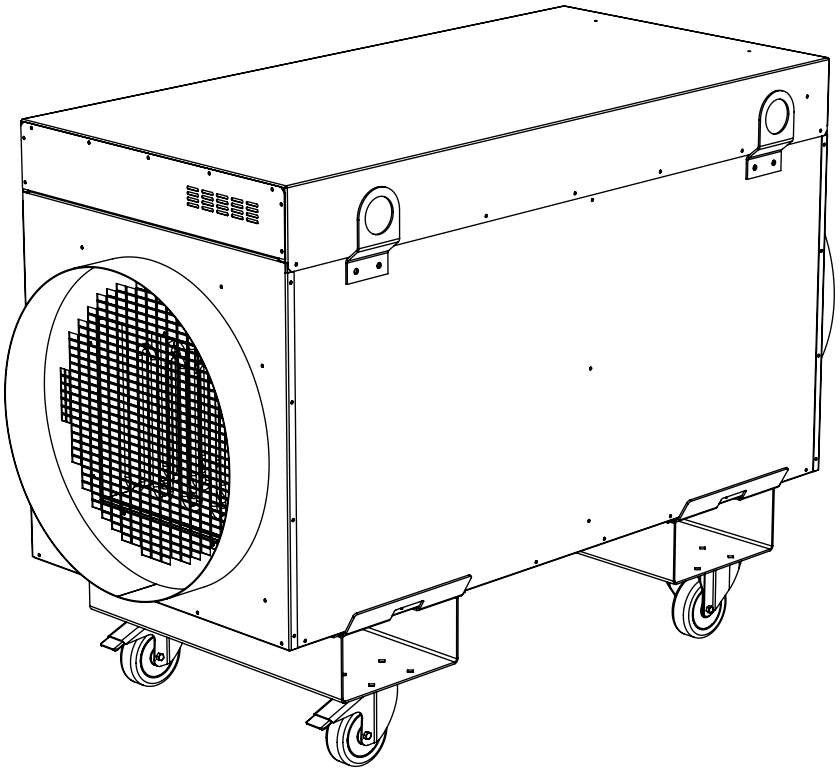
FF42



FF42-23
3 PHASE 400V ELECTRIC HEATER

PRODUCT MANUAL

TABLE OF CONTENTS

WARNINGS

These instructions should be read by:

The specifying engineer.
The installation engineer.
The user.
The service engineer.

- **Failure to follow these instructions may result in risk of personal injury or damage to the equipment.**
- **Damage due to a failure to follow these instructions will invalidate the warranty.**
- **The appliance must be commissioned & serviced by qualified engineers in compliance with local regulations.**
- **The appliance must be switched off and disconnected from the power supply before any work is carried out.**
- **There are no user controls inside the appliance casing.**
- **Do not cover the appliance.**
- **Do not use in the vacinity of a pool, bath or shower.**
- **An air gap of at least 300mm should be allowed at the rear of the unit to ensure a clear airflow. Do not site the unit close to soft fabrics or combustible materials. Do not obstruct the outlet grill.**
- **Allow the unit to cool by running fan only for a minimum of 5 minutes before switching off.**
- **Do not disconnect the appliance from the supply under load.**
- **For internal use only. Do not use out of doors.**
- **Extension cables should be correctly rated for the load,fully unwound and never run through water or over sharp edges.**
- **Ensure that locking castors are engaged before running the unit.**
- **This unit can operate with a maximum of 20m of 500mm duct. Ducting should be kept as taught and straight as possible. (See P8)**
- **The machine is phase rotationally sensitive.**
- **This is a class 1 product and requires an Earth connection.**
- **Warning! Fan liable to start without warning.**
- **Do not use this appliance with plastic ducting.**
- **Do not operate this unit with fixings or panels missing.**

TECHNICAL SPECIFICATIONS. FF42-23	
Heating capacity.	42kW
Power supply.	400v. 3P+N+E. 63A. 50Hz.
Maximum running current.	61A
Airflow.	3956 m_3h
Weight .	111 kg
Noise level at 3M.	68 dB(A)
IP Rating.	IP20
Maximum operating temperature.	40 ºC +/- 3ºC
Maximum ducting length (500mm duct) See P8.	20m
Temperature rise at 24 ºC ambient. (Nominal)*	57 ºC

* Readings taken at centre of outlet grill at 150mm.

Standards applied:

BE EN 12100. 2010.
BS EN 60335-1. 2012.
BS EN 60335-2. 2009.
BS EN 61000.

MACHINE AND INSTRUCTION ICONS	
	Important information
	Warning. In order to avoid overheating, do not cover the heater.
	Safety limit thermostat.
	Fan on/off
	Heat setting I. Low heat. 17kW
	Heat setting II. Full heat. 42kW
	Thermostat. (Onboard)
	Thermostat. (Remote)
	Emergency stop button
	Power supply fault warning lamp.
	Read the manual.
	Risk of electric shock. Isolate from power supply before removing cover.

Specifications:

The FF42-23 is an 42kW 3 phase industrial electric fan heater.

The appliance is connected to a 400v 63Amp 3P+N+E 50Hz (The Neutral is unused) power supply and comes fitted with the appropriate 5 pin plug. This appliance requires an Earth connection.

The FF42 is fitted with a high performance forward curved fan which will allow it to operate with up to20m of 500mm duct. (See P8)

The FF42 is fitted with an on-board thermostat as standard. It is also supplied with a remote thermostat socket for the fitting of an optional remote thermostat. (See P7)

The FF42 is supplied with locking castors to the front of the machine.

Setup and operation:

To start:

- **Please note ! the control panel is at the rear of the appliance. (See P9)**
- **Site the appliance on a firm level surface and apply the castor brakes. Do not operate the unit without applying the brakes.**
- **Connect the machine to the appropriate power supply. Ensure the plug is pushed fully home and the locking ring is engaged.**
- **The fan motor is phase rotationally sensitive. The machine is fitted with a phase failure relay to prevent operation should the power supply phases be out of sequence or in a fault condition. In the event of a supply problem the power supply fault warning lamp will illuminate. (See P9 &11)**
- **Turn the rotary switch to 'Fan only' and press the yellow 'Start' button to start the fan motor.**
- **Turn the rotary switch to either low heat (17kW) or full heat (42kW).**
- **Set the thermostat to the desired temperature. Ensure the thermostat selector switch is set to 'On-board thermostat' or 'Remote thermostat' if one is fitted. (See P4&9)**

To stop:

- **Turn the rotary switch to 'Fan only' and allow the fan to run for a <u>minimum of five minutes</u> to cool the machine. Failure to follow this procedure will damage sensitive components and invalidate the warranty.**
- **Turn the rotary switch to '0' when the heat has dissipated. Do not use the emergency stop button to routinely turn the machine off.**
- **If the heat has not fully dissipated the fan may 'run on' automatically. It may take a few minutes to sufficiently cool the machine.**
- **If the heater is not in regular daily use disconnect from the power supply.**

Heating a room or enclosure to temperatures above 40˚C:

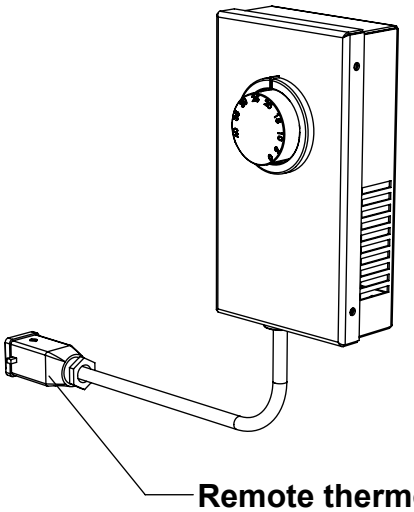
The FF42 uses thermal protective devices that will shut the machine down if operated in an ambient temperature above 40˚C.

To heat a room or enclosure to temperatures exceeding 40˚C it will be necessary to site the unit outside of the area and duct the hot air in. The ducting should be kept as short as possible and insulated duct is recommended.
To control the temperature above 40˚C a high temperature remote thermostat should be used. These can be supplied as an optional extra.

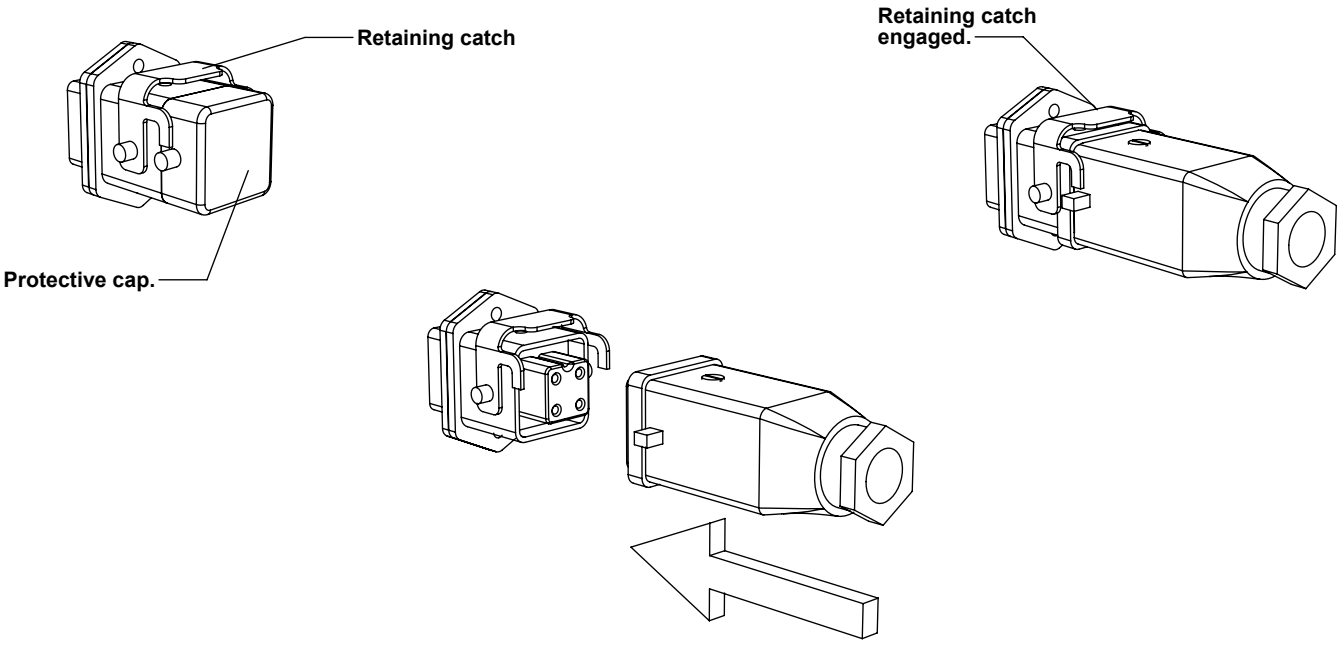
Using the remote thermostat:

- **Set the thermostat selector switch to 'Remote thermostat'. (See P9).**
- **Lift the retaining catch and remove the protective cap from the remote thermostat socket. The thermostat socket is located on the control panel at the rear of the machine.**
- **Fit the remote thermostat plug to the socket and secure in place with the retaining catch.**
- **The remote thermostat is now ready for use.**
- **Always refit the protective cap when not in use.**

Remote thermostat:

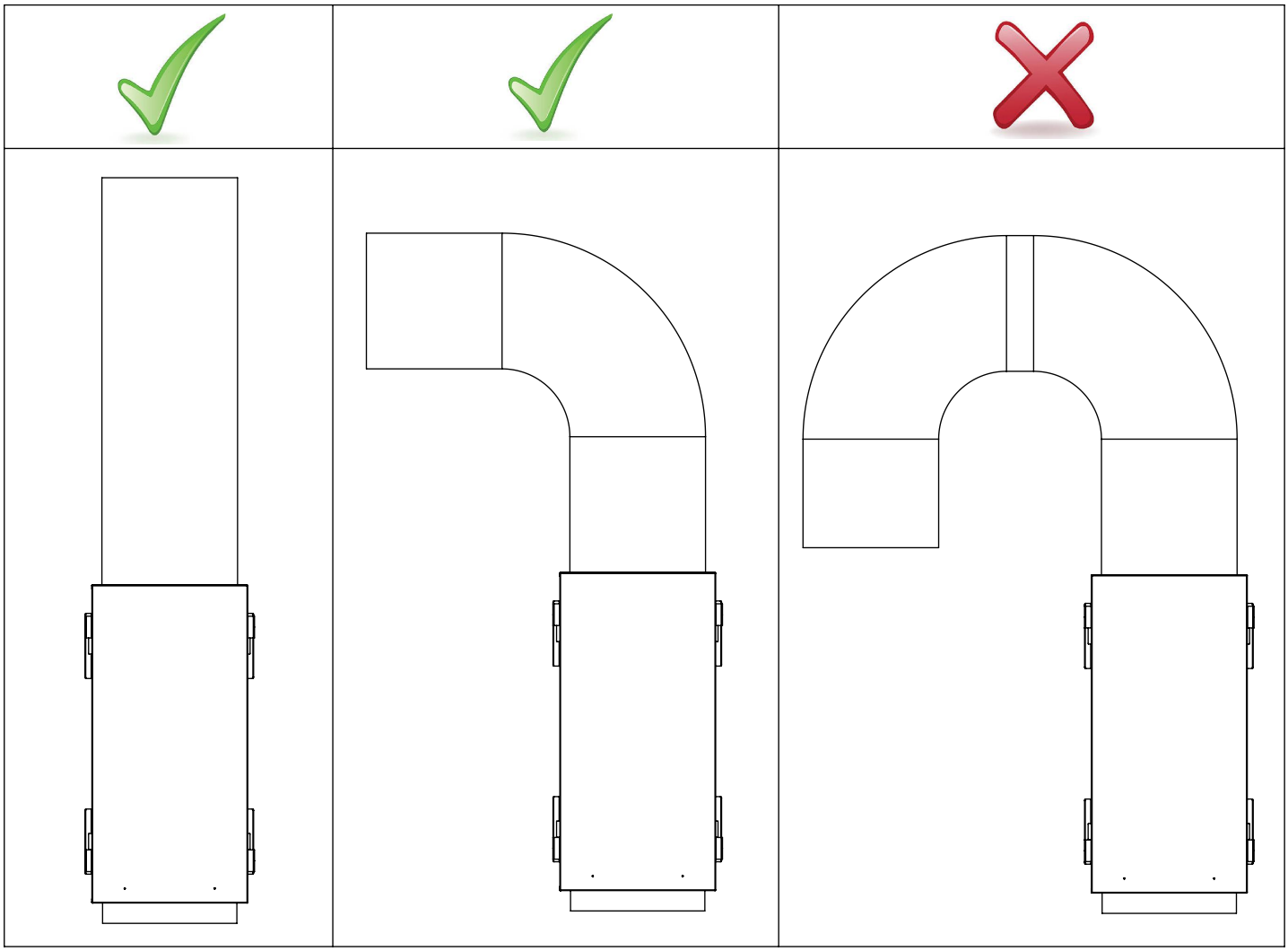


Remote thermostat socket::



Using flexible ducting:

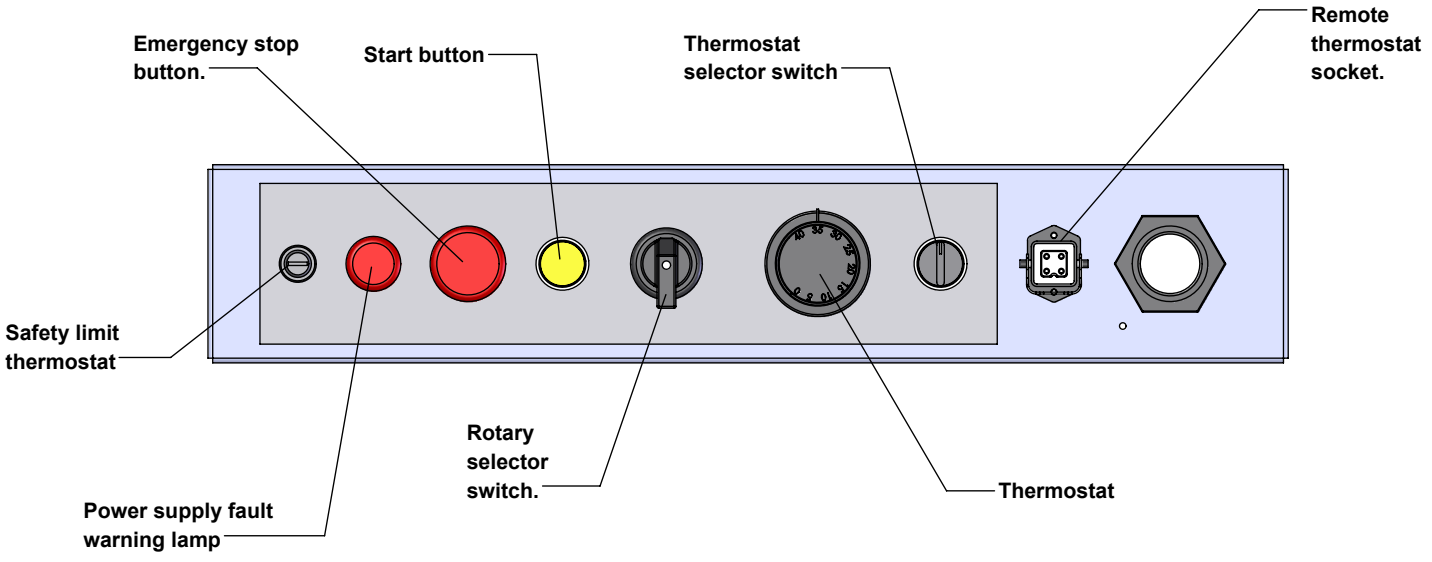
- This appliance is designed to be operated with a maximum flexible duct length of 20m. Duct can be fitted to the air inlet and outlet at the same time but the total maximum length must not be exceded. A maximum of 10m can be fitted to the inlet side of the machine.
- 500mm ducting should be fitted. Do not use reducers.
- Aluminium foil or high temperature duct is recommended. Do not use plastic flexible duct.
- Always keep duct lengths to a minimum.
- Always keep duct runs as straight as possible.
- Poorly run flexible ducting can cause overheating of the machine. Do not run ducting through 180 degrees.



Protective /safety devices:

- The FF42 is fitted with a safety limit thermostat. This is a fail-safe device. Should the maximum design operating temperature be exceeded it will shut down the heater contactors (The fan will continue to run). This device requires a manual reset and should only operate in the event of a fault. Any activation of this safety device should be investigated by a competent engineer. (See P10)
- The FF42 is fitted with limit thermostats. Should the maximum operating temperature be exceeded they will shut down the heating elements and leave the fan running. These devices will automatically reset once the temperature falls to an acceptable level.
- The machine is fitted with an automatic fan run-on thermostat. If the machine is shut down without running on fan only for 5 minutes to cool down, this device will activate and allow the fan to keep running. This should not be used to routinely shut down the machine.
- The FF42 is fitted with an 'Emergency stop' button. This should not be used to routinely shut down the machine.
- The FF42 is fitted with a phase failure relay. In the event of a power supply problem the Power supply fault lamp will illuminate. (See P11)

Rear view. Control panel:

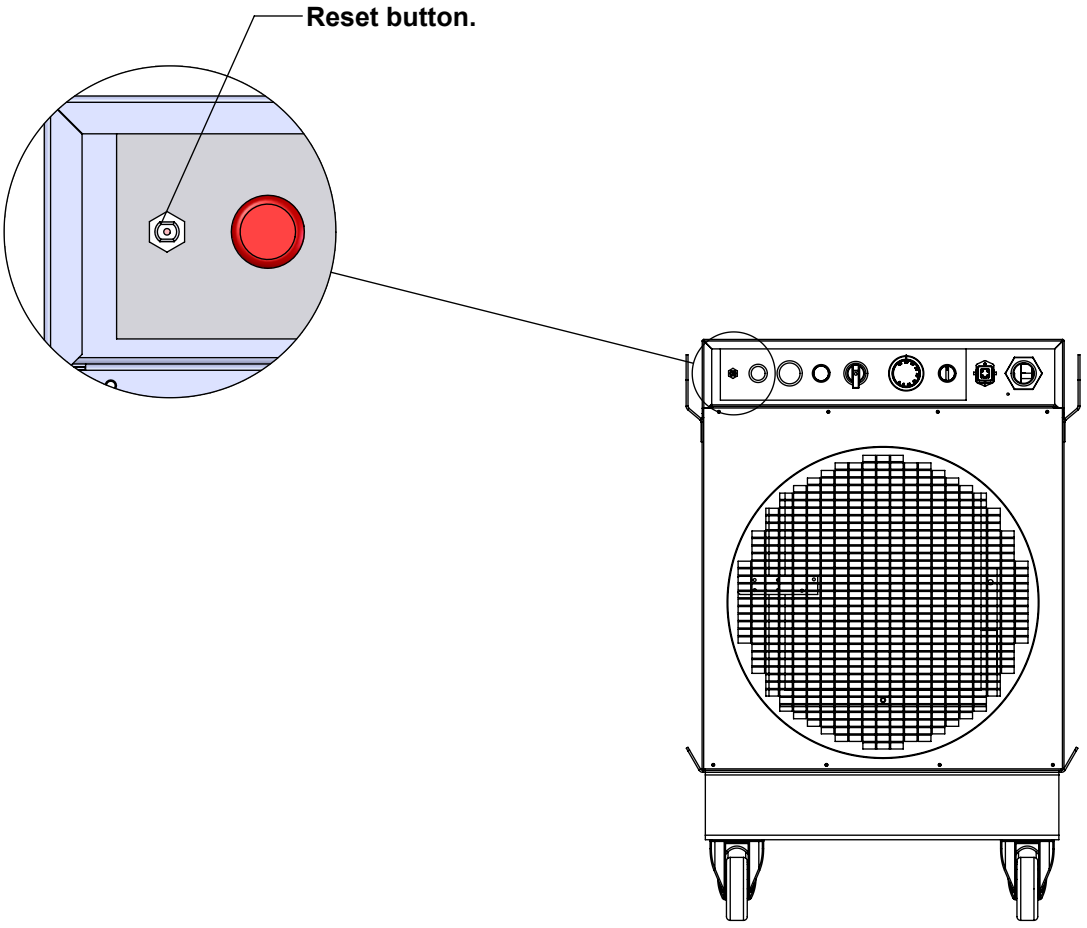


Safety limit thermostat:

Checking and resetting the safety limit thermostat:

Should the safety limit thermostat activate the causes should be investigated.

- **Remove the black plastic screw cover from the safety limit thermostat.**
- **If the reset button is noticeably pronounced the reset has activated.**
- **To reset the thermostat press the reset button. Allow the machine to fully cool down before resetting.**
- **Always replace the screw cap after resetting.**



Phase failure relay:

Should the power supply fault warning lamp illuminate investigation will be required by a qualified electrician. Under no circumstances should untrained operatives carry out this testing.

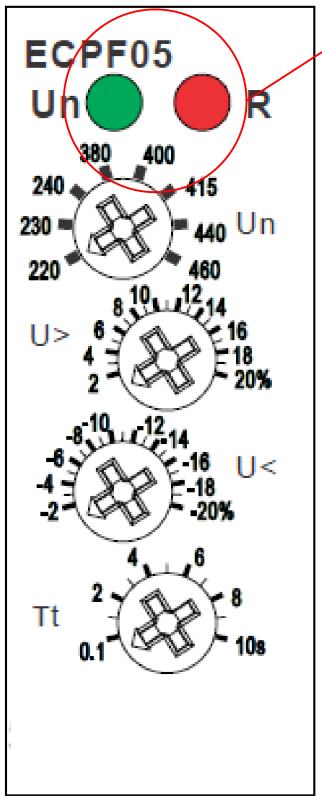
The phase failure relay will prevent operation of the machine for the following faults:

1: Phase sequence incorrect.

2: The loss of a supply phase.

3: Low or high supply voltage.

The fault can be identified by inspection of the relay when the machine is connected to the power supply. See below for the phase failure relay fault codes.



Phase failure relay

Fault code lamps:

1: Both lamps illuminated. Normal operation.

2: Green lamp only illuminated. Voltage high/ low.

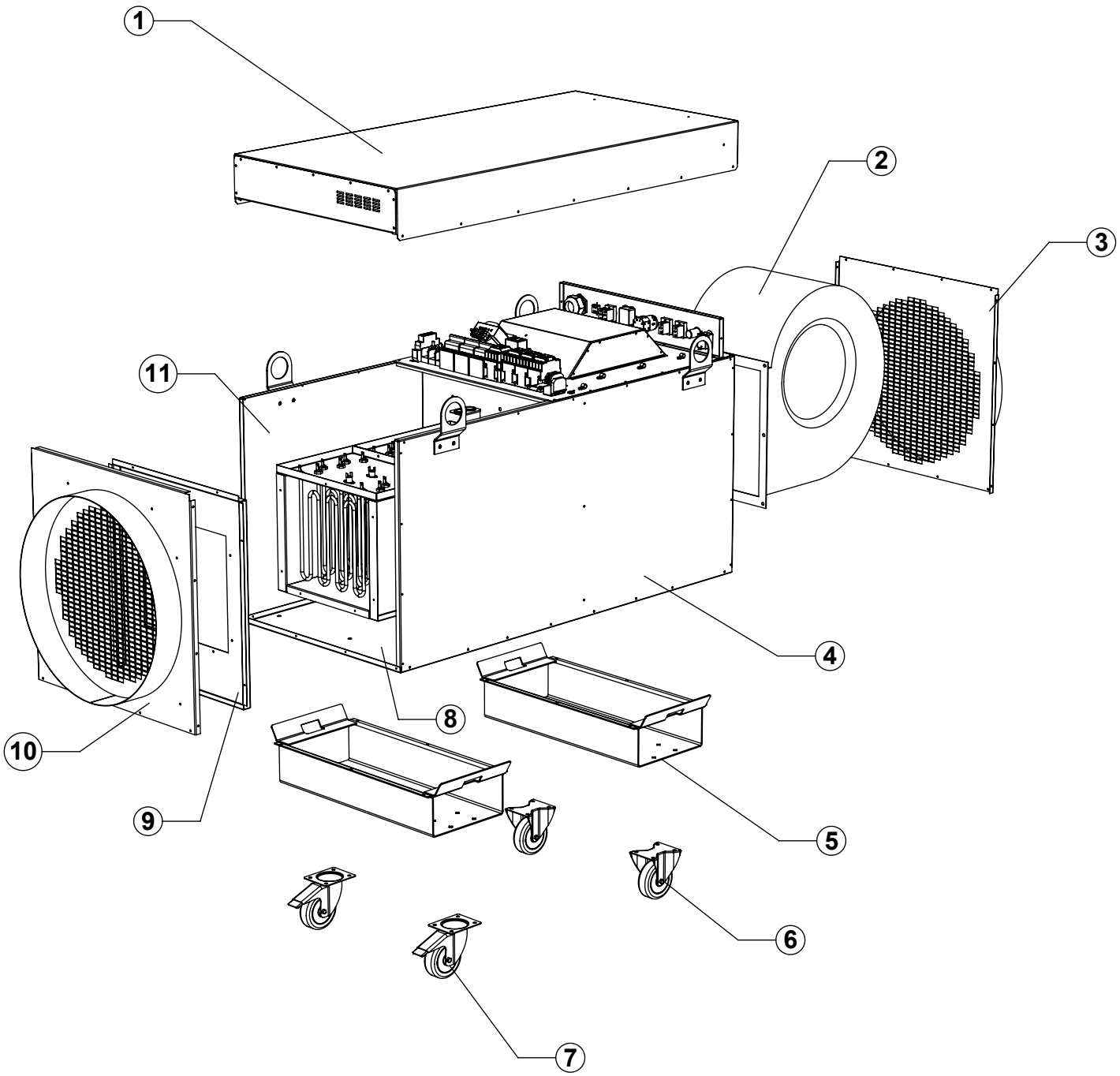
3: Green lamp flashing. Phase sequence incorrect.

4: No lamps illuminated. Phase loss.

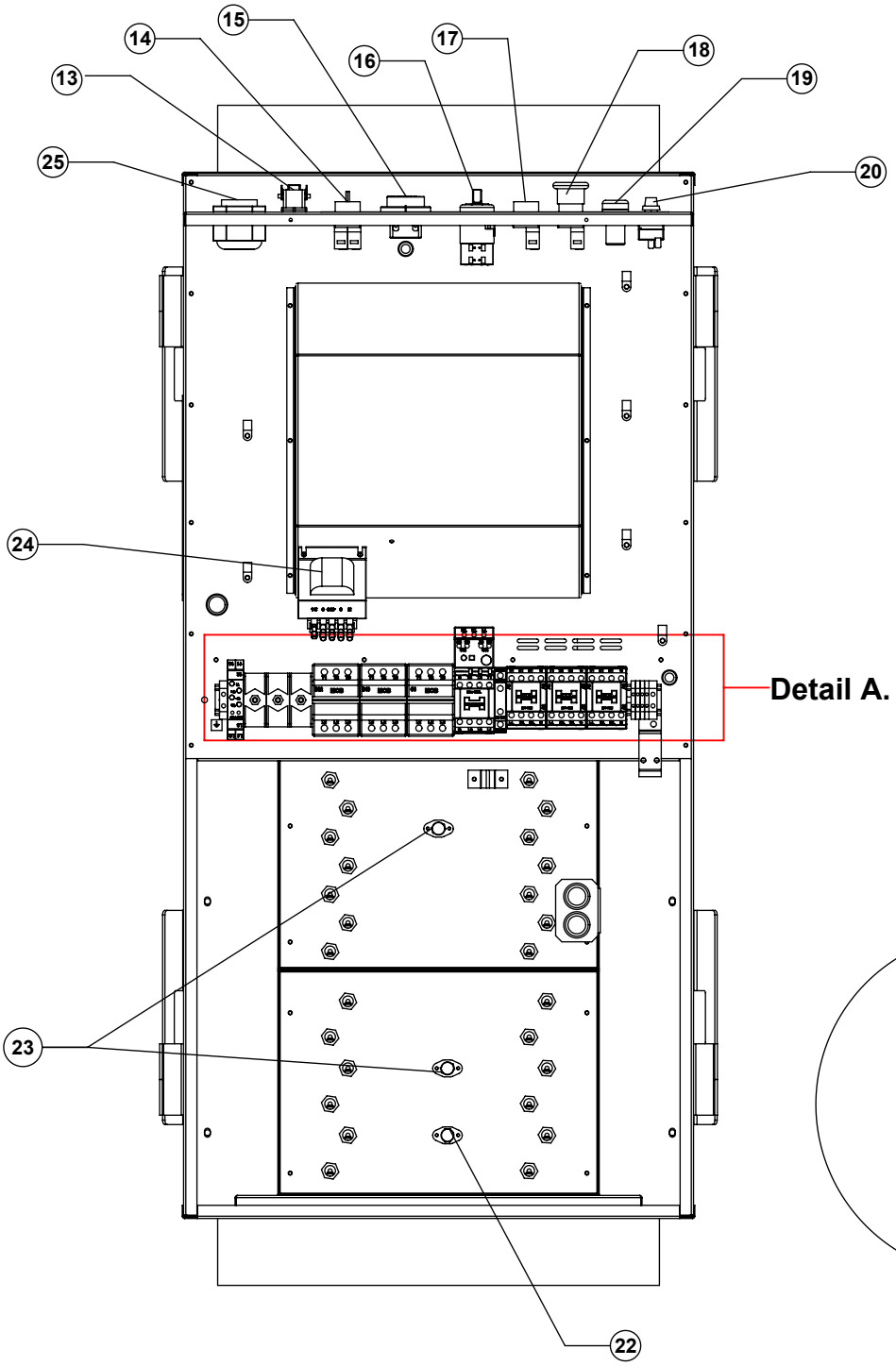
Phase failure relay settings:

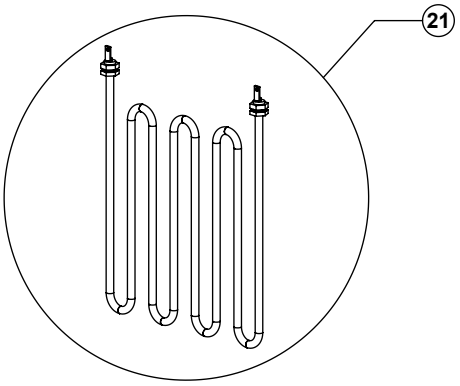
1: Un--- 400
2: U>--- 10%
3: U<--- 10%
4: Tt---- 4

Exploded drawing:

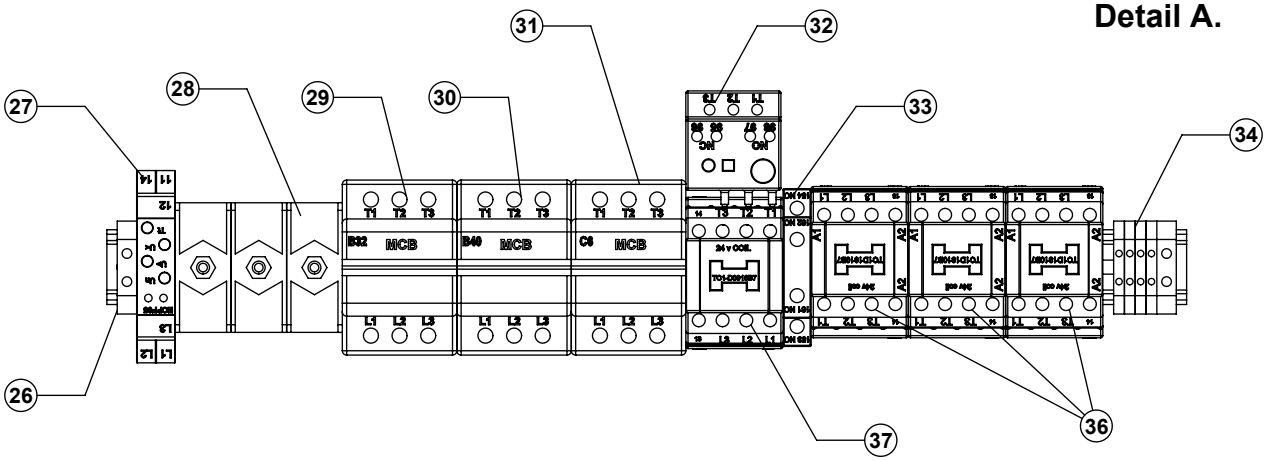


Exploded drawing cont'd:





Detail A.



Spare parts:

Drawing No	Description	Part No
1	Top panel assembly	BW010215
2	Forward curved fan assembly. 12/9.	FA010315
3	Rear panel assembly	BW010712
4	Right side panel	BW010316
5	Forklift pocket assembly	BW040520
6	100mm Fixed castor	ME010221
7	100mm Swivel castor	ME010220
8	Base panel	BW011006
9	Galvanised metal set	BW040522
10	Front panel assembly	BW010623
11	Left side panel	BW010412
12	Lifting eye	BW040521
13	Remote thermostat socket.	EL020523
14	2 Position rotary switch (Thermostat selector switch)	EL030141
15	Thermostat c/w knob & bezel.	EI030409
16	4 Position rotary switch	EL030129
17	Start button assembly	EL030137
18	Emergency stop button assembly	EL030136
19	Warning lamp. 22.5mm. 24Vac	EL030714
20	Safety limit thermostat.	EL030417
21	Heating element. 230v. 2650w	HE010113
22	50 Degree thermal cut-out. N/O	EL010312
23	70 Degree thermal cut-out. N/C	EL010311
24	Transformer. 50VA. 400v-24v isolating.	EL030618
25	M40 cable gland with lock-nut.	ME040208
26	DIN rail end stop.	EL020403
27	Phase failure relay.	EL030212
28	M6 stud terminal	EL020420
29	MCB. 32A. 3 pole. Type B.	EL010209
30	MCB. 40A. 3 pole. Type B.	EL010231
31	MCB. 6A. 3 pole. Type C.	EL010227
32	Fan overload. 1.6-2.5A.	EL010224
33	Auxiliary contact.	EL030810
34	DIN terminal. 2.5mm.	EL020421
35	N/A	
36	Contactor. 32A. 24vac coil.	EL010225
37	Contactor. 9A. 24vac coil.	EL010226
38	Mains cable assembly. (Not shown).	EL020118

Maintenance:
Always isolate the machine from the power supply before Carrying out any maintenance.

Fan motors, elements and switch gear are not customer serviceable components. General maintenance should include regular inspection of:

1: Mains cable. Check for signs of damage to the insulation. Replace if necessary.
2: Air intake & outlet grills: ensure grills are free from accumulated debris. blow out with compressed air if required.
3: Fixings: Check all fixings are present and secure.

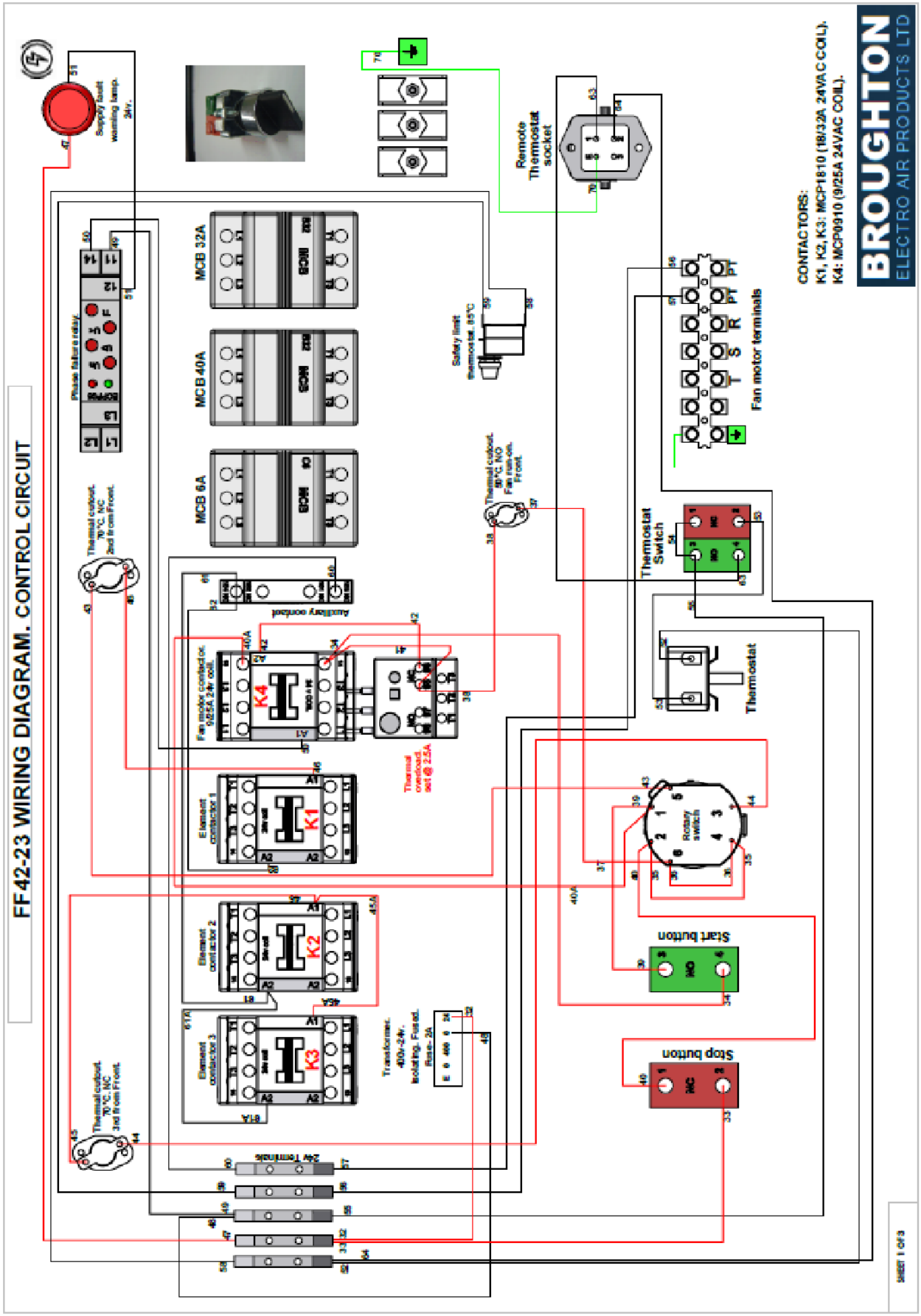
Maintenance carried out by a competent person:

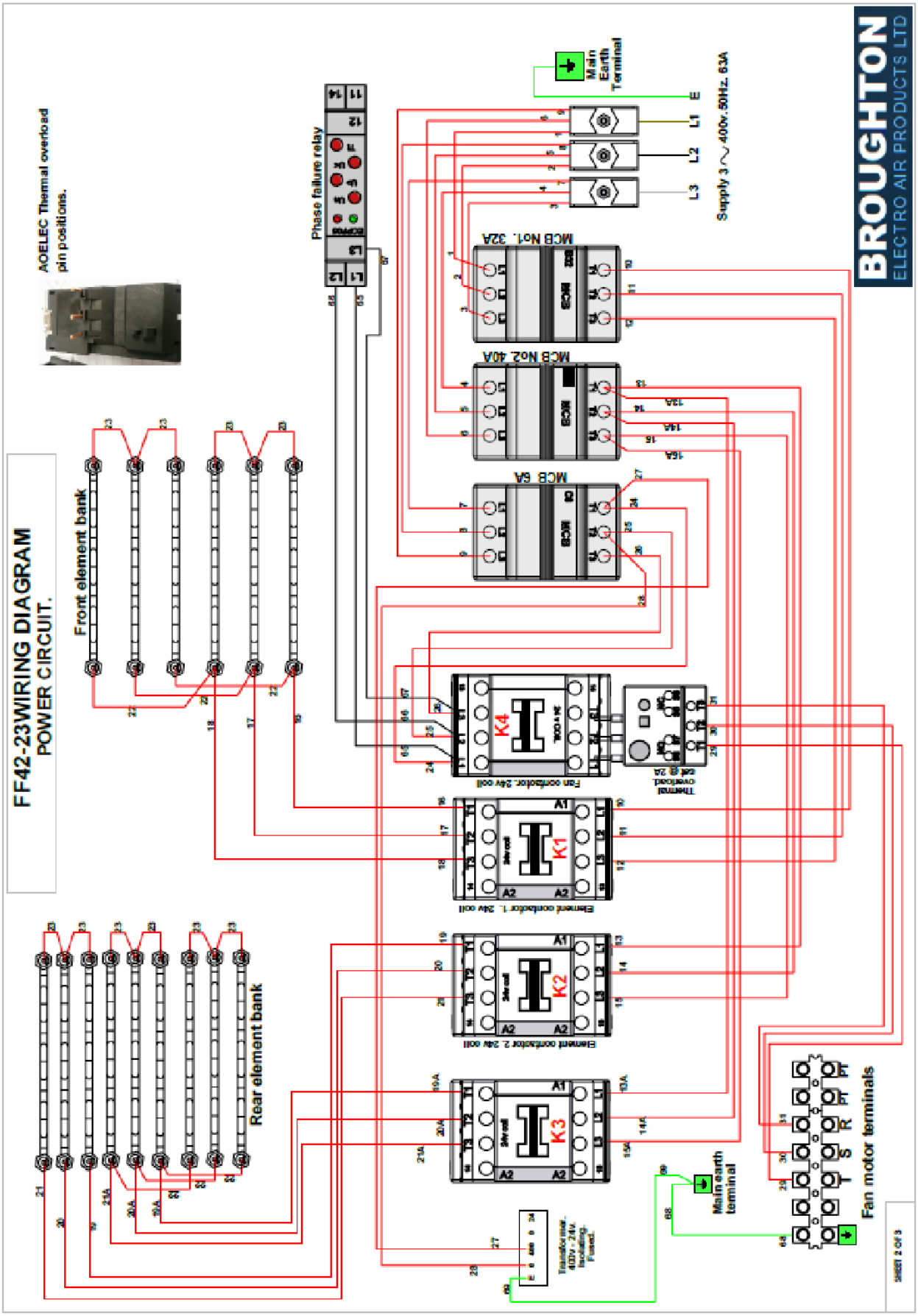
1: Internal cables should be inspected for signs of heat damage and replaced when necessary.

2: All cable connections should be regularly checked and tightened. Particular attention should be paid to the connections at the contactors and circuit breakers.

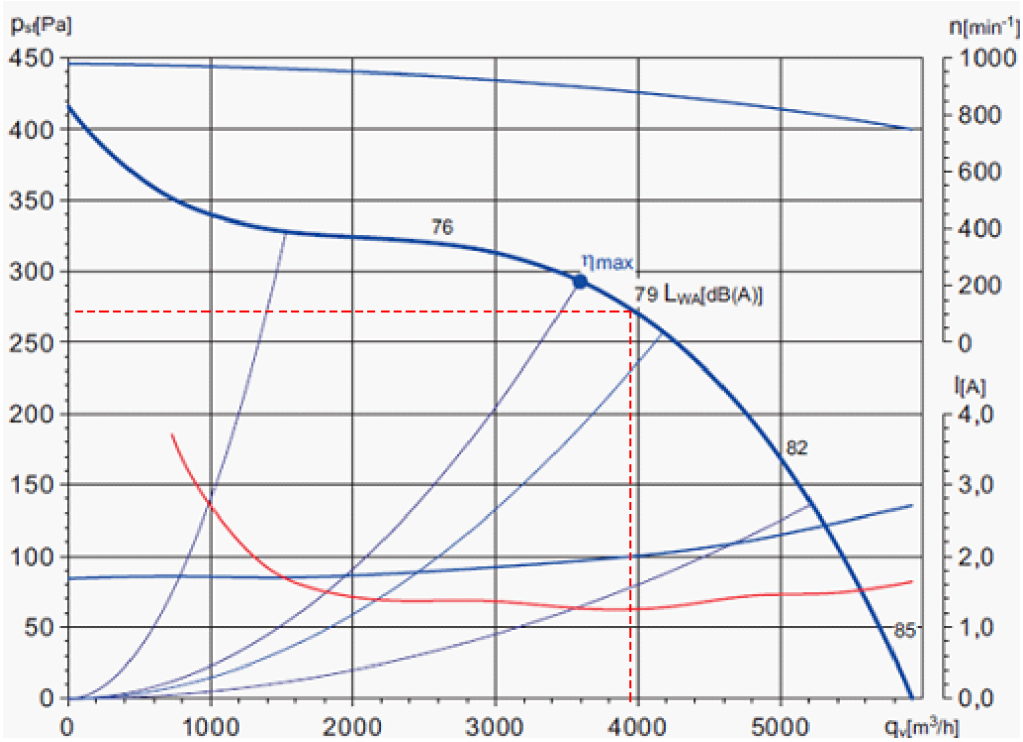
3: Regularly check the contactors for signs of heat. Replace if necessary.

FAULT	POSSIBLE CAUSE	SOLUTION
NO HEAT OUTPUT.	FANS AND OR HEATING NOT SWITCHED ON.	CHECK ALL SWITCHES ARE ON.
	THERMOSTAT INCORRECTLY SET.	TURN THERMOSTAT KNOB FULLY CLOCKWISE.
	POWER SUPPLY INTERRUPTED.	CHECK POWER SUPPLY.
	FAULTY ROTARY SWITCH.	CHECK SWITCH AND REPLACE IF NECESSARY.
	FAULTY THERMOSTAT.	CHECK THERMOSTAT AND REPLACE IF NECESSARY.
	FAULTY CONTACTOR.	CHECK CONTACTOR AND REPLACE IF NECESSARY.
REMOTE THERMOSTAT NOT SWITCHING THE HEATING ELEMENTS	THERMOSTAT SELECTOR SWITCH INCORRECTLY SET	(SEE P 5&9)
	REMOTE THERMOSTAT PLUG INCORRECTLY FITTED	GO THROUGH FITTING STEPS ON P7.
SAFETY LIMIT THERMOSTAT HAS ACTIVATED	AMBIENT ROOM TEMPERATURE TOO HIGH	DO NOT OPERATE IN AN AMBIENT TEMPERATURE ABOVE 40ºC.
	EXCESSIVE DUCT LENGTH OR POORLY ROUTED DUCTING	SHORTEN DUCT LENGTH OR RE-ROUTE
	FAN MOTOR FAILURE	TEST FAN MOTOR AND REPLACE IF REQUIRED.
	CORRECT SHUTDOWN PROCEDURE NOT FOLLOWED	ALLOW THE MACHINE TO FULLY COOL AND FOLLOW CORRECT SHUTDOWN PROCEDURE. (SEE P4)
	FAILED SAFETY LIMIT THERMOSTAT	THE SAFETY LIMIT THERMOSTAT IS A FAIL-SAFE DEVICE. CHECK THE CAPILLARY TUBE AND BULB FOR SIGNS OF DAMAGE. REPLACE IF REQUIRED.
FAN MOTOR NOT RUNNING.	POWER SUPPLY INTERRUPTED.	CHECK POWER SUPPLY.
	FAN MOTOR OVER HEATED	THE FAN MOTOR HAS A HIGH TEMPERATURE PROTECTIVE DEVICE FITTED INTO THE WINDINGS. ALLOW THE MACHINE TO FULLY COOL AND ATTEMPT TO START.
	FAULTY ROTARY SWITCH	REPLACE ROTARY SWITCH
TEMPERATURE RISE INSUFFICIENT.	THE MACHINE SHOULD DELIVER A TEMPERATURE RISE OF APPROXIMATELY 57ºC AT AMBIENT TEMPERATURE OF 24ºC. SHOULD THE MACHINE FAIL TO DO THIS CHECK THE POWER SUPPLY AND THAT THE THERMOSTAT IS TURNED FULLY CLOCKWISE. IT SHOULD BE NOTED THAT THE MAXIMUM AMBIENT TEMPERATURE THE MACHINE WILL RUN AT IS 40ºC +/- 3ºC. ABOVE THIS THE HEATING ELEMENT CONTACTORS WILL NOT OPERATE.	


FF42-23 WIRING DIAGRAM. CONTROL CIRCUIT
BROUGHTON
ELECTRO AIR PRODUCTS LTD
CONTACTORS:
K1, K2, K3: MCP1610 (18/32A 24VAC COIL).
K4: MCP0910 (9/25A 24VAC COIL).
Supply fault warning lamp. 24v.
Remote Thermostat socket
MCB 32A
MCB 40A
MCB 6A
Phase failure relay
Safety limit thermostat. 85°C
Thermal cutout. 70°C N/C 2nd from Front.
Thermal cutout. 85°C N/O Fan non-ex. Front
Fan motor terminals
Thermostat Switch
Thermostat
Auxiliary contact
Fan motor contactor. 9/25A 24v coil.
Thermal overload. set @ 25A
Element contactor 1
Element contactor 2
Element contactor 3
Rotary switch
Start button
Stop button
Transformer. 400v-24v. Isolating. Fused. Rose - 2A
24v Terminals
SHEET 1 OF 3


BROUGHTON
ELECTRO AIR PRODUCTS LTD
FF42-23WIRING DIAGRAM
POWER CIRCUIT.
AOELEC Thermal overload pin positions.
Phase failure relay
Main Earth Terminal
Supply 3 ~ 400v. 50Hz. 63A
L1
L2
L3
E
MCB No1. 32A
MCB No2 40A
MCB 6A
Front element bank
Rear element bank
Fan contactor. 24v coil
Thermal overload set @ 24
Element contactor 1. 24v coil
Element contactor 2 24v coil
Transformer. 400v - 24v. Isolating. Fused.
Main earth terminal
Fan motor terminals
K1
K2
K3
K4

Airflow characteristics:



Operating point with 1.5m 50mm ducting.