

## HARS-LX Series

Highest-accuracy version of the IET Labs resistance substituters for the most exacting calibration and test applications. The HARS-LX Series features a continuous rheostat as an option.

- High accuracy - 20 ppm
- High stability - 5 ppm/yr
- Low temperature coefficient - as low as 3 ppm/°C
- High-performance, solid silver contact switches
- Resistance from 10 mΩ to over 121 MΩ
- 1 mΩ or optional 20 μΩ resolution
- Hermetically sealed, low inductance resistors
- Precise fixed minimum resistance

**See also:**

- More economical: [HARS-X](#) or [RS Series](#)
- Higher power: [HPRS Series](#)
- Higher resistance: [HRRS Series](#)
- Higher voltage [HRRS-5kV](#) and [HRRS-10kV Series](#)
- RTD simulators: [RTD Series](#)
- Programmable models: [PRS Series](#)

### Models

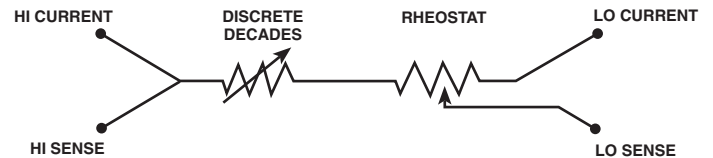


Nine-decade Model with 1 mΩ resolution

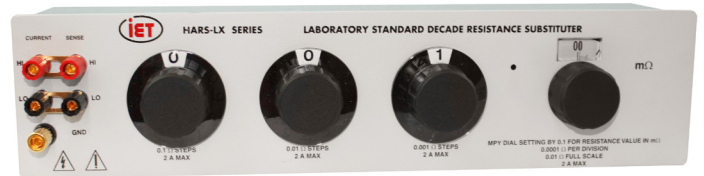
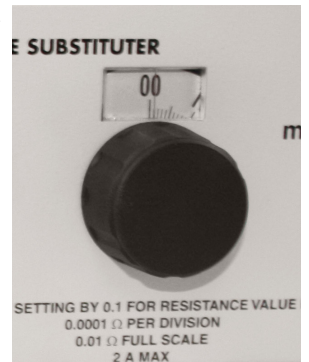


Eleven-decade model with 1 mΩ resolution, offering wide range and high resolution

### Rheostat

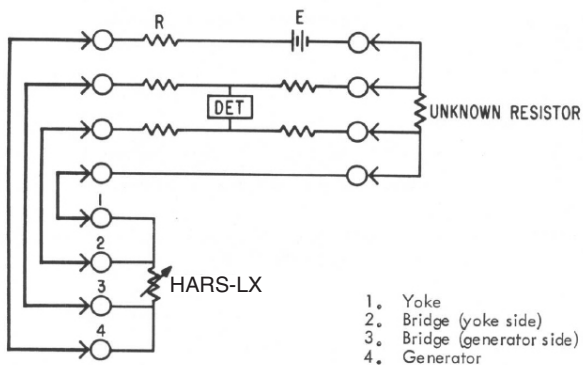


For high-resolution applications, a 10 mΩ rheostat may be added for the lowest step. It is a 0.20 μΩ resolution “decade”. In order to eliminate contact resistance and thermal emf, the HARS-LX integrates the rheostat as shown. In this way, the wiper is in the low potential circuit, which is the high impedance lead. As a result, voltage and contact resistance effects are removed by being effectively added to the input impedance of the measuring instrument.



Three-decade HARS-LX with optional rheostat

### Kelvin Bridge Measurement



Many models and combinations are available; see ORDERING INFORMATION



### Specifications

Resistance per step	Total decade resistance	Max current	Max power	Temperature coefficient (±ppm/°C)	Power coefficient (±ppm/mW)	Accuracy*	Stability (±ppm/yr)	Decade positions	Resistor type
		whichever applies first							
100 μΩ division 20 μΩ resolution	10 mΩ	2 A	NA	20	1	±(20 ppm+0.5 mΩ)	20 ppm+0.5 mΩ	Continuous	Rheostat
1 mΩ	10 mΩ	2 A	NA	20	1			11 positions "0"- "10"	Resistance wire
10 mΩ	100 mΩ	2 A	NA	20	1			10 positions "1"- "10" (10 mΩ minimum reading)	
100 mΩ	1 Ω	2 A	NA	20	1			11 positions "0"- "10" (12 positions "0"- "11" for highest decade)	Wirewound hermetically sealed low-inductance
1 Ω	10 Ω	1 A	5 W	20	0.4				
10 Ω	100 Ω	0.33 A	5 W	10	0.3				
100 Ω	1 kΩ	0.1 A	5 W	3	0.1				
1 kΩ	10 kΩ	33 mA	5 W	3	0.1				
10 kΩ	100 kΩ	10 mA	5 W	3	0.1				
100 kΩ	1 MΩ	3 mA	2,000 V peak	3	0.1				
1 MΩ	10 MΩ	1 mA	2,000 V peak	3	0.1			10 ppm (<5 ppm typical)	
10 MΩ	100 MΩ	2,000 V peak		15	0.2				
Wiring and switch resistance		NA		50 μΩ/°C	0.2 μΩ/W			±0.02%	50 ppm

\*At 23°C "true ohm" measurement, 30-70% RH, absolute reading, SI traceable  
No zero subtraction required

#### Minimum resistance:

For models with 10 mΩ or lower the minimum is 10 mΩ ± 0.5 mΩ; determined by the lowest settable position, "1", of the 10 mΩ/step decade.

For models with lowest steps of 100 mΩ or higher, the minimum resistance is determined by the first position of the lowest decade.

#### Resistance repeatability:

Better than 100 μΩ, short-term, average value

#### Leakage Resistance:

>10 GΩ

#### Environmental Conditions:

**Operating Temperature:** 0°C to 55°C

**Storage Temperature:** -40°C to 70°C

#### Switch Type:

Multiple solid silver contacts; dust-tight diallyl-phthalate body. To allow continuous rotation, a blank position is added on most decades.

#### Terminals:

Four, 5-way, gold-plated, tellurium-copper binding posts with low thermal emf and low resistance, for four-terminal Kelvin measurements, plus one binding post connected to case for shielding. Rear outputs are available as an option.

#### Mechanical Information:

Model	Dimensions	Weight
1 decade	7.7 cm W x 7.7 cm H x 8.4 cm D (3" W x 3" H x 3.3" D)	0.45 kg (1.0 lb)
2-5 decades	37.5 cm W x 8.9 cm H x 10.2 cm D (14.8" W x 3.5" H x 4" D)	2.0 kg (4.3 lb)
6-7 decades	43.9 cm W x 8.9 cm H x 10.2 cm D (17.3" W x 3.5" H x 4.0" D)	2.2 kg (4.8 lb)
8-10 decades	48.3 cm W x 17.8 cm H x 19.7 cm D (19" W x 7" H x 7.8" D)	5.1 kg (11 lb)
11 decades	48.3 cm W x 31 cm H x 19.7 cm D (19" W x 12.3" H x 7.8" D)	6.6 kg (14 lb)



### Ordering Information

Model	Total Resistance	Number of Decades	Resolution
HARS-LX-1-0.001	10 mΩ	1	1 mΩ
HARS-LX-1-0.01	100 mΩ	1	10 mΩ
HARS-LX-1-0.1	1 Ω	1	100 mΩ
HARS-LX-1-1	10 Ω	1	1 Ω
HARS-LX-1-10	100 Ω	1	10 Ω
HARS-LX-1-100	1.1 kΩ	1	100 Ω
HARS-LX-1-1k	11 kΩ	1	1 kΩ
HARS-LX-1-10k	110 kΩ	1	10 kΩ
HARS-LX-1-100k	1.1 MΩ	1	100 kΩ
HARS-LX-1-1M	11 MΩ	1	1 MΩ
HARS-LX-2-0.001	110 mΩ	2	1 mΩ
HARS-LX-2-0.01	1.1 Ω	2	10 mΩ
HARS-LX-2-0.1	11 Ω	2	100 mΩ
HARS-LX-2-1	110 Ω	2	1 Ω
HARS-LX-2-10	1.1 kΩ	2	10 Ω
HARS-LX-2-100	12 kΩ	2	100 Ω
HARS-LX-2-1k	120 kΩ	2	1 kΩ
HARS-LX-2-10k	1.2 MΩ	2	10 kΩ
HARS-LX-2-100k	12 MΩ	2	100 kΩ
HARS-LX-3-0.001	1.11 Ω	3	1 mΩ
HARS-LX-3-0.01	11.1 Ω	3	10 mΩ
HARS-LX-3-0.1	111 Ω	3	100 mΩ
HARS-LX-3-1	1.11 kΩ	3	1 Ω
HARS-LX-3-10	12.1 kΩ	3	10 Ω
HARS-LX-3-100	121 kΩ	3	100 Ω
HARS-LX-3-1k	1.21 MΩ	3	1 kΩ
HARS-LX-3-10k	12.1 MΩ	3	10 kΩ
HARS-LX-4-0.001	11.11 Ω	4	1 mΩ
HARS-LX-4-0.01	111.1 Ω	4	10 mΩ
HARS-LX-4-0.1	1.111 kΩ	4	100 mΩ
HARS-LX-4-1	12.11 kΩ	4	1 Ω
HARS-LX-4-10	121.1 kΩ	4	10 Ω
HARS-LX-4-100	1.211 MΩ	4	100 Ω
HARS-LX-4-1k	12.11 MΩ	4	1 kΩ
HARS-LX-5-0.001	111.11 Ω	5	1 mΩ
HARS-LX-5-0.01	1.111 1 kΩ	5	10 mΩ
HARS-LX-5-0.1	12.111 kΩ	5	100 mΩ
HARS-LX-5-1	121.11 kΩ	5	1 Ω
HARS-LX-5-10	1.211 1 MΩ	5	10 Ω
HARS-LX-5-100	12.111 MΩ	5	100 Ω

Model	Total Resistance	Number of Decades	Resolution
HARS-LX-6-0.001	1.111 11 kΩ	6	1 mΩ
HARS-LX-6-0.01	12.111 1 kΩ	6	10 mΩ
HARS-LX-6-0.1	121.111 kΩ	6	100 mΩ
HARS-LX-6-1	1.211 11 MΩ	6	1 Ω
HARS-LX-6-10	12.111 1 MΩ	6	10 Ω
HARS-LX-7-0.001	12.111 11 kΩ	7	1 mΩ
HARS-LX-7-0.01	121.111 1 kΩ	7	10 mΩ
HARS-LX-7-0.1	1.211 111 MΩ	7	100 mΩ
HARS-LX-7-1	12.111 11 MΩ	7	1 Ω
HARS-LX-8-0.001	121.111 11 kΩ	8	1 mΩ
HARS-LX-8-0.01	1.211 111 1 MΩ	8	10 mΩ
HARS-LX-8-0.1	12.111 111 MΩ	8	100 mΩ
HARS-LX-8-1	121.111 11 MΩ	8	1 Ω
HARS-LX-9-0.001	1.211 111 11 MΩ	9	1 mΩ
HARS-LX-9-0.01	12.111 111 1 MΩ	9	10 mΩ
HARS-LX-9-0.1	121.111 111 MΩ	9	100 mΩ
HARS-LX-10-0.001	12.111 111 11 MΩ	10	1 mΩ
HARS-LX-10-0.01	121.111 111 1 MΩ	10	10 mΩ
HARS-LX-11-0.001	121.111 111 11 MΩ	11	1 mΩ

**Options:**

- RH: 10 mΩ rheostat for lowest decades, 20 μΩ resolution
- RO: Rear output binding posts
- RM: Rack-mountable case for standard 19" rack

