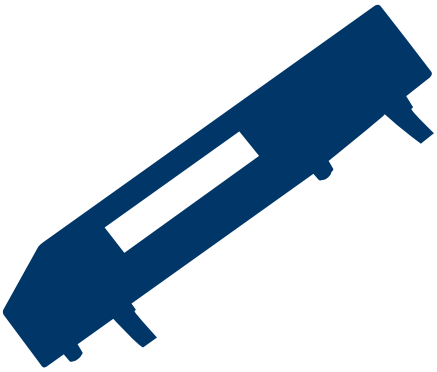
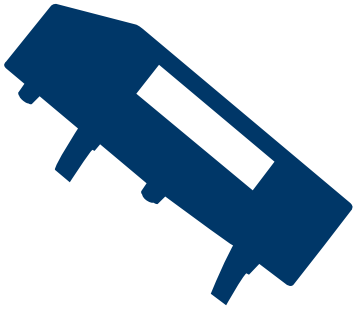
Instrument selection guide





How to select a temperature instrument for your application

Lake Shore offers the most comprehensive line of cryogenic temperature instruments in the world. The instruments described in this section are designed and manufactured for both general and specific temperature research applications in mind. For much of its 35-year history, Lake Shore has focused on instrumentation used for the precise measurement of temperatures from near absolute zero to well above room temperature.

Unfortunately, you can't have it all in one instrument. The most precise and accurate temperature instruments optimized for operation below 100 mK work with fewer sensors and provide lower heater power. The stable and high-resolution instruments designed for general cryogenic use work well for nearly any application, but can have limitations in rare circumstances. Choosing the appropriate instrument for a particular application necessitates prioritizing the requirements for that application.

Any one or several of the following factors may be important to you in selecting an instrument, whether temperature control or temperature monitoring is required:

- Operating temperature range
- Number of sensor inputs
- Sensor type compatibility
- Sensor input resistance and voltage ranges
- Current excitation ranges and methods
- High measurement resolution
- High electronic accuracy
- Control stability
- Number of reading displays
- Interfaces

  Ethernet
  USB
  IEEE-488
  RS-232C
  Alarms
  Relays
  Analog outputs
  Digital I/O
  Data logging

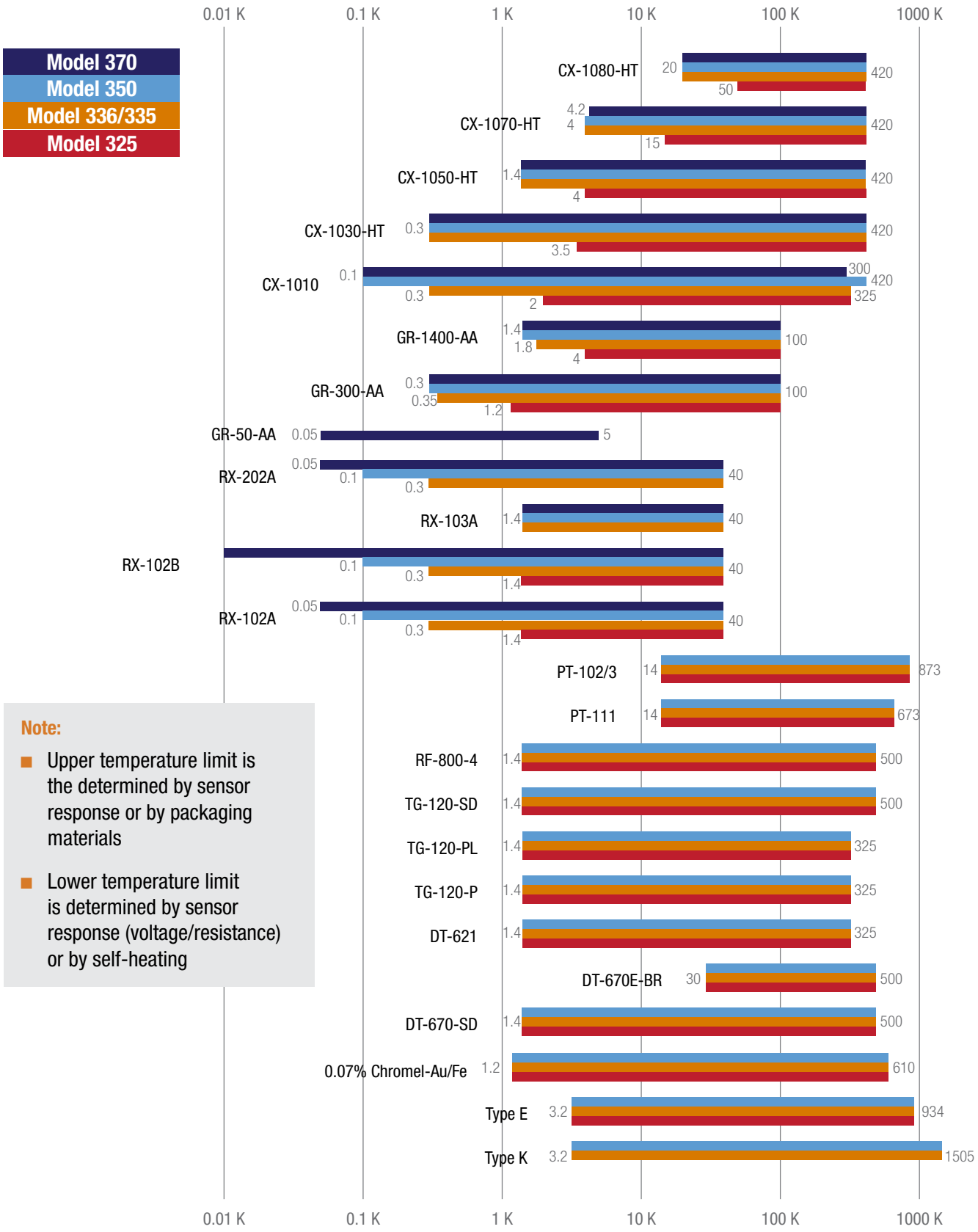
- Number of control loops, control type, and operating parameters
- Heater power and ranges
- Low cost

The tables on the following pages are designed to compare the instruments more easily with regard to sensor compatibility, operating temperature range, control capability, display features, and interface flexibility.

Our experienced sales staff is here to answer your questions. If you already know what your needs are, please inform us. Otherwise we ask a lot of questions to inform, educate, and to assist you in selecting the correct instrument.

Instrument selection guide

Temperature controller temperature ranges



Note:

- Upper temperature limit is the determined by sensor response or by packaging materials
- Lower temperature limit is determined by sensor response (voltage/resistance) or by self-heating

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Instrument selection guide

Current excitation ranges

	3.16 pA	10 pA	31.6 pA	100 pA	316 pA	1.0 nA	3.16 nA	10 nA	31.6 nA	100 nA	316 nA	1 µA	3.16 µA	10 µA	31.6 µA	100 µA	316 µA	1 mA	3.16 mA	10 mA	31.6 mA
370	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
350								■	■	■	■	■	■	■	■	■	■	■			
336										■	■	■	■	■	■	■	■	■			
335										■	■	■	■	■	■	■	■	■			
325														■				■			

	AC bridge	Controllers			
	370	350	336	335	325
Number of sensor inputs	1 to 16[1]	8[1]	4	2	2
Number of user curves	20	39	39	39	15
Minimum operating temperature	<20 mK	100 mK	300 mK	300 mK	1.2 K
Maximum operating temperature	420 K	1505 K	1505 K	1505 K	1505 K
Current reversal	Yes	Yes	Yes	Yes	Yes
Current excitation autoranging	Yes	Yes	Yes	Yes	—
Number of reading displays	1 to 8	1 to 8	1 to 8	1 to 4	1 to 4
Interfaces					
Ethernet	—	Yes	Yes	—	—
USB	—	Yes	Yes	Yes	—
IEEE-488.2	Yes	Yes	Yes	Yes	Yes
RS-232C	Yes	—	—	—	Yes
Number of alarms	32	8	4	2	—
Number of relays	2	2	2	2	—
Analog voltage output	2 at ±10 V	2 at ±10 V	2 at ±10 V	1 at ±10 V	0 to 10 V
Number of autotuning control loops	1	1	2	2	2
Maximum heater output power					
Control loop 1	1 W	75 W	100 W	75 W[2]	25 W
Control loop 2	—	50 W	50 W	25 W	2 W
Number of heater ranges	8	5	3	3	2

[1] *Optional input card or scanner*
[2] *75 W only available when output 2 is in voltage mode; maximum in other modes 50 W*

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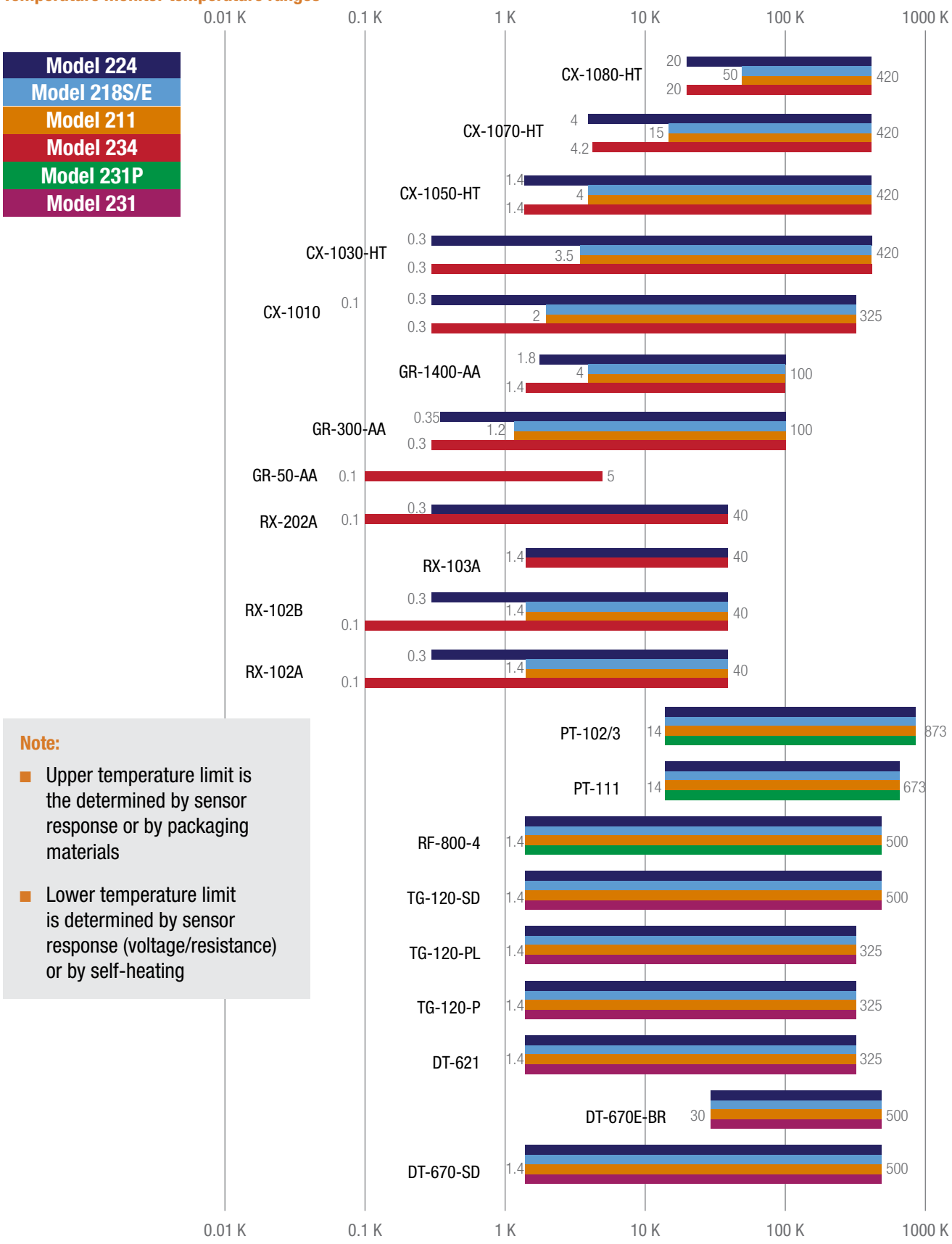
Instrument selection guide

Temperature monitor temperature ranges



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Instrument selection guide

Current excitation ranges

	31.6 nA	100 nA	316 nA	1 µA	3.16 µA	10 µA	31.6 µA	100 µA	316 µA	500 µA	1 mA
224		■	■	■	■	■	■	■	■		■
218S/E						■					■
211						■					■
234	■	■	■	■	■	■	■	■	■	■	■
231P										■	
231						■					

	Monitors				Transmitters		
	224	218S	218E	211	234	231P	231
Number of sensor inputs	12	8	8	1	1	1	1
Number of user curves	39	8	8	1	1	1	1
Minimum operating temperature	0.3 K	1.2 K	1.2 K	1.2 K	100 mK	1.4 K	1.4 K
Maximum operating temperature	873 K	800 K	800 K	800 K	420 K	800 K	500 K
Current reversal	Yes	—	—	—	Yes	—	—
Current excitation autoranging	Yes	—	—	—	Yes	—	—
Number of reading displays	1 to 16	1 to 8	1 to 8	1	1	—	—
Interfaces							
IEEE-488.2	Yes	Yes	—	—	—	—	—
USB	Yes	—	—	—	—	—	—
Ethernet	Yes	—	—	—	—	—	—
RS-232C	—	Yes	Yes	Yes	Yes	—	—
Number of alarms	12	16	16	2	—	—	—
Number of relays	2	8	—	2	—	—	—
Analog voltage output	—	2 at ±10 V	—	0 – 10 V	0 – 10 V	0 – 10 V	0 – 10 V
4 – 20 mA output	—	—	—	Yes	Yes	Yes	Yes
Data logging	Yes	Yes	Yes	—	—	—	—

[3] *Uses 5 mV or 10 mV constant voltage*

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