2 / 1O / 5O Turn Precision Clamp Coil Adapter   2901A

- **Calibrates Clamp Meters up to 1000Amps**
- **2 / 10 / 50 Turn Coils**
- **High Accuracy Balanced Design**
- **Wide range of clamp sizes covered**
- **Complete with connection leads**

Designed for the calibration of both wound (AC only) & Magnetic field (hall effect) AC/DC clamp meters the Transmille current coil offers several unique features built in a robust construction.

Theory of Operation

The coil effectively multiplies the current produced by the calibrator by the number of turns of the coil, e.g. 2, 10, and 50 with the Transmille coil. The principle is each turn of the coil produces a magnetic field proportional to the current flowing in it. If you take 50 wires all side by side with the same current flowing in the same direction the magnetic field for each turn of wire will add together and produce a magnetic field 50 times stronger, e.g. the same magnetic field as one wire with 50 times the current flowing in it. By using a 50 turn coil it is possible to calibrate clamp meters up to 1000 Amps without having to actually generate more than 20 Amps (available from the 2000 Series calibrators). Clamp meters up to 2000 Amps can be calibrated when using Transmille's 50 Amp transconductance amplifier.

High Accuracy Design

Clamp meters can measure current by using the invisible magnetic field generated round any conductor carrying a current. The degree of magnetic coupling between the field produced by the conductor and the jaws of the clamp meter varies due to the position of the conductor within the jaws - this changes the current reading. Transmille's coil is designed to immerse both jaws of he clamp meter in

the magnetic field while allowing the 'gap' or opening where magnetic flux will escape to protrude through the coil and stay out of the strongest part of the field. This makes the reading less dependent on the position of the clamp within the coil and also the quality of the jaw closing, allowing greater confidence in the calibration.
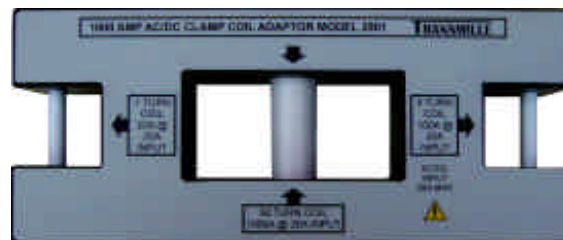
Calculating Clamp Meter Accuracy.

There are two contributions to the total accuracy which should be taken into account when calibrating clamp meters using a coil. The first is the accuracy of the current produced by the calibrator, the second is the coupling between the coil and clamp meter. These must be combined using a *root sum of the squares*. Empirical tests made on a wide range of clamp meters calibrated by Transmille at its laboratory have shown that *torroidal wound current transformer* type clamps typically exhibit better performance and will give coupling errors of 0.2% and *hall effect devices* slightly higher at around 0.4%.

Innovative Closed Construction Design

Three coils in one provide the ability to calibrate a wide range of coils, from small lower clamps down to 10mm jaw diameter to larger 2000A clamps. The low inductance, low resistance properties allow the calibrators to easily drive the coil, giving plenty of overhead for calibrating older clamps. The coils are fully enclosed in a strong, robust and compact plastic enclosure preventing mechanical damage. This rugged design is ideal for using the coil on-site and in harsh environments.

2 Turn Coil
Minimum 10mm inside jaw diameter.

10 Turn Coil
Minimum 10mm inside

50 Turn Coil
Minimum 25.4mm inside jaw diameter.

Specifications: See extended specifications for full details

2901A Clamp Coil Adapter Specifications

General Specifications

Adapter Connection	4x 4mm safety sockets mounted on the rear of the unit
Adapter Dimensions	28cm x 12cm x 6cm
Colour	Black
Connection to Calibrator	Via supplied 4mm to 4mm connection leads (x2) to 2000 series current terminals
Coil Configuration	2 Turn (LHS) : 10 Turn (RHS) : 50 Turn (CENTRE)
Coil Type	High accuracy balanced configuration
Min. internal jaw dimensions	10mm (2 Turn & 10 Turn) : 25mm (50 Turn)
Maximum Current	40A
Maximum RMS voltage	4V
Frequency Range	DC to 500Hz
Construction	Loose wound coil (for heat dissipation) in moulded ABS enclosure
Durability	Fully enclosed coil for maximum protection from mechanical damage
Compatibility	Designed for use with Transmille 2000 Series calibrators and ProCal Software

2 Turn Coil Accuracy (Input 0 to 40A : Freq. DC - 30Hz to 60Hz : Effective Output 0 to 80A)

	90 Day Rel. % A	180 Day Rel. % A	1 Year Rel. % A	2 Year Rel. % A
Effective accuracy - Coil only (wound clamps)	0.35 + 0.008	0.35 + 0.008	0.35 + 0.008	0.35 + 0.008
Effective accuracy - Coil only (hall effect clamps)	0.48 + 0.07	0.48 + 0.07	0.48 + 0.07	0.48 + 0.07
Total uncertainty with 2050 (All clamps)	0.51 + 0.09	0.51 + 0.09	0.52 + 0.09	0.56 + 0.10
Total uncertainty with 2041A (wound clamps)	0.36 + 0.028	0.36 + 0.028	0.36 + 0.028	0.38 + 0.036
Total uncertainty with 2041A (hall effect clamps)	0.49 + 0.090	0.49 + 0.090	0.49 + 0.090	0.50 + 0.098
Total uncertainty with 2006A calibrator (wound clamps)	0.36 + 0.010	0.36 + 0.010	0.36 + 0.010	0.37 + 0.010
Total uncertainty with 2006A (hall effect clamps)	0.48 + 0.072	0.49 + 0.072	0.49 + 0.072	0.49 + 0.072

10 Turn Coil Accuracy (Input 0 to 40A : Freq. DC - 30Hz to 60Hz : Effective Output 0 to 400A)

	90 Day Rel. % A	180 Day Rel. % A	1 Year Rel. % A	2 Year Rel. % A
Effective accuracy - Coil only (wound clamps)	0.41 + 0.01	0.41 + 0.01	0.41 + 0.01	0.41 + 0.01
Effective accuracy - Coil only (hall effect clamps)	0.59 + 0.11	0.59 + 0.11	0.59 + 0.11	0.59 + 0.11
Total uncertainty with 2050 (All clamps)	0.61 + 0.13	0.62 + 0.13	0.62 + 0.13	0.65 + 0.14
Total uncertainty with 2041A (wound clamps)	0.42 + 0.03	0.42 + 0.03	0.42 + 0.03	0.43 + 0.04
Total uncertainty with 2041A (hall effect clamps)	0.60 + 0.13	0.60 + 0.13	0.60 + 0.13	0.61 + 0.14
Total uncertainty with 2006A calibrator (wound clamps)	0.41 + 0.012	0.42 + 0.012	0.42 + 0.012	0.42 + 0.012
Total uncertainty with 2006A (hall effect clamps)	0.59 + 0.112	0.59 + 0.112	0.60 + 0.112	0.60 + 0.112

50 Turn Coil Accuracy (Input 0 to 40A : Freq. DC - 30Hz to 60Hz : Effective Output 0 to 2000A)

	90 Day Rel. % A	180 Day Rel. % A	1 Year Rel. % A	2 Year Rel. % A
Effective accuracy - Coil only (wound clamps)	0.24 + 0.04	0.24 + 0.04	0.24 + 0.04	0.24 + 0.04
Effective accuracy - Coil only (hall effect clamps)	0.45 + 0.42	0.45 + 0.42	0.45 + 0.42	0.45 + 0.42
Total uncertainty with 2050 (All clamps)	0.48 + 0.44	0.48 + 0.44	0.49 + 0.44	0.53 + 0.45
Total uncertainty with 2041A (wound clamps)	0.25 + 0.06	0.26 + 0.06	0.26 + 0.06	0.28 + 0.07
Total uncertainty with 2041A (hall effect clamps)	0.46 + 0.44	0.46 + 0.44	0.46 + 0.44	0.47 + 0.45
Total uncertainty with 2006A calibrator (wound clamps)	0.25 + 0.042	0.25 + 0.042	0.25 + 0.042	0.26 + 0.042
Total uncertainty with 2006A (hall effect clamps)	0.45 + 0.42	0.46 + 0.42	0.46 + 0.42	0.46 + 0.42

Accuracy is dependant on proper alignment of the clamp meter within the coil

Certain clamp meters have alignment marks which should be aligned with the centre of the coil.

Certain types of clamp meter may have additional errors, or be outside the range which can be driven by the 2041A directly

Use of the Transmille 2400 Transconductance amplifier may be used to provide additional drive.

Uncertainty calculated as the square root of the square of coil accuracy + square of calibrator accuracy

using empirical data obtained for both wound & hall effect instruments from a wide range of manufacturers

Clamp coil adaptor is supplied complete with workstation incorporating alignment marks (size 275x295x45mm)

2901A Clamp Coil Adapter Specifications (Cont'd)

DC Resistance	
At Coil	0.14Ω
With Connection Leads	0.18Ω

Duty Cycle	
10A	Continuous
20A	2mins on ~ 5mins off
40A	30secs on ~ 5mins off

Inductance	
Coil Only	120uH
Coil with typical clamp meter on 50 Turn coil	200uH
Coil with typical clamp meter on 10 Turn coil	50uH
Coil with typical clamp meter on 2 Turn coil	5uH

Specifications apply between 17°C and 27°C.

Outside this range an allowance of 0.18 x 1 Year Spec. per °C should be added.

Due to continuous development specifications may be subject to change.