

## CWT / CWTHF

Since pioneering the wide-band Rogowski current probe over 30 years ago PEM Ltd have continued to develop the CWT, and now the shielded CWTHF, to provide state of the art, wide-bandwidth AC current measurement.

**The CWT and CWTHF combine an easy to use thin, flexible, clip-around Rogowski coil with an ability to accurately replicate fast switching current waveforms be they, sinusoidal, quasi-sinusoidal, PWM or pulsed.**



CWT wideband probe connected to an oscilloscope



Different coil lengths available



### Key Features

- A patented electrostatic shielded coil providing excellent immunity to 50/60Hz voltage fields and fast voltage transients.
- Models cover a range of 0.03Hz to 30MHz.
- Current ratings from 30A pk to 300kA pk.
- Peak di/dt capability up to 120kA/μs.
- Coil insulation 10kV pk.
- 8.5mm (max) coil cross section diameter.
- Loads the circuit under test by only a few pF.
- Standard coil length of 300mm to 1000mm, but longer coil lengths readily available.



### Applications

- Current transient measurement in power electronic switching circuits.
- Lightning strike measurements.
- Power converter development and diagnostics.
- High frequency (hf) sinusoidal currents e.g. induction heating.
- Measuring small AC currents in the presence of large DC currents (e.g. monitoring capacitor ripple).
- EMC measurements, in traction, motor drives and power networks.
- Measuring fault currents, or currents in pulsed power applications.

## CWT - Original Models

Model	Sensitivity (mV/A)	Peak Current* <sup>1</sup> (A)	Noise* <sup>2</sup> (mVp-p)	Droop (%/ms)	LF (-3dB) (Hz)	Peak di/dt (kA/μs)	HF (-3dB) Bandwidth* <sup>3</sup> (MHz)	
							300mm	700mm
CWT 3N	20	600	14	0.9	1.0	2.0	10	5
CWT 6	5.0	1.2k	12	0.9	1.0	8.0	16	10
CWT 15	2.0	3.0k	7.0	0.7	0.8	20	16	10
CWT 30	1.0	6.0k	3.5	0.5	0.6	40	16	10
CWT 60	0.5	12k	3.0	0.35	0.4	40	16	10
CWT 150	0.2	30k	3.0	0.2	0.2	40	16	10
CWT 300	0.1	60k	3.0	0.1	0.1	40	16	10

## CWTHF - Shielded / High Frequency Models

Model	Sensitivity (mV/A)	Peak Current* <sup>1</sup> (A)	Noise* <sup>2</sup> (mVp-p)	Droop (%/ms)	LF (-3dB) (Hz)	Peak di/dt (kA/μs)	HF (-3dB) Bandwidth* <sup>3</sup> (MHz)	
							300mm	700mm
CWTHF 015	200	30	15	85	150	2.0	20	8
CWTHF 03	100	60	11	78	105	4.0	20	8
CWTHF 06	50	120	8.0	70	80	8.0	20	10
CWTHF 1	20	300	6.0	50	50	20	20	10
CWTHF 3	10	600	12	11	12	40	30	15
CWTHF 6	5.0	1.2k	12	5.5	6.0	80	30	15
CWTHF 15	2.0	3.0k	10	3.0	3.0	80	30	15
CWTHF 30	1.0	6.0k	10	1.5	1.5	120	30	15
CWTHF 60	0.5	12k	8.0	1.0	1.0	120	30	15
CWTHF 150	0.2	30k	5.0	0.8	0.8	120	30	15
CWTHF 300	0.1	60k	5.0	0.2	0.2	120	30	15
CWTHF 600	0.05	120k	5.0	0.06	0.05	120	30	15
CWTHF 1500	0.02	300k	5.0	0.035	0.03	120	30	15

\*1 Higher Peak current than 300kA pk available on request.

\*2 'Noise' is the internally generated integrator noise, this is predominantly the same frequency as the LF (-3dB) bandwidth.

\*3 The HF(-3dB) is quoted for a 2.5m cable.

### di/dt ratings

These are 'Absolute maximum di/dt ratings' and values must not be exceeded

Type	Abs. Max. peak di/dt	Abs. Max. rms di/dt
CWT	40kA/μs	1.5kA/μs
CWT HF	120kA/μs	1.5kA/μs

## Output

±6V pk corresponding to 'Peak Current' into  $\geq 100\text{k}\Omega$  (recommended e.g. DC1M $\Omega$  oscilloscope).  
±2V pk, Sensitivity is half the nominal value into = 50 $\Omega$  (CWTHF models only 015HF to 150HF).

## Accuracy

Calibrated to  $\pm 0.2\%$  reading with conductor central in the Rogowski coil loop.  
Conductor position in the coil (for a 10mm dia. conductor) typically  $\pm 1\%$  reading.  
Linearity (with current magnitude) 0.05% reading.

## DC offset

±3mV max. at 25°C

## Temperature

Coil and cable -20°C to +100°C  
Integrator electronics 0°C to +40°C

## Coil voltage

10kV pk -- Safe peak working voltage to earth.  
Rating established by a 15kV rms, 50Hz, 60sec voltage withstand test.

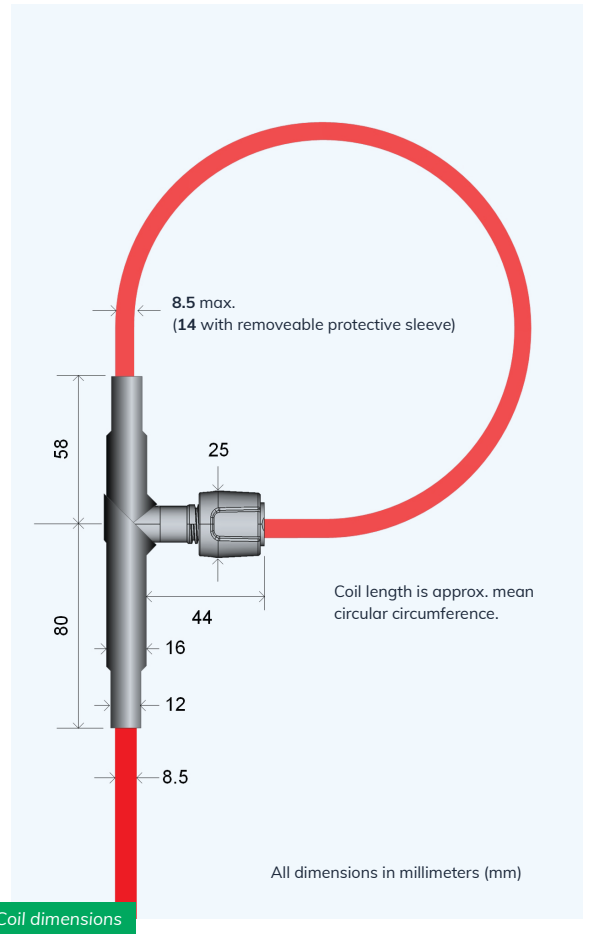
The CWT and CWTHF coil include a removable silicone sleeve which provides additional robust mechanical protection.

## Cable length

1m, 2.5m or 4m (length of cable from coil to electronics).  
**Longer cables are available on request.**

## Coil length

300mm, 500mm, 700mm or 1000mm.  
**Longer coils are available on request.**



## Battery Options

- B Alkaline Batteries** -- 4 x 1.5V AA alkaline batteries, 25 hour life (70 hours CWT).  
*External power adaptor disconnects batteries and powers unit.*
- R Rechargeable Batteries** -- 4 x 1.2V NiMH batteries, 10 hour life (30 hours CWT).  
*External power adaptor trickle charges batteries and powers unit.*

External power adaptor available in **US, EURO, UK & AUS** versions as an optional extra.

1 2 3 4 5  
**CWTHF / 06 / R / 2.5 / 700**

### Example part codes

#### **CWTHF/06/R/2.5/700**

CWTHF peak current 120A, Rechargeable batteries, 2.5m cable, 700mm circumference coil, 10kV pk, 8.5mm thick coil.

#### **CWT/15/B/1/500**

CWT peak current 3.0kA, Alkaline batteries, 1m cable, 500mm circumference coil, 10kV pk, 8.5mm thick coil.

### Generating the part code

- 1 **Model**
- 2 **Range**
- 3 **Battery Option**
- 4 **Cable Length (m)**
- 5 **Coil Length (mm)**

#### Included as standard

- ✓ Carry Case
- ✓ Unit Model
- ✓ Batteries (B or R)
- ✓ 0.5m BNC Output Cable
- ✓ Calibration Certificate

#### Optional Extras

- + Longer Cable
- + Longer Coil
- + Power Adaptor (UK, EU, US, AU)



More detailed technical notes, dimensioned drawings, CAD files and quotation request for this product are available online.

# PEN1

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