



M600 Series

Programmable Resistance Decades
and RTD Simulators



Main features

- ✓ Parallel binary decade with relay switching
- ✓ Extremely high resolution over low resistance values ($1\mu\Omega$)
- ✓ Very low thermoelectric voltage
- ✓ No residual resistance R_0
- ✓ Easy recalibration using front panel keyboard
- ✓ IEEE488 / RS232 / USB / Ethernet remote control

Application



Ohmmeter calibration
4W connection, accuracy 30ppm,
remote control

Thermometer calibration
4W connection, accuracy 0.01°C,
remote control



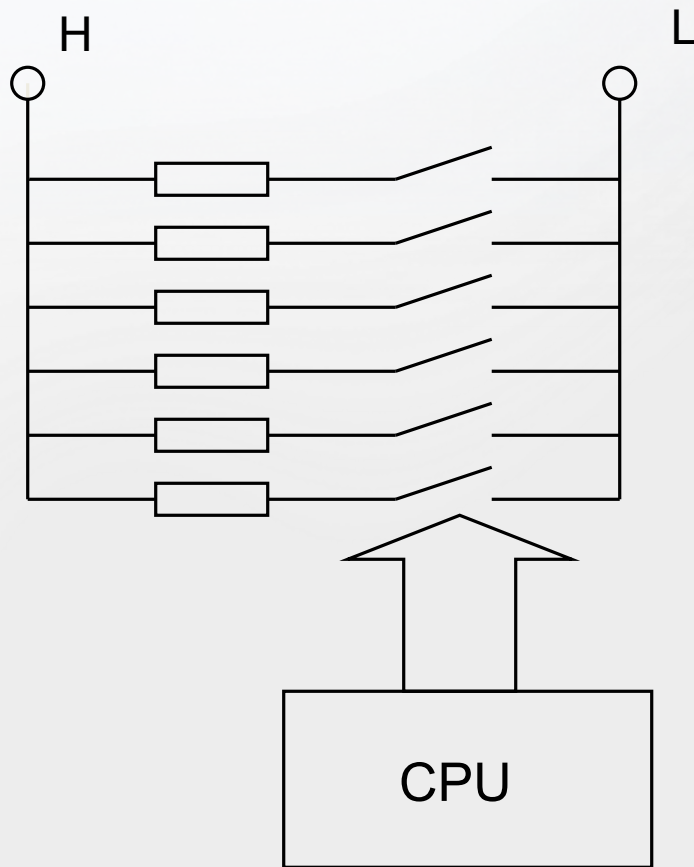
Application

Checking of meters (evaluation units) connected to resistance based sensors:

- position sensors
- rotary sensors
- temperature sensors

Very accurate and fast computer controlled simulation.

Electric principle



- Parallel combination of resistors
 - Fine resolution over low resistances
- Special relays
 - Low residual parameters
 - Low thermo voltage
- Precise foil resistors
 - Excellent metrology parameters

M632 Precision Resistance Decade

Highest accuracy, wide range

Range

$1\Omega \dots 1.2\text{ M}\Omega$

Accuracy

20 ppm

Resolution

$10\ \mu\Omega$

Maximum load

0.25 W, 200 V, 0.5 A



M631 Precision RTD Simulator

Highest accuracy, limited range

Range

$16\Omega \dots 400\text{ k}\Omega$

Accuracy

0.01°C

Resolution

0.001°C

Maximum load

$0.25\text{ W}, 200\text{ V}, 0.5\text{ A}$



M642 Programmable Resistance Decade

high load limit, widest range



Range

0.1 Ω ... 20 M Ω

Accuracy

0.02%

Resolution

1 $\mu\Omega$

Maximum load

5 W, 200 V, 0.5 A

M641 Programmable RTD Simulator

High load limit, limited range

Range

10 Ω ... 300 k Ω

Accuracy

0.1 $^{\circ}\text{C}$

Resolution

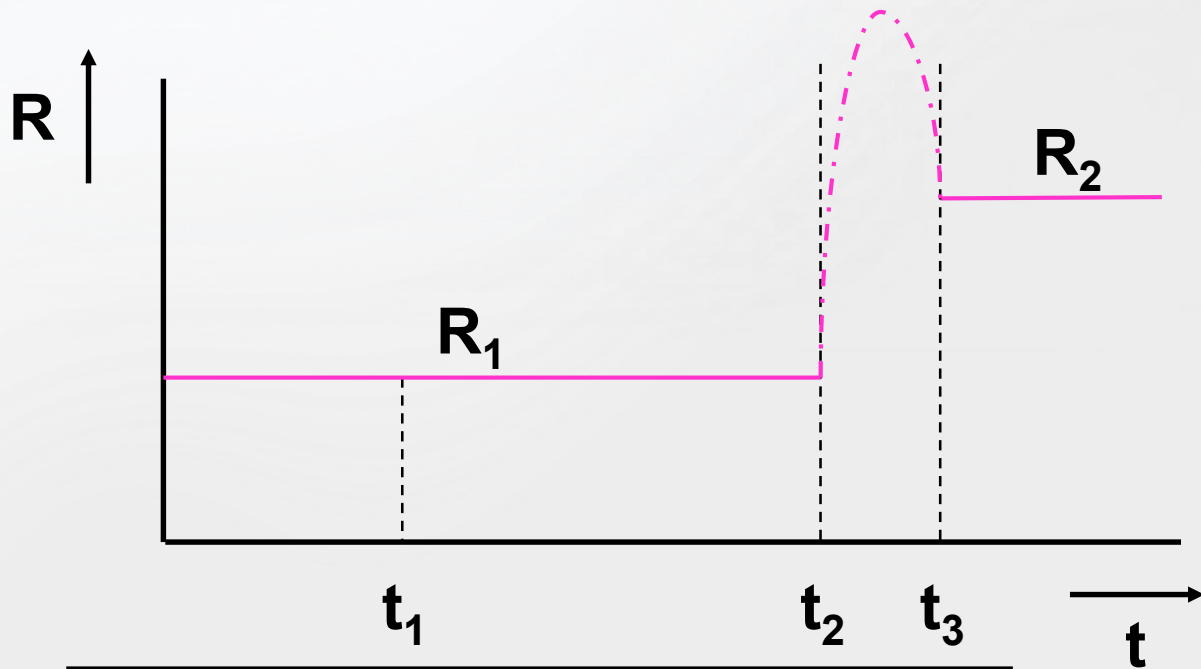
0.01 $^{\circ}\text{C}$

Maximum load

5 W, 200 V, 0.5 A



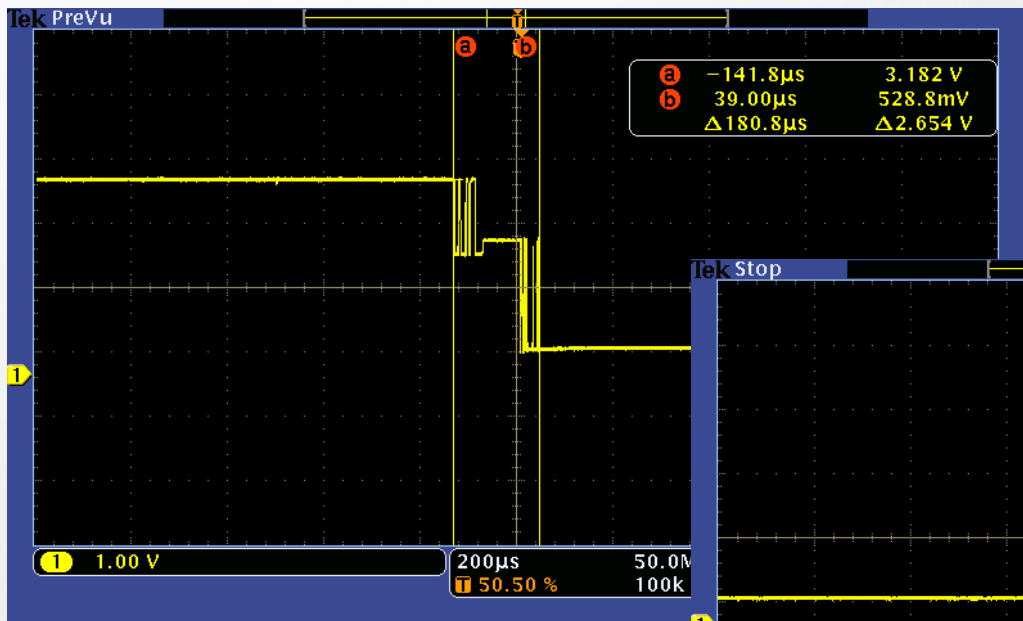
Switching diagram



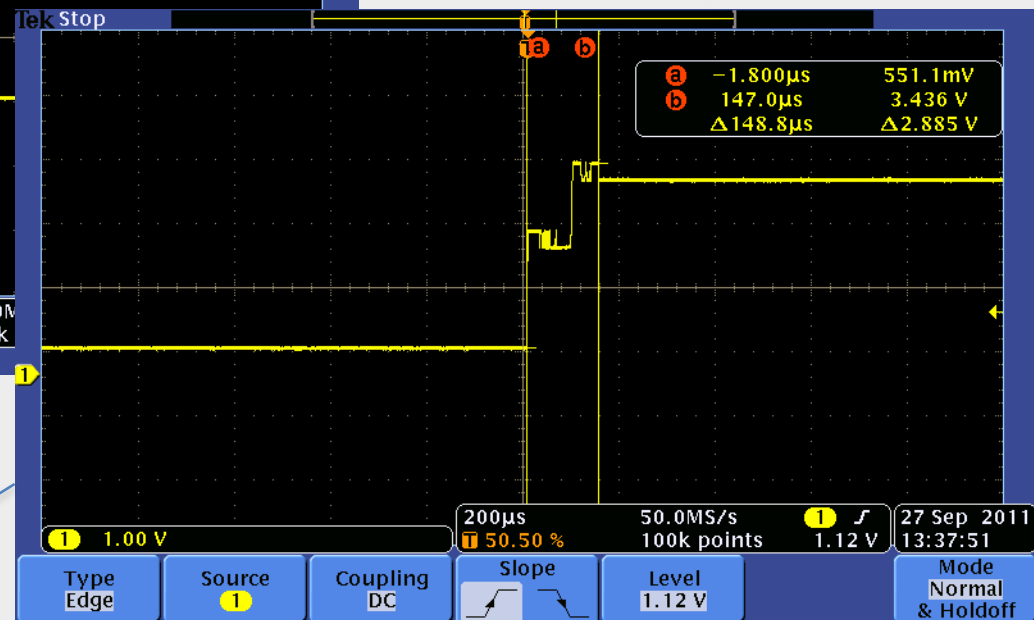
t_1 – change request
 t_2 – start of switching
 t_3 – end of switching

| | | | | |
|----------------------|----------------|--------------|---|---|
| | ← | → | ← | → |
| Maximal value | 2...6m | 1ms | | |
| Typical value | 1...4ms | 0.3ms | | |

Switching diagram - example



1 kΩ → 100 Ω
Switching time 180 µs



100 Ω → 1 kΩ
Switching time 150 µs

Industrial version

Design for industry – 19" rack module, height 3HE



Overview

| | Usage | Range | Resolution | Max. load | Interfaces (RS232 std.) | Accuracy |
|-------------|------------|------------------------------|--------------------------|-----------|----------------------------|-------------------------|
| M632 | Resistance | 1 Ω – 1.2 M Ω | 10 $\mu\Omega$ | 0.25 W | USB,GPIB,LAN | 0.002 % |
| M642 | Decade | 0.1 Ω – 20 M Ω | 1 $\mu\Omega$ | 5 W | USB,GPIB,LAN | 0.02 % |
| M631 | RTD | 16 Ω – 400 k Ω | 0.001 $^{\circ}\text{C}$ | 0.25 W | USB,GPIB,LAN | 0.01 $^{\circ}\text{C}$ |
| M641 | Simulator | 10 Ω – 300 k Ω | 0.01 $^{\circ}\text{C}$ | 5 W | USB,GPIB,LAN | 0.1 $^{\circ}\text{C}$ |