# CWCT & BCM-CW-E


## High-resolution current measurement of CW beams or macropulses

Beam repetition frequency 15 to 200 MHz

Average current with 1 µA rms resolution
With Low Current Option: ≤8 nA rms resolution

Fast beam loss interlock 1 µs
Linearity error <1.5%
Beam loss resolution <1 %

Independent of bunch shape and width
Low temperature dependence, EMI immune

## Operating principle

**CWCT and BCM-CW-E**

The CWCT is a current transformer with strict limits on lower and upper cut-off frequencies, tailored to the beam structure. Its lower cut-off frequency is tuned to get a high enough droop to allow fast differentiation while retaining a stable baseline between bunches. Its upper cut-off frequency is high enough to properly distinguish individual bunches. Yet, it is low enough to remove high frequency noise.

The BCM-CW-E is the electronics module processing the CWCT output signal. By applying fast sample-and-hold techniques it measures the average beam current with microsecond response time.
Properly adjusted signal amplification and filtering improves the resolution of small beam current fluctuations.

**Low Currents Option (LC)**

To measure beams with tens of nanoamperes intensity, a shielded front-end electronics can be directly attached to the sensor.
This front-end consists of a Low-Noise Amplifier and specially tuned filters.

With the LC-CWCT and BCM-CW-E, a few nanoamperes resolution can be reached.

## Performance

Typical performance of the 100 Hz output signal

| | Standard CWCT | | | LC-CWCT (CWCT with LC option) | | |
|---|---|---|---|---|---|---|
| BCM-CW-E Gain | 0 dB | 20 dB | 40 dB | 0 dB | 20 dB | 40 dB |
| Maximum measurable current | 100 mA | 20 mA | 2 mA | 50 µA | 20 µA | 2 µA |
| Resolution | 100 µA rms | 10 µA rms | 1 µA rms | 250 nA rms | 25 nA rms | 8 nA rms |


MANUFACTURER

**BERGOZ Instrumentation**
www.bergoz.com
Espace Allondon Ouest
01630 Saint Genis Pouilly, France
info@bergoz.com

DISTRIBUTORS

**U.S.A.**: GMW Associates
www.gmw.com
sales@gmw.com

**Japan**: Hayashi-Repic Co.
www.h-repic.co.jp
sales@h-repic.co.jp

**India**: GEEBEE International
www.geebeeinternational.com
info@geebeeinternational.com

**China**: Beijing Conveyi Limited
www.conveyi.com
sales@conveyi.com

# CWCT & BCM-CW-E

## Inputs / Outputs specifications

**Outputs for beam current measurement**

BCM Output (SMA)

| | |
|---|---|
| Nominal range | -1V … +1V |
| Bandwidth | 350kHz (-3dB) |
| Readout impedance | 50Ω |
| Response time | <1µs (10%-90%) |

Output View (BNC)

| | |
|---|---|
| Nominal range | -4V … +4V |
| Bandwidth | 350kHz (-3dB) |
| Readout impedance | High impedance |
| Response time | <1µs (10%-90%) |

"DB9,3" Output

| | |
|---|---|
| Nominal range | -4V … +4V |
| Bandwidth | 100Hz (-3dB) |
| Readout impedance | High impedance |
| Response time | <3.5ms (10%-90%) |

"DB9,8" Output

| | |
|---|---|
| Nominal range | -4V … +4V |
| Bandwidth | 10kHz (-3dB) |
| Readout impedance | High impedance |
| Response time | <35µs (10%-90%) |

**Other Inputs / Outputs**

| | |
|---|---|
| Trigger in (SMA) | External RF clock input |
| Bandwidth | 15MHz.. 200MHz |
| Amplitude range | Sine wave: -25dBm… 0dBm<br>Square wave: 20mVpp… 200mVpp |
| Input impedance | 50Ω |

| | |
|---|---|
| Timing View (BNC) | Internal delayed clock output |
| Nominal range | 40mVp-p (Square Wave) |
| Readout impedance | 50Ω |

| | |
|---|---|
| Signal View (BNC) | CWCT signal after amplification |
| Nominal range | -0.5V… +0.5V |
| Readout impedance | 50Ω |

"DB9,6" & "DB9,2" inputs
Gain selection (0dB/20dB/40dB)
TTL compatible

USB 2.0
Gain selection (0dB/20dB/40dB);
Digital readout of measured current
Delay line settings

## Order codes

**CWCT dimensions**

| In-flange CWCT sensor order code | Pipe OD | Mating flange | ID (mm) |
|---|---|---|---|
| CWCT-CF3"3/8-22.2-40-UHV | 1" | DN/NW50CF | 22.2 |
| CWCT-CF4"1/2-34.9-40-UHV | 1.5" | DN/NW63CF | 34.9 |
| CWCT-CF4"1/2-38.0-40-UHV | 40 mm | DN/NW63CF | 38.0 |
| CWCT-CF6"-47.7-40-UHV | 2" | DN/NW100CF | 47.7 |
| CWCT-CF6"-60.4-40-UHV | 2.5" | DN/NW100CF | 60.4 |
| CWCT-CF6"3/4-96.0-40-UHV | 4" | DN/NW130CF | 96.0 |
| CWCT-CF8"-96.0-40-UHV | 4" | DN160/NW150CF | 96.0 |
| CWCT-CF10"-147.6-40-UHV | 6" | DN/NW200CF | 147.6 |
| CWCT-CF12"-198.4-40-UHV | 8" | DN/NW250CF | 198.4 |
| | | Axial length (mm) | 40.0 |

**Cables**

BCM-C-xx: Coaxial cable with PTFE connector dielectric, xx meters

BCM-RHC-xx: Radiation-tolerant coaxial cable with Radox insulation, PEEK connector dielectric, xx meters

BCM-C400-xx: LMR400 cable or similar cable, xx meters

**BCM-CW-E electronics**

BCM-CW-E: Eurocard format 100 x 160mm, 20mm wide
To be plugged into BCM-RFC chassis station

**BCM-RFC chassis**

BCM-RFC/xx: 19"x3U RF-shielded chassis with xx wired stations (max. 10)
AC mains 90-125Vac or 220-245Vac
Switch selectable 50/60Hz

## Options

| | |
|---|---|
| LC- | Low Currents Option (resolution ≤8 nA rms) |
| -H | Radiation-tolerant sensor |
| -316LN | AISI 316LN instead of AISI 304 SS |
| -ARB#xx | Arbitrary shape aperture |
| -BK150C | 150'C (300'F) bakeable |


MANUFACTURER

**BERGOZ Instrumentation**
www.bergoz.com
Espace Allondon Ouest
01630 Saint Genis Pouilly, France
info@bergoz.com

DISTRIBUTORS

**U.S.A.**: GMW Associates
www.gmw.com
sales@gmw.com

**Japan**: Hayashi-Repic Co.
www.h-repic.co.jp
sales@h-repic.co.jp

**India**: GEEBEE International
www.geebeinternational.com
info@geebeeinternational.com

**China**: Beijing Conveyi Limited
www.conveyi.com
sales@conveyi.com