser, enter the Configuration Portal URL: http://10.123.45.1/config

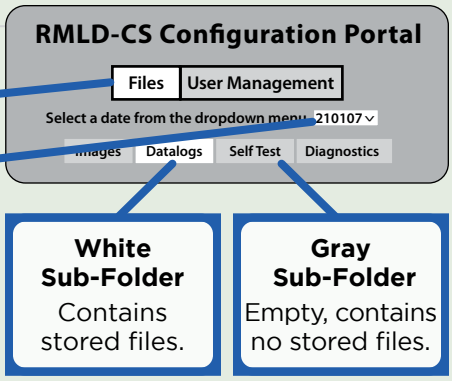
The browser will display the Configuration Portal, which is divided between two tabs or buttons:

- **Files** for accessing/downloading data and images saved on the instrument's internal SD card. Usage is the same as for USB File Access (details on page 40).
- **User Management** for setting up user credentials and configuring the instrument. Both AP and Station mode credentials are supported.

Files Access

For file access:

1. Click the Files tab/button.
2. Select a date stamped folder using the drop-down box.

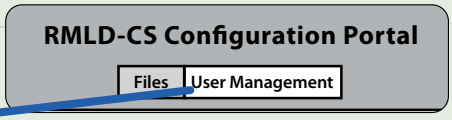


For a chosen date, a white sub-folder contains stored files. A gray sub-folder is empty. For the image above, only Datalogs are saved for the chosen date.

Once a sub-folder has been selected, the contents are shown in the same format as for USB File Access. (details on page 40)

User Management

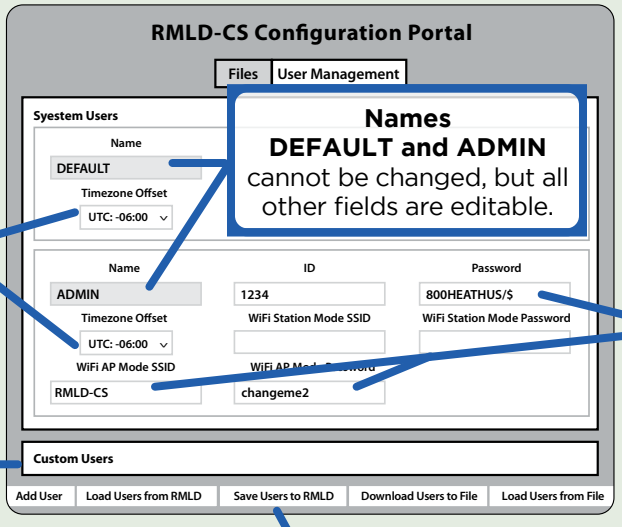
To change credentials or to configure the instrument, click the User Management tab.



All fields are editable except the user DEFAULT and ADMIN's name.

In the "System Users" form you can modify DEFAULT Timezone Offset.

For ADMIN, you can modify the ID, PIN (Password), Timezone Offset and WiFi credentials which include SSID and passwords for both AP and Station Mode applications. It is highly recommended to change the ADMIN password and default AP SSID and password.



Timezone Offset offers a drop-down list for ease of selection.

CUSTOM USERs are displayed for editing.

NOTICE

If ADMIN password is lost or forgotten, please contact Heath Customer Service (see page 51) for support.

Changing ADMIN Password, and default AP SSID and Password is highly recommended.

Save Users to RMLD must be clicked to update the instrument with any changes. A confirmation message will pop up.

FW: 1.57-2.39-10 or Newer Security Enabled

ADMIN has access to the Configuration Portal via WiFi only.

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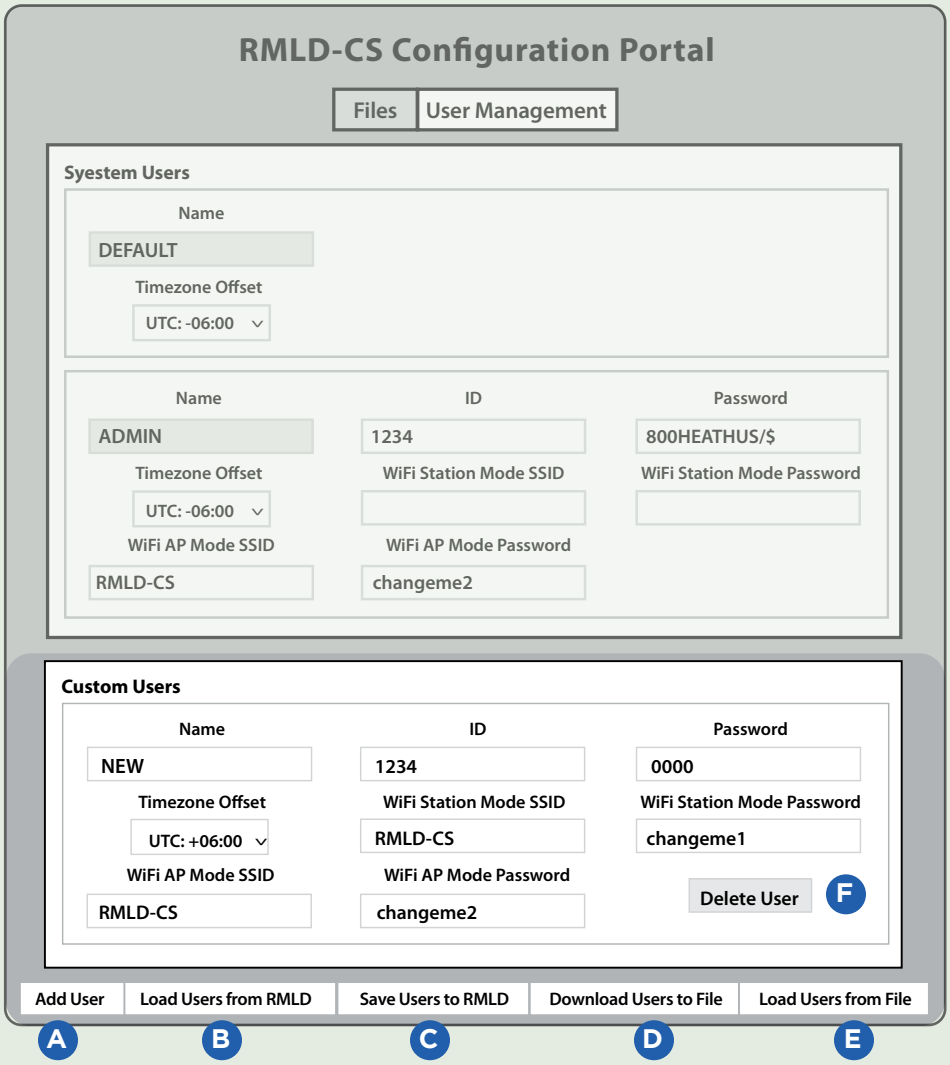
FW 1.57-2.39-10 or Newer

Buttons A through F are available to perform the following functions:



A Add User

to create new users and their credentials:

1. Click the **Add User** button (A). The "Custom Users" block will expand with the factory default settings.
2. Assign custom credentials. A custom User Name will distinguish each User profile from the default name "NEW". Each User can have different credentials, which is helpful with WiFi networks and Timezone Offset for remote operators. It is recommended to change all the credentials.
3. Click "Save Users to RMLD" (button C).

B Load Users from RMLD

to read existing data from the RMLD-CS and populate the System Users form with that data. This is helpful to validate recent changes.

C Save Users to RMLD

must be clicked to update the instrument with any changes. A confirmation message will pop up.

D Download Users to File

to save System Users data to a PC as a JSON formatted text file. It is highly recommended to Download Users to File for archival purposes.

E Load Users From File

to allow a previously saved System Users file to populate the form and configure the RMLD-CS. This is very useful when managing multiple instruments as only specific changes would then be made from a template. "Save Users to RMLD" (button C) must then be clicked to save the edits to the instrument.

F Delete User

1. Click"**Add User"** (button A). The "Custom Users" block will expand with the factory default settings.
2. Click "Delete User" (button F) in the Custom Users form for that user.
3. Click "Save Users to RMLD" (button C) to update the changes.

How Does the RMLD-CS Measure Gas?

The RMLD-CS uses infrared (IR) laser technology known as Tunable Diode Laser Absorption Spectroscopy (TDLAS).

TDLAS enables the Operator to safely scan:

- Hard to reach areas
- Plumes up to 100 ft (30 m) away (actual distance may vary due to surface condition)
- Through windows

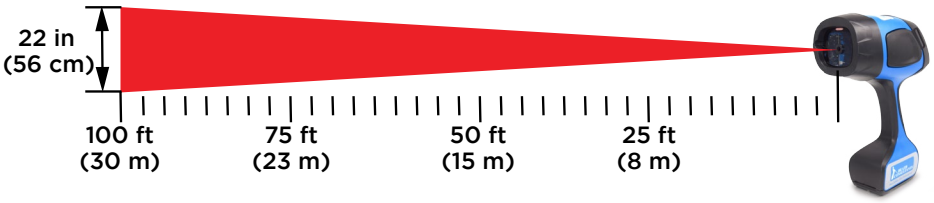
When the laser passes through a gas plume, a portion of the light is absorbed by methane, while some of the light is reflected back to the RMLD-CS. The reflected light is collected and processed so the RMLD-CS can report methane concentrations in parts-per-million-meter or PPM-M.

WARNING

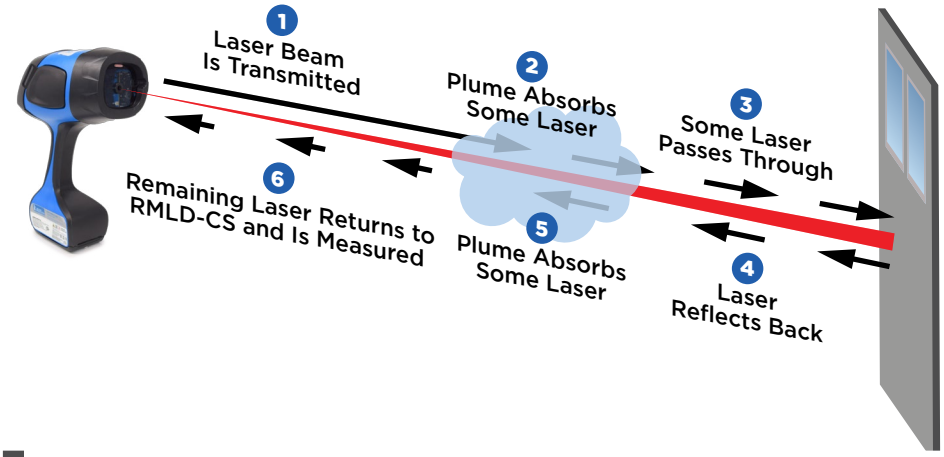
WARNING - The RMLD-CS is capable of scanning through windows to possibly detect methane gas. However, scanning through windows is not guaranteed. False positives and negatives may occur.

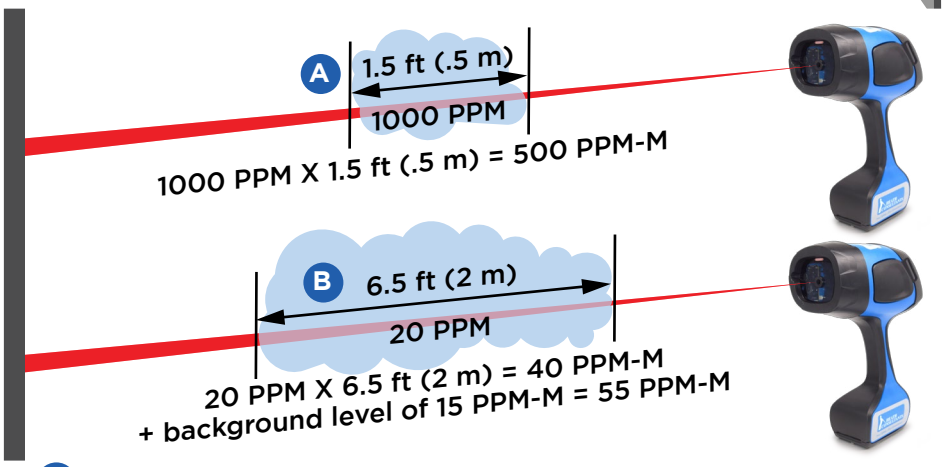
AVERTISSEMENT

AVERTISSEMENT - Le RMLD-CS est capable de scanner à travers les fenêtres pour éventuellement détecter le méthane. Toutefois, l'analyse dans Windows n'est pas garantie. Des faux positifs et négatifs peuvent se produire.



Infrared beam width is about 22" at 100 ft (55 cm at 30 m). It is important to note that the laser beam "footprint" width increases as the distance increases. This is why it is much easier to detect natural gas from a distance of 10 to 15 ft (3 m) and beyond.





A Gas cloud of 1000 PPM is about 1.5 ft (.5 m) in width (the distance the infrared beam passes through the plume). RMLD-CS measures 500 PPM-M.

B Average concentration of gas cloud is 20 PPM and is about 6.5 ft (2 m) in width. RMLD-CS measures 40 PPM-M, plus 15 PPM-M background level, displaying a total value of 55 PPM-M.

NOTICE

NOTICE: There is always a small amount of methane in the air. This natural methane background is also measured by the RMLD-CS. The PPM-M reading will then increase as the scanning distance increases.

NOTICE: The nature of a gas plume is highly variable. The above/right illustrations are intended to convey the basic theory. Some leaks may have a high surface concentration with little to no measurable plume above the surface.

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Surveying With The RMLD-CS

Refer to your company's specific training and procedures for being qualified for leak surveying.

WARNING

WARNING: The visible green Spotter laser is a Class 2 (II) laser product.

WARNING: Do not stare into beam or view directly with optical instruments.

WARNING: Avoid direct eye exposure to the laser and do not point in the direction of others. Visible and Invisible Lasers are deployed by this instrument.

AVERTISSEMENT

AVERTISSEMENT :
Le Laser de repérage vert visible est un produit laser de classe 2 (II).

AVERTISSEMENT :
Ne jamais fixer le faisceau ni le regarder directement avec des instruments optiques.

AVERTISSEMENT :
Évitez l'exposition directe des yeux au laser et ne le pointez pas vers d'autres personnes. Des lasers visibles et invisibles sont déployés par cet instrument.

NOTICE

NOTICE: Spotter laser is about 1.25 in (3.2 cm) to the right of the IR laser beam.

In order for the RMLD-CS to detect gas, three conditions must be met. *(see visual representation on page 44)*

1. Gas plume concentration and size must be greater than the alarm level of the instrument.
2. Infrared beam must pass through the plume.
3. Background target (i.e., ground, building, etc.) must reflect the infrared beam back.

Operator must consider several factors which influence gas plume size and concentration:

- Low-flowing leaks may produce small to non-measurable plumes.
- Surface types (i.e., concrete) spread the leak and create spot leaks through surface cracks and holes.
- Weather conditions dissipate the plume faster (i.e., high winds, higher temperatures).
- Weather conditions change the venting conditions and spread of gas (i.e., heavy rain and moisture in the soil, frost conditions in winter).

The most important aspect to using the RMLD-CS is the proper control and aiming of the infrared beam. You must learn to control the aiming of the laser and rate of sweeping. Radical or abrupt motion may cause false detections due to rapidly changing distance or background that the laser detects, or may cause the IR beam to not thoroughly scan the area. Here are a few tips for surveying:

Along the Main

· Use a smooth sweeping motion.
· Keep the beam pointed out 15 to 20 ft (4.5-6 m). This allows for the beam footprint on the ground to be large enough to provide good coverage, and control over the path of the beam.
· Scan service tap and valve areas as you approach them.
· Target probable vent locations such as cracks, vegetation damage, etc.

Service Line/Meter - Location Known

· Use the advantage of the beam by sweeping wider around the line location.
· Work the beam up the line in an "S" pattern.
· Scan the meter area.
· Re-scan down the line using the "S" pattern.
· Move in closer if the range is too far or ground elevation causes the beam to not come into contact with the ground (dark zones).

Service Line/Meter - Location Unknown

· Use an "X" pattern (or similar) to thoroughly scan the area.
· Target typical vent areas i.e., along the street or sidewalk edges.
· Target locations where valves may be placed.
· Scan along the foundation of the structure.
· Move in closer if the range is too far or ground elevation causes the beam to not come into contact with the ground creating dark zones (shadow).

WARNING

WARNING: The visible green Spotter laser is a Class 2 (II) laser product.

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WARNING: Avoid direct eye exposure to the laser and do not point in the direction of others. Visible and Invisible Lasers are deployed by this instrument.

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NOTICE

NOTICE: Spotter laser is about 1.25 in (3.2 cm) to the right of the IR laser beam.

Meter

· Maintain at least 10 ft (3 m) from meter, so beam width is not too small.
· Thoroughly scan the ground around the meter fittings.
· Use an angle that provides the best background behind the meter.
· If meter is out in the open, or the angle is limited and there is no background right behind the meter; scan the meter in a horizontal "Z" pattern maintaining a constant distance as you sweep across.

Leak Is Near/On Meter - Determine if Leak is Underground or On Meter

· Keep the wind to your back.
· Stand 5 to 10 ft (4.5-6 m) from meter .
· Use Real Time (Geiger) audio mode to help pick out the strongest return.
· Start by aiming low on the ground.
· Work beam up and around piping.
· If in doubt and if the leak is underground, bar hole the area.

During Inclement Weather

Use of the RMLD-CS in inclement weather should be addressed in your company's O&M Manual.

It is crucial to understand how inclement weather can affect a leak survey, corrective actions and/or postponement options. Scanning must be methodical and at a slower rate.

- RMLD-CS can be a backup tool to assist First Responders with difficult to locate and/or isolate leaks.
- The RMLD-CS is water resistant, NOT waterproof. Do not point instrument straight up into the air when raining. Water entering the Laser port can damage the instrument.
- Technician can inspect roof top vents, sewer vent, through most windows, around foundation, door frames, and building vents.
- Standing water makes a poor background and often causes low light indications. Raise the laser above the water and scan the atmosphere with a better background.

Long Range Scanning

RMLD-CS can detect methane up to 100' away.

Actual distance may vary due to target surface and environmental conditions.

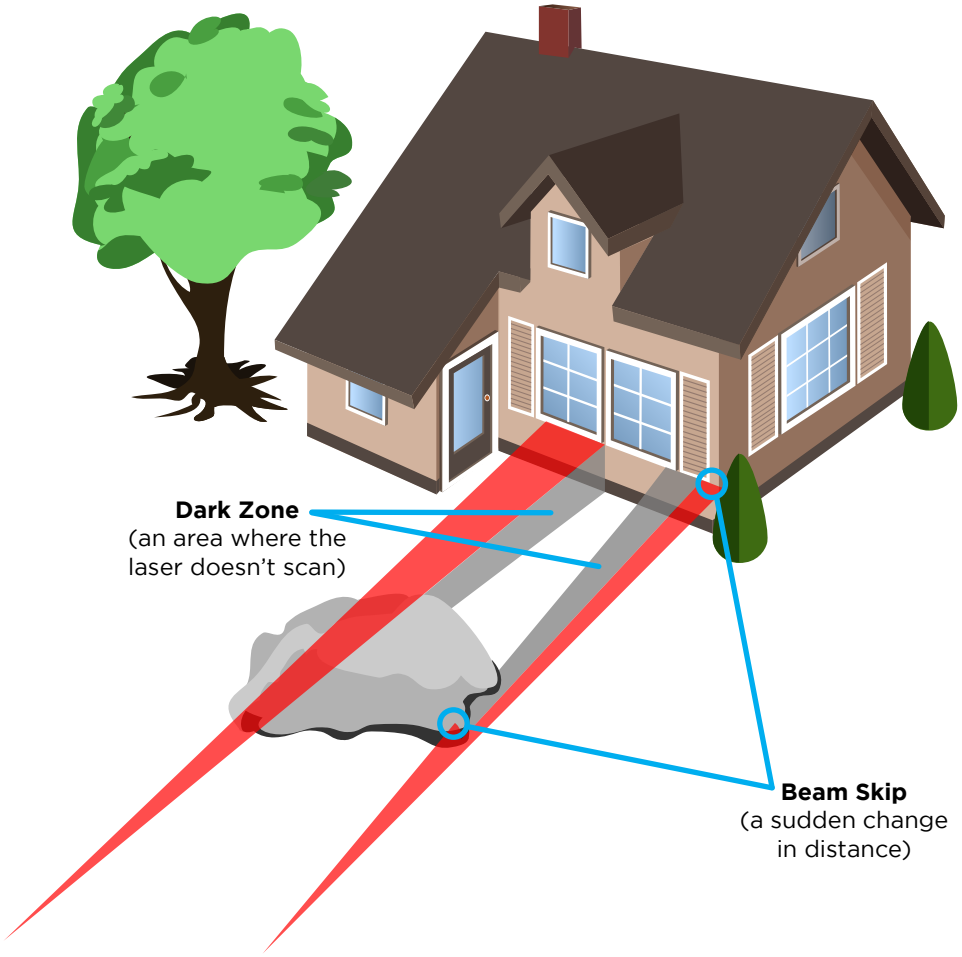
As scanning distance increases, the returning laser light level decreases. As the maximum distance is approached, a "low return signal" tone is heard. You will need to move in closer.

Scanning Distance of 50'+

- Slow down the scanning rate.
- Take care in pointing the laser.
- Use the spotter laser or IMAGE mode to ensure proper scanning of the target area.
- Be aware of the ground elevation. Scanning across the top of a knoll or past the edge of a structure can result in **beam skip** (a sudden change in distance) which may give you a false detection.
- Obstructions or variations in the landscape can cause a **dark zone** (an area where the laser doesn't scan). Look for the best angle to thoroughly scan these areas. Scanning up a hillside may cause beam skip or dark zones around the foundation of a structure.

- Beam Skip is a sudden change in distance.
- Dark Zone is an area where the laser doesn't scan.

They are caused by obstructions such as rocks, trees, structures, and uneven landscape.



Dealing With False Detections

While using the DMD mode, several conditions may occur, causing the algorithm to give a detection indication. The most common are:

- Abrupt or jerky motions cause the scanning distance to rapidly change.
- Overly strong returns due to strong reflectors.

False detection most commonly occurs in the 50 ft (15 m) range, due to the beam footprint becoming very large. Abrupt motion, and change in terrain or distance to an object may cause the DMD to give a short low detection. To verify if the detection is due to a leak, pause at this distance, aim off to the side, and re-sweep across the area to determine if gas is present.

Scanning from a long range to short range will also minimize false detection.

Strong reflections off certain surfaces (e.g., black garbage bags, water droplets, glass, polished surfaces, stones, license plates, reflectors, etc.) may give a false detection. Re-scan the area from a slightly different angle.

The laser light is selective to methane, and will not false-alarm on other hydrocarbons.

Scanning Through Windows

WARNING

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WARNING: Do not stare into beam or view directly with optical instruments.

WARNING: Avoid direct eye exposure to the laser and do not point in the direction of others. Visible and Invisible Lasers are deployed by this instrument.

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AVERTISSEMENT :
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NOTICE

NOTICE: Spotter laser is about 1.25" to the right of the IR laser beam.

WARNING

The RMLD-CS is capable of scanning through windows to possibly detect methane gas. However, scanning through windows is not guaranteed. False positives and negatives may occur.

AVERTISSEMENT

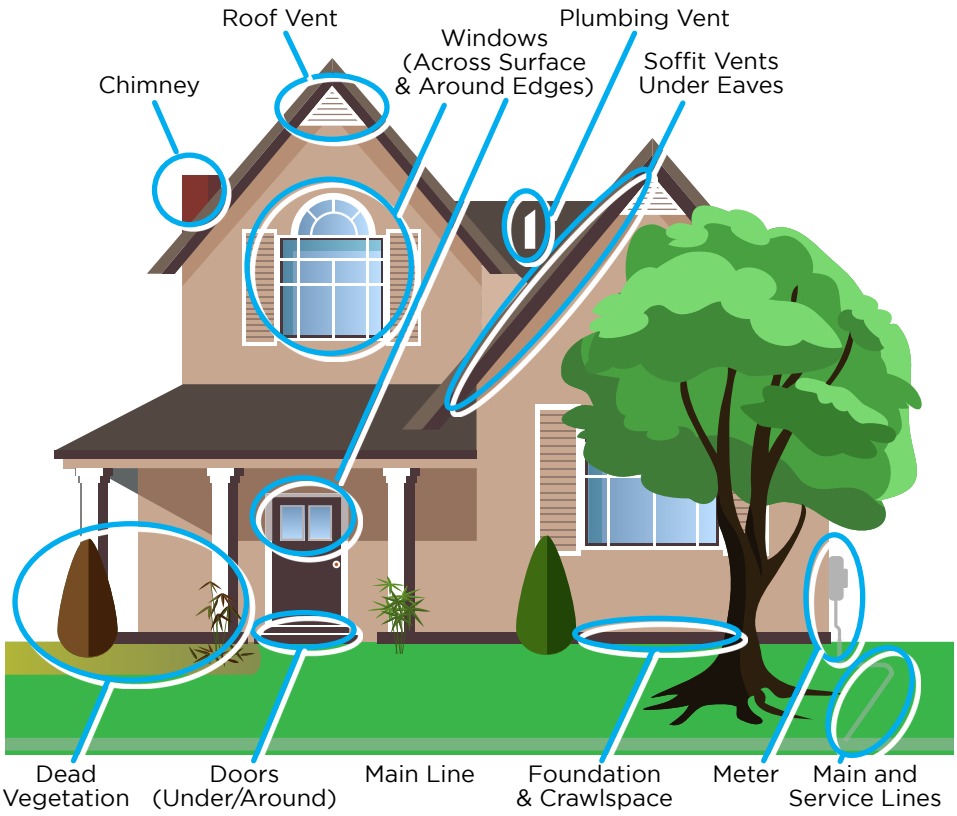
Le RMLD-CS est capable de scanner à travers les fenêtres pour éventuellement détecter le méthane.Toutefois, l'analyse dans les fenêtres n'est pas garantie. Des faux positifs et négatifs peuvent se produire.

Detection Through a Window

- Do not aim straight into a window. Keep to an angle, 30 – 60 degrees from direct is recommend, and sweep across the window slowly.
- The laser may not penetrate certain window types effectively, such as, tinted, double pane, stenciled, etc.
- If there is no gas reading indicated, do not assume there is no gas within the structure, ie. houses, office buildings. Continue scanning common venting points as referenced in the image below.

Common Venting Points

The RMLD-CS may be used to scan any structure or place that has gas service. Some of the common venting points of a house are shown below.



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Troubleshooting

The advanced design of the RMLD-CS makes it one of the most reliable leak survey instruments available. Should you experience problems, there is most likely a simple cause. The following table provides a list of common problems, cause and solution.

Should you have a problem not listed, or the recommended solution doesn't work, please contact HEATH CUSTOMER SERVICE *(see page 51)* for further assistance. Do not use the instrument for survey work until the problem is resolved.

CAUTION

CAUTION: Only a qualified RMLD-CS repair technician should attempt repairs/adjustments.

CAUTION: Make no attempt to repair the instrument. There are no user serviceable components within the RMLD-CS.

Symptom	Probable Cause(s)	Solution
Higher than normal short range, and lower than normal long range readings	Laser calibration has drifted	Run Self Test
Concentration reading is low and will not pass the Self Test	Laser calibration has drifted	Run Self Test up to three (3) times and then contact Heath Customer Service *(see page 51)*
Unit will not turn on	Low battery pack	Replace or recharge battery pack
Continual warning sound or screen notification when scanning	Scanning at distance beyond RMLD-CS range	Move closer to the target
	Background surface is absorbing or reflecting the IR light level	Change angle to target to get a better reflecting background
	Low battery pack	Check battery pack capacity and recharge if necessary
Excessive false detection while scanning at longer distances	Scanning too fast	- Slow down the scanning rate - Pause at the long range and sweep towards you
	Alarm detection threshold set too low	Increase the Alarm detection threshold
	Scanning at the instrument's range limit	Move in closer
Excessive false detection while scanning at closer distances	Scanning too fast	Avoid making abrupt motions while scanning
	Alarm detection threshold set too low	Increase the Alarm Detection Threshold
Excessive false detection or loss of sensitivity	Laser output not optimized	Perform Self Test procedure
	Alarm Detection Threshold is too high or low for conditions	Check the Alarm Detection Threshold
Error message or Warning icon on continuously	Low battery pack	Check battery pack capacity and recharge if necessary
	Moisture condensation on mirror due to rapid change in temperature	Allow for the instrument temperature to stabilize
	Internal component failure	Note error message and contact HEATH
Reduced run time	Battery pack not fully charged	Charge battery pack until solid green light on charger is on
	Diminished battery pack capacity	Replace battery pack, and properly dispose of exhausted battery pack
Low Signal or Low Light	Background surface is absorbing or reflecting the IR light level	Change angle to the target for a better background
	Scanning at the range limit of the instrument	Move in closer
Saturated	Background surface is reflecting the IR light level	Change angle to the target for a better background
No WiFi connection	Incorrect credentials	Verify credentials
	Outside of WiFi range	Place unit closer to WiFi point
	WiFi disabled in menu	Enable WiFi in menu
No Bluetooth connection	Bluetooth is disabled	Enable Bluetooth in menu
	Device not paired	Pair device with instrument
USB not recognized	USB cable does not work	Use another USB cable
	Port is not working	Try another USB port or allow computer to load drivers
	Low battery pack	Charge or replace battery pack
	Driver did not install properly	Uninstall device driver and allow to reinstall
	IT restrictions	Contact local IT support

Symptom	Probable Cause(s)	Solution
Screen message: Critical Fault Detected. Please Service Unit. Core Unresponsive.	Potential optoelectronic system failure	Contact Heath Customer Service *(see page 51)*
	Low battery pack	Charge battery pack until solid green light on charger is on
Excessively low or 0 battery capacity reported on screen	Battery pack not fully installed	Take out battery, check/ clean contacts with soft damp cloth, re-insert
	Low battery pack	Charge battery pack until solid green light on charger is on
	Diminished battery pack capacity	Replace battery pack, and properly dispose of exhausted battery pack

Maintenance

In order to maintain the RMLD-CS in good working condition, the following maintenance should be performed as indicated:

Maintenance Item	Frequency
Clean outer surfaces with damp rag	As needed
Clean instrument window with damp Kim-Wipe™ or equivalent non-abrasive lens tissue	As needed to prevent dust or water stain build up
Self Test	Daily to ensure the instrument is functioning properly
Recharge battery pack	Recharge to full capacity after each use
Replace battery pack	As needed
When storing a battery pack for one month or more leave a storage capacity	As needed

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Warranty and Repair

Instruments and products manufactured by Heath Consultants Incorporated are warranted to be free from defects in material and workmanship for one (1) year from the date of shipment.

Furthermore, the warranty on authorized repairs in the Houston Factory Service Center (FSC) and other regions is ninety (90) days materials and thirty (30) days labor. This repair warranty does not extend any other applicable warranties.

Warranty covers only failures due to defects in materials or workmanship which occur during normal use. It does not cover failure due to damage which occurs in shipment, unless due to improper packing, or failures which result from accident, misuse, abuse, neglect, mishandling, misapplication, alteration, modification, or service by anyone other than a Heath warranty repair location.

Batteries and damage from battery pack leakage and all expendable items such as filters and tubing are excluded from this warranty.

Heath's responsibility is expressly limited to repair or replacement of any defective part, provided the product is returned to an authorized warranty repair location, shipped prepaid, and adequately insured. Return shipping charges and insurance will be paid by Heath warranty expense.

We do not assume liability for indirect or consequential damage or loss of any nature in connection with the use of any Heath product. There are no other warranties expressed, implied, or written except as listed above.

Heath warrants only that the parts manufactured by it will be as specified and free of defects. Heath makes no other warranties or representations of any kind whatsoever, express or implied, and any and all implied warranties including any warranty of merchantability and fitness for a particular purpose or use are hereby disclaimed.

Return for Repair Procedure

Follow these steps to initiate repair of your instrument:

1. Repair Form

- For a single instrument, find online at **https://heathus.com/assets/uploads/Primary-Instrument-Repair-Form-Fillable-1.pdf**
- For multiple instruments, find online at **https://heathus.com/assets/uploads/Primary-Instrument-Repair-Form-Fillable.pdf**
- Complete the form by providing all information requested, such as:
  - full shipping and billing addresses
  - instrument or product name, model number and serial numbers
  - brief description of the problem you are experiencing
  - the person and phone number to be contacted for additional information and approvals

2. Package Your Return Carefully

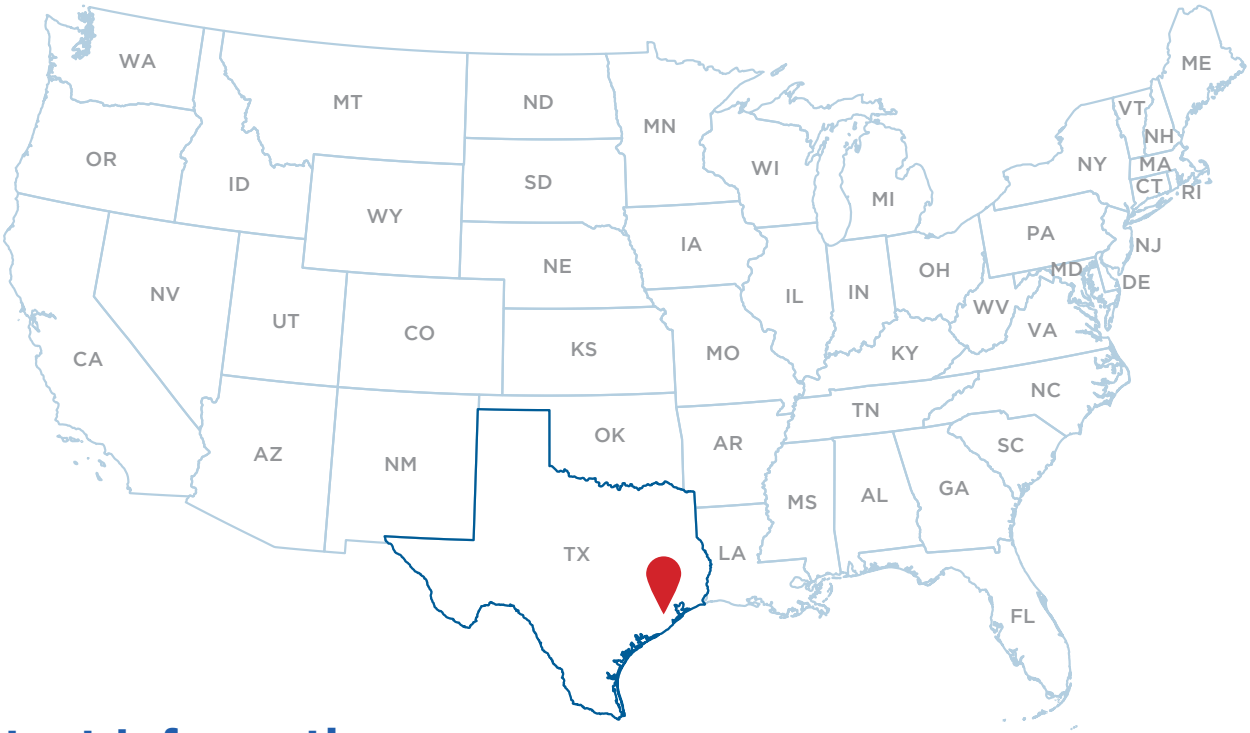
- Use the original shipping carton and cushions if available
- Include all components
- Include the repair form
- Address your package to the repair facility specified on your form

Heath Customer Service

9030 Monroe Road
Houston, TX 77061
Tel: 713-844-1300
Fax: 713-844-1309
www.heathus.com

Primary Instrument Repair Facility

9030 Monroe Road
Houston, TX 77061
Tel: 713-844-1350
Fax: 713-844-1384
fsc@heathus.com



Contact Information

Heath Customer Service / Houston Factory Service Center Manufacturing Division

9030 Monroe Road
Houston, TX 77061

Phone: 713.844.1300
Fax: 713.844.1309

www.heathus.com

Heath Consultants Incorporated operates under a continual product improvement program and reserves the right to make improvements and/or changes without prior notification.