TSX Series High-Performance Refrigerators and Freezers

A better environment inside and out

Thermo Fisher
S C I E N T I F I C

Lab and clinical-grade storage that adapts to you and your environment

Temperature variation can have an impact on the viability and efficacy of vaccines, medication, reagents and other temperature-sensitive materials. These variations can shorten product shelf life, degrade enzymes and reduce vaccine effectiveness. Therefore, it is important to choose a high-performance refrigerator or freezer that has been designed for the demanding standards of the laboratory and clinical environment.

The sustainable, SNAP compliant choice

Thermo Scientific™ TSX Series high-performance refrigerators and freezers are designed with features that support sample protection, sustainability objectives and the U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP).* Our V-drive technology is designed to provide temperature uniformity that continually adapts to the lab or clinical environment, offering significant energy savings without compromising protection.

Whisper quiet operation

Compared to conventional refrigerant, high-performance models[†], the TSX Series offers a whisper quiet operation, so you can bring the refrigerator or freezer out of the hallway and back into your lab without disrupting your audio environment.

Significant energy savings

While conventional refrigerant, high-performance refrigerators and freezers can run at very high kWh/day in energy usage, the TSX Series by comparison has been designed to reduce energy usage without compromising performance.

Application-specific models

Our laboratory refrigerators feature your choice of glass or solid door with adjustable shelves. Freezers come in a choice of auto defrost –30°C or manual defrost –20°C setpoint. For blood banking applications our blood bank refrigerators are FDA Class II, and plasma freezers are FDA Class I. Our pharmacy refrigerators feature convenient, adjustable basket drawers. And for enzyme storage, our –20°C freezers feature enzyme bins for convenient storage.
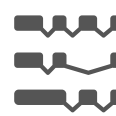
Biologics | Whole blood and plasma | Diagnostics kits and reagents | Enzymes | Industrial testing | Molecular biology | Vaccines and pharma | Clinical applications

* www.epa.gov/snap/snap-regulations. See page 8 for details on our SNAP compliance.
† Based on published sound specifications, data on file. October, 2016.

The drive for sample integrity and energy savings

The performance and energy savings of the new TSX Series are driven by our unique **V-drive technology**.

- While conventional refrigerant, high-performance refrigerators and freezers use single speed compressors that continually cycle on and off, the TSX Series V-drive runs at variable speeds to adjust cooling performance to the conditions inside and outside of the refrigerator or freezer.

- When combined with the automated tuning control, this variable speed drive optimizes the compressors running speed to the current conditions.

- When there are frequent door openings, or samples are added to the refrigerator or freezer, the control system detects the activity and increases the drive speed to bring temperatures back to the set point quickly. This innovative technology is one of the reasons the TSX Series delivers outstanding door opening recovery (DOR) speed, and more peace of mind for busy laboratories.

- When conditions are stable, such as when the unit is running overnight or on weekends, the drive runs at a low speed, reducing energy consumption while maintaining a stable temperature for your samples.
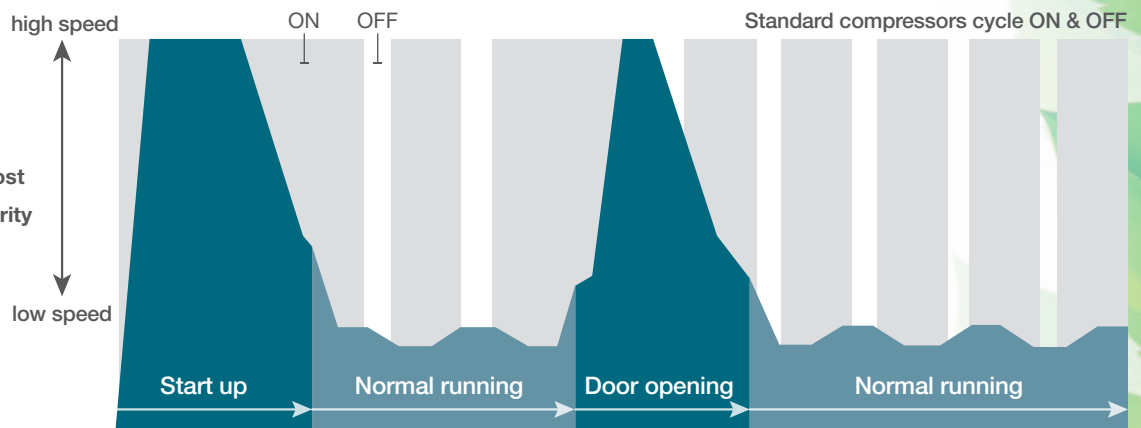
V-drive

Low energy → **Low operating cost**

Adaptive control → **Sample security**

Adaptive control

Adapting to your refrigerator or freezer usage patterns, the TSX V-drive increases compressor speed to quickly restore temperature after door openings.

Variable speed compressors (V-Drive) change speed. As shown in the above graphic, the TSX V-drive, unlike standard compressors that cycle on and off, adjusts to factors such as start-up and door openings, when a higher compressor speed is needed. During normal running time when the door is closed, the V-drive runs at a lower speed to maintain your setpoint.

Easy-to-access controls with setpoint security

Setpoint security
Key-operated triple position switch for main power and alarm; locks in temperature and alarm setpoints to minimize setpoint error and prevent tampering
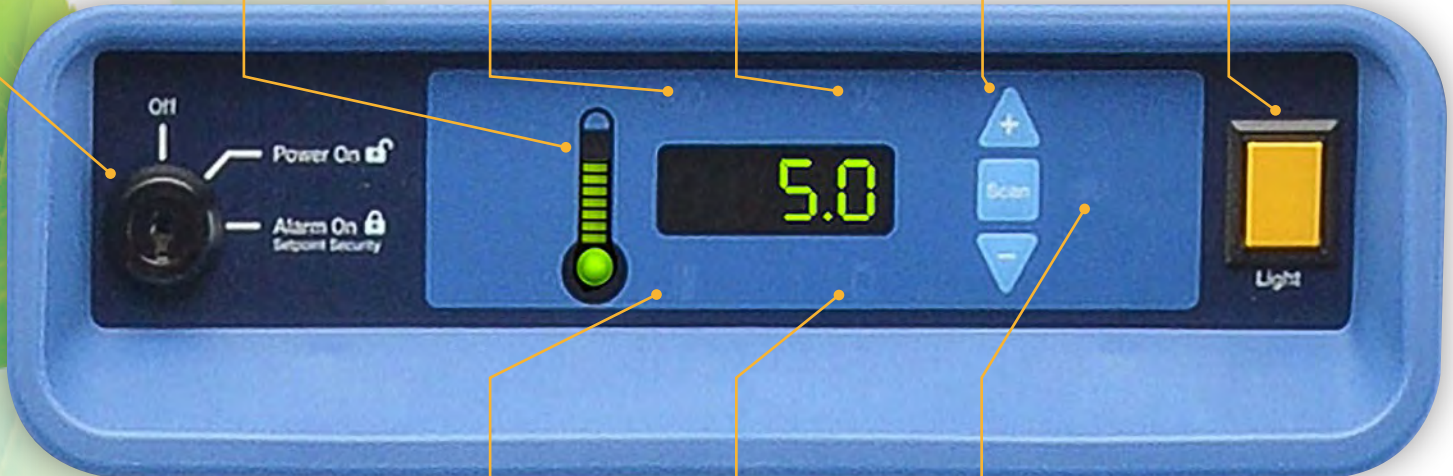
Graphic thermometer
Easy to view, shows normal, high or low temperature condition; steady green for normal, flashing top bar for overtemperature, flashing bulb for undertemperature

Power failure
Illuminated when main power is interrupted

Service required
Illuminated when controller is in programming mode, or if simulated warm or cold conditions fail to occur during alarm test function

Touchpad data entry
Increases or decreases setpoint values in programming modes

Interior light switch
Enables interior lighting system (on glass door cabinets)

Automatic defrost system
Defrost sensor manages automatic defrost cycle (except manual defrost models)

Door ajar
Illuminated when door is left open

Battery backup
Continuous charge provide full alarm function in case of power failure

Low battery alarm
Illuminated when the alarm system battery backup charge is low

Audible alarm
Simulates in the event of warm, cold or power loss conditions. Mute will silence audible alarm with 6 minute ring back interval; display remains flashing

What is SNAP and how is the TSX Series compliant?

Under Title VI of the Clean Air Act (Stratospheric Ozone Protection), regulations in the U.S. were established to phase out the use of both CFC and HCFC refrigerants. Under section 612 of that Act, the U.S. Environmental Protection Agency (EPA) is empowered to review and approve new substitutes, and prohibit the use of older refrigerants to reduce the overall risk to human health and the environment. Hence, the EPA's Significant New Alternative Policy (SNAP) program was created.

Our TSX Series refrigerators and freezers are "SNAP compliant," meaning we have already transitioned from HFCs to the approved natural refrigerants — well in advance of any phase-out deadlines.

A sound environment for critical samples

You know that the constant noise created by compressors can compromise communications and create a less than ideal working environment. The new TSX Series is **up to 10X quieter than our previous generation of refrigerators and freezers**.* Our new V-drive technology, combined with superior insulation, limits the sound output of the TSX Series to just **52 dB**, approximately the sound generated by a conventional refrigerator.**

up to
10X
quieter

Decibel scale of common sounds. Examples of noise levels in decibels

Noise source	Decibel level
Freeway traffic 15M, vacuum cleaner	70
Conversation in restaurant, office, background music	60
TSX Series (auto-defrost models)	**52**
TSX Series (manual defrost models)	**50**
Library	40
Quiet rural area	30
Rustling leaves	20
Breathing	10

* Thermo Scientific TSX2304GA compared to Thermo Scientific high-performance 2304A model (non TSX).

** Data on file. October, 2016.

Designed for ergonomic usage

In addition to the significant reduction in sound, the TSX Series features an ergonomically designed door handle and the microprocessor controller is angled to help prevent neck strain.

TSX Series High-Performance Lab Refrigerators

Biologics · Diagnostics kits and reagents · Industrial testing · Molecular biology · Vaccines and pharma · Clinical applications

Available in glass or solid door, our high-performance refrigerators combine advanced microprocessor temperature control with high-quality cabinet construction and alarm systems. Positive, forced-air circulation is designed to maintain temperature uniformity to protect important medical and pharmaceutical-grade storage as well as laboratory media, reagents and more.

• Forced-air circulation for temperature uniformity at all shelf levels

• Heat-free defrost for maximum temperature uniformity

• Quiet operation at just 52 dBA

• Four 2" casters for easy mobility; the front two are lockable

• Bright, LED interior lighting

• Keyed on/off switch with easy to use, setpoint security

• Self-closing door with 90° stop to assist with inventory loads

• Built-in remote alarm contacts

• Standard self powered 4–20mA output

• Glass door versions are standard with triple pane glass door

• See pages 13–15 for options and accessories

TSX Series high-performance lab refrigerators

Model no.	Temp. range (setpoint)	Capacity cu. ft. (liters)	Electrical (plug)	Doors	Shelves	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2305GA			115V, 60Hz (NEMA 5-15)				UL, cUL			435 (210)
TSX2305GD	2–8°C (5°C)	23 (650)	208-230V, 60Hz (NEMA 6-15)	1 glass	4	auto	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	422 (200)
TSX2305GV			230V, 50Hz (European)				UL, cUL, CE			422 (200)
TSX2305SA			115V, 60Hz (NEMA 5-15)				UL, cUL			445 (202)
TSX2305SD	2–8°C (5°C)	23 (650)	208-230V, 60Hz (NEMA 6-15)	1 solid	4	auto	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	424 (192)
TSX2305SV			230V, 50Hz (European)				UL, cUL, CE			424 (192)

TSX Series High-Performance Blood Bank Refrigerators

Whole blood and plasma

Our high-performance blood bank refrigerators are designed to meet strict requirements established by the AABB for the storage of whole blood and blood components.

- Factory pre-set to 4°C to meet blood storage guidelines
- Triple pane glass door helps maintain optimal internal condition
- Forced-air circulation for temperature uniformity and fast temperature recovery
- Heat-free defrost for maximum temperature uniformity
- Convenient, stainless steel, fully extendable and adjustable drawers
- Standard, built-in chart recorder
- Quiet operation at just 52 dBA
- Four 2" casters for easy mobility; the front two are lockable
- Bright, LED interior lighting
- Keyed on/off switch with easy to use, setpoint security
- Self-closing door with 90° stop to assist with inventory loads
- Built-in remote alarm contacts
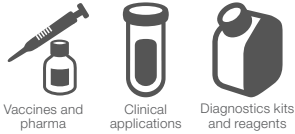- See pages 13–15 for options and accessories

TSX Series high-performance blood bank refrigerators

Model no.	Temp. range (setpoint)	Capacity cu. ft./liters (blood bags*)	Electrical (plug)	Doors	Drawers	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2304BA			115V, 60Hz (NEMA 5-15)				UL, cUL			575 (261)
TSX2304BD	2–8°C (4°C)	23/650 (385)	208-230V, 60Hz (NEMA 6-15)	1 glass	7	auto	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	554 (251)
TSX2304BV			230V, 50Hz (European)				UL, cUL, CE			554 (251)

*450 mL whole blood bags

TSX Series High-Performance Pharmacy Refrigerators

Vaccines and pharma

Clinical applications

Diagnostics kits and reagents

Our high-performance pharmacy refrigerators feature adjustable basket drawers and glass doors for the easy identification and access of vaccines, pharmaceuticals, chemotherapeutics and other material requiring 2 to 8°C storage.

- Triple panel glass door helps maintain optimal internal conditions

- Forced-air circulation for temperature uniformity and fast temperature recovery

- Heat-free defrost for maximum temperature uniformity

- Convenient, fully extendable and adjustable basket drawers

- Quiet operation at just 52 dBA

- Four 2" casters for easy mobility; the front two are lockable

- Bright, LED interior lighting

- Keyed on/off switch with easy to use, setpoint security

- Self-closing door with 90° stop to assist with inventory loads

- Built-in remote alarm contacts

- See pages 13–15 for options and accessories

TSX Series high-performance pharmacy refrigerators

Model no.	Temp. range (setpoint)	Capacity cu. ft. (liters)	Electrical (plug)	Doors	Basket drawers	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2305PA			115V, 60Hz (NEMA 5-15)				UL, cUL			544 (247)
TSX2305PD	2–8°C (5°C)	23 (650)	208-230V, 60Hz (NEMA 6-15)	1 glass	6	auto	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	523 (237)
TSX2305PV			230V, 50Hz (European)				UL, cUL, CE			523 (237)

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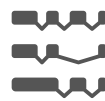# TSX Series High-Performance Auto Defrost –30°C Freezers

Biologics Diagnostics kits and reagents Industrial testing Molecular biology

Our high-performance laboratory freezers are designed for applications requiring storage of reagents, pharmaceuticals, biological and other commonly used laboratory materials such as primers, siRNA molecules and fetal bovine serum (FBS).
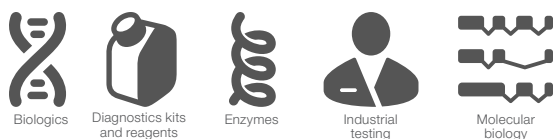
- Forced-air circulation for temperature uniformity and fast temperature recovery
- Non-invasive defrost with time and temperature guided cycle
- Quiet operation at just 52 dBA
- Four 2" casters for easy mobility; the front two are lockable
- Keyed on/off switch with easy to use, setpoint security
- Self-closing door with 90° stop to assist with inventory loads
- Built-in remote alarm contacts
- Standard self powered 4–20mA output
- See pages 13–15 for options and accessories

TSX Series high-performance auto defrost –30°C freezers

Model no.	Temp. range (setpoint)	Capacity cu. ft. (liters)	Electrical (plug)	Doors	Shelves	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2330FA			115V, 60Hz (NEMA 5-15)				UL, cUL			437 (198)
TSX2330FD	–35°C to –15°C (–30°C)	23 (650)	208-230V, 60Hz (NEMA 6-15)	1 solid	4	auto	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	416 (189)
TSX2330FV			230V, 50Hz (European)				UL, cUL, CE			416 (189)

TSX Series High-Performance Manual Defrost –20°C Freezers

Biologics   Diagnostics kits and reagents   Enzymes   Industrial testing   Molecular biology

Our manual defrost, high-performance freezers are designed for applications in which even slight intermittent coil warming during auto defrost cannot be tolerated.

• Cold wall convection cooling with temperature uniformity

• Enzyme freezers feature enzyme bins

• Quiet operation at just 50 dBA

• Four 2" casters for easy mobility; the front two are lockable

• Keyed on/off switch with easy to use, setpoint security

• Self-closing door with 90° stop to assist with inventory loads

• Built-in remote alarm contacts

• See pages 13–15 for options and accessories

TSX Series high-performance manual defrost –20°C freezers

Model no.	Temp. range (setpoint)	Capacity cu. ft. (liters)	Electrical (plug)	Doors	Shelves	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2320FA			115V, 60Hz (NEMA 5-15)				UL, cUL			442 (200)
TSX2320FD	–35°C to –15°C (–20°C)	23 (650)	208-230V, 60Hz (NEMA 6-15)	1 solid	4	manual	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	421 (191)
TSX2320FV			230V, 50Hz (European)				UL, cUL, CE			421 (191)

TSX Series high-performance manual defrost –20°C enzyme freezers

Model no.	Temp. range (setpoint)	Capacity cu. ft. (liters)	Electrical (plug)	Doors	Shelves (bins)	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2320EA			115V, 60Hz (NEMA 5-15)				UL, cUL			497 (225)
TSX2320ED	–30°C to –15°C (–20°C)	23 (650)	208-230V, 60Hz (NEMA 6-15)	1 solid	9 (45)	manual	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	476 (216)
TSX2320EV			230V, 50Hz (European)				UL, cUL, CE			476 (216)

TSX Series High-Performance –30°C Plasma Freezers

Whole blood and plasma

Our pre-set, high-performance –30°C plasma freezers with automatic defrost are designed to meet strict requirements established by the AABB for the storage of plasma.

- Forced-air circulation for temperature uniformity and fast temperature recovery

- Heat-free defrost for maximum temperature uniformity

- Convenient, stainless steel, fully extendable and adjustable drawers

- Standard, built-in chart recorder

- Quiet operation at just 52 dBA

- Four 2" casters for easy mobility; the front two are lockable

- Bright, LED interior lighting

- Keyed on/off switch with easy to use, setpoint security

- Self-closing door with 90° stop to assist with inventory loads

- Built-in remote alarm contacts

- See pages 13–15 for options and accessories

TSX Series high-performance -30°C plasma freezer

Model no.	Temp. range (setpoint)	Capacity cu. ft./liters (plasma boxes*)	Electrical (plug)	Doors	Drawers	Defrost	Certification	Interior dimensions D x W x H in. (cm)	Exterior dimensions D x W x H in. (cm)	Shipping weight lbs. (kg)
TSX2330LA			115V, 60Hz (NEMA 5-15)				UL, cUL			549 (249)
TSX2330LD	–35°C to –15°C (–30°C)	23/65 (532)	208-230V, 60Hz (NEMA 6-15)	1 solid	7	auto	UL, cUL	28.5 x 24 x 58 (72.3 x 61 x 147.3)	37 x 28 x 78.6 (94 x 71.1 x 199.6)	528 (239)
TSX2330LV			230V, 50Hz (European)				UL, cUL, CE			528 (239)

*250 mL plasma boxes

Options and Accessories

Productive use of our TSX Series refrigerators and freezers can be enhanced with options and accessories specifically designed to improve utility and convenience. Many options are factory-installed and must be specified with your refrigerator and freezer order. Customer-installed options may require the services of a factory authorized technician. The ordering chart on page 15 will inform you which options are factory- or customer-installed.

Before ordering…

Serial number tags on all of our TSX Series refrigerators and freezers provide model numbers and voltage information needed for accurate selection of options ordered for field installation. You can also refer to the refrigerator and freezer ordering charts in this brochure for model numbers and voltage information. It is recommended that options be ordered when your refrigerator or freezer is ordered. Factory-installed options eliminate down-time during product installation.

Adjustable alarm delay modules

The adjustable alarm delay is designed to eliminate nuisance alarms due to intermittent or transitory conditions such as lightning or brief power outages. The adjustable delay requires an alarm condition to exist continuously for a pre-determined time (adjustable) before a signal is released to a central alarm/monitoring system or telephone dialer.

• Adjustable delay from 0.5 to 32 minutes

• Red alarm indicator light remains flashing after transient condition is corrected; requires manual reset

• Signals chronic alarm conditions that may indicate impending component failure; allows time for inspection or corrective maintenance

• Inserts variable time interval between detection of alarm condition and transmission of signal

• Includes accurate digital timing circuit adjustable from 0.5, 1, 2, 4, 8, 18 or 32 minutes

• Operates independent of the line power; built-in battery and alarm test function uses customer supplied 9V battery

Remote alarm modules

Free-standing remote alarm modules tie-in to the standard remote alarm terminals on the refrigerators and freezers.

Options and Accessories

Digital temperature monitors

Simple, accurate and cost-effective, the digital temperature monitor provides both alarm/monitoring and digital temperature display in a single, self-contained unit. Standard features include high alarm, alarm mute and chirp, audio delay timer, remote alarm contacts (SPDT), NiCad battery backup and low voltage AC power supply. 120V, AC only.

• Can be installed on or adjacent to the refrigerator or freezer

• Activates an audible and visual warning in case off power failure or over-temperature condition

• Choose from single probe digital models or multiple probe, microprocessor-based models

• Temperature range is –100°C to 25°C

• Probe size 1.25" L x 0.25" diameter (3.1 x 0.635 cm)

4–20 milliamp (MA) transmitters

4–20 milliamp transmitters offer a point-to-point circuit to transmit signals from refrigerator and freezer sensors to a controller, sending an analog signal from 4 to 20 milliamps.

Temperature chart recorders

Standard on blood bank refrigerators and plasma freezers but optional on other models. Chart recorders are 6" (15.2 cm), seven-day and use pressure-sensitive chart paper. One box of 50 charts is included with order.

Door swing options and heated glass door options

All TSX Series refrigerators and freezers are right-hand swing but factory-installed, left hand swings are available. To mitigate condensation, a heated glass door option is also available.

Surge suppressors

Designed to prevent issues related to voltage surges.

Seismic restraint kits

Provides additional stability for regions prone to earthquakes.

e-lock adapter kits

E-locks provide access control with audit-trail capabilities, as well as temperature monitoring. These kits require no electricity and are available in both factory- and customer-installed options for CompX™, Pyxis®, Omnicell® and McKesson™ locks.

Specialty electrical plugs

For countries where NEMA 5-15, 6-16 and Continental EU plugs are not standard, specialty plug options are available. See the following page for these country-specific plugs.

Options and Accessories

Factory-installed options must be specified at time of refrigerator or freezer order

e-Lock adapter kits (does not include lock)	Model No.
CompX adapter, factory-installed	CXELAF
CompX adapter, customer-installed	CXELAC
Pyxis glass door adapter, factory-installed	PXELAGF
Pyxis glass door adapter, customer-installed	PXELAGC
Pyxis solid door adapter, factory-installed	PXELASF
Pyxis solid door adapter, customer-installed	PXELASC
Omnicell glass door adapter, factory-installed	OMELAGF
Omnicell glass door adapter, customer-installed	OMELAGC
Omnicell solid door adapter, factory-installed	OMELASF
Omnicell solid door adapter, customer-installed	OMELASC
McKesson glass door adapter, factory-installed	MKELAGF
McKesson glass door adapter, customer-installed	MKELAGC
McKesson solid door adapter, factory-installed	MKELASF
McKesson solid door adapter, customer-installed	MKELASC
Door options, refrigerators (factory installed)	**Model No.**
Left hand swing, solid	6995
Left hand swing, glass	6996
Left hand swing, heated glass	7073
Right hand swing, glass	7066
Right hand swing, heated glass	7074
Door options, freezers (factory installed)	**Model no.**
Left hand swing, solid	6997
Stainless steel interior (factory installed)	**Model no.**
All models except –20°C freezers	6115
Additional shelves	**Model no.**
Epoxy-coated, full size	6696
Epoxy-coated, half size	6698
Stainless steel, full size	6696-1
Additional enzyme storage bin	**Model no.**
Enzyme bin (labels not included)	6736
Replacement wire baskets	**Model no.**
For pharmacy refrigerators	WB23/50
Specialty Plugs (factory installed)	**Model no.**
Specialty Plug – Argentina	AR230V16A
Specialty Plug – Australia	AU230V16A
Specialty Plug – Brazil	BR230V16A
Specialty Plug – China	CH230V16A
Specialty Plug – Denmark	DK230V16A
Specialty Plug – Great Britain	UK230V13A
Specialty Plug – India	IN230V16A
Specialty Plug – Israel	IS230V16A
Specialty Plug – Italy	IT230V16A
Specialty Plug – Switzerland	SW230V16A
Specialty Plug – Twist Lock Plug NEMA L6-15P	TL230V15A

Roll-out drawers	Model no.
Complete set (6 qty)	6699
Single drawers	6702
Drawer dividers	**Model no.**
For blood bank refrigerators (4 qty)	6206
3" Casters (2" standard included)	**Model no.**
3" (7.6 cm) casters (4 qty)	6041-1
4–20mA transmitters, refrigerators*	**Model no.**
Self-powered, factory-installed	7204
Non-powered, factory-installed	6907-1
Non-powered, customer-installed	6907-2
4–20mA transmitters, freezers*	**Model no.**
Self-powered, factory-installed	7205TA
Non-powered, factory-installed	4706
6" 7-day inkless chart recorders (–40°C to 25°C)	**Model no.**
Factory-installed	6183-7
Free-standing, 115V, 60Hz, NEMS 5-15 plug	6383-7A
Free-standing, 208–230V, 60Hz, NEMA 6-15 plug	6383-7D
Free-standing, 230V, 50Hz, European plug	6383-7V
Free-standing, 230V, 50Hz, U.K. plug	6383-7W
Surge supressor	**Model no.**
115V, 60Hz	6402-1
208–230V, 60Hz	6402-2
230V, 50Hz	6402-3
Remote alarm modules	**Model no.**
115V, 60hz	5612-1A
208–230V, 60hz	5612-2D
230V, 50hz	5612-3V
Alarm delay modules	**Model no.**
Battery operated	6903
Digital temperature monitors**	**Model no.**
For 60Hz models only*	6898
Seismic restraint kits	**Model no.**
Basic kit	TFR210
Kit for OSHPD	TF-LRF23

* Self powered 4–20mA outputs are standard on TSX2305G, TSX2305S, TSX2320F, TSX2320E and TSX2330F

** Single input channel, temperature range –100° to 25°C, set point resolution of 1°C, high temperature alarm only, numeric LCD display, red visual alarm, 8 ft teflon lead wire, velcro mounting strap, 5" L x 2"D x 4.5"W (mm, 130 x 50 x 110), 120V, 60Hz, with a 15amp dual prong plug (fits NEMA 5-15R plug).

Services

Our TSX Series high-performance refrigerators and freezers are designed to meet UL and CE criteria for safety and performance. All connections must comply with local electrical codes.

• Selection charts for each standard model list voltage, rated amperage, recommended circuit breaker size, and NEMA (National Electrical Manufacturers' Association, USA) electrical plug information

• Most refrigerators and freezers are supplied with line cord plugs, which require corresponding receptacles

• Site preparation requires availability of the proper receptacle; a dedicated circuit is required

• Special voltage selections may be available at extra cost and must be specified when ordering

• For questions regarding site preparation, installation and electrical connection, contact your sales representative

Certificate of Calibration

Control, alarm and temperature recording systems are systematically calibrated at the factor for accurate performance. An optional Certificate of Calibration to an NIST (National Institute of Standards and Technology, formerly National Bureau of Standards) traceable instrument includes a model number and serial number certificate (single point calibration). Multiple point calibration is also available. Calibration certificates must be requested when ordering; for details contact your sales representative.

Validation Testing Program

Validation testing services in advance of shipment may accelerate in-house Installation Qualification (IQ) and Operation Qualification (OQ) programs. Validation services include documentation and performance reports, compressor and subsystem component specifications, microprocessor flow diagrams, software specifications and more. For more details, contact your sales representative.

Model no.	Services description
7455TA	Temperature mapping of 24 hours at setpoint to include: • Mapping data graphed at each location • Thermocouple placement diagram • Test equipment list • Average uniformity and stability at specified cycle • Minimum, average and maximum temperatures at each thermocouple location • Uniformity and stability at each location
7456TA	Temperature mapping of 24 hours (traceable instruments and raw data) at setpoint to include: • Mapping data graphed at each location • Thermocouple placement diagram • Test equipment list- utilizing Kaye Validator® thermal validation equipment • Calibration certificates of test equipment • Thermocouple calibration reports • Average uniformity and stability at specified cycle • Minimum, average and maximum temperatures at each thermocouple location • Uniformity and stability at each location
6916-2	Certificate of calibration

Other Accessories

Wireless Monitoring

Thermo Scientific Smart-Vue™ wireless monitoring solution offers 24/7 continuous, real-time wireless monitoring of critical parameters, early warning alerts, and remote data logging. Likewise, Thermo Scientific Smart-Tracker™ requires only a smart phone to access stored temperature readings. No other equipment or installation is necessary.

Clinical Containers

Made with the highest quality resins, Thermo Scientific Nalgene™ bottles are engineered to work together with a proprietary valve seal and a strong, semi-buttress thread design. Our Nalgene bottles offer a leakproof* guarantee because we manufacture and test both components together as part of our routine quality program.

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Gibco™ media, sera, supplements, cells and cell culture reagents are designed to deliver reproducibility and performance for results you can count on. Regardless of whether you are performing cell culture in a research lab or production facility, need a special or defined formulation, or are growing cell lines, primary cells, or stem cells, Gibco products offer a reliable solution.

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* Our guarantee for a leakproof seal is subject to our standard product warranty, as set forth in the Thermo Fisher Scientific Terms and Conditions of Sale. Our products are leakproof at ambient temperature and pressure when used with their corresponding closures. However, to ensure safe usage, customers are advised to test our containers and closures under conditions of their planned applications. Please contact technicalsupport@thermofisher.com if you need additional information about our products.

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Also available, TSX Series ultra-low freezers

Our TSX Series also includes ultra-low freezers for storage applications requiring a –70°C or –80°C setpoint:

• Two capacities: 400 or 600 2-inch box

• Up to 50% energy savings over conventional-refrigerant ultra-low freezers

• Quiet operation enabling you to move the freezer out of the hall and into the lab

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