
# MTS-5100 SPECIFICATIONS

MANTA™ TEST SYSTEMS
A DOBLE COMPANY

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# MTS-5100 SPECIFICATIONS

## 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
- Parameter display active and updated while under computer control

### State Sequencing

| | |
|---|---|
| **State duration** | Infinite or 0-9999.9999 seconds |
| **control** | 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 |

### Time Measurement

| | | |
|---|---|---|
| **No. of timers** | 5 | |
| **Range** | 0 - 99999 seconds<br>0 - 99999 cycles | |
| **Significant digits** | 6 | |
| **Accuracy** | ±0.5ppm of reading ±50µs | |
| **Resolution** | for times <1 sec | 0.1 ms |
| | for times >1 sec | 1 ms |

### Sequence of Events Recording

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

| | |
|---|---|
| **Resolution** | 0.1ms |

### Waveform Capture

- Functions as a 12ch oscilloscope on inputs 1-12

| | |
|---|---|
| **Resolution** | ±0.2 Vdc for signal levels ±300 Vdc |

### Display of Relaying Quantities

- V0, V1, V2
- I0, I1, I2
- Impedance (positive sequence 3-phase, phase-phase or phase-ground)
- V/Hz, % unbalance, power, impedance ratios

### Time/Phase/Frequency Synchronization

Synchronizes phase, frequency and time of multiple instruments

| | |
|---|---|
| **Synchronization Sources** | ▪ Internal clock<br>▪ Internal GPS receiver<br>▪ External IRIG-B |
| **Time** | ▪ Synchronize start of prefault and Fault1 in non-waveform playback mode<br>▪ 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
- Synchronizing / Synchrocheck
- Differential
- Overcurrent
- Reclosing
- Distance
- Meter and Transducer

### 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

*Note: Due to technical progress, all specifications are subject to change without notice.*

# OUTPUTS

## AC/DC Current Outputs

| | | |
|---|---|---|
| **Range** | 6-phase AC | 0-30 Arms |
| | 3-phase AC | 0-60 Arms |
| | 1-phase AC | 0-180 Arms[1] |
| | DC | 0-5 A |
| **Maximum power** | 6-phase AC | each 450 VA |
| | 3-phase AC | 3 x 900 VA[1] |
| | 1-phase AC | 1 x 2400 VA[1] |
| | DC | 60 W |
| **Accuracy[2]** | for > 5% of range | Greater of 0.25% setting or 10mArms (15mAdc) |
| **Resolution** | | 0.001 Arms |
| **Superimposed harmonic** | 2nd to 50th harmonic | 0 – 50% |
| **Bandwidth** | (-3dB) | 3 kHz |
| **Noise & distortion** | at maximum power | <1% (for >3% range) |
| **Protection** | Overload, overtemperature, transient overvoltage, open circuit | |
| **Paralleling** | ▪ 2, 3, or 6 channels<br>▪ >6 channels when using multiple MTS-5100's | |

## AC Outputs – Frequency/Phase

| | | |
|---|---|---|
| **Freq. range** | | 10 – 3000 Hz |
| **Freq. resolution** | | 0.001 Hz |
| **Freq. accuracy** | Without GPS<br>With GPS | < ±1ppm typ.[2,3]<br>< ±1µs |
| **Phase Angle** | Range | 0 - 359.99° |
| **Phase Resolution** | | 0.01° |
| **Phase Angle** | Accuracy[2] | < ±0.25° guar.<br>< ±0.10° typ. |

## IRIG-B Output

| | |
|---|---|
| **Type** | 5V TTL, isolated |
| **Connector** | BNC |

[1] *Transient, dependant on line and channel configuration.*
[2] *For frequencies 47-63Hz*

## AC/DC Voltage Outputs

| | | |
|---|---|---|
| **Range** | 3-phase AC | 0-250 Vrms |
| | 1-phase AC | 0-750 Vrms |
| | DC | 0-350 V |
| **Maximum Power** | 3-phase AC | 3 x 85 VA |
| | 1-phase AC | 1 x 250 VA |
| | DC | 100 W each phase |
| **Accuracy[2]** | for >5% of range | Greater of 0.15% setting or 10 mVrms |
| **Resolution** | | 0.01 Vrms |
| **Superimposed harmonic[4]** | 2nd to 50th harmonic | 0 – 50% |
| **Bandwidth** | (-3dB) | 3 kHz |
| **Noise & distortion** | at maximum power | <0.5% guaranteed<br><0.2% typical<br>(for >3% range) |
| **Protection** | Overload, short circuit, overtemperature, transient overvoltage | |

## 4th Voltage Output

| | |
|---|---|
| **Range** | 10 - 350 Vdc, 0-250 Vrms |
| **Max. power** | 150 W, 200 VA |
| **Current** | 0.5 Arms cont. max, 1.5 Apk surge |
| **Accuracy** | Greater of 0.15% setting or<br>10 mVrms (for >1% range) |
| **Resolution** | 0.01 V |
| **Noise & distortion** | <0.5% guaranteed (at max power)<br><0.2% typical (for >3% range) |

## 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 6.0 - 9999.9 ms |

[3] *Less than10ppm guaranteed*
[4] *Maximum 353.55Vpk (fundamental + harmonic)*

# INPUTS

## Analog Transducer Measurement

| | |
|---|---|
| **Input range** | 0 to ±10 VDC or 0 to ± 20 mADC |
| **Accuracy** | 0.1% of reading or 0.05% of range |
| **Connector** | 4mm banana |

## Contact/Voltage Inputs

| | | |
|---|---|---|
| **Type** | 12ch dry contact or AC/DC voltage | |
| **Voltage range** | ±300 VDC, 0 - 225 VAC **Accuracy** | |
| | ±1.5% of reading ±0.5% of range | |
| **Threshold range** | Channels 1-12 | 0.1V - 250 V |
| **Threshold resolution** | Channels 1-12 | 0.1V |
| **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, isolated |
| **Connector** | BNC |

## Power Input

| | |
|---|---|
| **Rated range** | 100-240 VAC |
| **Frequency** | 47 - 63 Hz |
| **Consumption** | 1800 VA typical maximum |

# MTS-5100 SPECIFICATIONS

## OTHER

### Communication Interfaces

- 2x USB 2.0 type “A” receptacle – Host Port
- 1x USB 2.0 type “B” receptacle – Slave Port (opt.)
- 10/100/1000 Base-TX Ethernet (RJ45)
  (IEC - 61850 Capable)
- RS-232 (9600 to 115200 baud, DB-9)

### Communication Protocols

- USB 2.0
- IEC-61850 / GOOSE
- HTTP, FTP
- ASCII commands

### Physical

| | |
|---|---|
| **Weight** | 49 lbs (22.2 kg) |
| **Width** | 18.9 in. (48.0 cm) |
| **Height** | 14.5 in. (36.8 cm) |
| **Depth** | 11.7 in. (29.7 cm) |
| **Operating Temperature** | 14° to 122°F (-10 to 50°C) |
| **Relative Humidity** | 5% to 90%, non-condensing |
| **Storage Temperature** | -22° to 158°F (-30 to 70°C) |

### Accessories Included

- Front panel cover
- Rugged, watertight HPX shipping/transport case with wheels & extension handle
- Manual
- GPS antenna with 100’ extension cable
- AC power cord

### Application Software

- RapidReporter®
- Remote Console

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