Installation Manual

Safe-t-SLAB

Heating Cables

Storage Heating System

1 CBS Safe-t-SLAB Thermal Storage Heating System

The Safe-t-SLAB Thermal Storage Heating System consists of heating cables installed in the foundation of a building either in the concrete slab, or in the sand bed below the concrete slab. Control of the heating cables is achieved via the TRO310F thermostat. A separate magnetic contactor and GFCI are required for current loads above 16A.

The principle of thermal storage heating consists of heating a concrete slab. One of the economic benefits of Safe-t-SLAB is that it can make effective use of off-peak electricity pricing. The slab is thus charged with heat that gently radiates to the building above throughout the day, providing a comfortable, efficient and reliable heat source.

Benefits of the Safe-t-SLAB thermal storage are numerous over other heating methods, and include:

- Lower capital and operating costs
- Easy and flexible installation combined with a single point connection.
- Reclaimed interior floor space (no furnace/boiler required)
- Decorating freedom (no heating registers to keep clear)
- Silent, safe, and efficient operation
- No cold spots
- Energy efficiency
- Reduced dust and allergens
- Higher degree of comfort.

Versatile and easy to install, the Safe-t-SLAB thermal storage system is the optimal way to heat your residential, commercial or industrial building.

CAUTION!

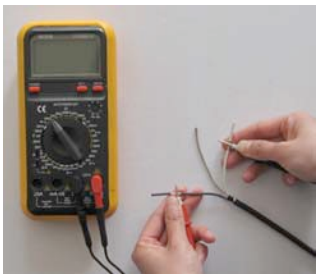
Safe-t-SLAB is a heating system usually intended to be the sole source of heat in the building.

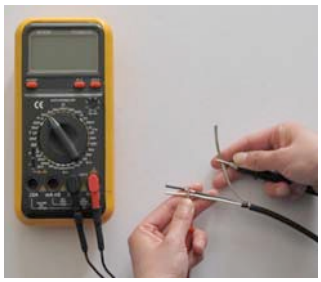
2 Safe-t-SLAB Cable Specifications

Cable Construction:	Twin conductor
Rated Volts (Safe-t-SLAB Cables):	240V
Output (Safe-t-SLAB Cables):	(30W/m)
Heating Element Size (HX Cables):	(16.8m to 207.3 m)
Bending radius:	(38mm)
Cable Diameter:	(6.5mm)
Conductor Insulation:	Fluoropolymer and XLPE
Outer Insulation:	PVC
Max. Rated Temp.:	(105 C)
Min. Installation Temp.:	(5 C)
Cold Tail Lead	(6m) length

3 Measuring the Resistance

WARNING: Remember to measure resistance.





The typical monitor shown at right will constantly monitor the heating wire during the entire installation process. If the wire is cut or damaged during installation, this device sounds an alarm. This will prevent burying a damaged wire below hardened concrete.

Using a digital Ohmmeter, the resistance should be measured between the black and white conductors. Compare the measured resistance to the resistance listed on the product label (on the power lead).

Also, measure the resistance between the black and ground wires, and between the white and ground wires to test the insulation resistance. Both should have infinite resistance. If available, CBS recommends using a meggar for this test with a voltage setting of up to 2500V.

Record the resistance on your Cable Resistance Certificate, documenting the resistance at each stage of the installation is required for warranty purposes. If the resistances do not match the expected values, the cable may be damaged and need repair. Contact CBS for a suggested repair procedure.

While not required, you may also want to measure the resistance of the floor sensor. It should be approximately 10kΩ at room temperature.

4 GENERAL NOTES

Read before beginning foundation!

• The installation shall be in accordance with the manufacturer's instructions and national and local electrical codes. The installation shall be in accordance with Australian AS 3000 Wiring Regulations. You must use a ground fault protection device (GFCI) or a Residual Current Device (RCD).

• All local codes concerning buildings, electrical installations etc. must be adhered to regardless of instructions provided in this manual. If these regulations are in direct conflict with instructions stated herein, please contact CBS Radiant Heating Systems.

• It is important that this equipment is only installed by qualified electricians who are familiar with the proper sizing, installation, construction and operation of electric heating cable systems and the hazards involved. The Safe-t-SLAB Cable system is designed for installation in concrete or sand applications only.

• Metal structures or materials used for the support of or on which the Safe-t-SLAB Cable is installed must be grounded.

• It is recommended to install the Safe-t-SLAB Heating Cable with a controller that contains an integrated temperature limiter;

- Remember to check that the supply voltage matches the voltage required for your particular Safe-t-SLAB product;
- Extreme care must be used to ensure the in slab cables are not damaged when using sharp tools, wheelbarrows, heavy machinery, shovels, rakes, or other implements. Avoid walking on the cables during installation;

READ THESE INSTRUCTIONS BEFORE BEGINNING THE CONSTRUCTION OF THE FOUNDATION

- **Never cut the heating cable;**
- **Do not install the cables in such a manner that two heating cables touch, cross or overlap;**
- Measure, verify and record the actual resistance throughout the installation process:
    1. Out of the box
    2. After installation
    3. After laying the sand bed (for sand bed installation)
    4. After the concrete slab is poured (but not set)
    5. After connecting thermostat and/or contactors

Record these values in the Cable Resistance Certificate. Failure to do so will void the warranty;

- The Safe-t-SLAB thermal storage heating system is most effective in single story buildings, with tiled or stone or concrete floors. If carpet, wood or other flooring materials are to be used, please consult with CBS radiant heating Systems.
- The Safe-t-SLAB cable must be embedded in mortar or mortar mixture, concrete, sand or similar material. Ensure no air pockets exist in the concrete or sand as this can cause damage to the cable.
- The perimeter of the heated area should be insulated with a minimum of 50mm of rigid, closed cell foam insulation (Styrofoam) or equivalent suitable for in-ground installation. Foamed urethane or polystyrene are not acceptable in their moisture reduced insulation properties.
- Ensure that all sharp stones and debris are removed from the area where the heating cables are going to be installed.
- Make sure the cable is not subjected to excessive tension or strain, especially at the heating cable to cold tail lead splice. It should not cross an expansion joint when installed in concrete. For two or more slabs, use of separate cables in each slab is recommended.
- At low temperatures, the heating cable stiffens and may be difficult to work with. To overcome this, connect the cable to the mains for a brief period of time. Ensure the cable is fully rolled out when this is done.
- A minimum space of (30 cm) should exist between the cables and the perimeter of the foundation, and obstructions such as drains, conduits, and structural members.
- There should be a minimum of (5 cm) of concrete or sand above and below the heating cables.
- Allow the concrete to set for at least 30 days before the heating cables are turned on.
- **There should not be any moving groundwater in the building area. Natural moisture in the soil is acceptable. If in doubt, contact CBS Radiant Heating Systems.**

5 General Safe-t-SLAB Installation Guidelines

5.1 Installing the heating cable

The Safe-t-SLAB cable must be laid out with even spacing over the entire area to be heated. To ensure an accurate and easy method of installing the heating cable can be attached directly to the rebar or wire mesh using plastic electrical cable tie wraps.

5.2 Center-to-center (C-C) distance

To determine the approximate c-c distance with Safe-t-SLAB Cables, the following formula below can be used, or consult with the engineer responsible for the building construction. To determine this:

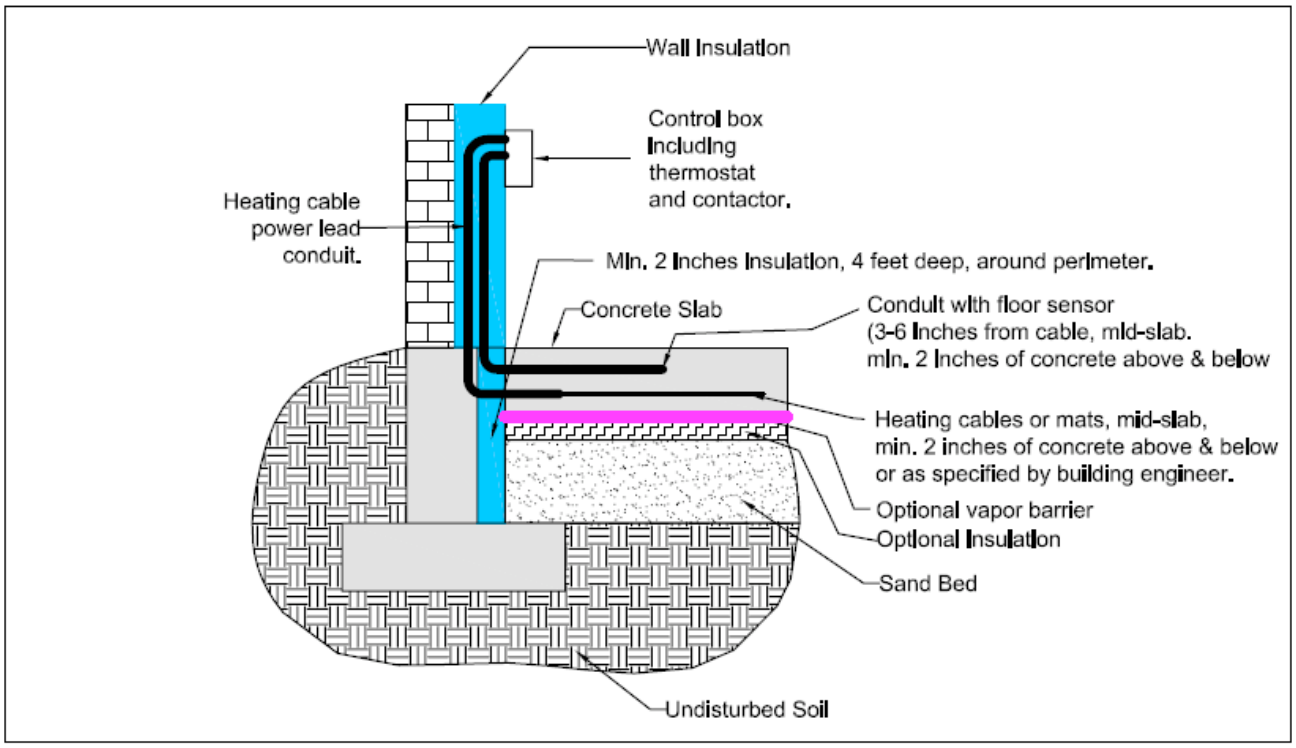
Heated Area in m2 multiplied by 1000

Divided by

The length of the selected cable(s) in Meters

WARNING: DO NOT CUT THE HEATING CABLE

CONCRETE INSTALLATION



6 Safe-t-SLAB Installation in Concrete Slab - Step by Step

STEP 1: PLAN YOUR LAYOUT

Make a sketch of the area to be covered with heating cables. Determine the location of fixtures such as drains, pipes, electrical conduits, structural members and remember to keep a distance of (30cm) around such obstacles. All obstacles that shall be in the concrete slab should be installed prior to Safe-t-SLAB Cable installation to avoid damaging the cable.

You should also plan the location of the thermostats, floor sensors locations and their conduit's location. The start of the cable should be as close as possible to the thermostat's final placement. For guidelines on cable installation, see page 3 or 5 of this manual.

STEP 2: INSTALLING THE FLOOR SENSOR AND CONDUIT

A floor sensor for high temperature protection must be installed in a rigid conduit. The conduit protects the sensor and facilitates its replacement in the unlikely event of failure.

The sensor and the conduit may be installed during the actual construction work and connected at a later date. Please observe the following:

1. Ensure that the conduit is sealed before the concrete is poured.
2. The conduit must be positioned between the heating cables. This is usually at approximately the mid-point of the concrete slab.
3. CBS recommends keeping the conduit as short as possible and to minimize the number of bends in the conduit. This will ease the installation of the sensor.
4. Place the sensor inside the tube until it reaches the end of the conduit.
5. The sensor and conduit should be placed within 75 to 150mm of the heating cables and with at least 50mm of concrete or sand above and below.
6. The floor sensor should be installed at least (1m) into the heated area.

7. The floor sensor has a standard (3m) lead that may be extended to a maximum of 50m with 20 AWG wire.

STEP 3: MEASURING THE RESISTANCE OF THE HEATING CABLE

Using a digital ohm-meter, measure the resistance of the cable. Compare the measured value with the resistance listed on the label of the power lead. See page 2 for details.

Remember to record the measured resistances on the Cable Resistance Certificate. Documenting the resistance at each stage of the installation is required for warranty purposes.

STEP 4: INSTALLING THE Safe-t-SLAB CABLE

Installing the cable. The cable is usually installed by attachment to the rebar or wire mesh of the foundation. For details on this, see page 3 and 5 of this manual. The cables should be approximately at the midpoint of the slab, but in all cases, it is recommended to have at least 50mm of concrete above and below the cables.

The cold tail leading to heating junction box should have at least (30 cm) of its length embedded in the mass material. The remainder of the power lead should be in a conduit that extends to the thermostat or contactor. The power lead may be extended if required.

Measure the resistance once again as outlined in step 3, and record the information on the Cable Resistance Certificate.

TIP: CBS recommends taking a picture of the cable layout and conduit placement during installation. This can help in the unlikely case that the cable needs repairs and for warranty claims.

STEP 5: POUR THE CONCRETE SLAB

Pouring the concrete slab. Ensure that the contractors are careful not to damage the cable with tools, heavy machinery, etc. Once the slab is poured but concrete is still wet, measure the resistance once again as outlined in step 3, and record the information on the Cable Resistance Certificate.

It is not recommended to power the cables until the concrete has cured (approximately 30 days). Check with the concrete manufacturer for exact curing times. Doing so can affect both the integrity of the slab, and the subsequent proper operation of the Safe-t-SLAB cable.

STEP 6: CONNECTING POWER SUPPLY AND THERMOSTAT

The connection of the TRO310F thermostat must be done by a qualified electrician familiar with heating cables and in accordance with Australian AS 3000 Wiring Regulations. Remember to properly ground the heating cable braid.

If this is not already done, the sensor should be installed in the conduit. Remember that the sensor should reach the sealed end of the conduit. Connect the thermostat and sensor according to the wiring diagram in appendix A.

A final resistance reading of the cables should be carried out as discussed in step 3 and the measured values recorded on the Cable Resistance Certificate.

STEP 7: RECORD INFORMATION AND AFFIX LABELS

- Ensure that all resistances measured in steps 3 to 6 are recorded on the Cable Resistance Certificate.
- The eight digit product code found on the CBS cable power lead must also be recorded on the above certificate.
- Install the electrical panel label at the electrical panel, indicating the location of the cable.
- Install the Warning label in a visible area of the floor, for the duration of the construction.

It is also recommended that the label be kept in a suitable location on a permanent basis.

STEP 8: ENJOY THE COMFORT OF Safe-t-SLAB Heating

The Safe-t-SLAB thermal storage heating system is now ready to use. Increase the temperature gradually and adjust it until it reaches a level that suits your personal preferences.

Note that it may take several hours for the thermal mass to heat up the first time the system is powered, or after extended periods of inactivity.

⚠ EXTENDED WARRANTY

For a period of two (2) years from the date of purchase CBS Radiant Heating Systems warrants that the Safe-t-SLAB cable is free from defects in material, design and workmanship. The extended warranty is only valid if the warranty certificate has been properly completed and mailed, and the installation is in accordance with the installation instructions.

The defective Safe-t-SLAB cable has to be inspected by or submitted to CBS Radiant Heating Systems. Failure to comply with all of the foregoing will void this extended warranty. CBS will, when the customer has documented that a defect in the Safe-t-SLAB Cable was present at the date of delivery, repair or supply a new Safe-t-SLAB Cable at CBS' option. All claims shall be made within the extended warranty period.

CBS shall not be liable for any claims made later than ten years from date of purchase.

CBS shall not be liable for any consequential and secondary costs or damages linked to the defect or replacement of the Safe-t-SLAB Cable. CBS will be liable for any costs related to the dismantling of defective product and the installation of a new product; however such liability is limited to the amount of five (5) times the initial product costs for each damage/case.

THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ON THE PART OF CBS RADIANT HEATING SYSTEMS. CBS DISCLAIMS ANY WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CBS NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SALE OR PRODUCT. CBS SHALL NOT BE HELD RESPONSIBLE FOR DAMAGE TO PERSON OR PROPERTY, CONSEQUENTIAL LOSS, LOSS OF PROFIT, LOSSES ON GOODS IN STORE, OR THE LIKE WHICH MIGHT ARISE OUT OF THE FAILURE OF THE EQUIPMENT DELIVERED, IRRESPECTIVE OF THE CAUSE (INCLUDING FAULTY MANUFACTURE).

How to claim this warranty

Contact the company's Customer Service department and provide the following information:

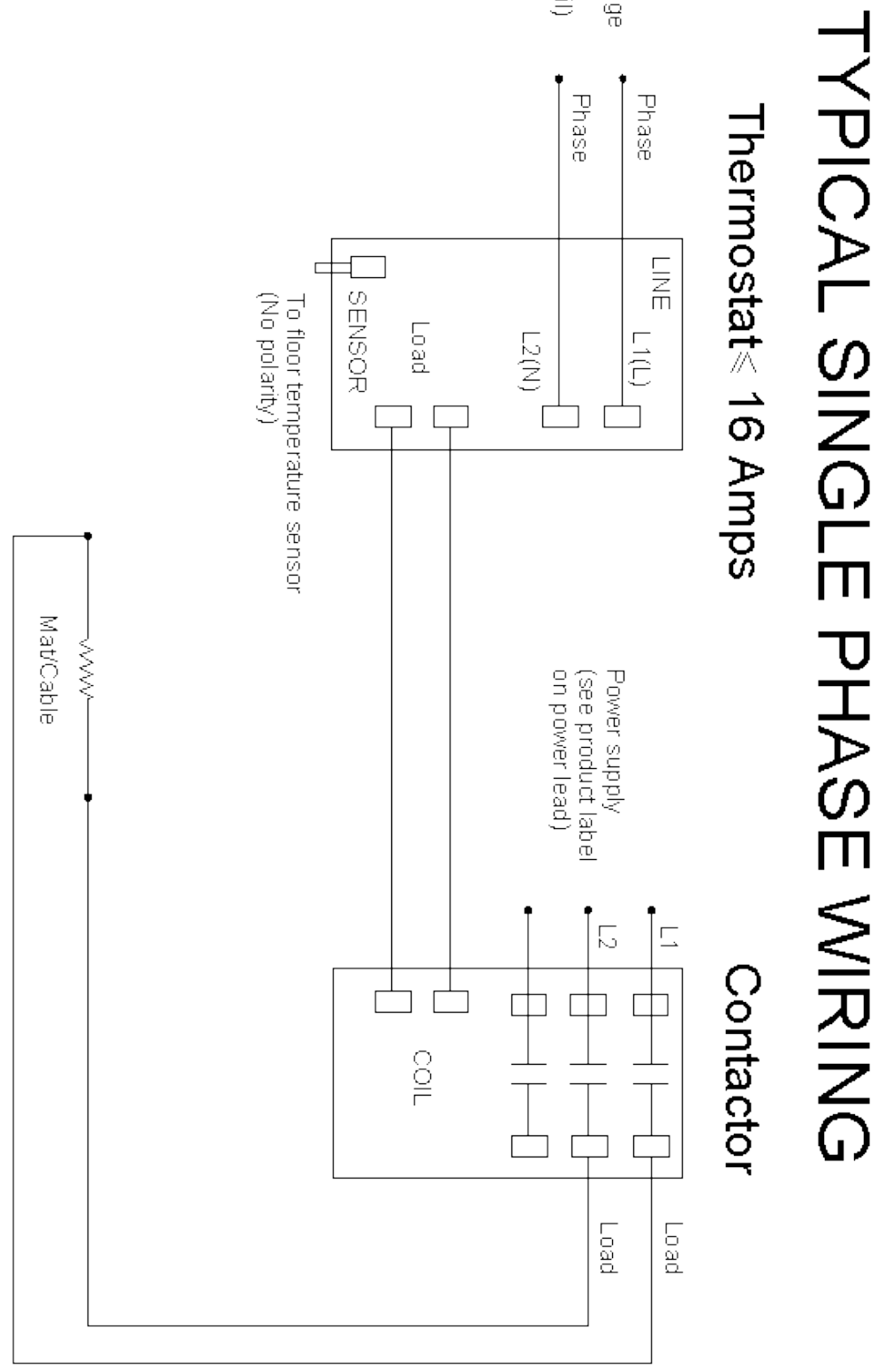
1) Nature of the manufacturing defect
2) Date of purchase and, if already installed, date of installation
3) If installed, name of electrician and flooring installer
4) Resistance readings taken by installer
5) Proof of purchase and serial number from product label

Our Customer Service department will provide you with an authorization number and advise you on the next steps to complete your warranty claim.

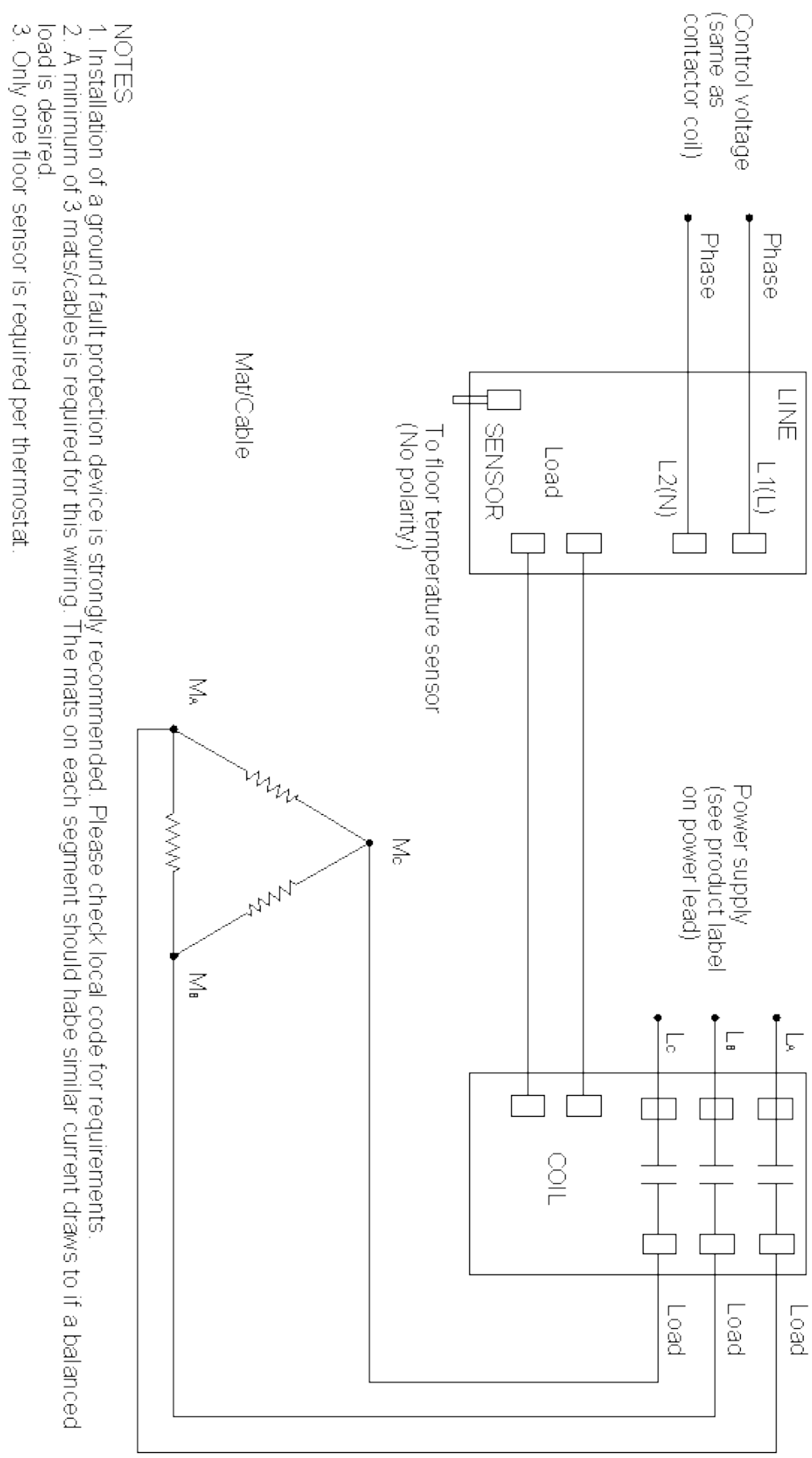
Disclaimer:

This warranty gives you specific legal rights and you may also have some legal rights which may vary from state to state or province to province. CBS Radiant Heating Systems hereby disclaims, and it is as a condition of the sale, that there are no implied warranties. Some states and provinces do not allow limitations on an implied warranty so the above limitation may not apply to you.

APPENDIX A: TYPICAL SAFE-T-SLAB WIRING DIAGRAM



APPENDIX A: TYPICAL SAFE-T-SLAB WIRING DIAGRAM (CONTINUED)



NOTES
1. Installation of a ground fault protection device is strongly recommended. Please check local code for requirements.
2. A minimum of 3 mats/cables is required for this wiring. The mats on each segment should habe similar current draws to if a balanced load is desired.
3. Only one floor sensor is required per thermostat.