

# PROTECT YOUR ASSETS

Troubleshooting Issues:  
*Electrical Zones*

Practical Content Delivered by EDI® Extrusion Die Experts

Sometimes even the most organized operations can face unexpected production start-up issues that require extensive troubleshooting to solve. By using a systematic approach to define the problem, sort through possible causes, and then develop a solution, a die system can be successfully brought on-line.

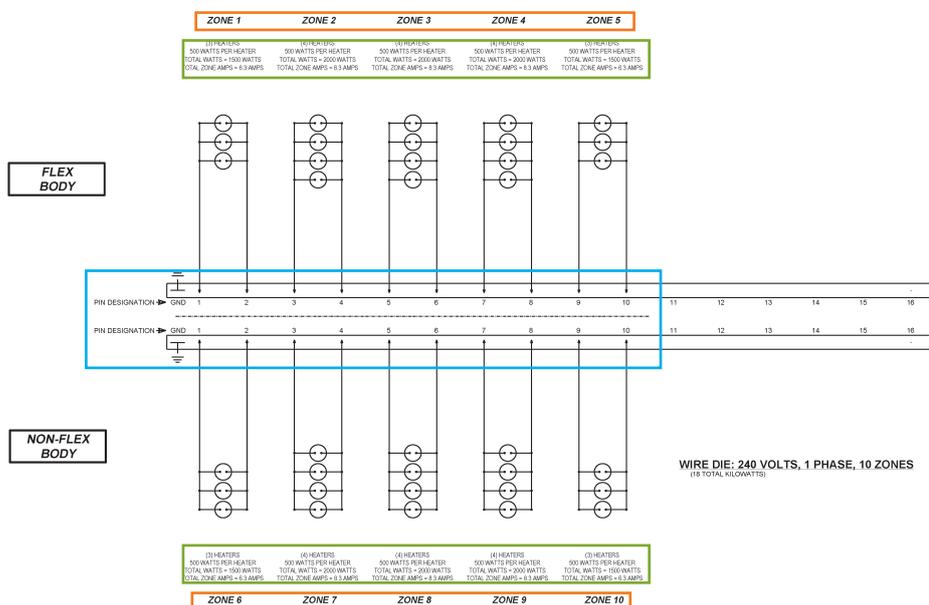
Our service and technical support experiences in the field have enabled us to identify some common causes of set-up issues, helping to fast track your troubleshooting process.

## Checking Your Heaters

It's important to check heaters every time your die and/or feedblock is set to be reinstalled into a production line. This is true if the equipment was recently removed from storage, recently refurbished, or simply shutdown for a preventive maintenance event.

By checking your heaters before completing the installation process, you will ensure that they are properly heating and will not cause any further issues when production is set to begin.

When checking your heaters, you'll reference information included in the electrical drawing provided with your die or feedblock. The electrical drawing will show the number of zones, how many heaters are in each zone, and the wattage of the heaters in each zone.



### Example Electrical Drawing

- In this example drawing, we see the zones for the flex and non-flex bodies of an extrusion die. Each zone is labeled, for a total of 10.
- This diagram also shows that the end zones (1, 5, 6, and 10) have fewer heaters than the center zones. This also means that these zone have a reduced number of total watts.
- Finally, at the center of the drawing, we see the pin designations, beginning on the left.

This information will be important to note as you begin checking heaters.

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## Checking Your Heaters, *continued*

Once you've reviewed the information in your electrical drawing, you may begin testing the heater by checking the ohms in each zone using a multimeter, reading across the corresponding pins. We will use the information from the drawing on page 1 as an example, so Zone 1 is across from Pins 1 and 2.

First, we need to calculate the total number of ohms ( $\Omega$ ), using Ohm's Law, in Zone 1:

$$\begin{aligned}\text{Ohm's Law: Ohms} &= \text{Voltage (V)} \times \text{Voltage (V)} \div \text{Watts (W)} \\ 240 \text{ V} \times 240 \text{ V} &= \mathbf{57,600 \text{ Total Voltage}} \\ 3 \text{ Heaters} \times 500 \text{ W Each} &= \mathbf{1,500 \text{ Total Watts}} \\ 57,600 \div 1,500 \text{ W} &= \mathbf{38.4 \Omega (\pm 10\%)}\end{aligned}$$

The number of heaters differs for each zone in this die, so we will need to complete a similar exercise to find the total number of ohms for Zone 2, as well as any other zones with a different number of heaters:

$$\begin{aligned}\text{Ohm's Law: Ohms} &= \text{Voltage (V)} \times \text{Voltage (V)} \div \text{Watts (W)} \\ 240 \text{ V} \times 240 \text{ V} &= \mathbf{57,600 \text{ Total Voltage}} \\ 4 \text{ Heaters} \times 500 \text{ W Each} &= \mathbf{2,000 \text{ Total Watts}} \\ 57,600 \div 2,000 \text{ W} &= \mathbf{28.8 \Omega (\pm 10\%)}\end{aligned}$$

Using an ohmmeter, check the value of the corresponding pins for each zone. If the measurements differ from the calculated value, then you'll need to check each individual heater within the zone as there may be an issue. To do this, you will need to calculate the heater ohms ( $\Omega$ ) of the individual heater:

$$\begin{aligned}\text{Ohm's Law: Ohms} &= \text{Voltage (V)} \times \text{Voltage (V)} \div \text{Watts (W)} \\ 240 \text{ V} \times 240 \text{ V} &= \mathbf{57,600 \text{ Total Voltage}} \\ \text{Divide the Total Voltage by the Heater's Wattage (500 W)} & \\ 57,600 \div 500 \text{ W} &= \mathbf{115.2 \Omega (\pm 10\%)}\end{aligned}$$

If your heater ohm reading differs from this value, verify that the installed heater has the correct voltage and wattage required (this information is engraved on the heater). If this information is correct, then the heater may be bad and should be replaced.

## Checking Electrical Connections to the Die System Zones

Whether you are installing a brand new die or feedblock, or one that's been recently refurbished or pulled from storage, it's important to ensure that all electrical components are in the proper position to function correctly. This process can be completed in a relatively short time and saves a lot of frustration later during start-up.

This procedure should be completed when your die or feedblock is at an ambient temperature. Starting from one end of the die, begin turning power on to one zone at a time. Once the temperature begins to climb for the activated zone (approximately 10°F), turn the power back off and move to the next zone to repeat the process.

While simple, this process ensures two things. First, you are confirming that the correct zone is heating once power is applied. Second, you are confirming that each thermocouple is installed in the correct location.

If you notice that a different zone is heating when power is applied, then there could be an issue related to wiring or thermocouple placement. If a zone does not turn on, check if there is a solid-state relay that needs to be replaced, if there is a fuse blown in the control panel, or if there is a loose or broken wire.