

# **PARKER<sup>™</sup>** **FREEZE DRY**

A DIVISION OF PROFORM FABRICATION

## **SOP 1.1 CART MAINTENANCE**

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# CART ANATOMY

The Parker Freeze Dry Cart system allows you to easily load, process, and unload product in your facility.

On the front door of each cart there is a hole [Figure 2] for easy access to the 8th tray, which the thermocouple is placed to read the cart temperature. The cart nearest the door will have an additional thermocouple to monitor product. Each cart is also equipped with a male twist-lock plug [Figure 3].



Figure 2



Figure 3

Each Cart has two wheel locks [Figure 4] on the left side of the cart. When opening the door on the cart, first remove the ring pin and lift the door latch [Figure 5].



Figure 4



Figure 5

## CART ANATOMY (CONT'D)

The Parker Freeze Dry carts are equipped with 2 doors, front and rear. You can identify the front door as it is equipped with an access hole for the thermocouples in your chamber. Product should be loaded via the rear door [Figure 6]. The front of the cart has a pan retainer bar in place to secure pans. With a notch at the 9th tray position for access to product for thermocouple insertion (only applies to cart position 10) [Figure 7]. The pan retainer bar is attached to cart by Phillips machine screws with 3/8 locking nuts it can be removed for servicing the foil heater assembly trays.



Figure 6



Figure 7

Another aspect of the cart is the Cart Wiring Panel [Figure 8] which can be accessed from the side of the cart, panel can be opened by removing two #4 Allen wrench screws [Figure 9]. If opened you will have access to the carts internal wiring [Figure 10]. See Cart Wiring Schematic on page.



Figure 8



Figure 9



Figure 10

## CART ANATOMY (CONT'D)

Bus bars, shorting links, wiring terminations, and thermostat sensors are accessible with the cart wire panel open [Figure 11].

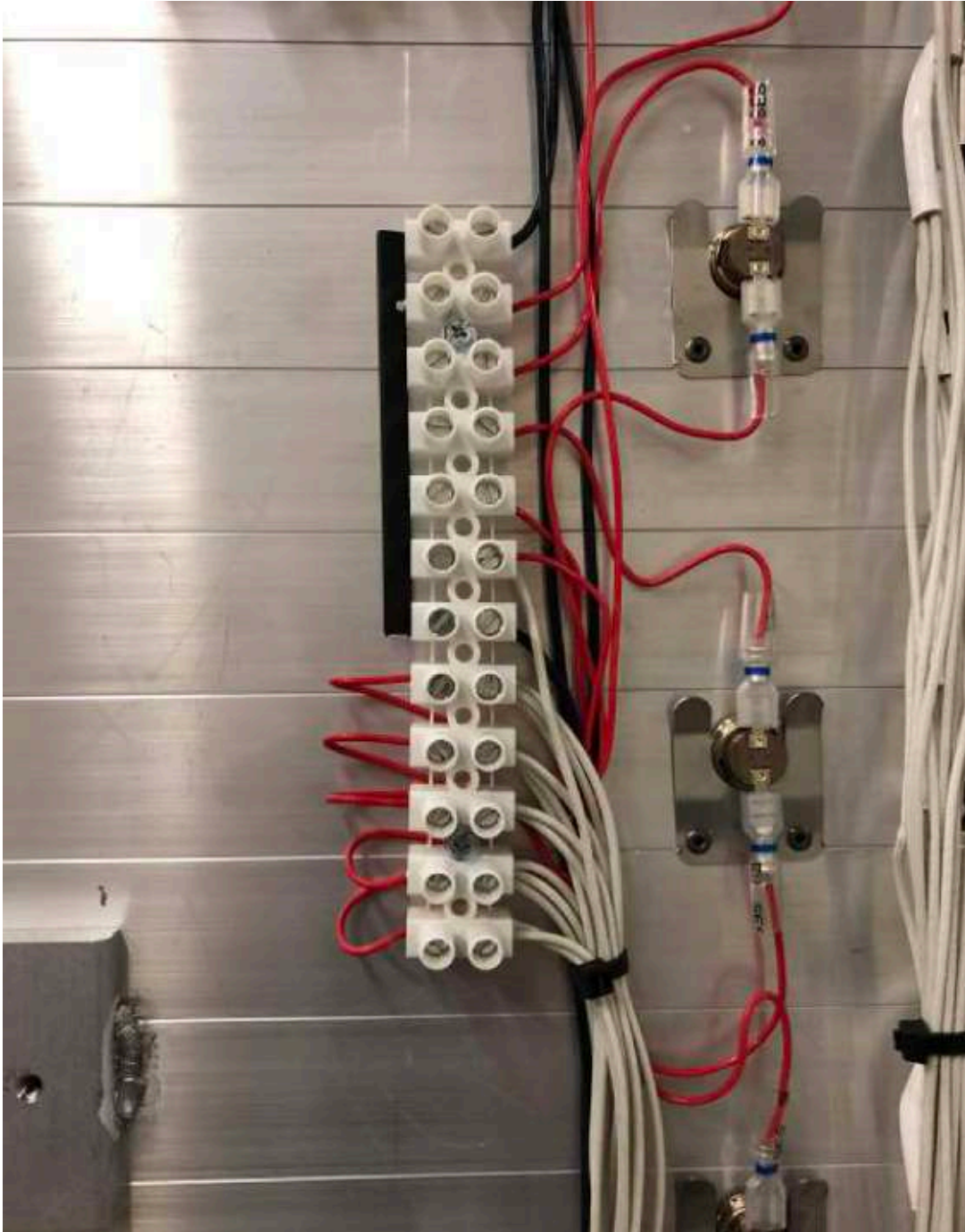


Figure 11

# CART FUNCTIONALITY

The carts function is to regulate and maintain the desired temperature set-point programmed into the recipe.

The cart operates on 208v 3-Phase power supply with an average amperage draw of 10-65 amps depending on model. The power is divided into 3 circuits. Each circuit powers a designated amount of heaters per model. See *wiring schematic*.

| AMPS | Model | Amps Per Phase |      |      |
|------|-------|----------------|------|------|
|      |       | L1             | L2   | L3   |
|      | 42H   | 21             | 18.9 | 18.9 |
|      | 34H   | 16             | 16   | 15.3 |
|      | 23H   | 12.2           | 10.7 | 10.0 |

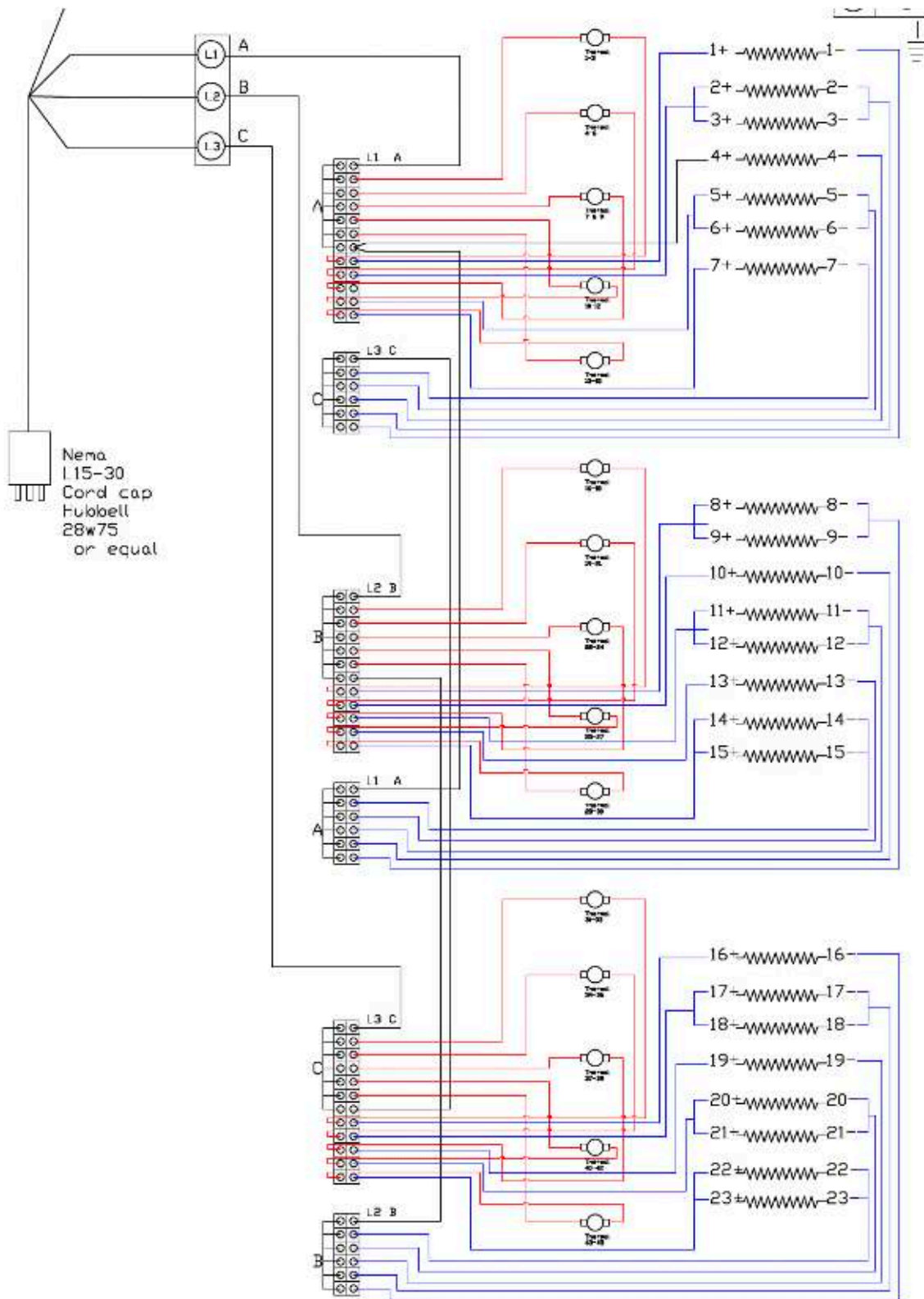
The cart is self regulating by the internal thermostat sensor preventing over temperature of cart to protect product integrity. There are presently two sensor types used in production (169 and 203). Upon request we can order custom range.

There are a total of 12-15 thermostat sensors per cart dependent on the cart model. Each thermostat sensor regulates a number of foil heater assemblies dependent on the cart model. See *wiring schematic for more detail*.

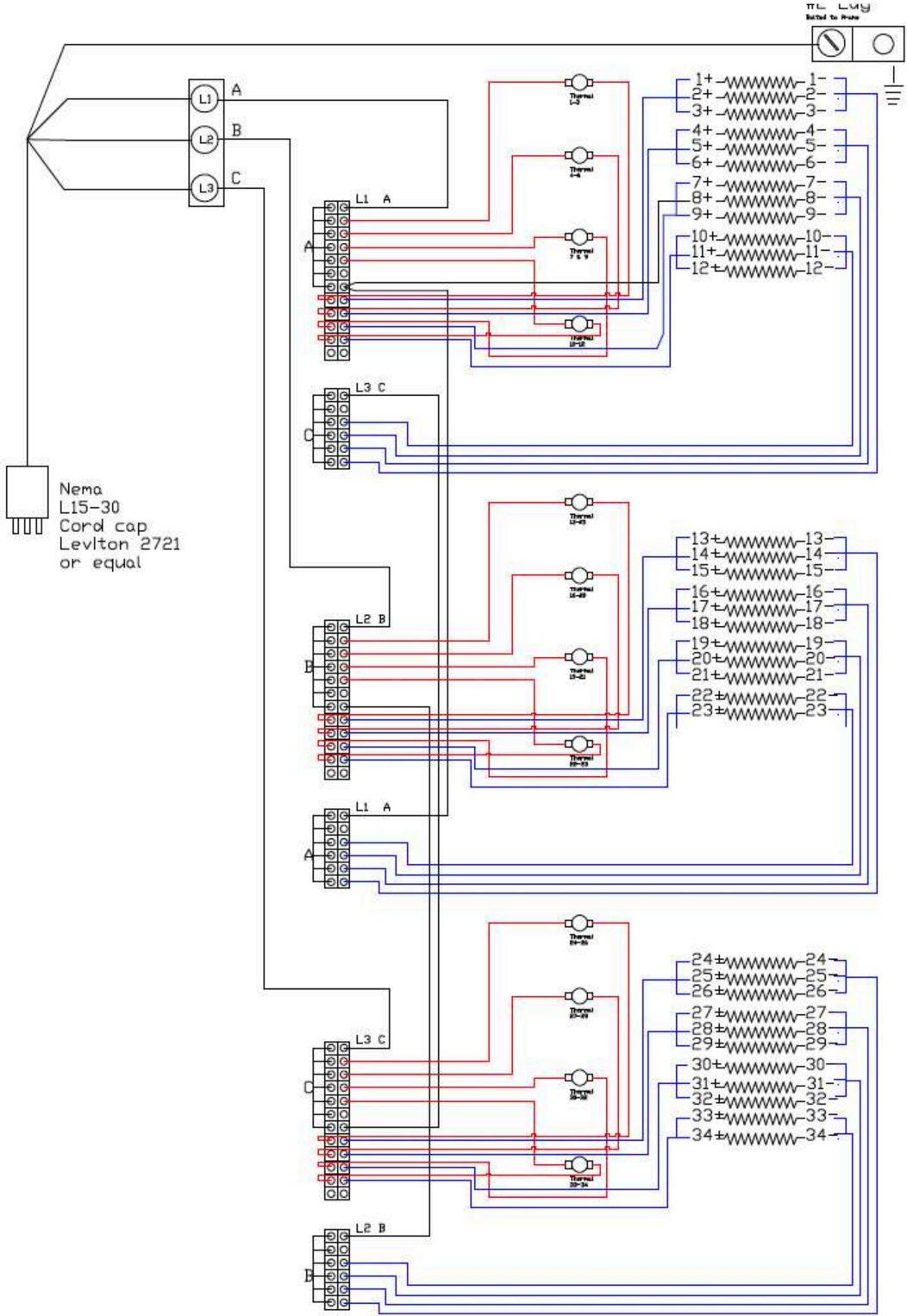
| SENSORS | Model | Number of          |
|---------|-------|--------------------|
|         |       | Thermostat Sensors |
|         | 42H   | 14                 |
|         | 34H   | 12                 |
|         | 23H   | 15                 |



# CART MODEL: 23H



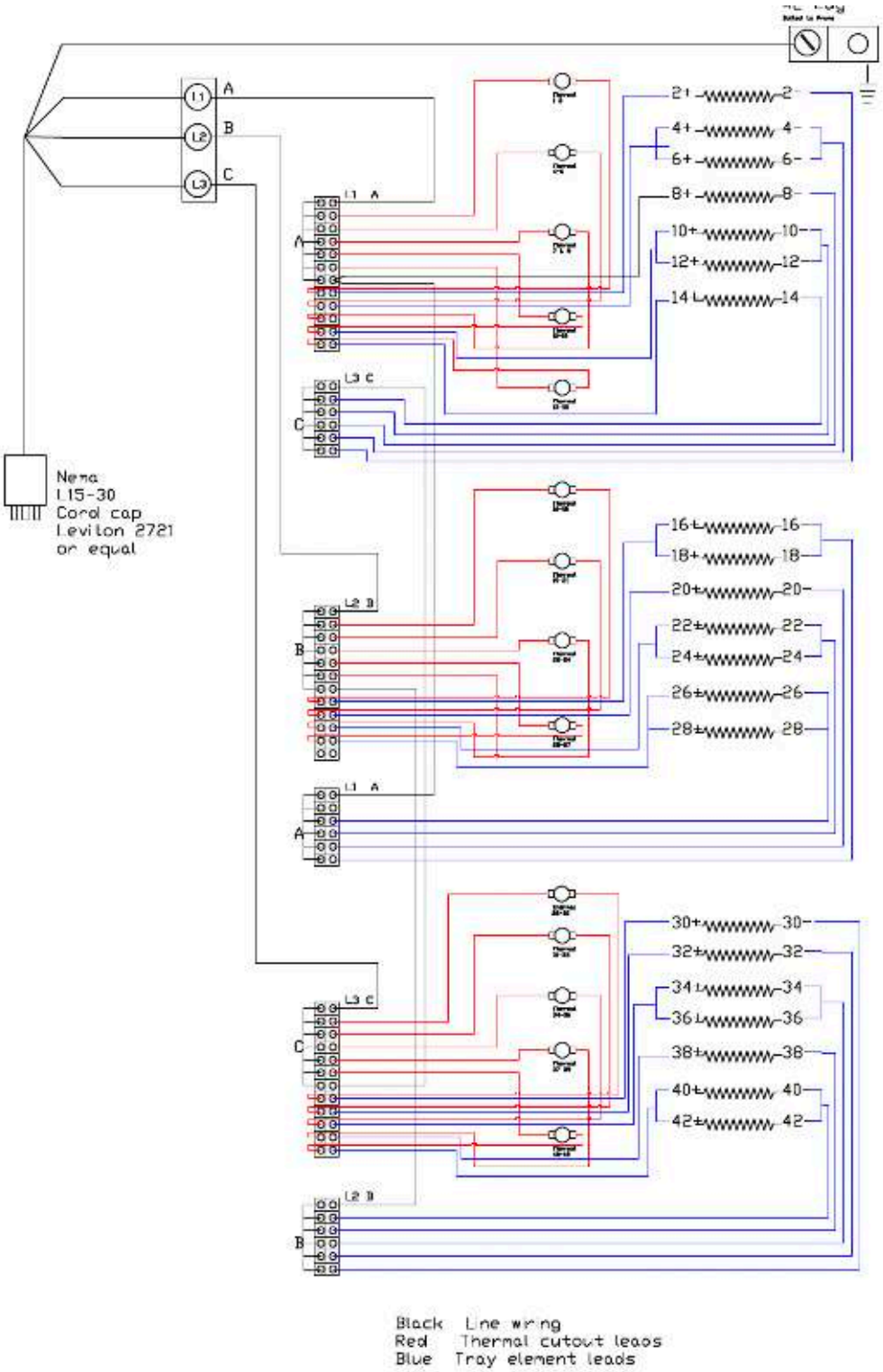
# CART MODEL: 34H



Black Line wiring  
 Red Thermal cutout leads  
 Blue Tray element leads



# CART MODEL: 42H



# TOOLS

- Wire Snips
- Wire Strippers
- #4 Allen Wrench or Bit
- Phillips Bit
- Phillips Screwdriver
- Flathead Bit
- Flathead Screwdriver
- 3/8 Open End Wrench
- Rubber Mallet
- Foil Heater Assembly Forming Clamp
- Multi-Meter
- Clamp-on Amperage Meter
- Cordless/Corded Drill

# CHECKING CART RESISTANCE

Checking the cart resistance should be done on a weekly basis as preventative maintenance. Checking the overall cart resistance is beneficial in the fact that it will indicate if there are hardware issues or short to ground present in the cart wiring.

The cord plug end of the cart consists of 4 prongs L1, L2, L3, and earth ground [Figure 12]. With a multi-meter set to ohm/resistance ( $\Omega$ ) use the common and positive probes to check between L1-L2 [Figure 13], L1-L3 [Figure 14], L2-L3 [Figure 15]. The resistance variance should be roughly the same for two of the phases, and one phase will be slightly higher.

| NORMAL RESISTANCE | Model | Normal Resistance |      |      |
|-------------------|-------|-------------------|------|------|
|                   |       | L1                | L2   | L3   |
|                   | 42H   | 14.3              | 12.9 | 12.9 |
|                   | 34H   | 16                | 16.7 | 16.7 |
|                   | 23H   | 26.9              | 23.8 | 22.2 |

The acceptable variance is dependent on cart model. If the resistance is higher or lower on any of the 3 phases further troubleshooting must be completed to find faulty hardware.

| AVERAGE RESISTANCE | Model              | Average Resistance |
|--------------------|--------------------|--------------------|
|                    |                    | 42H                |
| 34H                | 16.0-16.7 $\Omega$ |                    |
| 23H                | 22.0-27.0 $\Omega$ |                    |



Figure 12



Figure 13



Figure 14



Figure 15

## CHECKING THERMOSTAT RESISTANCE

Checking thermostat resistance typically only arises when a short to ground or hardware issues are detected. It is not recommended to check these on a scheduled bases, although it is left to the users discretion.

Open cart wire panel by removing the 2 #4 Allen screws. Locate suspected thermostat sensor to be checked. Disconnect the quick connect terminations on the thermostat [Figure 16] with a multi-meter set to ohm/resistance ( $\Omega$ ) use the positive and common probes to read resistance between the thermostat circuit [Figure 17]. The acceptable resistance is between .1-.3 $\Omega$ . If the resistance is lower, higher, or 0 the sensor must be replaced.



Figure 16



Figure 17

## REPLACING THERMOSTAT

To replace the thermostat first disconnect quick connect terminal [Figure 22]. Using a flathead screwdriver gently press up on the thermostat retainer mount until it's almost out of the retainer clip (do not make contact with the actual sensor with flathead) [Figure 23]. Remove thermostat sensor by hand [Figure 24]. Begin installing new thermostat sensor by hand. Center the thermostat retainer mount so both tabs make contact with the retainer clip [Figure 25].



Figure 22



Figure 23



Figure 24



Figure 25



## REPLACING THERMOSTAT (CONT'D)

With a flathead screwdriver press down gently until thermostat is fully seated in the retainer clip [Figure 26-27]. Re-connect the quick connect terminations to thermostat sensor [Figure 28]. Close wire panel door and secure.



Figure 26

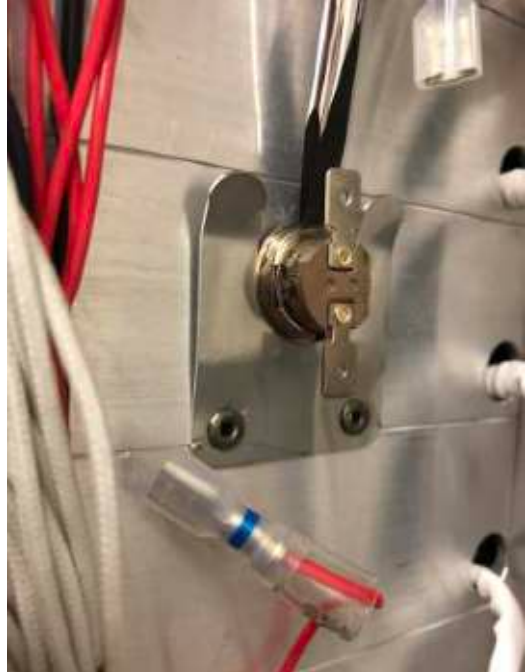


Figure 27



Figure 28



# CHECKING FOIL HEATER RESISTANCE

Checking the foil heater assembly is typically required when a short to ground or hardware issue is detected.

- Open the cart wire panel by removing the 2 #4 Allen screws.
- Locate the faulty or suspected foil heater assembly. Refer to wiring schematic for bus bar terminal locations of +/- sides of the foil heater assembly. Remove the terminal connections with a flathead screwdriver [Figure 18-19].
- Separate the foil heater wires into individual assemblies [Figure 20].
- Using a multi-meter check the resistance of the foil heater with the positive and common probes on +/- sides of the foil heater. The acceptable resistance is between 268-277 $\Omega$ . If lower, higher or 0 it must be replaced.



Figure 18

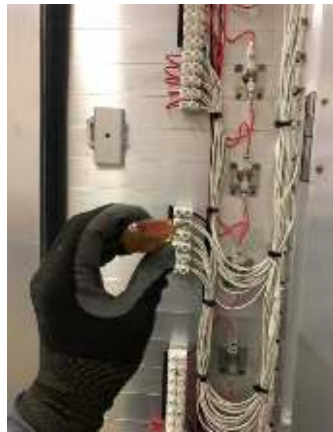


Figure 19



Figure 20



Figure 21

## REPLACING FOIL HEATER

- Replacing the foil heater is necessary if it has been determined that there is an issue with the foil heater wiring, if the resistance is out of specification, if abrasions are present, or a short to ground is detected.
- Open cart wire panel by removing 2 #4 Allen screws.
- Identify the faulty foil heater location, refer to wiring schematic for detailed location of foil heater +/- terminations on the bus bars.
- Once identified remove the +/- terminations with a flathead screwdriver for the suspected faulty foil heater [Figure 29-30].



Figure 29



Figure 30

## REPLACING FOIL HEATER (CONT'D)

- The wire terminations will generally be twisted into pairs of 3 foil heaters, separate the wires and identify the suspected foil heater [Figure 31].
- Open the cart front door, and remove the pan retainer bar hardware with a Phillips screwdriver and 3/8 wrench and set aside [Figure 32].
- Identify the disconnected foil heater tray assembly and pull out to remove from cart [Figure 33-34].



Figure 31



Figure 32



Figure 33



Figure 34



## REPLACING FOIL HEATER (CONT'D)

- With the foil heater tray assembly removed, open the envelope by gently separating the two layers to release [Figure 35-36].
- Once separated open the envelope slightly [Figure 37] to access the foil heater and peel up one of the corner from the envelope through the width of the envelope [Figure 38-39].



Figure 35



Figure 36



Figure 37



Figure 38



Figure 39

## REPLACING FOIL HEATER (CONT'D)

- It is important to note the position of the foil heater prior to removal so that the placement of the replacement foil heater is correct. Continue to peel up defective foil heater until it is separated from the envelope and remove.
- Source the replacement foil heater and peel the adhesive backer off. Center foil heater on the envelope and press foil to the envelope. Close the envelope.
- Re-insert the foil heater tray assembly in to the cart just slightly past the wire port [Figure 40].
- Feed the foil heater wire leads through the wire port [Figure 41].
- Pull the foil heater tray assembly forward past the tray platform and ensure that the wire leads are not bound up [Figure 42].
- Push the tray assembly lip onto the tray platform and tap lightly into place with rubber mallet [Figure 43].



Figure 40



Figure 41



Figure 42



Figure 43

## REPLACING FOIL HEATER (CONT'D)

- Using the tray assembly clamp reform/clamp the tray assembly to the tray platform [Figure 44].
- Install the pan retainer bar and hardware with Phillips screwdriver and 3/8 wrench.
- Re-wire the new foil heater leads to the bus bars. Refer to wiring schematic. Cut to size with wire snips, and use wire strippers to strip the lead ends.
- Tighten leads to bus bar with flathead screwdriver.
- Close cart wire panel and secure.



Figure 44