

FLUKE®

Calibration

52120A Transconductance Amplifier



Expand the workload capability of your
power and electrical calibrators



52120A Transconductance Amplifier

The Fluke Calibration 52120A Transconductance Amplifier supplies dc current up to 100 amps and ac current up to 120 amps at accuracies to 140 ppm. Using accessory coils, it can generate 3,000 or 6,000 amps. Three 52120As connected in parallel can output up to 360 amps. Inductive drive capability of 1 mH and compliance voltage of 4.5 volts support a wide range of applications.

Expand the workload capability of your power and electrical calibrators

The 52120A is designed for users whose ability to address their calibration workload may be limited by the output current, accuracy and drive capability of their present test equipment, including:

- Calibration professionals in a calibration/standards lab or an electrical utility
- Manufacturers of power/energy instrumentation and meters, power quality analyzers or power converters
- Users of electrical test and measurement equipment

The 52120A enables you to test and calibrate a broad workload at full current range:

- Primary and secondary power standards
- Power and energy meters
- Power quality analyzers
- Digital multimeters, analog and clamp meters
- High current clamp meters, e.g.: Fluke-345
- Rogowski coils e.g., Fluke i6000 Flex
- Current shunts, probes and transformers
- Relay/breaker test sets

The 52120A operates as a transconductance amplifier with:

- 5500A/5520A/5522A Multi-Product Calibrator
- 5700A/5720A Multifunction Calibrator
- 5080A Multi-Product Calibrator
- 9100 Universal Calibration System
- Any calibrator, signal generator or power supply capable of sourcing 2 V or 200 mA, dc or ac

You may also operate your 52120A in closed-loop mode, seamlessly communicating with your Fluke Calibration 6105A or 6100B Electrical Power Standard to deliver enhanced 52120A accuracy.



52120A performance at a glance

- Industry-leading amplifier accuracy:
 - 140 ppm ac (used with 61XXA Electrical Power Standard)
 - 350 ppm ac (used with dc/1f calibrator)
 - 150 ppm dc (used with dc/1f calibrator)
- Frequency: to 10 kHz
- Burden voltage (compliance): 4.5 V @ 120 A
- Inductive drive capability: 1 mH load
- Output ranges: 2 A, 20 A, 120 A
- Input ranges: 2 V or 200 mA F.S. for 2 A and 20 A ranges, 1.2 V or 120 mA F.S. for 120 A range
- Parallel operation: 2 or 3, up to 360 A in a single phase
- Accessory coils: 25-turn coil supports 3000 A, 50-turn coil supports 6000 A
- Control communication with 6105A /6100B Electrical Power Standards
- GPIB remote operation

Address your high-current workload with a 120A Transconductance Amplifier

- Output dc to 10 kHz
- Parallel operation for 240 A or 360 A
- Drive accessory coils for 3000 A or 6000 A

Features

- 1** 6 mm terminals for outputs to 120 A
- 2** 4 mm terminals for outputs up to 20 A
- 3** 12 V power for Current Coil fans
- 4** Compliance voltage bar graph
- 5** Three output ranges; 2 A, 20 A and 120 A
- 6** LCOMP mode for highly inductive loads
- 7** Status indicators for operation with 6105A
- 8** Drive the amp with 200 mA or 2 V





Current Coils support 3000 or 6000 Amps



52120A/COIL3KA
Coil, 25-turn,
3000 Amp



52120A/COIL6KA
Coil, 50-turn,
6000 Amp

Specifications

General specifications

Input line voltage range	100 V to 240 V with up to $\pm 10\%$ fluctuations
Transient overvoltage	Impulse withstand (overvoltage); Category II of IEC 60364-4-443
Frequency	47 Hz to 63 Hz
Maximum consumption	< 1500 VA
Dimensions with feet (H x W x L)	192 mm x 432 mm x 645 mm (7.6 inches x 17 inches x 25.5 inches)
Dimensions without feet (H x W x L)	178 mm x 432 mm x 645 mm (7 inches x 17 inches x 25.5 inches)
Weight	25 kg (54 lb.)
Design standards and compliance	Designed to EN 61010-1:2010, CAN/CSA 22.2 No 61010.1-04, ANSI/UL 61010-1:2004, EN 61326-1:2006 CE marked, CSA listed
Operating temperature	5 °C to 35 °C
Calibration temperature range	16 °C to 30 °C
Storage temperature	0 °C to 50 °C
Transit temperature	-20 °C to 60 °C < 100 hours
Warm up time	1 hour
Safe operating max. relative humidity (non-condensing)	< 80 % 5 °C to 31 °C ramping linearly down to 50 % at 35 °C
Storage max relative humidity (non-condensing)	< 95 % 0 °C to 50 °C
Operating altitude	0 m to 2,500 m
Non-operating altitude	0 m to 12,000 m
Shock	MIL-PRF-28800F class 3
Vibration	MIL-PRF-28800F class 3
Enclosure	MIL-PRF-28800F class 3

Performance specifications

Electrical performance limits				
Operating limits				
Output current	0 A to 120 A			
Output ranges	Three ranges: 2 A, 20 A and 120 A			
Input current range	Maximum input	200 mA _{rms}	200 mA _{rms}	120 mA _{rms}
	Output range	2 A _{rms}	20 A _{rms}	120 A _{rms}
	Gain	10	100	1000
Input voltage range	Maximum input	2 V _{rms}	2 V _{rms}	1.2 V _{rms}
	Output range	2 A _{rms}	20 A _{rms}	120 A _{rms}
	Transconductance	1 Siemen	10 Siemens	100 Siemens
120 A range Operating current/frequency limits ^[1]	DC $\pm 100A$ >DC to < 10 Hz max current 70 Arms, 100 Apk 10 Hz to 10 kHz, max current 120 Arms, 170 Apk			
Maximum output compliance voltage ^[2]	4.5 Vrms (6.4 Vpeak) for DC			

^[1] The 2A and 20A ranges operate at full output current from DC to 10 kHz.

^[2] Available 120 A compliance voltage decreases from 4.5 V at 1 kHz to around 3 V at 10 kHz.

Output isolation	
Frequency	Maximum voltage signal applied to any output current terminal with respect to earth
DC to 850 Hz	600 Vrms, 850 Vpeak
850 Hz to 3 kHz	100 Vrms, 142 Vpeak
3kHz to 10 kHz	33 Vrms, 47 Vpeak

Operated within 6105A or 6100B control loop, Sine or Harmonic input, all 52120A current ranges				
Frequency	1 year accuracy, $t_{cal}^{[1]} \pm 5^{\circ}C \pm (\% \text{ of output} + \% \text{ of FR}^{[2]})$			
	6105A		6100B	
	% output	+% FR	% output	+% FR
DC	0.015 %	0.010 %	0.022 %	0.025 %
16 Hz to 850 Hz	0.011 %	0.003 %	0.018 %	0.003 %
850 Hz to 6 kHz	0.052 %	0.005 %	0.052 %	0.005 %
6 kHz to 9 kHz	Use stand-alone performance specification below			

^[1] t_{cal} is the temperature at which calibration adjustment took place, ^[2] FR = Full range.

Note: Maximum inductance for stability LCOMP OFF is 100 μH . Maximum inductance for stability LCOMP ON is 400 μH for 2 A and 20 A ranges, 100 μH on the 120 A range.

Operated within 6105A or 6100B control loop, Sine or Harmonic input, all 52120A current ranges (cont'd)					
Phase angle accuracy					
10 Hz to 69 Hz	69 Hz to 180 Hz	180 Hz to 450 Hz	450 Hz to 850 Hz	850 Hz to 3 kHz	3 kHz to 6 kHz
0.006°	0.012°	0.025°	0.045°	0.325°	0.645°
Maximum load dependent phase angle shift					
<0.001° @ 60 Hz; increasing linearly to: 0.006° @ 6 kHz					

Notes: 1. The amplitude accuracy and phase angle specifications above apply for the paralleled output of up three 52120A connected as Slaves to a single 610X Electrical Power Standard. 2. See 610X specifications for Interharmonic, Fluctuating harmonic, Dip and Flicker specifications.

Stand-alone performance, 2 A range			
1 year transconductance and current gain accuracy, $t_{cal}^{[1]} \pm 5^{\circ} C \pm (\% \text{ of output} + \% FR^{[2]})$			
Frequency	% of output	% FR	
		LCOMP OFF ^[3]	LCOMP ON ^[4]
DC	0.010 %	0.005 %	0.005 %
10 Hz to 65 Hz	0.015 %	0.070 %	0.300 %
65 Hz to 300 Hz	0.030 %	0.070 %	0.500 %
300 Hz to 1 kHz	0.100 %	0.070 %	3.500 %
1 kHz to 3 kHz	0.300 %	0.600 %	Not specified
3 kHz to 6 kHz	1.000 %	1.600 %	Not specified
6 kHz to 10 kHz	2.000 %	4.000 %	Not specified

Stand-alone performance, 20 A range			
1 year transconductance and current gain accuracy, $t_{cal}^{[1]} \pm 5^{\circ} C \pm (\% \text{ of output} + \% FR^{[2]})$			
Frequency	% of output	% FR	
		LCOMP OFF ^[3]	LCOMP ON ^[4]
DC	0.010 %	0.005 %	0.005 %
10 Hz to 65 Hz	0.015 %	0.060 %	0.300 %
65 Hz to 300 Hz	0.030 %	0.060 %	1.200 %
300 Hz to 1 kHz	0.100 %	0.060 %	6.000 %
1 kHz to 3 kHz	0.300 %	0.200 %	Not specified
3 kHz to 6 kHz	1.000 %	0.400 %	Not specified
6 kHz to 10 kHz	3.000 %	0.600 %	Not specified

Stand-alone performance, 120 A range			
1 year transconductance and current gain accuracy, $t_{cal}^{[1]} \pm 5^{\circ} C \pm (\% \text{ of output} + \% FR^{[2]})$			
Frequency	% of output	% FR	
		LCOMP OFF ^[3]	LCOMP ON ^[4]
DC	0.010 %	0.005 %	0.005 %
10 Hz to 65 Hz	0.015 %	0.020 %	0.500 %
65 Hz to 300 Hz	0.030 %	0.030 %	0.700 %
300 Hz to 1 kHz	0.100 %	0.100 %	3.500 %
1 kHz to 3 kHz	0.300 %	0.250 %	Not specified
3 kHz to 6 kHz	1.000 %	0.450 %	Not specified
6 kHz to 10 kHz	4.000 %	0.750 %	Not specified

^[1] t_{cal} is the temperature at which calibration adjustment took place, ^[2] FR = Full range, ^[3] Maximum inductance for stability LCOMP OFF is 100 µH, ^[4] Maximum inductance for stability LCOMP ON is 1mH

Up to ten 52120A (one Master, nine Slaves) can be chained together in stand-alone mode. Any additional Slave units will be ignored by the control system.

Notes

- The specifications above are stated with a coverage factor $k=2.58$ equivalent to 99 % confidence level.
- The Stand-alone specifications are for the accuracy of transconductance with a voltage input or current gain with a current input. The specifications do not include the errors of the instrument providing the voltage or current signal to the Product input. To get the absolute accuracy of the current output the source and Product specifications should be combined using the "root sum of squares" (RSS) method which is explained in Chapter 4 of the 52120A User's Manual.
- Voltage compliance developed across inductive loads may prevent range maximum current output being achieved at higher frequencies. The approximate maximum frequency (Fmax) for given load inductance and current is given by:

$$F_{max} = \frac{4.5}{(2 \times \pi \times I \times L)} \quad \text{where } I \text{ is the current and } L \text{ the total inductance.}$$

The maximum frequency calculated with this equation is only approximate. Series resistance and parallel capacitance also affect the maximum achievable frequency.

Ordering information

Models

52120A Transconductance Amplifier, 120A

Options and accessories

52120A/COIL3KA Coil, 25 turn, 3000 Amp

52120A/COIL6KA Coil, 50 turn, 6000 Amp

52120A/COIL12V Coil 12 V DC Supply

GCP 52120 CarePlan one year

G3P 52120 CarePlan three years

Fluke Calibration. Precision, performance, confidence.™

Electrical	RF	Temperature	Pressure	Flow	Software
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