# MIRION
TECHNOLOGIES

**PORTABLE RADIATION MEASUREMENT**

# Colibri® TTC
# & Colibri® VLD

*Hand-Held Health Physics*
*Communication ALARA\* Platform*

TTC        VLD        CSP Family

## FEATURES

- TTC: H*(10) dose rate equivalent measurement from background up to 10 Sv/h (1000 rem/h)

- VLD[1]: H*(10) dose rate equivalent measurement from 10 nSv/h to 1 mSv/h (1 µrem/h to 100 mrem/h)

- Fast start up time: <15 sec

- Multiple CSP™ probe host controller

- Mapping applications with GPS, Barcode or RFID reader

- Multiple usability levels via profile and user management

- Easy data transfer and instrument setup with standard PC web browser

- Background subtraction mode

- Timer/Scaler for better MDA

- Large data storage

- Traceability: When, How, Who, Where for each record

- Wired or wireless probe connection

- Large control buttons to accommodate use with gloves

- Large color touch screen

- Easy to read display in all light conditions

- Waterproof to 1 meter depth

- Rechargeable batteries with no memory effect

- Always visible dose-rate display for better user safety

- Standard Bluetooth® headset connection

- Loud audio alarm and vibrator

- Free and easy to upgrade software via PC connection

## DESCRIPTION

The Colibri survey meter is a comprehensive health physics instrument with unique characteristics that can lower the dose exposure of HP technicians and other workers in radiation areas. The "always on" gamma dose feature ensures the worker is always informed – even when using the Colibri unit for contamination surveys with attached probes. The Colibri survey meter also allows for wireless data collection from pre-positioned detectors that can be placed in radiation areas – eliminating the need to attach probes, get close to the source – then manually transcribe data. Walk into the room – and Colibri survey meter performs the survey for you – allowing exit from the rad area in a fraction of the normal time.

The Colibri survey meter is available in two different versions:
1. TTC (grey gasket) – for radiation area measurements up to 10 Sv/h (1000 rem/h). Colibri TTC survey meter will not saturate in case of a sudden increase of radiation and will always provide the user with a reliable and precise dose-rate information when most other conventional instruments will stop measuring. Thus, Colibri TTC unit is the ideal tool for daily survey inside nuclear buildings, for radiation post accident follow-up and emergency response follow-up (dose and contamination).
2. VLD – Very Low Dose (red gasket) for public area measurements starting from 10 nSv/h (1 µrem/h). Colibri VLD survey meter is the smallest versatile instrument capable of measuring precisely and quickly background level of dose-rate changes starting from 10 nSv/h with a saturation limit that allows quantification of significant dose-rate hazard.

*ALARA = As Low As Reasonably Achievable

# MIRION
TECHNOLOGIES

The large color touch screen reports real-time, error-free measurements for up to eight Canberra™ Smart Probes (CSP) (seven via Bluetooth® technology and one via CSP standard cable) while always displaying dose-rate at worker location.
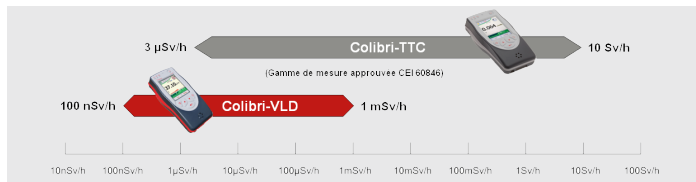


Colibri survey meter provides both fast reacting semi-log bargraph and averaged digital reading for each measurement window. The main window displays either the internal detector dose-rate or the external probe read-out and the secondary window shows the cumulated dose or the Colibri dose-rate when one or multiple external probes are connected.
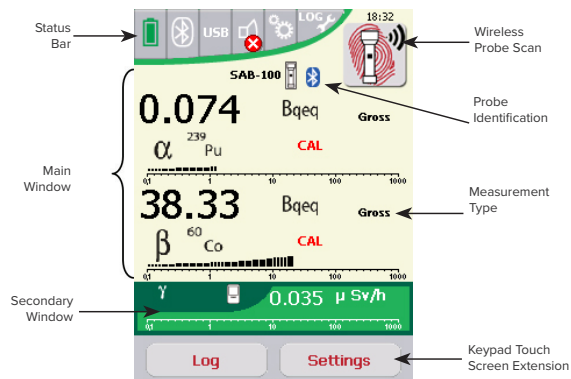


Figure 1: Colibri screen with external alpha/beta probe connected

It is always ready to go with no-memory-effect rechargeable batteries and accompanies the worker in the field with minimum constraint. It can be worn on the belt with a permanent smooth clip, or held comfortably in the hand using the finger strap and secure wrist strap.

The Colibri unit's speaker emits alarm sounds as well as other audible signals. In the event of a radiation hazard, regardless of working conditions, an alarm will sound along with a flashing LED and vibrator. The standard available off the shelf Bluetooth headset will better support source and contamination location in noisy environments. When using a mixed Alpha/Beta probe, the Colibri unit emits separate sounds to differentiate between Alpha and Beta counts. This allows the user to focus their eyes on things other than the Colibri unit.

Colibri TTC survey meter integrates a GM detector with Mirion superior Time-To-Count technique that covers never achieved dose rate range from background up to 10 Sv/h reducing the risk of saturation in unexpected high dose rate situations. Colibri VLD unit is based on a CsI scintillator with a novel energy compensation technique that improves sensitivity over entire energy range[1].

Colibri VLD survey meter allows quick measurement of very low dose-rate while other instruments only estimate such background level. Dose-rate is automatically stored every five seconds in a date stamped internal file allowing for post analysis.

Quality assurance and traceability is naturally embedded in Colibri operations for each logged data and answer typical questions like:

| Q: When was the measurement taken? | A: *With date and time stamped records.* |
| --- | --- |
| Q: Who drove the measurement? | A: *User login settable access.* |
| Q: Was the instrument/probe calibration valid? | A: *Calibration validity check and storage.* |
| Q: Where was the user? | A: *Internal GPS and/or external wireless barcode/RFID reader.* |

Colibri survey meter is compatible with all Canberra Smart Probes (CSP). The probes extend the capabilities of the instrument to a range of general surveying applications. With CSP design, key components of hardware circuitry (high voltage, amplifier, discriminator, etc.) are located directly inside of the probe housing rather than in the host survey instrument. Also, the intelligence associated with controlling those components is located in the probe – that is, control and storage of key parameters, settings, calibrations, probe ID, alarm settings, etc. Thus the probe is a fully-integrated subsystem acquiring and transmitting the measurement to the instrument, which is used for display.

With high voltage and digitization of the data occurring in the probe rather than the instrument, measurement accuracy is no longer dependent on cable quality as with older analog systems. Also, the probes can be plugged in "hot" without powering down the instrument – the instrument immediately recognizes the probe and automatically switches measurement to the mode required for that specific probe.

Calibrations and QA measurements can be performed directly with the probe, without even using the instrument, by connecting the probe to a computer with the Canberra Smart Probe Software (CSPS™). This allows the Colibri unit to remain deployed in the field while various probes are being calibrated.

The Colibri unit can be connected to external probes by a cable. It can also connect to the CSP probes with wireless Bluetooth technology via CSP-COM™ modules, eliminating the need for a cable. This eases contamination surveys as the user is not dependent on cable length and cable coil-ups.

**Colibri Upgrades**

You can download free of charge Colibri upgrades on the firmware upgrade database available at www.mirion.com. This database will provide all further software versions and applications to enable additional features.

## Timer Scaler

Colibri unit incorporates a scaler timer mode that allows user to select an integration time from 1 s to 65535 and improves MDA. It displays the number of counts for the selected period of time and the average value in selected unit.

## Source Finder Mode

The source finder mode has been designed to monitor and display on an easy-to-understand graphic showing the radiation trend vs. time, in any of the pre-selected units. The graphic updates can be chosen within three different dwell times:
Fast = 250 ms,
Medium = 500 ms or
Slow = 1 s.

This mode is useful in decommissioning applications with contamination probes, when the audio control is not enough and when a more precise control is required.
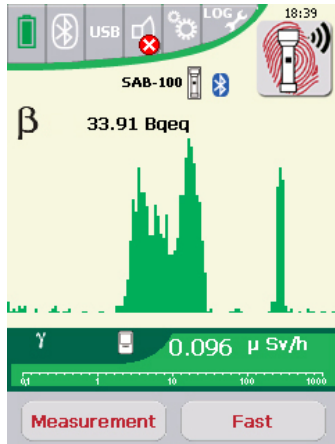


Figure 2: Colibri source finder mode

## Background Subtraction

Colibri survey meter includes a background subtraction mode. It allows acquisition of a background for a selected duration and subtracts it from next measurements to display and store net results. Colibri unit allows for the setting of a validity period after which the device will query the user to perform a background update. This mode is useful when performing contamination measurement in a constant background area, thus obtaining measurements reflecting real contamination of a monitored object.

## Data-Logging and Mapping applications

Colibri survey meter is the perfect instrument for mapping applications. It can save a large number of measurements associated with location data, such as GPS coordinates, barcode, RFID tag or simply an incremental index. GPS is an internal option for the Colibri unit while Barcode or RFID readers connect via Bluetooth link.

Each logged data is encapsulated with QA information about external probes and /or internal detector calibration traceability. A comment can be entered via a virtual touch screen keyboard to highlight any specific information for each measurement point.

The automatic data-logging function stores up to 60 000 records of 0 to 65535 seconds acquisition with time interval of 0 to 200 000 seconds. It is a powerful mapping tool when GPS coordinates are available.

Colibri survey meter manages three date stamped CSV files (MS-EXCEL compatible) for each day of operation:

1. Automatic and transparent storage of dose-rate every five seconds.
2. Manually triggered data-logging with internal detector and/ or external probes.
3. Automatic data-logging.



This selection facilitates data retrieval because the user only needs to identify the day of interest.
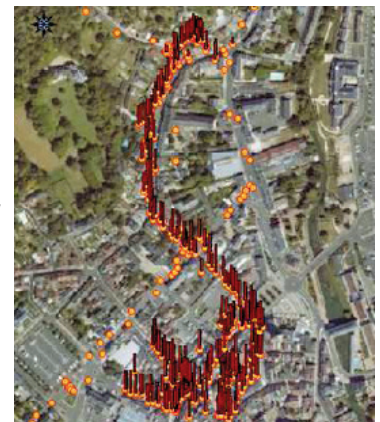
Example of Automatic Data logging measurements achieved with Colibri GPS and displayed on a map

**MIRION** TECHNOLOGIES

### Colibri improves ALARA

Colibri unit will always warn you of any radiation hazard. When used without an external probe, Colibri unit displays both the dose rate and the cumulative dose taken since the Colibri unit has been powered on. When an external probe is connected, it



displays both the external probe measurement and the internal dose rate, allowing the user to be aware of the dose rate level when he is focused on the contamination survey.

Colibri survey meter features a loud audible alarm, visible LED and vibrator, triggered by alarm set-point for dose-rate, cumulative dose and external probes.

Figure 3: Colibri unit with external single channel probe

Colibri survey meter can connect to remote probes with the wireless Bluetooth link. Probes can transmit measurement data from the hot zone to the user, eliminating the need for the user to enter the hot zone to control the area. It can also be used to assess the radiation risk before entering into a hazardous area. This decreases the total dose exposure for the worker.

### A Customizable Instrument

Colibri unit connects to a PC using a standard web browser for data transfer and instrument setup. Connection can be wired with the USB Colibri cable (part of standard delivery) or wireless with internal Bluetooth link if the user computer is Bluetooth capable.
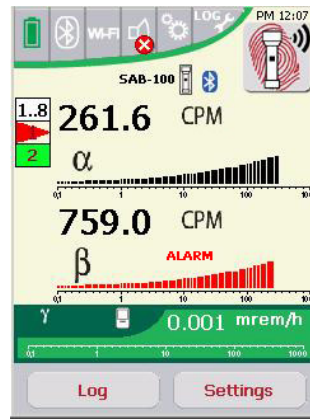
Colibri unit can be set to any level between fully open and highly restricted for a dedicated worker or a group of users.

Colibri survey meter includes user and profile management to adapt the instrument to worker capabilities depending on his primary task. The log-in function can be enabled to bring an additional level of traceability since each measurement stored is then linked to a specific user name or group of users.

Colibri data and parameters are password protected.
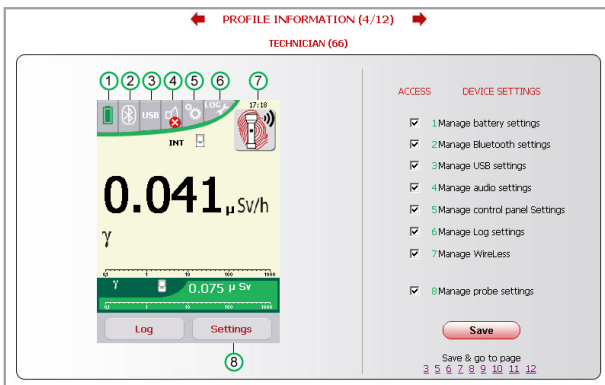


### Multiple Probe Connection



Colibri unit can connect to eight CSP probes (one via standard cable and seven via CSP-COM Bluetooth) and display all probe measurements simultaneously. The user can decide to focus on one specific probe manually or automatically if a probe turns an alarm off. The latest alarming probe is always displayed in main window.

Colibri survey meter with two probes connected; focus on alpha/beta probe with beta channel alarming

### A Ruggedized Platform

Colibri unit has been built to resist harsh environment constraints. Its ABS housing is shock absorbant. Its silicon rubber keypad provides excellent tactile control compression recovery, and superior resistance to extreme temperatures unlike an ordinary keypad.

Colibri survey meter is also waterproof, which makes it operational in extreme environments.

### Field Upgradable Software

Colibri software can be periodically upgraded via PC USB link with the standard delivered cable. As a result, user continues to receive the benefit of future software enhancement long after the instrument is purchased.

Colibri survey meter comes with a wrist strap, and a rubber finger strap. It also includes a smooth permanent metallic belt clip.



Figure 4: Wrist, belt and hand straps (left);
Belt clip in use (right)

MIRION
TECHNOLOGIES

4

The standard Colibri package includes a carrying case with USB cable and international AC power supply.

**Options**

- An optional handle which attaches the Colibri unit to compatible CSP probes (SG, SX, SA, SB, SAB probes) greatly eases contamination control as only one hand is required to perform measurements.



Figure 5: Handle for Colibri

- An internal GPS with typical three meters accuracy.
- External Bluetooth barcode or RFID reader.



Colibri unit is provided with a carrying case and accessories

Barcode or RFID wireless reader

The CSP-COM Bluetooth module is necessary to enable wireless communication from the probe side. As Colibri unit is natively Bluetooth no additional module is required on the Colibri side.



Figure 6: Colibri unit in use with external probe connected via Bluetooth with CSP-COM module

| | | Units Displayed | | | | | | | | | | |
| | | US Mode | | | | | | SI Mode | | | | |
| Emitter Displayed | Detector | CPM | CPS | DPMeq | DPMeq/100 cm² | rem/h | R/h | c/s | Bqeq/cm² | Bqeq | Sv/h | Sveq/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SG-1R — $\gamma, X$ | NaI | | • | | | | • | • | | | | • |
| SG-2R — $\gamma, X$ | NaI | | • | | | | • | • | | | | • |
| SAB(G)-100 — $\alpha, \beta$ | Phoswich | • | | • | • | | | • | • | • | | |
| SA-100 — $\alpha$ | ZnS | • | | • | • | | | • | • | • | | |
| SB-100 — $\beta$ | Plastic | • | | • | • | | | • | • | • | | |
| SA-20-2 — $\alpha$ | ZnS | • | | • | • | | | • | • | • | | |
| SA-32 — $\alpha$ | ZnS | • | | • | • | | | • | • | • | | |
| SB-20 — $\beta$ | Plastic | • | | • | • | | | • | • | • | | |
| SX-2R — $X$ | NaI | • | | • | • | | | • | • | • | | |
| STTC — $\gamma$ H*(10) | GM | | | | | • | | | | | • | |
| SVLD — $\gamma$ H*(10) | CsI(Tl) | | | | | • | | | | | • | |
| SPAB-15 — $\alpha, \beta$ | PIPS® | • | | • | • | | | • | • | • | | |
| SN-S — $n$ | $^3$He | | • | | | | | • | | | | |
| SABG-15+ — $\alpha, \beta, \gamma$ | GM | • | | • | • | | | • | • | • | | |
| TELE-STTC-(C or R) — $\gamma$ H*(10) | GM | | | | | • | | | | | • | |

Figure 7: Compatible Probe List (non exhaustive)



**MIRION** TECHNOLOGIES

## SPECIFICATIONS

### Nuclear

- Display Units: Internal Detector: Sv/h, Sv or rem, rem/h. H*(10) ambient gamma dose equivalent rate (according to ICRP-60)
- With external probes: c/s, $Bq_{eq}$, Sv, Sv/h, $Sv_{eq}$, $Bq_{eq}$/cm², $Sv_{eq}$/h or cpm, rem/h, rem, R, R/h, $DPM_{eq}$, $DPM_{eq}$/100 cm²
- Emitters: Gamma
- Detector: TTC: Energy Compensated Geiger Mueller. VLD: CsI(Tl) with energy compensation
- Sensitivity ($^{137}$Cs): TTC: 0.73 c/s per µSv/h (438 cpm per mR/h), VLD: 70 c/s per µSv/h (27 kcpm per mR/h)
- Measurement Range: TTC: 0.05 µSv/h to 10 Sv/h (5 µrem/h to 1000 rem/h), VLD: 10 nSv/h to 1 mSv/h (1 µrem/h to 100 mrem/h)
- IEC Approved Range: TTC: 3 µSv/h to 10 Sv/h (300 µrem/h to 1000 rem/h), VLD: 100 nSv/h to 1 mSv/h (10 µrem/h to  100 mrem/h)
- IEC Approved Energy Range: TTC: Gamma 48 keV to 1.5 MeV, VLD: 59 kev to 1.5 MeV

### Alarm Threshold

- Use: Choice of one within a list of 10 preset and editable values
- External Probes: 10 editable values for each unit to display, stored in probe memory
- Each value is editable via PC setup, CSPS software and Colibri survey meter

### Ergonomic

- Display: 3.5 in. QVGA TFT 240*320 with backlight

### Alarm:

- Audible Alarm: >85 dB at 30 cm, typical: 90 dB
- Vibrator
- Visual: Flashing red LED, alarm pictogram and screen display color (red)
- Keyboard: Ruggedized silicon keyboard with six buttons: power, audio, light, up, down, enter
- Operating Controls: Complete and automatic self test when switching on. Periodical control of main functions when in use.
- Data Storage (internal or external detector): Measure, selected thresholds, probe identification, serial number, time and date, calibration data and location data. 512 MB flash memory

### Electrical

- Batteries: Integrated rechargeable batteries (Li-ion)
- External Charger: 100-240 V ac/47-63 Hz
- Charge Time: 2 hours approx
- Battery Life: Up to 25 h (based on TTC version); display of 'low battery' pictogram when battery life is <1 hour

### Mechanical

- Housing: Molded polycarbonate housing with elastomer and Silicon keyboard. Waterproof and easy to decontaminate
- Dimensions: 195 x 100 x 69 mm (7.6 x 3.9 x 2.7 in.) (L x W x H)
- Weight: ~630 g depending on version and options (22.2 oz)
- Connector for Probes: Waterproof Fisher socket

### Environmental

- Operating Temperature: TTC: -20 °C to +50 °C (-4 °F to 122 °F), VLD: -10 °C to +40 °C (14 °F to 104 °F)
- Storage Temperature: TTC: -25 °C to +60 °C (-13 °F to 140 °F), VLD: -25 °C to +50 °C (-13 °F to 122 °F)
- Relative Humidity, INGRESS Protection: 10% to 95% at +35 °C – IP67 (waterproof down to 1 meter (3.4 ft) during 30 min.)

### Applicable Standards

- Bluetooth Class 2
- ANSI: Compliant with ANSI 42.17A
- IEC: Compliant with IEC 60846:2009 and IEC 60325 with external contamination probes. Colibri-TTC is approved to IEC 60846:2009 –            Type approval N° 0111-CS-A046-11
- CE: Meets CE requirements
- Radio/FCC: Conform

## ORDERING INFORMATION

- Colibri TTC-Basic: EM96846. (Does not include BT, Wi-Fi or GPS)
- Colibri TTC-GPS: EM87771
- Colibri VLD-Basic: EM96146. (Does not include BT, Wi-Fi or GPS)
- Colibri VLD-GPS: EM86789
- Spare Colibri AC charger: EM87452
- Spare Colibri carrying case: EM89305
- Colibri Car DC charger: EM88805
- Barcode reader with charging cradle and key retractable reel: EM89303
- RFID reader with charging cradle and key retractable reel: EM89304
- Handle for Colibri unit and one CSP probe: EM87501
- Straight 1.5 meter cable for CSP probe: EM77336
- Straight 10 meter cable for CSP probe: EM99006
- Straight 20 meter cable for CSP probe: EM98830
- Coil cable 0.7-1.5 meter for CSP probe: EM77337
- CSP-COM Bluetooth: EM82481

<br>

- Colibri internal detector calibration cable: EM88940.
- Colibri internal detector calibration English software CSPS-E (SI units): EM80643
- Colibri internal detector calibration English software CSPS-R

    (US units): EM80642
- Colibri internal detector calibration French software CSPS-F (US units): EM78468

1. US Patents 8754377, 8748833, 9040925, 9689991
   French Patents 3031397, 2653890 1254351
   UK Patent 2653890
   German Patent 602012030972.5

CE

ISO 9001 SYSTEM CERTIFIED

MERIDEN   CT
SMYRNA   GA
OAK RIDGE TN
CONCORD  ON

MIRION
TECHNOLOGIES

**www.mirion.com**