



MTS-5000 SPECIFICATIONS

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CAPABILITIES

Arbitrary Adjustment

- Independent adjustment and display of all output amplitudes and phase angles
- All output parameters can be set "off-line"
- Adjustment via continuous dial or numeric keypad

Multi-Phase Adjustment

- AC output amplitudes, angles and frequencies controllable in a multi-phase fashion
- Control phase-phase and 3-phase voltage, current and phase angle via single parameter adjustment
- Rotation of fault quantities to improve 3-phase testing productivity

Parameter Display

- All amplitude/angle/frequency parameters displayed numerically
- All AC outputs displayed in phasor graph form
- Parameter display active and updated while under computer control

State Sequencing

States	Off, Prefault, Fault 1-8, Postfault
State duration	Infinite or 0-9999.9999 seconds
State change control	Infinite, fixed duration, or dynamic based on contact/voltage input
Point-on-wave	Programmable from 0-359 deg for Prefault to Fault1 transition
DC offset	Exponentially decaying, user controllable

Waveform Playback

- Accepts IEEE C37.111 COMTRADE format files
- Reproduces analog and digital waveforms
- Channel assignment and scaling performed on front panel user interface
- Plays back from internal waveform memory

Max duration	1 minute
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Time Measurement

No. of timers	5	
Range	0 - 99999 seconds 0 - 99999 cycles	
Significant digits	6	
Accuracy	Greater of 0.2 ms or 1 LSD	
Resolution	for times <1 sec. for times ≥1 sec.	0.1 ms 1 ms

Sequence of Events Recording

- Records state changes on all contact/voltage inputs, contact outputs and output state changes

Resolution	0.1ms
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Waveform Capture

- Functions as an 8 channel oscilloscope on inputs 1-8

Resolution	1V for signal levels between -28V to +28V 4V for signal levels between -225V to -28V or +28V to +225V
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Display of Relaying Quantities

- V0, V1, V2
- I0, I1, I2
- Impedance (positive sequence 3-phase, phase-phase or phase-ground)

Time/Phase/Frequency Synchronization

- Synchronizes phase, frequency and time of multiple instruments

Synchronization Sources	<ul style="list-style-type: none"> Internal clock Internal GPS receiver External IRIG-B
Time	Synchronize start of prefault and Fault1 in non-waveform playback mode Synchronize start of record in waveform playback mode
Internal GPS 1pps accuracy	± 1 microsecond (subject to selective availability)
Frequency sources	2 (for testing synchronizing devices, and islanding conditions)

Ramping

- Independent linear ramps settable for each state

AC current	(each output)	0 - ± 100000 A/s
AC voltage	(each output)	0 - ± 100000 V/s
Phase angle	(each output)	0 - ± 9000.0 °/s
Frequency	(each frequency source)	0 - ± 20.00 Hz/s

Relay Test Modes

- Synchronizing for testing synchrocheck elements
- Differential for testing current differential elements
- Overcurrent for testing overcurrent elements

Automatic Control

- All instrument capabilities controllable via RS-232 and Ethernet communication interfaces

Preferences & Defaults

- User programmable, non-volatile defaults for system frequency, line-to-line voltage, phase sequence, phase naming and display colors, DC voltage, and communication settings

OUTPUTS

AC/DC Current Outputs

Range	3-phase AC	0-30 Arms
	1-phase AC	0-90 Arms
	DC	0-5 A
Maximum power	3-phase AC	0 x 600 VA
	1-phase AC	1 x 1800 VA
	DC	60 W
Accuracy	for > 1% of range	Greater of 0.5% or 0.01 Arms
Resolution		0.001 Arms
Superimposed harmonic	2 nd to 50 th harmonic	0 - 50%
Bandwidth	(-3dB)	3 kHz
Noise & distortion	at maximum power	<1%
Protection	Overload, overtemperature, transient overvoltage, open circuit	
Paralleling	<ul style="list-style-type: none"> 2 or 3 channels >3 channels when using multiple MTS-5000's 	

AC/DC Voltage Outputs

Range	3-phase AC	0-150 Vrms
	1-phase AC	0-300 Vrms
	DC	0-150 V
Maximum power	3-phase AC	3 x 100 VA
	1-phase AC	1 x 200 VA
	DC	50 W
Accuracy	Greater of 0.5% or 0.03 Vrms	
Resolution		0.01 Vrms
Superimposed harmonic	2 nd to 50 th harmonic	0 - 50%
Bandwidth	(-3dB)	3 kHz
Noise & distortion	at maximum power	<1%
Protection	Overload, short circuit, overtemperature, transient overvoltage	

AC Outputs - Frequency/Phase

Freq. range		1 - 3000 Hz
Freq. resolution		0.001 Hz
Freq. accuracy	with GPS synchronization	10 ppm
	without GPS synchronization	20 ppm
Phase angle range		0 - 359.9°
Phase angle resolution		0.1°
Phase angle accuracy	at 50/60 Hz	0.5°

DC Voltage Output

Range	10 - 300 V
Max. power	85 W
Surge current	2 A max
Accuracy	greater of 0.3V or 1%
Resolution	0.1V
Noise & distortion	<1% at maximum power

Contact Outputs

Type	4 x form A
Rating	5 A / 240 VAC
	0.4 A / 300 VDC
Isolation	each output independently isolated
Functions	52A, 52B, unblock, permissive
Transition delay	programmable 0.0 - 9999.9 ms

IRIG-B Output

Type	5V TTL
Connector	BNC

INPUTS

Analog Transducer Measurement

Input range	0 to ±10 VDC or 0 to ± 20 mADC
Accuracy	0.1% of range
Connector	4mm banana

Contact/Voltage Inputs

Type	8 x dry contact or AC/DC voltage 4 x AC/DC voltage	
Voltage range	0 - 300 VAC	
	-300 to +300 VDC	
Threshold range	Channels 1-8	3-225V
	Channels 9-12	12V fixed
Threshold resolution	Channels 1-8	1V
Debouncing/Deglitching	0.0 - 999.9 ms programmable	
Isolation	each input independently isolated	

Antenna

Type	Active, low gain
Connector	BNC

IRIG-B

Type	AM or TTL
Connector	BNC

Power Input

Rated range	110-130 VAC / 220-250 VAC
Operating range	100-130 VAC / 210-250 VAC
Frequency	47 - 63 Hz
Consumption	1800 VA avg. maximum

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OTHER

Communication Interfaces

- USB 1.0 (series "A" receptacle)
- 10Base-T/100Base-TX Ethernet (RJ45)
- RS-232 (9600 to 115200 baud, DB-9)

Physical

Weight	49.5 lbs (22.5 kg)
Width	9.9 in. (25.1 cm)
Height	16.4 in. (41.7cm)
Depth	15.6 in. (39.5 cm)
Operating temperature	32° to 122°F (0 to 50°C)
Storage temperature	-13° to 158°F (-25 to 70°C)

Accessories Included

- Front panel cover
- Rugged, watertight HPX shipping/transport case with rollers
- Manual
- Outdoor use GPS antenna, antenna cable and stand
- AC power cord
- MTS-2100 Graphical Monitoring Software

Application Software

- MTS-2150 Monitoring and Control Software
- MTS-2170 Power System Model
- MTS-2800 MPower: Protection test management, execution, reporting and analysis

NOTE: All specifications are subject to change

