

Power cabinet Reference Manual

Tempress® Systems, Inc.
Power cabinet manual
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1. MAIN POWER CABINET

The main power cabinet is part of the Tempress Systems Inc. diffusion and conveyor furnace systems. It contains the main switch, a start and stop button an EMO-switch and all electrical facilities.

The main power cabinet distributes all electrical facilities to the desired tubes, gas cabinet and load station. The separate set-up provides instant overview and improved maintainability.

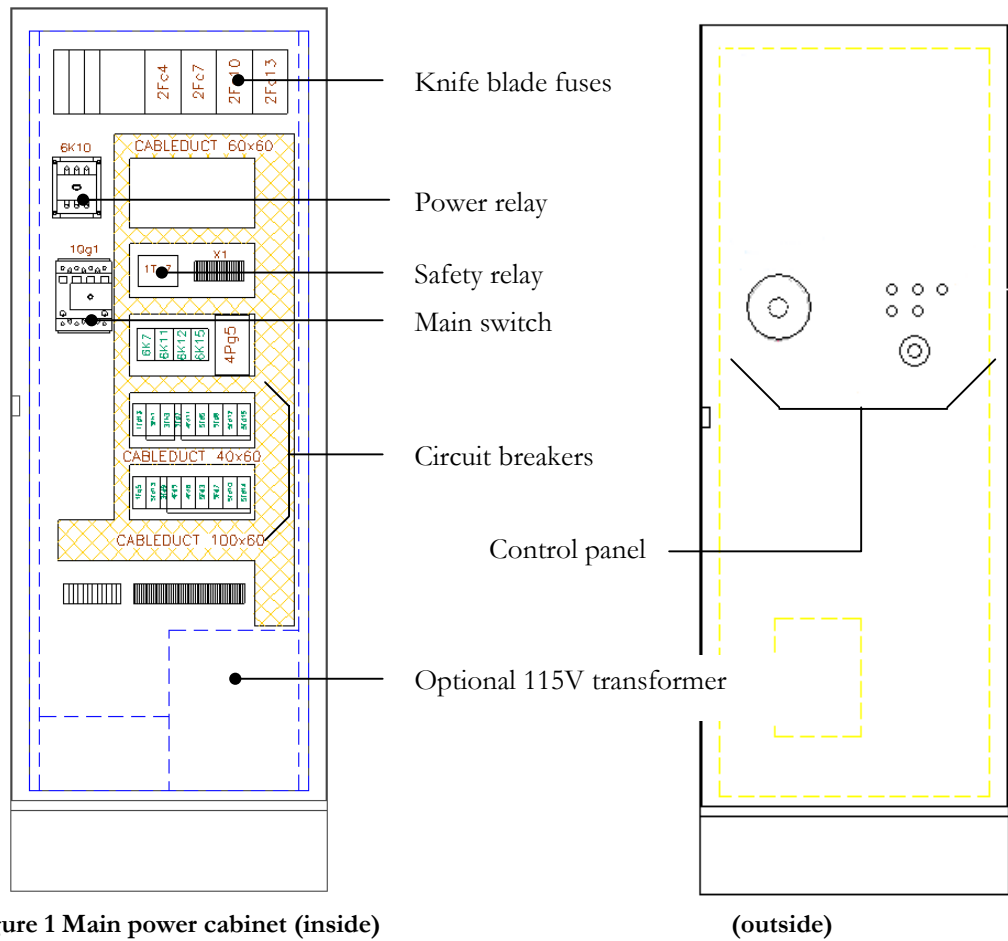


Figure 1 Main power cabinet (inside)

(outside)

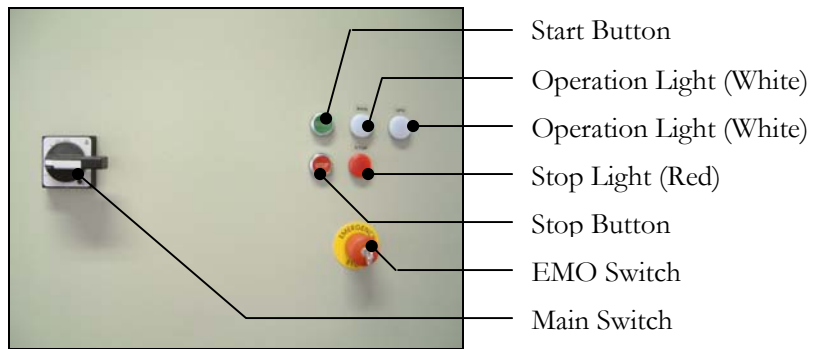


Figure 2 Control panel (Main power cabinet)

2. MAIN POWER CIRCUIT

The main power system is modular based and is prepared for a UPS connection. The UPS may be connected during the installation or at a later stage. The UPS connection is default bridged. Remove the bridge first, before connecting the UPS facilities.

Fans mounted on top of the furnace continue to remove heat to prevent overheating of the furnace only if they are connected to the UPS.

2.1 The safety relay

The heart of the EMO circuit is the Pilz PNOZ 16 safety relay. Heating power to the system is supplied by the power relay, which is controlled by the safety relay. The safety relay (1TG7) verifies if the EMO-switches are operational and the power relay is switched off.

The safety relay will switch off power at three points if an EMO-switch is activated:

- power relay (6K10)
- control power not connected to UPS (6K11)
- UPS connected control power relay (6K12)

The red 'Stop' light on the main power cabinet will indicate that some components are still connected to power.

2.1.1 Heating power

The heating power to the tube heating elements is switched by the power relay. The cables between the main power cabinet and the furnace are secured against short circuit by 'knife blade fuses'.

A subsequent manual power switch at tube level further supplies power to the heating element. This switch also has the protective features as, thermic and magnetic over current protection.

2.1.2 Control power

The control power not connected to the UPS is used for peripheral equipment such as external torches, bubblers, lights, boat loaders and loadstation fans.

Default these components are not connected to the UPS and will therefore be switched off should a power failure occur or an EMO-switch be activated.

2.1.3 UPS Control power

Equipment like the DPC and DTC, gas panels, sag detectors and even heating power can optionally be fed by a UPS system as long as the UPS system has sufficient capacity. This may save a process batch and bring the system into a safe condition automatically.

A UPS system with 3000VA capacity will keep a typical Tempress furnace system running for approximately 10 minutes. Consult Tempress for details.

2.2 Over-current protection

To protect the diffusion or conveyor furnace system against over-current the main power cabinet contains circuit breakers. Check the outline drawing for their exact location.

Additional circuit breakers are mounted in the furnace and load station section:

- in the mounting duct at tube level
- in the bottom of the load station, one each for the load station fans
- in the gas cabinet bottom, one each for the external torch

3. OPERATION

The main power cabinet has four operating modes, switch ON/standby, switch OFF, start and stop/standby.

The UPS system default feeds DPC's, DTC's, touch screens, gaspanels, excess temperature controllers, sag detectors and furnace fans and power will be present to those components as soon as and as long as the UPS facilities are activated.

3.1 Operating modes

3.1.1 Switch on

The UPS facilities must be switched on if available. To switch on the diffusion or conveyor furnace system the main switch on the main power cabinet needs to be switched into "I".

After switching the main switch into "I" the power cabinet comes in the "Standby" condition.

3.1.2 Standby

After switching the main switch into "I" the power cabinet comes in the "Standby" condition.

The red 'Stop' light will be ON to indicate some components already receive power. At this stage, the safety relay checks for the condition of the EMO-switches.

3.1.3 Start

To start the furnace the 'Start' button needs to be pressed.

The two white 'Start' lights will be ON as the safety relay activates the power relay.

3.1.4 Stop

To stop the furnace the 'Stop' button needs to be pressed.

The red 'Stop' light will be turned ON as the safety relay de-activates the power relay. The main power cabinet is returned to the Standby condition.

3.1.5 Switch off

To switch off the main power cabinet completely the main switch needs to be switched into "O". All electrical power will be removed except for the UPS connection.

3.2 Emergency situations

Two emergency situations may result in power loss. These are power failure and EMO-switch activation.

3.2.1 Power failure

A power failure lasting more than 10 seconds will trigger the undervoltage detection system, which will trip the main switch. All UPS connected components remain up. The electrical contacts of the main switch will remain open after the power has been restored.

3.2.1.1 Main Switch Reset procedure

A tripped main switch requires a manual reset.

1. First turn the main switch into the 'O' position,
2. then switch to 'I' to activate the main switch.
3. The main power cabinet has now returned into Standby mode.

A process batch may be saved depending on which components are connected to the UPS system and at which point in the process the power failure occurred.



WARNING

Never move the boatloader automatically or manually outside the tube during UPS operation. The loadstation fans will be switched off and possible fire hazard occurs due to overheated loadstation filters

3.2.2 EMO-switch activation

If an operator activates one of the EMO-switches the safety relay will bring the main power cabinet back into Standby mode. It switches off the power relay and all components that are not connected to the UPS system. All UPS connected components remain up. The EMO-switch must be reset with a key to allow the safety relay to verify the good condition and subsequently allow the system to be Started again, using the Start procedure 3.2.1.1.

A process batch may be saved depending on which components are connected to the UPS system and at which point in the process the EMO-switch activation occurred.