

# M 151

# Current calibrator



## HIGHLIGHTS

- AC/DC current 8 mA...120 A, 15-1000 Hz
- Total accuracy 275-700 ppm in all ranges
- Floating output up to 450 Vpk, compliance voltage 8 Vpk
- Calibration of clamp meters up to 3000 A
- Real and simulated transconductance amplifier
- GPIB and RS-232 come as standard

## DESCRIPTION

Model M151 is a stable high current calibrator up to 120 A. Basic accuracy is 275 ppm. Instrument can be controlled via RS232 or GPIB interface. Calibrator can work in a simulated amplifier mode to increase current ranges of any multifunction calibrator. It is suitable for power meter's calibration because M151 can be synchronized with the input signal not only in amplitude but also in frequency and phase. Current terminals are isolated up to 450 Vpk against case (protective earth). M151 is a sophisticated instrument with its own recalibration procedure. The procedure enables to adjust any deviation directly from the front panel. Calibrator is designed for checking parameters of amp meters. With current coil it can be used for calibration of clamp meters.

### Current accuracy (% of value and range, 1 year)

Summarized range *	Source mode		Real transconductance amplifier	
	DC, 40-70 Hz	15-40 Hz 70-1000 Hz	DC, 15-70 Hz	70-1000 Hz
8 mA - 5 A	0.0175 + 0.01	0.025 + 0.02	0.2 + 0.1	0.4 + 0.2
5 - 10 A	0.021 + 0.015	0.04 + 0.02	0.2 + 0.1	0.4 + 0.2
10 - 120 A	0.025 + 0.015	0.05 + 0.02	0.2 + 0.1	0.4 + 0.2

\* Current ranges are: 300 mA, 1A, 2A, 5A, 10A, 30A, 60A, 120A.

## SPECIFICATION

### Maximum compliance voltage

Range	Source mode			Real TC amplifier
	DC	15 - 400 Hz	400-1000 Hz	DC, 15 - 1000 Hz
8 mA - 2 A	8 V	5.5 Vrms	3.5 Vrms	3.5 Vrms*
2 A - 120 A	5 V	3.5 Vrms	3.5 Vrms	3.5 Vrms*

\* Accuracy specified up to 2 Vrms. Terminals are disconnected when input signal exceeds 2 Vrms or if slew rate exceeds 35 V/ms.

### Built in process multimeter

Function	Range	% of value + % of range
AC voltage < 1 kHz	0 - 20 V	0.02 % + 0.02 %
AC voltage > 1 kHz	0 - 20 V	0.05 % + 0.05 %
DC voltage	±20 V	0.01 % + 0.01 %
AC current < 1 kHz	0 - 200 mA	0.02 % + 0.02 %
AC current > 1 kHz	0 - 200 mA	0.05 % + 0.05 %
DC Current	±200 mA	0.01 % + 0.01 %
Frequency	1 Hz - 10 kHz	0.005 % + 0.00 %

### Typical RTA phase shift

$$\text{delay } [\mu\text{s}] = 7 \times \text{output\_voltage} \times \text{range\_current} / \text{output\_current} + 3,5$$

For example if your output at 10 A range (5x gain) is 5 A and 1 V, typical output delay will be  $7 \times 1 \times 10 / 5 + 3,5 = 17,5 \mu\text{s}$ . At 55 Hz this makes  $0,35^\circ$  phase shift.

Typical 24 hour phase shift stability between 50 - 60 Hz is better than 0.01°.

## GENERAL DATA

Warm-up time:	15 min
Output terminals isolation:	up to 450 Vpk against GND (protective earth)
Distortion of output signal:	< 0.1 %
Frequency accuracy:	0.005 %
Frequency resolution:	0.001, 0.01 Hz above 500 Hz
Frequency synchronization:	internal, external, power supply
Simulated amplifier gain:	0.5 ... 10 A/V (transconductance amplifier) 50 ... 1000 A/A (current amplifier)
Remote control:	RS232, IEEE488
Power supply:	115/230 VAC, 50/60 Hz
Reference temperatures:	+20 °C ... +26 °C
Working temperatures:	+5 °C ... +40 °C
Storage temperatures:	-10 °C ... +55 °C
Dimensions:	W 538 mm, H 283 mm, D 540 mm
Weight:	42 kg

### Option 151-25 Current Coil

Actively cooled 25-turn current coil for calibration of clamp ammeters up to 3000 A.

