thermoscientific

Thermo Fisher Scientific Lindberg/Blue M 1200°C Split-Hinge Tube Furnace

Models: HTF55000 series

Installation and Operational Manual

332068H01 Rev. A February, 2022

ThermoFisher SCIENTIFIC

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Safety Notes

Explanation of Symbols

This symbol when used alone indicates important operating instructions which reduce the risk of injury or poor performance of the unit.

DANGER : Indicates a hazardous situation which, if not avoided, will result in death or serious injuries.

WARNING : Indicates a hazardous situation which, if not avoided, could result in death or serious injuries.

CAUTION : Indicates a situation which, if not avoided, could result in damage to equipment or property.

Before installing, using or maintaining this product, please be sure to read the manual and product warning labels carefully. Failure to follow these instructions may cause the product to malfunction, which could result in injury or damage.

This symbol indicates possible pinch points which may cause personal injury.

This symbol indicates surfaces which may become hot during use and may cause a burn if touched with unprotected body parts.

WARNING : This symbol indicates situations where dangerous voltages exist and potential for electrical shock is present.

This symbol indicates a need to use gloves during the indicated procedures.
If performing decontamination procedures, use chemically resistant gloves.

Use gloves during the daily usage.

WARNING : This symbol indicates a situation which fire hazards exits in the Product.

WARNING : Unauthorized repair of your Furnace will invalidate your warranty. Contact Technical Service at 1-800-438-4851 for additional information.

This symbol indicates Alternating current.

This symbol indicates Earth ground power.

This symbol indicates Protective conductor terminal.

Safety Considerations

DANGER :
Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for its intended use. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not modify or use equipment in a manner other than expressly intended. Modification of equipment other than that for which it is explicitly designed could cause severe injury or death. Any customer after-market retrofit violates the warranty of the equipment.

Do not modify or disconnect any safety features provided. Disconnection of the unit safety features could allow the unit to become overheated and start on fire, causing personal injury or death, product and property damage.

Do not use components or materials not specifically designed for this equipment. Failure to comply with this precaution could result in damage to equipment used or the furnace and may create an overheat situation. Also, do not use anything other than OEM exact replacement equipment and parts. Not using OEM replacement parts could cause faulty instrumentation readings, inoperable equipment or temperature overshoot. Both situations may cause personal injury or death, product, and property damage.

Before using, user shall determine the suitability and integrity of the product for the intended use and that the unit has not been altered in any way. Misapplication may compromise the safety of the end user or the life of the product.

WARNING : Use appropriate Personal Protective Equipment (PPE) per local protocols.

CAUTION : This product contains refractory ceramic fiber or other refractories which can result in the following:

- May be irritating to skin, eyes, and respiratory tract.
- May be harmful if inhaled.
- May contain or form cristobalite (crystalline silica) with use at high temperature (above 871°C (1599.8°F)) which can cause severe respiratory disease.
- Possible cancer hazard based on tests with laboratory animals. Animal studies to date are inconclusive. No human exposure studies with this product have been reported.

WARNING : This product can expose you to chemicals including arsenic, which is known to the state of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

WARNING : Before maintaining this equipment, read the applicable SDS (Safety Data Sheets). SDS is provided with unit.

WARNING : When installing, maintaining, or removing the Refractory Fiber Cement insulation, the following precautions will minimize airborne dust and fiber:

- Keep personnel not involved in the installation out of the area.
- Use a good vacuum to clean area and equipment. Use a dust suppressant if sweeping is necessary. Do not use compressed air.
- Use a disposable mask suitable for nuisance dust.
- Wear long sleeve clothing, gloves, hat and eye protection to minimize skin and eye contact. Do not wear contact lenses.
- Thoroughly wash self after work is complete.
- Launder work clothing separate from other clothes and thoroughly clean laundering equipment after use. If clothing contains a large amount of dust and/or fiber, dispose of rather than clean.
- Promptly place used ceramic fiber parts and dust in plastic bags and dispose of properly.

Standards and Directives

The box furnaces complies with the following standards and guidelines:

European Union

The European voltage models of this product meet all the applicable requirements of the European Directives and therefore display the CE Marking. The most current EU Declaration of Conformity may be obtained from the manufacturer.

Product Safety

This product family has been tested to applicable product safety standards by a Nationally Recognized Test Laboratory (NRTL) and may bear the NRTL's mark of safety compliance to those applicable standards.

The maximum limit of 10 mA shall not be exceeded when tested according to Clause 5.5 (Measurement of protective conductor current) of EN 50678 VDE 0701.

Electromagnetic Compatibility

FCC Statement (USA)

This device complies with Part 15 Subpart B of the FCC Rules. Operation is subject to the following two conditions:

(1) this devicemay not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian ISED IC Notice

This ISM digital apparatus complies with Canadian ICES-001, Class A.

Cet appareil ISM est conforme á la norme NMB-001 du Canada, Classe A.

South Korean EMC Statement

사용자안내문이기기는업무용환경에서사용할목적으로적합성평가를받은기기로 서가정용환경에서사용하는경우전파간섭의우려가있습니다 .

EMC Registration is done on this equipment for business use only. It may cause interference when the product would be used in home.

Evaluation of Chemicals - Regulations and Directives

Proposition 65 - California

WARNING : Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Furnaces using Refractory Ceramic:

This warning is presented for compliance with California Proposition 65 and other regulatory agencies and only applies to the insulation in this product. This product contains refractory ceramic, refractory ceramic fiber or fiberglass insulation, which can produce respirable dust or fibers during disassembly. Dust or fibers can cause irritation and can aggravate pre-existing respiratory diseases. Refractory ceramic and refractory ceramic fibers (after reaching 1000°C) contain crystalline silica, which can cause lung damage (silicosis). The International Agency for Research on Cancer (IARC) has classified refractory ceramic fiber and fiberglass as possibly carcinogenic (Group 2B), and crystalline silica as carcinogenic to humans (Group 1).

The insulating materials can be located in the door, the hearth collar, in the chamber of the product.Tests performed by the insulation manufacturer indicate that there is no risk of exposure to dust or respirable fibers resulting from operation of this product under normal conditions. However, there may be a risk of exposure to respirable dust or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing them in a manner which causes release of dust or fibers. By using proper handling procedures and protective equipment you can work safely with these insulating materials and minimize any exposure. Refer to the appropriate Safety Data Sheets (SDS) for information regarding proper handling and recommended protective equipment. For additional SDS copies, or additional information concerning the handling of refractory ceramic products, please contact the manufacturer's Customer Service Department.

REACH - Europe

Thermo Fisher Scientific is committed to meeting all compliance obligations to evaluate, communicate, and register any Substances of Very High Concern (SVHC), and finding alternates where appropriate.

RoHS - Europe

Thermo Fisher Scientific is determined to reduce the impact we have on the environment, and so can declare that this product complies with the European Parliament's RoHS2 (Restriction of Hazardous Substances) Directive 2011/65/EU, and 2015/863 Annex II (RoHS2 Amendment) with respect to the limitation of the following substances:

- Lead (0.1 %)
- Mercury (0.1 %)
- Cadmium (0.01 %)
- Hexavalent chromium (0.1 %)
- Polybrominated biphenyls (PPB) (0.1 %)
- Polybrominated diphenyl ethers (PBDE) (0.1 %)
- Bis(2-ethylhexyl) phthalate (DEHP) (0.1 %)
- Butyl benzyl phthalate (BBP) (0.1 %)
- Dibutyl phthalate (DBP) (0.1 %)
- Diisobutyl phthalate (DIBP) (0.1 %)

Our compliance is witnessed by written declaration from our suppliers and/or component testing. This confirms that any potential trace contamination levels of the substances listed above are below the maximum level set by the latest regulations or follow established exemptions of the regulation due to their application.

RoHS – China

This product complies with the requirements of the legislative act Administration on the Control of Pollution Caused by Electronic Information Products (ACPEIP). The following label of conformance, may be found on the product.

A declaration may be obtained from the manufacturer with greater detail of this conformance.

Introduction

All Lindberg/ Blue M 1200°C split-hinge laboratory tube furnaces feature Moldatherm Lindberg's vacuum formed ceramic fiber insulation and patented LGO (light gauge overbend) heating elements. Available in standard single-zone and three-zone heated chambers for process tubes from 3/4 to 6 inches these versatile tube furnaces are adaptable to a wide variety of processes. In addition these furnaces are designed to operate in either a horizontal or vertical position. please contact Thermo Fisher Scientific for information on available vertical stands. All 1200°C split-hinge tube furnaces are designed for use with standard Lindberg/ Blue M CC58114 and CC58434(3) series control consoles.

Intended Use

This furnace is intended as a general purpose laboratory, ashing, and heat treating furnace at 1200°C for continuous (over 3 hours) or intermittent (under 3 hours) use. For industrial, laboratory, and commercial applications only. The furnace is designed for thermal technology applications in laboratories, such as those found in manufacturing trades and industry, schools, universities and biology. It is used for ageing, analysis, tempering, decomposing, baking, annealing, hardening, soldering, oxidizing, reducing, incineration and preheating.

Non-Intended Use

This furnace is not intended for the following:

- To heat up food.
- For drying or heat treatment of substances which release gases or vapors into the atmosphere that are flammable or dangerously explosive when mixed with air.
- This furnace is equally unsuitable for the heat treatment of combustible dusts and fibrous materials.

Specifications

Table 1. Single Zone 1200°C Split-Hinge Tube Furnaces

Model	HTF55122A	HTF55322A	HTF55322C	HTF55342C
Control Console	Independent CC58114A	Independent CC58114A	Independent CC58114C	Independent CC58114C
Maximum Temperature Range	1200°C	1200°C	1200°C	1200°C
Heated Zone	12 in (30.5 cm)	12 in (30.5 cm)	12 in (30.5 cm)	24 in (61.0 cm)
Exterior (D x W x H)	13 x 21 x 12 in (33.0 x 53.3 x 30.5 cm)	17 x 23 x 16 in (43.2 x 58.4 x 40.6 cm)	17 x 23 x 16 in (43.2 x 58.4 x 40.6 cm)	17 x 35 x 16 in (43.2 x 88.9 x 40.6 cm)
Tube O.D.	0.75 to 1 in (1.9 to 2.54 cm)	1 to 3 in (2.54 to 7.62 cm)	1 to 3 in (2.54 to 7.62 cm)	1 to 3 in (2.54 to 7.62 cm)
Electrical Voltage	120 VAC	120 VAC	208/240 VAC	208/240 VAC
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60Hz
Power Rating	1300 W	2670 W	2670 W	5400 W
Maximum Current	11 A	23 A	12 A	23 A
Shipping Weight	60 lbs (28 Kg)	120 lbs (55 Kg)	120 lbs (55 Kg)	175 lbs (80 Kg)

Note: Single zone tube furnace heat one defined zone, and contain one controller for this zone.

Table 2. Three Zone 1200°C Split-Hinge Tube Furnaces

Model	HTF55347C	HTF55667C
Control Console	Independent CC58434(3)C	Independent CC58434(3)C
Maximum Temperature Range	1200°C	1200°C
Heated Zone	24 in (61.0 cm)	36 in (91.4 cm)
Exterior (D x W x H)	17 x 35 x 16 in (43.2 x 88.9 x 40.6 cm)	21 x 49 x 20 in (53.3 x 124.5 x 50.8 cm)
Tube O.D.	1 to 3 in (2.54 to 7.62 cm)	3 to 6 in (7.62 to 15.24 cm)
Electrical Voltage	208/240 VAC	208/240 VAC
Frequency	50/60 Hz	50/60Hz
Power Rating	5100 W	11500 W
Maximum Current	22 A	48 A
Shipping Weight	195 lbs (89 Kg)	310 lbs (141 Kg)

Note: Three zone tube furnaces heat three zones, and contain one controller for each zone. The temperature can be set individually, with the following restrictions:

Note: If using independent control console with primary and mimic controller, Zones 1 & 3 (mimic) will maintain temperature in the range of +/-50°C in relation to Zone 2 (primary-middle) based on user supplied setpoint(s). See Control Console user manual for more information."

Table 3. Accessories Tube Adapters (DIA inches)

Furnace Models	HTF55122A	HTF55322A HTF55322C	HTF55342C HTF55347C	HTF55667C
Blank (solid)	59519	59529	59529	59539TA
0.75 in (1.90 cm)	59510	-	-	-
1 in (2.54 cm)	59511*	59521	59521	-
1.5 in (3.81 cm)	-	59522	59522	-
2 in (5.08 cm)	-	59523*	59523	-
2.5 in (6.35 cm)	-	59524	59524	-
3 in (7.62 cm)	-	59525	59525*	59535TA*
4 in (10.16 cm)	-	-	-	59536TA
5 in (12.7 cm)	-	-	-	59537TA
6 in (15.24 cm)	-	-	-	59538TA
*Set of 2 included with unit				

Pre-Installation

Unpacking

Carefully unpack and inspect the unit and all accessories for damage, if you find any damage, keep the packing materials and immediately report the damage to the carrier. We will assist you with your claim, if requested. Do not return goods to Thermo Fisher Scientific without written authorization. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.

Contents include:

- User Manual, SDS, User Information Instructions*

Note: May be contained on optional USB thumb drive.

- Essential Safety Instructions.
- Platinel II Thermocouple Extension wires with plugs (Two for single zone and Six for 3-Zone).
- Two Tube Adapters (Size varies by unit)
- Two L-Shaped Support Legs

Operating Conditions

High concentrations of sulfates, chlorides, fluorides, alkalis, and V_2O_5 can have corrosive effects on the ceramic fiber. Contact Thermo Fisher Scientific for additional information about the effects of specific atmospheres on furnace performance.

With prolonged use, hairline cracks can develop in the insulation materials. These minor cracks will not affect the furnace completely when not in use. The heating unit is not damaged by rapid heating and cooling cycles.

Environmental Conditions

Indoor Use Only.	
Class of Equipment	Class I
Operating	The recommended ambient temperature is 17°C to 27°C (62.6°F to 80.6°F); 20% to 80% relative humidity, non-condensing. Installation Category II (over-voltage) in accordance with IEC 664. Pollution degree 2 in accordance with IEC 664. Do not exceed ambient temperature of 40°C (104°F).
Altitude Limit	2,000 meters (6561.68 feet).
Storage	-25°C (-13°F) to 65°C (149°F); 20% to 80% relative humidity.

Atmosphere Systems

The 1200°C Lindberg/ Blue M tube furnaces are designed for use with combustible or inert atmospheres when contained in a process tube. Process tubes not included and to be purchased from a preferred vendor.

WARNING : Do not use combustible gases directly in this furnace. Process gases must always be contained in a separate tube.

CAUTION : Avoid combustible products which generate toxic or hazardous vapor or fumes. Work should only be done in a properly vented environment.

Installation

CAUTION : Improper operation of this apparatus results in dangerous conditions. To preclude hazard and minimize risk, follow all instructions and operate within design limits noted on dataplate.

Lifting and Carrying

CAUTION : Heavy loads. Lift with care!

1. To avoid injury through physical strain, such as strain trauma and slipped discs, do not attempt to lift the furnace alone.
2. To avoid injury through dropped loads, wear Personal Protective Equipment (PPE) per local protocols, such as safety shoes, when lifting the furnace.
3. To avoid crushing your fingers or hands (particularly in a closing door) or damaging the furnace, do not use any other lift points than the bottom sides of the furnace.

Transport

1. For transport, do not lift the device using the lid, door handles, tube openings or components attached to the device (e.g. control box on rear panel) as lift points.
2. Lift at the bottom sides of the furnace with NIOSH rated straps and/or using appropriate number of personnel per local safety policies and regulations.

Location

Install the furnace in a level area free from vibration. To permit proper air flow, leave at least 12" (30.48 cm) of space on all sides of the unit and 12" (30.48 cm) above the unit.

WARNING : Do not stack furnaces or control consoles to avoid damage or personal injury due to units are not designed to be secured together.

Wiring

Thermo Fisher Scientific model furnaces are designed for operation on 208-240 VAC. The furnaces will operate on 208 volts, but will have reduced heat up rates.

1. Suitable lengths of properly sized wires must be acquired prior to the installation of furnace. Furnace will draw approximately 11 amps (HTF55122A) or 23 amps (HTF55322A) on 120 VAC; 12 amps (HTF55322C), 23 amps (HTF55342C), 22 amps (HTF55347C), or 47 amps (HTF55667C) on 240 VAC. Minimum recommended wire gauge size is 14AWG 90°C insulated copper wire. For 3-Zone furnaces, the minimum recommended for ground is 8AWG 90°C insulated copper wire. A ground wire should be provided per local code.

2. Remove the back lower electrical access panel of the furnace by removing the appropriate four screws. Removing the access panel allows for access to the terminal block and grounding screws, located at the back of the unit.

Furnace installation requires A1, B1, and ground wire no more than 118" (3 m) inches long (not provided) to attach to a Thermo Scientific approved control console. 3-Zone furnaces requires A1, B1, A2, B2, A3, B3, and ground wire no more than 3 m long (not provided).

Note: For Europe, B1, B2, and B3 connection at furnace are wired to Neutral.

Note: Electrical installation must be performed by a qualified electrician.
consult local electrical codes for proper sizing of power and control wiring.

3. Thread two (six for 3-Zone) properly sized power wires and one properly sized ground wire through the conduit hole. The wires should be marked A1, B1, (A2, B2, A3, B3) and ground. Insert power leads A1 and B1 (A2, B2, A3, B3 for 3-Zone) into terminal block and tighten down securely. Ground on the provide ground screw.

Wire	Label
Line 1	A1, A2, A3
Line 2	B1, B2, B3
Ground	GND

Note: Unit supplied with 7/8" Hole covered with a bushing that is sized for 1/2" conduit / connections per electrical standards. Utilize strain reliefs as needed.

4. For Door Switch: Insert min 14AWG 90°C insulated copper wire to LS1 and LS2 into terminal block and tighten down securely. The other end of the lead wires will connect to the Thermo Scientific approved control console.
5. Check that all electrical connections are secure.
6. Place the Back Base Panel on the furnace and secure with the screws.
7. Connect Thermocouple type Platinel II extension wires (two included for single zone or 6 included for 3-zone) to the thermocouple jacks at the rear of the furnace to the respective jacks on the control console.

Note: For 3-zone tube furnace, all 6 thermocouple extension wires are only used for units with the mimic style control console to control Zones 1 and 3. Otherwise only 4 thermocouple extension wires are used.

Furnace Assembly

The furnace is shipped assembled with all heating elements and thermocouple(s) installed. The customer must install furnace L- shaped support legs tube adapters and wire the furnace to the control console and the power source.

Support Leg Installation

Horizontal Furnace Position

Close latch and tilt furnace forward. Remove bolt and two flat ashers located in the base of the furnace. Position L-shaped support legs between the two washers and over black plastic feet. Tighten bolts and reset furnace in horizontal position. These L-shaped support legs are designed to support the furnace top assembly when opened.

Vertical Furnace Position

The HTF55000 series tube furnace can be mounted in the vertical position with no modifications to the furnace.

CAUTION : To avoid hazardous conditions disconnect electrical power from apparatus before attempting any repair.

Tube Adapter Installation

Each HTF55000 series tube furnace is designed for use with one pair of Moldatherm Tube Adapters, and customer supplied process tube. Additional adapters with varying inner diameters for use with different diameter process tubes are available from Thermo Fisher Scientific. Refer to the Parts Specification Sheet for tube adapters that are compatible with your model furnace.

1. Shut off power at control console and allow furnace to cool to room temperature before installing or replacing tube adapters.
2. Loosen chrome plated tube support by unscrewing allen head set screw through square hole on end of furnace.
3. Place adapter onto heating element and position tightly against end of chamber insulation. Filling or sanding outside of circular portion of adapter may be necessary.
4. Install process tube (customer supplied).
5. Position tube support bracket against outside of tube adapter and slide up or down to support the process tube. Care must be taken not to apply excessive pressure against the tube adapter when adjusting the support bracket. It may be necessary to install additional washers between the frame and support bracket.
6. Bulk ceramic fiber (not supplied) may be used to seal any gaps that may exist between the Moldatherm tube adapter and process tube to reduce heat loss.

Temperature Profiling

The 3-zone tube furnace has been designed with equally sized zones in both length and power output. Typically a 3-zone furnace is utilized, when greater linear temperature uniformity is required, than can be obtained with a single-zone furnace. The uniform temperature zone normally extends beyond the center zone length into each end zone. Factors which affect temperature uniformity include process load, atmosphere flow, Operating temperature, and an open or sealed process tube.

To profile a 3-zone furnace for the best flat zone. It is necessary to use a separate monitoring thermocouple in conjunction with an appropriate recording instrument. It is recommended that temperature measurements be taken in 1" increments in order to profile the chamber. By recording the temperature at various points inside the process tube a plot of temperature versus furnace heated length may be made illustrating uniformity within the chamber. Individual temperature adjustment of each end zone and additional profile temperature measurements will finally produce the best profile and largest uniform temperature zone.

Idling or Nonproductive Periods

Since furnaces designed with Moldatherm heating units have rapid heat-up rates, it is recommended that the furnace be turned off completely when not in use. No damage to the Moldatherm heating unit will be caused by rapid heating and cooling cycles.

Heating Elements

The chamber of these furnaces is comprised of two semi-cylindrical heating modules. Each module is a composite unit of Moldatherm, fiber insulation, and a LGO embedded alloy heating element. The unit is rated for a maximum operating temperature of 1200°C. After prolonged use, hairline cracks may develop in the Moldatherm insulation. Minor cracks will not affect the furnace performance.

Thermocouples

Note: Single Zone Furnace is supplied with a double thermocouple with respective thermocouple jacks labeled as 1TC for Main controller and 1XT for overtemperature controller (OTC). 3-Zone Furnace is supplied with a triple thermocouple in center zone plus three single thermocouples for center and outer two zones. The single thermocouple in the center is for overtemperature 1XT. 1TC is for Zone 1, 2TC is for Zone 2, and 3TC is for Zone 3. 1TC-C and 3TC-C are for units with a mimic control console in which they connect to the triple thermocouple in Zone 2 as reference point to control Zones 1 & 3.

The furnaces are equipped with a Platinel II thermocouple. Platinel II thermocouples have longer life and greater stability than base metal thermocouples such as Chromel-Alumel (Type K).

A control instrument calibrated for Chromel-Alumel (Type K) may be used with a Platinel II thermocouple but a temperature discrepancy may be noted because the millivolt output of Platinel II and Chromel-Alumel thermocouples are slightly different.

All thermocouples are subject to aging and deterioration over a period of time. Thermocouple deteriorationis usually indicated by pit marks in the wire immediately behind the welded junction. This condition will be indicated by a gradual drop in millivolt output for any given temperature and result in furnace operation at a higher temperature than the controlling instrument indicates. The amount of deviation will vary with operating temperatures and thermocouple life. For critical processes it is advisable to periodically check (every 6 months) the furnace chamber temperature with a reference thermocouple and instrument to determine the amount of error.

The most obvious thermocouple failure is complete breakage. The break usually occurs at the welded junction tip and is recognized by a complete lack of output by the controlling instrument. Occasionally the ceramic support tube will crack or break. The thermocouple will continue to function until the broken end twists or bends causing the two wires to touch in the broken area. This situation causes another reference junction. The thermocouple should then be replaced.

Note: If other than a Thermo Fisher Scientific control console is used to control the furnace, it will be necessary to assure that the controlling instrument may be used with the furnace-thermocouple. In addition, the control system must have sufficient voltage output capability to properly power the furnace.

Start-Up

WARNING : After transport and decommissioning, or storage under humid conditions a drying-out process must be performed due to hydroscopic nature of the ceramic fiber insulation. During the drying-out process the equipment cannot be assumed to meet all the safety requirements of the IEC 61010-2-010 standard.

WARNING : Observe the following precautions when operating the furnace:

- Never stand in front of an open furnace.
- Wear protective eyeware.
- Wear protective gloves.
- Use tongs to insert and remove furnace load.
- Do not allow the load to touch the furnace walls.

Initial Furnace Start-Up/Drying-Out Process

To start up the furnace for the first time:

1. 1200°C furnaces are constructed with Moldatherm, unique ceramic fiber insulation and heating element composite. The ultra lightweight insulation combines low thermal mass with improved heat transfer to give exceptionally fast furnace performance. A specific dry out schedule is not required, however, it is recommended that the furnace be initially operated for approximately 6 hrs started from cold at a slower dry out rate to drive moisture out and to minimize the effect of thermal shock.
2. During the dryout period, keep the heating chamber free of retorts and workloads. Following the above dryout procedure will assure maximum life and efficiency of the furnace insulation. 6 hrs started from cold at a slower dry out rate to drive moisture out and to minimize the effect of thermal shock.

To start up the furnace for the first time or after maintenance, complete the following recommended steps with attached control console:

1. Adjust controller temperature to 200°C.
2. Run furnace for 2 hours after reaching 200°C.
3. Adjust controller temperature to 550°C.
4. Run furnace for 2 hours after reaching 550°C.
5. Adjust controller temperature to 1000°C.
6. Run furnace for 2 hours after reaching 1000°C.

NOTE After prolonged use of the 1200°C furnace, hairline cracks may develop in the insulating material. Minor cracks will not affect the furnace performance. Severe cracks may be repaired in the field through the use of proper insulation patching materials. Please contact factory for information.

Maintenance & Cleaning

General Maintenance

CAUTION : Maintenance should only be performed by trained personnel.

WARNING : Disconnect console from main power before attempting any maintenance to furnace or its controls.

WARNING : Before maintaining this equipment, read the applicable SDS (Safety Data Sheets). SDS is provided with unit.

WARNING : When installing, maintaining, or removing the refractory ceramic fiber Insulation, the following precautions will minimize airborne dust and fiber:

- Keep personnel not involved in the installation out of the area.
- Use a good vacuum to clean area and equipment. Use a dust suppressant if sweeping is necessary. Do not use compressed air.
- Use a disposable mask suitable for nuisance dust.
- Wear long sleeve clothing, gloves, hat, and eye protection to minimize skin and eye contact. Do not wear contact lenses.
- Thoroughly wash self after work is complete.
- Launder work clothing separate from other clothes and thoroughly clean laundering equipment after use. If clothing contains a large amount of dust and/or fiber, dispose of rather than clean.
- Promptly place used refactory ceramic fiber parts and dust in plastic bags and dispose of properly.

Note: It is recommended to maintain unit minimum once every 12 months or unless otherwise specified.

Cleaning and Decontamination

Furnace must be kept clean in order to ensure proper operation. Cleaning routine should be started with furnace at room temperature.

1. Vacuum the chamber to remove dust/debris, if needed.
2. Clean/Disinfect all exterior surfaces with a general-use laboratory disinfectant, such as quaternary ammonium. Wipe thoroughly with sterile distilled water, then 70% alcohol. Dry with a clean cloth as needed. Be sure not to spray any liquids directly on electronics, controls, and ceramic insulating materials or heating elements.

3. Interior Surfaces Cleaning: Do not use any liquids on ceramic insulating materials or heating elements.

Heating Element Replacement Furnace Shell

Replacement of lower or upper Thermostat heating units are the same except for removal of the thermocouple(s). A level work surface as large as the furnace when opened like a book is needed. Depending on the furnace size, it may take two persons at different times to assist in the replacement of the Moldatherm heating element(s).

1. Shut off power at main power circuit breaker and control console circuit breaker.
2. Remove process tube and tube adapters.
3. Close latch and tilt furnace forward. Remove the two L-shaped support legs. Reposition furnace.

Retain all Hardware for reassembly.

4. Remove the lower two end caps from each end of the furnace from each end of the furnace four total two screws and two washers per cap.
5. Remove wiring access panel from back bottom panel.
6. Remove back bottom and front bottom cover panels two screws per each end of panel. It is not necessary to remove louvered end center covers.

Heating Element Replacement Moldatherm

1. While holding bottom half secure. carefully open furnace top and tilt fully back until furnace is in an open book form.
2. Loosen the end bracket by entering through the large round hole on the end of the furnace frame. Loosen hex head screws, two screws per end.
3. On the front and back sides of the heating element aluminum shell. Loosen only round head screws: turn screws clockwise to loosen. These screws are used to adjust the square pressure pads that secure and align the Moldatherm unit.
4. On the front and back sides of the aluminum shell. Remove completely the two (2) hex head screws located inside the vertical channel shaped support brace.
5. Note the position of ridges and terminal location within the Moldatherm unit in relationship to the furnace. Label wires and terminals if necessary. Remove wires from terminals.
6. Raise Moldatherm unit and three piece shell up and out. The vertical channel shaped braces need to be pulled away from the shell to allow the round head screws to pass by.
7. Position Moldatherm heating unit and shell on a level surface. While removing the remaining hex bead screws, mark with a pencil the screws and the adjacent holes on the aluminum shell. This is done for reassembly. Remove side panels.
8. Remove heating unit. Seal Moldatherm unit and dispose of properly.

Heating Element Replacement Alignment

1. Lay aluminum shell bottom panel flat and rotate all square pressure pads to be approximately the same height 5/8" from panel.
2. Position and center new Moldatherm heating unit onto the bottom panel. Unit will rest on the pads screws will impale into the Moldatherm.
3. Rotate all square pressure pads on each side panel to be approximately the same height 5/8" from panel.
4. Reverse step 13. Pads may or may not touch Moldatherm sides and screws into Moldatherm will impale.

Note: When returning screws into previously marked boles in shell screw only until snug. Bent edge of side panel- should seat in outer most ledge of Moldatherm.

5. Before repositioning the heating unit into the frame. Refer to step 11 and loosen the horizontal spacers that the unit will rest upon. Reverse step 12.
6. Reverse stepn10. Do not over tighten screws.
7. Position horizontal spacers firmly against bottom aluminum shell.
8. Using a straight edge as long as the furnace span the Moldatherm unit touching the center ledge of the unit and the top edge of both ends of the furnace frame.
9. To adjust Moldatherm unit to align with straight edge rotate the round head screws on the bottom of aluminum shell.
10. Access to bottom screws is done by removing perforated bottom guard off furnace frame. Turn screws counter clockwise to adjust Moldatherm unit or remove top center cover to access screws for top Moldatherm unit.
11. To adjust unit left or right rotate round head screw on the sides of the unit. Reverse step 9.

Note: The two Moldatherm heating elements should seal completely over the entire length of the unit assembly when the furnace is in the closed position. A slight taper on the ends of the Moldatherm heating units may exist, which will create a small gap between top and bottom heating units. This small gap will not be detrimental to the performance of this furnace.

12. Reverse steps 8 through 3.
13. Check that all electrical connections are secure. Reference Wiring Diagram.

Thermocouple (T/C) Replacement

1. Remove the top center cover of the furnace to provide access to the thermocouple.
2. Take note of polarity and wire location. Red is always negative. Loosen the terminal screws and remove the thermocouple lead wires.
3. Remove the thermocouple mounting screws. Gently pull the thermocouple out and away from the furnace.
4. Carefully install the replacement thermocouple by reversing the above procedure:- Use care in sliding the thermocouple through the insulation so as not to bend thermocouple wire.

Note: When reconnecting the lead wire to the thermocouple, observe the proper polarity. Red is always negative.

Note: For critical processes it is advisable to periodically check (every 6 months) the furnace chamber temperature with a reference thermocouple and instrument to determine the amount of error.

Replacement Parts

Table 4 Single Zone 1200°C Split-Hinge Tube Furnaces

Description	HTF55122A	HTF55322A	HTF55322C	HTF55342C
Thermocouple Jack (Type K)	(2) 33931-002	(2) 33931-002	(2) 33931-002	(2) 33931-002
Thermocouple, Double	7299-1200-00V	7299-1200-00V	7299-1200-00V	7299-1200-0BV
Thermocouple Lead wire (PLII)	33940-006	33940-006	33940-006	33940-006
Wire Harness	38850G22	38850G41	38850G41	332274G01
Thermocouple Extension wire (PLII) - 3 meters long	(2) 332211G01	(2) 332211G01	(2) 332211G01	(2) 332211G01
Door Switch Terminal Block	33407-001	[REF Mains Terminal Block]	[REF Mains Terminal Block]	[REF Mains Terminal Block]
Mains Terminal Block	33407-001	33407-003	33407-003	33407-003
Lid Handle	101018TA	101018TA	101018TA	(2) 101018TA
Lid Hatch	101034	101034	101034	101034
L-Shaped Support Leg & Cap	(2) 35431H01 & (2) 101084	(2) 35197H01 & (2) 101084	(2) 35197H01 & (2) 101084	(2) 35197H01 & (2) 101084
Insulation Heater Assembly (top or bottom)	(2) 7212-2070-00A	(2) 310778H01	(2) 310778H01	(2) 7212-2076-00A
Lid Switch	38258H01 & 38259H01	38258H01 & 38259H01	38258H01 & 38259H01	38258H01 & 38259H01
Lid Hinge	(2) 7212-2106-001	(2) 7212-2104-001	(2) 7212-2104-001	(2) 7212-2104-001
Operational Manual	332068H01	332068H01	332068H01	332068H01
Wiring Diagram	332277I01	332269I01	332269I02	332272I01

Table 5. Three Zone 1200°C Split-Hinge Tube Furnaces

Description	HTF55347C	HTF55667C
Thermocouple Jack (Type K)	(2) 33931-002	(2) 33931-002
Thermocouple, Double	N/A	N/A
Thermocouple, Triple (Zone 2)	7299-1300-0AD	7299-1300-0AC
Thermocouple, Single (Zone 1, 3 & Overtemperature)	(3) 7299-1104-0AG	(3) 7299-1110-00Z
Thermocouple Lead wire (PLII)	33940-006	33940-006
Wire Harness	38850G16	38850G18
Thermocouple Extension wire (PLII) - 3 meters long	(6) 332211G01	(6) 332211G01
Door Switch Terminal Block	33407-001	33407-001
Mains Terminal Block	33407-003	33407-003
Lid Handle	(2) 101018TA	(2) 101018TA
Lid Hatch	101034	101034
L-Shaped Support Leg & Cap	(2) 35197H01 & (2) 101084	(2) 35424H01 & (2) 101084
Insulation Heater Assembly (top or bottom)	(2) 311341H01	310779G01
Lid Switch	38258H01 & 38259H01	38258H01 & 38259H01
Lid Hinge	(2) 7212-2104-001	(2) 7212-2104-001
Operational Manual	332068H01	332068H01
Wiring Diagram	332276I01	332275I01

Wiring Diagram

332277I01

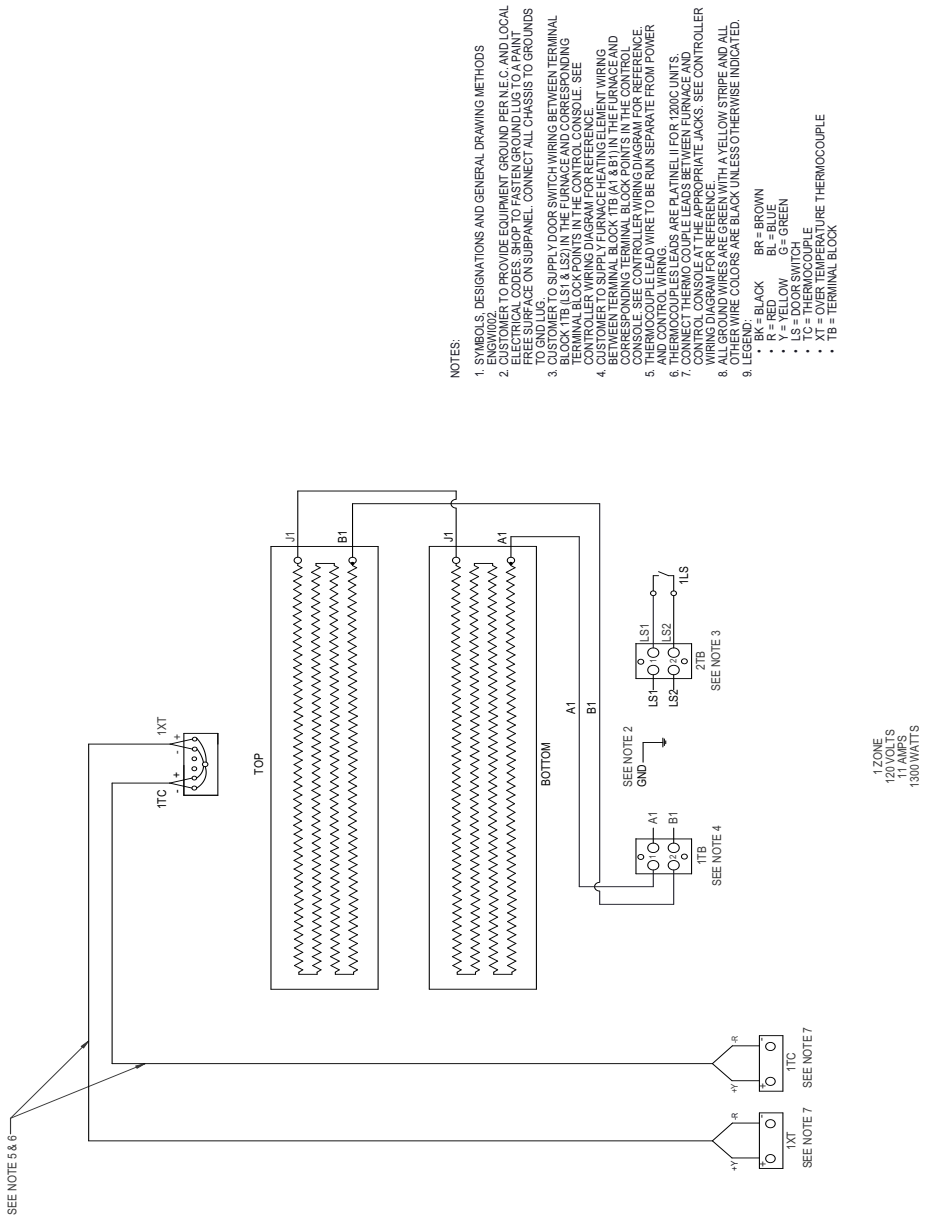


Figure 1. Wiring Diagram (HTF55122A)

332269I01

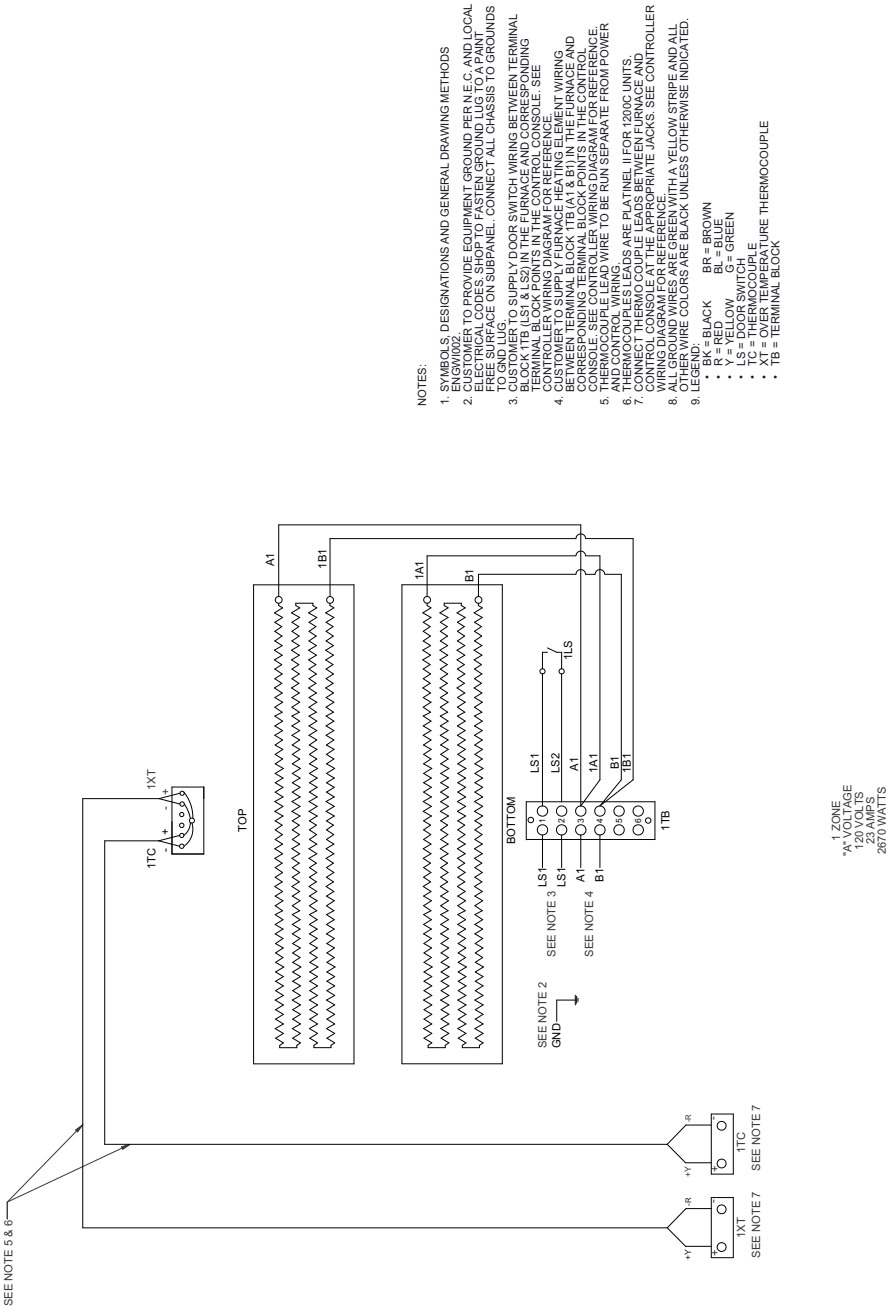


Figure 2. Wiring Diagram (HTF55322A)

332269I02

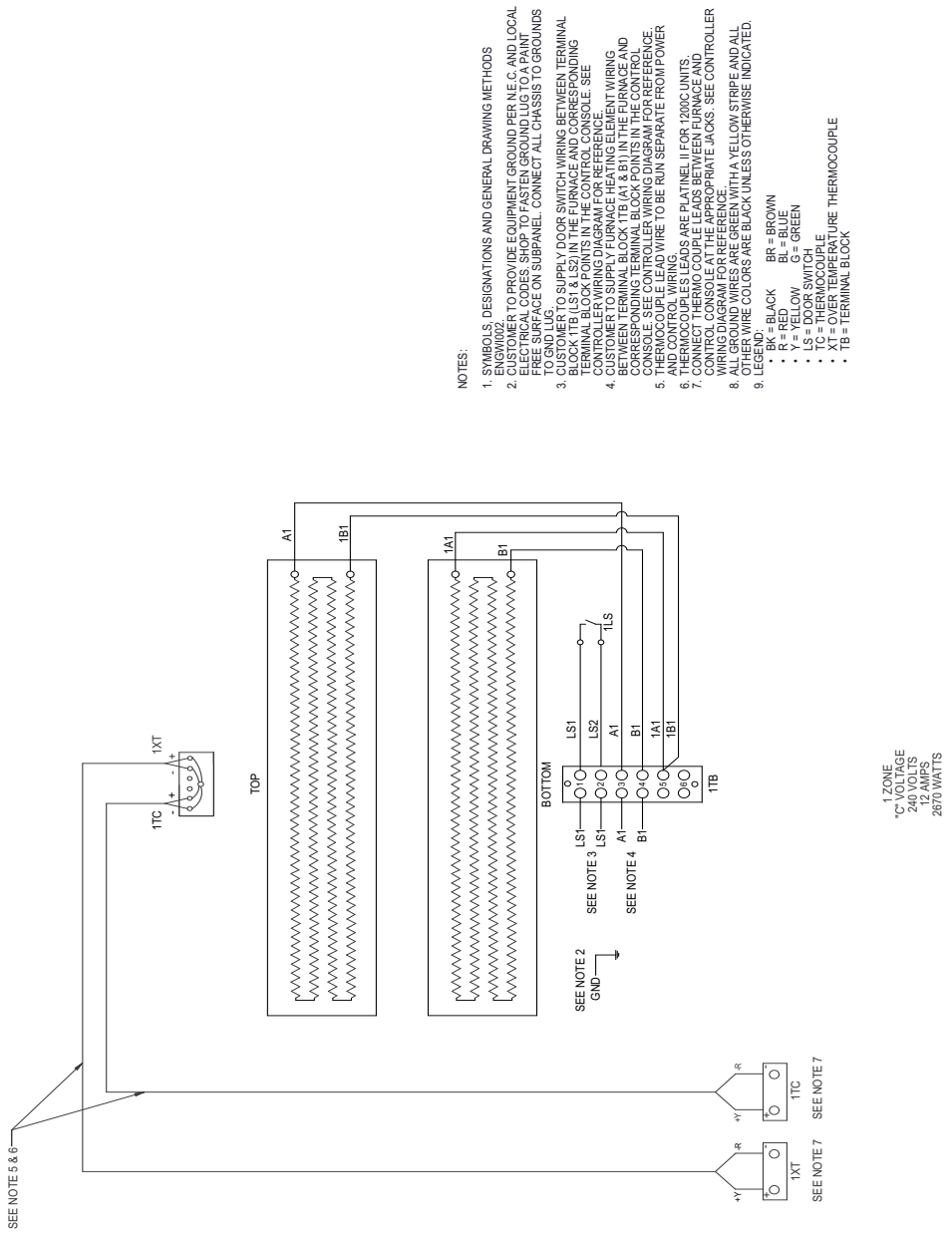


Figure 3. Wiring Diagram (HTF55322C)

332272I01

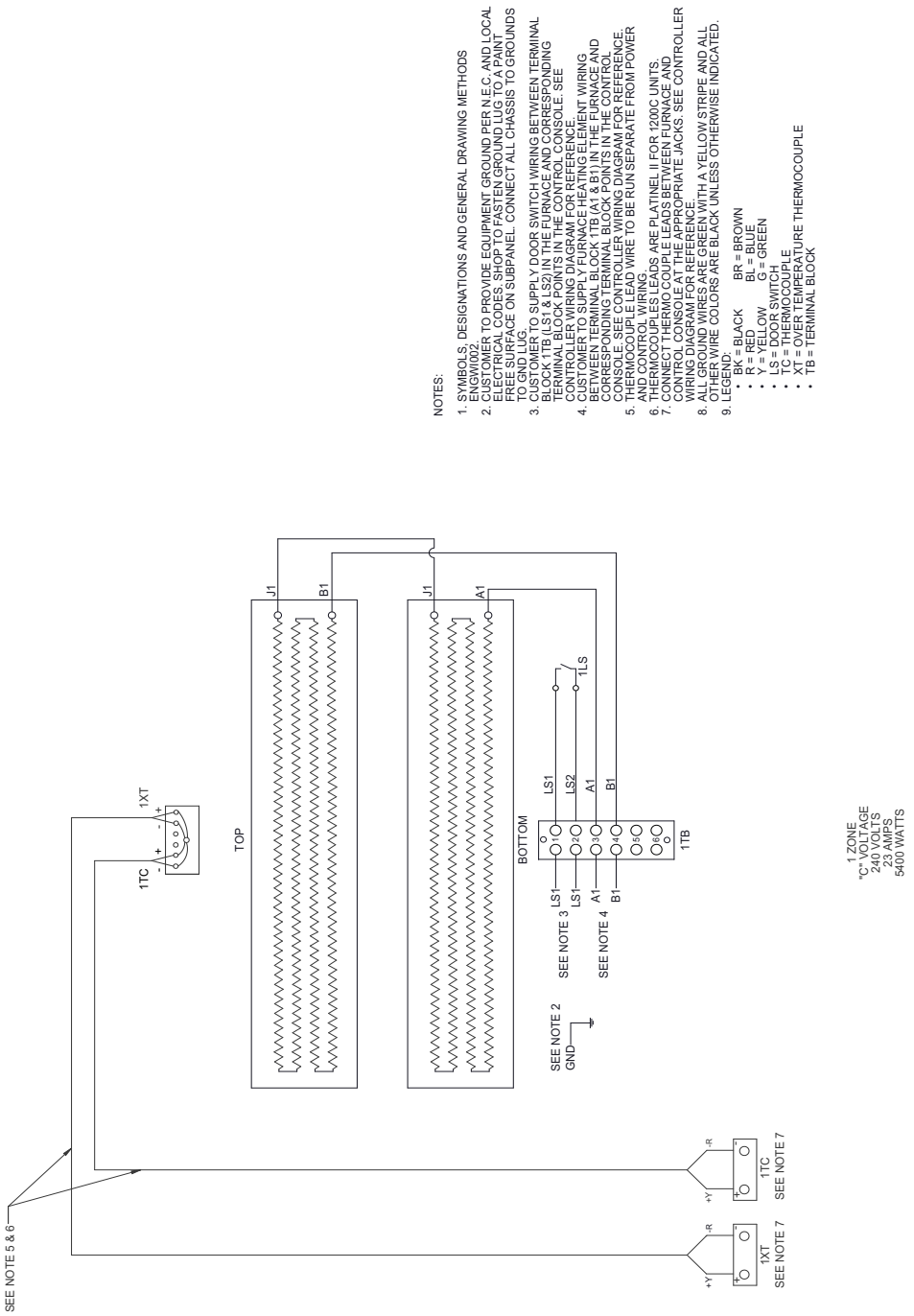


Figure 4. Wiring Diagram (HTF55342C)

332275I01

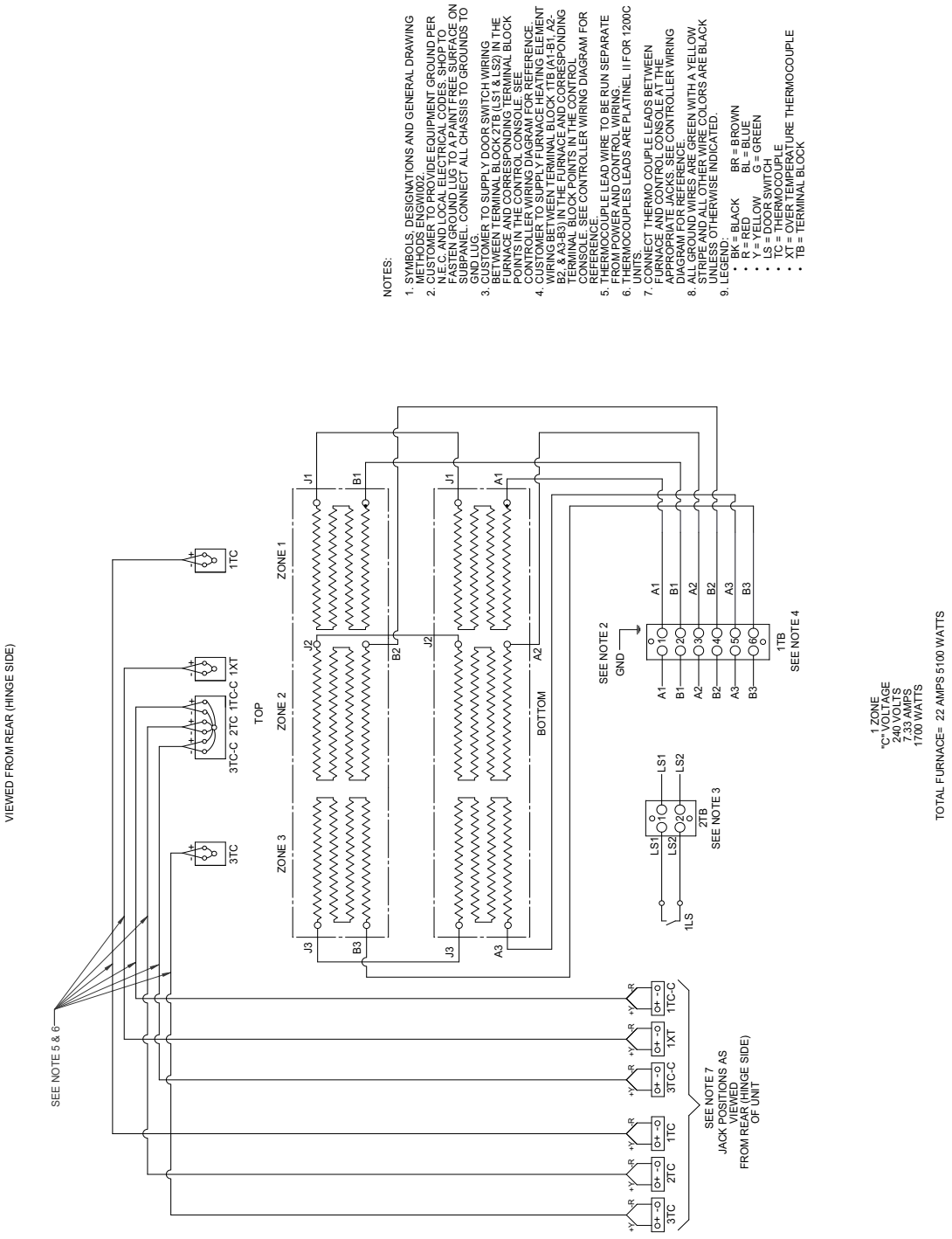


Figure 5. Wiring Diagram (HTF55347C)

332276I01

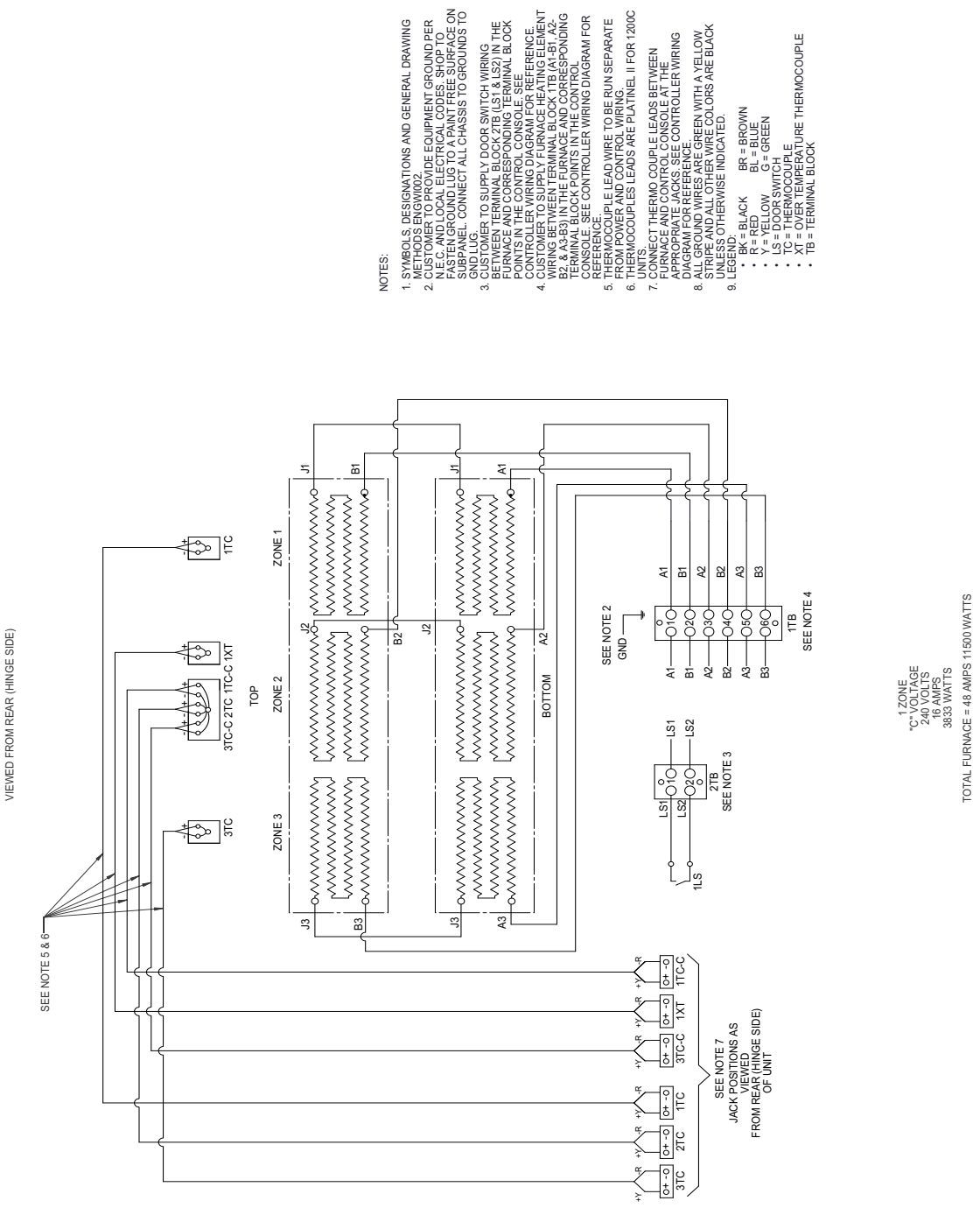


Figure 6. Wiring Diagram (HTF55667C)

End of Life Care

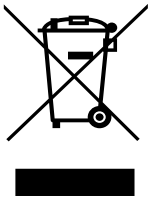
Some considerations and suggestions are listed below for proper disposal of this product. While addressing these actions for safe recycling and disposal, please follow all guidelines, Safety Data Sheets (SDS), or regulations applicable to your country and region.

- This product has materials and components that may be recycled or reused according to local guidelines and regulations.
- Clean up any chemical or biological safety hazards using appropriate methods.
- Have a certified technician remove the Refractory Ceramic insulation from the unit then dispose properly.

WEEE Compliance

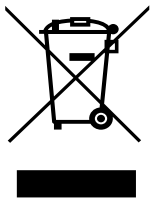
WEEE Compliance. This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the following symbol. Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on our compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at www.thermofisher.com/WEEERoHS

Great Britain



WEEE Konformittät. Dieses Produkt muss die EU Waste Electrical & ElectronicEquipment (WEEE) Richtlinie 2012/19/EU erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet. Thermo Fisher Scientific hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliederstaaten und dieses Produkt muss durch diese Firmen widerverwetet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch Thermo Scientific, dieVerwerter und Hinweise die Ihnen nützlich sein können, die Thermo Fisher Scientific Produkte zu identizfizieren, die unter diese RoHS. Anweisungfallen, finden Sie unter www.thermofisher.com/WEEERoHS

Deutschland



Conformità WEEE. Questo prodotto deve rispondere alla direttiva dell' Unione Europea 2012/19/EU in merito ai Rifiuti degli Apparecchi Elettrici ed Elettronici (WEEE). marcato col seguente simbolo.Thermo Fischer Scientific ha stipulato contratti con una o diverse società di riciclaggio/smaltimento in ognuno degli Stati Membri Europei. Questo prodotto verrà smaltito o riciclato tramite queste medesime. Ulteriori informazioni sulla conformità di Thermo Fisher Scientific con queste Direttive, l'elenco delle ditte di riciclaggio nel Vostro paese e informazioni sui prodotti Thermo Scientific che possono essere utili alla rilevazione di sostanze soggette alla Direttiva RoHS sono disponibili sul sito www.thermofisher.com/WEEERoHS

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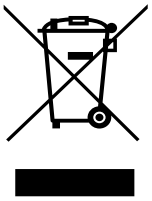
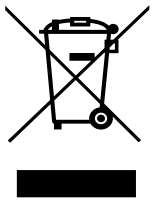


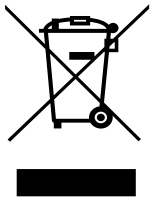
Conformité WEEE. Ce produit doit être conforme à la directive euro-péenne (2012/19/EU) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant. Thermo Fisher Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devraitêtre collecté ou recyclé par celles-ci. Davantage d'informations sur laconformité de Thermo Fisher Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Fisher Scientific qui peuvent aider le détection des substances sujettes à la directive RoHS sont disponibles sur www.thermofisher.com/WEEERoHS

France



Cumplimiento de WEEE. Se requiere que este producto cumpla con la Directiva 2012/19/UE de Desechos de Equipos Eléctricos y Electrónicos (WEEE) de la Unión Europea. Está marcado con el siguiente símbolo. Thermo Fisher Scientific ha contratado a una o más empresas de reciclaje / eliminación en cada Estado miembro de la UE, y este producto debe desecharse o reciclarse a través de ellos. Para obtener más información sobre el cumplimiento de estas Directivas, los recicladores de su país e información sobre los productos Thermo Scientific que pueden ayudar a detectar sustancias sujetas a la Directiva RoHS, visite www.thermofisher.com/WEEERoHS

Spanish



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