Fault Investigation Manual

Surescan SR
Power Converter

L45SR, L75SR, L120SR

GB DL0062AA - Draft 3 - 06/2007

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Contents

1 Safety

1.1 General

1.1.1 Most accidents which occur during the operation and maintenance of machinery are the result of failure to observe basic safety rules or precautions. An accident can often be avoided by recognising a situation that is potentially hazardous.

1.1.2 When handling, operating or carrying out maintenance on the unit, personnel must use safe engineering practices and observe all relevant local health and safety requirements and regulations. The attention of users in the UK is drawn to the Health and Safety at Work Act, 1974, the Regulations of the Institution of Electrical Engineers and the Pressure Systems and Transportable Gas Container Regulations 1989.

1.1.3 CompAir cannot anticipate every possible circumstance which might represent a potential hazard. The WARNINGS in this manual are therefore not all-inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by CompAir he must ensure that the unit will not be damaged or made unsafe and that there is no risk to persons or property.

1.1.4 The standard builds of all CompAir products are not intended for use in either explosive or potentially explosive atmospheres as defined in Directive 94/9/EC. An explosive atmosphere is a mixture with air, under atmospheric conditions, of flammable gases, vapours, hazes or dust in which, after ignition has occurred, combustion propagates to the entire unburned mixture and may cause a hazard. A potentially explosive atmosphere is an atmosphere which could become explosive due to local conditions.

1.1.5 Failure to observe the precautions given under ‘Safety Procedures’ may be considered dangerous practice or misuse of the compressor unit.

1.2 Warnings, Cautions And Notes

1.2.1 Warnings

Warnings call attention to operations or procedures involving specific hazards which could cause injury or death and are identified by the following symbols on the unit and in the text of the manual.

WARNING: RISK OF DANGER

WARNING: RISK OF ELECTRIC SHOCK

WARNING: RISK OF HOT SURFACES

WARNING: CONSULT MANUAL

WARNING: RISK OF HIGH PRESSURE

WARNING:
ENTRY DELAY –
ENERGISED
CAPACITORS

1.2.2 Cautions

Incorrect operational procedures causing possible damage to the compressor unit are identified by a ‘CAUTION’ in the text of this manual.

1.2.3 Notes

Methods to make the job easier and points which require particular attention are identified by a ‘Note’ in the text of the manual.

1.3 General Safety Precautions

If using compressed air for cleaning purposes, ensure safety regulations are complied with and appropriate clothing and eye protection is worn.

Never direct compressed air onto your skin or at other people.

Never use compressed air to clean loose dirt from clothing.

Before releasing compressed air through a hose make sure that the free end is held securely so that it cannot whip and cause injury.

Avoid injury by using a hoist to lift heavy loads. Check that all chains, hooks, shackles and slings are in good condition and are of the correct capacity. They must be tested and approved according to local safety regulations.

Cables, chains or ropes must never be applied directly to lifting eyes. Always use an appropriate shackle or hook, properly positioned. Arrange lifting cables so that there are no sharp bends.

Use a spreader bar to avoid side loads on hooks, eyes and shackles.

When a load is on a hoist stay clear of the danger area beneath and around it. Keep lifting acceleration and speed within safe limits and never leave a load hanging on a hoist for longer than is necessary.

1.4 Installation Precautions

Installation work must only be carried out by competent personnel under a qualified supervisor.

Correctly sized supply cables and a fused isolating switch must be fitted between the main power supply and the compressor.

Ensure that air drawn into the air intake will not be contaminated with flammable fumes or vapours, since this could cause an internal fire or explosion.

Precautions must be taken to ensure that no injury is caused to passers-by through loose clothing being sucked into the air intake.

Ensure that the air delivery pipe from the compressor to the user's pipework or receiver is free to expand and that no flammable material is within the vicinity.

A shut-off valve must be fitted in the delivery air line to enable the compressor unit to be isolated. This is particularly important if more than one unit is to be coupled in parallel or connected to an existing air supply system.

The minimum pressure/non-return valve is not intended as an isolating valve and should not be relied upon for this purpose. In addition, it may be necessary to install shut-off valves elsewhere in the system to allow a dryer or other equipment to be by-passed.

A pressure relief valve must be installed between any compressor unit and the shut-off valve/s. A pressure relief valve is fitted on the reclaimer vessel as standard equipment.

A pressure relieving device must be fitted to every pressure vessel, or equipment containing air at above atmospheric pressure, when installed downstream of the unit.

1.5 Operational Precautions

The compressor unit must only be operated by competent personnel under a qualified supervisor.

Do not run the compressor with doors open or covers removed except when checking reclaimer operation.

Never remove or tamper with the safety devices, guards or insulation materials fitted to the unit.

The compressor must only be operated at the supply voltage and/or frequency for which it is designed

On a unit equipped with an Automatic Start/Stop system, attach a sign stating **'THIS UNIT MAY START WITHOUT WARNING'** next to the display panel.

On a unit equipped with an Automatic Restart device, attach a warning notice stating **'THIS UNIT HAS BEEN MODIFIED AND WILL START AUTOMATICALLY ON APPLICATION OF POWER'** next to the display panel and on the inside of the unit next to the starter contactors.

If the unit is equipped with a Remote Control device, attach warning notices stating **'THIS UNIT CAN BE STARTED REMOTELY'** in prominent locations, one on the outside of the unit, the other inside the control compartment.

As a further safeguard, take adequate precautions to make sure there is no one

checking or working on the unit before attempting to switch on remotely controlled equipment. Attach a **'CHECK THAT ALL PERSONNEL ARE CLEAR OF THE unit BEFORE STARTING'** or similar warning notice to the remote start equipment.

During normal operation no internal part of the compressor unit should reach a temperature above 120°C and protection devices are fitted to prevent excessive temperatures occurring.

If there is any indication that the compressor is overheating it must be shut down and the cause investigated. Beware of burns from hot metal parts or hot oil when working on a unit which has recently been shut down.

The compressor must not be operated at pressures above the nominal pressure given on the data plate.

The compressor must not be operated in ambient temperatures outside of those given under 'Leading Particulars'.

The 'Noise at Work Regulations 1989' suggest that ear protectors should be worn where noise levels are 85 dB(A) or higher. With all covers in place, the noise levels of the compressors described in the manual are substantially lower than this figure unless installed in an already noisy environment.

Be aware that high noise levels can interfere with communication.

1.6 Maintenance and Repair Precautions

WARNING

- Before opening the door of the power converter compartment, switch the power supply OFF at isolator and wait for 12 minutes to allow the dc link capacitors to discharge to a safe level. Check that the dc link capacitors have fully discharged before starting work on the compressor.

Maintenance, repairs or modifications must only be carried out by competent personnel under a qualified supervisor

Lethal voltages are present in the electrical circuits and extreme caution must be exercised whenever it is necessary to carry out any work on the electrical system.

If replacement parts are needed use only CompAir Genuine Parts.

Do not open the starter compartment or touch electrical components while voltage is applied unless it is necessary for measurements, tests or adjustments. Such work should be carried out only by a qualified electrician equipped with the proper tools and wearing appropriate body protection against electrical hazards.

Before removing any panels from the enclosure, if fitted, or dismantling any part of the unit, carry out the following preparatory operations:-

a) Isolate the compressor unit from the main electrical power supply. Lock the isolator in the 'OFF' position and remove the fuses.

b) Attach a label to the isolator switch and display panel carrying the warning **'WORK IN PROGRESS – DO NOT APPLY VOLTAGE'** Do not switch on electrical power or attempt to start the unit if a warning label is attached.

c) Close the isolating valve between the compressor unit and the user's pipework. Attach a label to each valve carrying the warning **'WORK IN PROGRESS – DO NOT OPEN'**

d) **Ensure that the blowdown system has operated to release all pressure from the reclaimer.**

e) Check that the pressure gauge registers zero. Release any remaining pressure from the delivery side of the reclaimer element by slackening a pipe connection to the differential pressure indicator. Release any residual pressure from the upstream side of the reclaimer element by slowly slackening the oil filler plug on the reclaimer. Release any pressure in the aftercooler by slackening the pipe at the bottom of the moisture separator. Tighten the plug and pipe connections.

Use only lubricating oils and greases approved by CompAir. Make sure that the selected lubricants comply with all relevant safety regulations, especially with regard to the risk of explosion or fire and the possibility of decomposition or the generation of hazardous gases.

Always clean up oil spills from both the inside and outside of the compressor unit before and after maintenance work.

Make sure that all instructions concerning operation and maintenance are strictly followed and that the complete unit, with all accessories and safety devices, is kept in good running order.

The accuracy of pressure and temperature gauges and switching thermometers must be regularly checked. They must be renewed when acceptable tolerances are exceeded.

Protection devices must be tested as described in the 'Maintenance' section of this manual.

Keep the compressor unit clean at all times. Protect components and exposed openings by covering with clean cloth or tape during maintenance and repair work.

Protect the motor, air intake, electrical and regulation components against the entry of moisture, e.g. when steam cleaning.

Precautions must be taken when carrying out welding or any repair operation which generates heat, flames or sparks. The adjacent components must always be screened with non-flammable material and if the operation is to be carried out near any part of the oil system, or close to a component which may contain oil, the system must first be thoroughly purged, preferably by steam cleaning.

Never use a light source with an open flame to inspect any part of the unit.

In no circumstances must any welding work or other modification be carried out on the reclaimer or any other pressure vessel.

Before dismantling of any part of the compressor unit ensure that all heavy movable parts are secured.

After completion of repair or maintenance work ensure that no tools, loose items or rags are left on or inside any part of the machine.

Check the direction of rotation of the motor when starting up the compressor initially and after any work on the electrical connections or switchgear.

Do not use any flammable liquid to clean valves, filter elements, cooler air passages, air pipes or any component carrying a flow of air during normal operation. If chlorinated hydrocarbon non-flammable fluids are used for cleaning, safety precautions must be taken against any toxic vapours which may be released.

Do not use carbon tetrachloride.

Precautions must be taken when using acids, alkalis and chemical detergents for cleaning machine parts and components. These materials cause irritation and are corrosive to the skin, eyes, nose and throat. Avoid splashes and wear suitable protective clothing and goggles. Do not breathe mists. Ensure that water and soap are readily available.

When disposing of condensate, old oil, used filter elements and other parts and waste material of any kind make sure that there is no pollution of any drain or natural water-course and that no burning of waste takes place which could cause pollution of the air. Protect the environment by using only approved methods of disposal.

1.7 Precautions In The Event Of Fire

1.7.1 Use extreme caution when handling components that have been subjected to fire or very high temperatures. Some components may contain fluoroelastomer materials which decompose under these conditions to form highly corrosive residues. Skin contact can cause painful and penetrating burns resulting in permanent skin and tissue damage.

1.8 Disposal

When items of equipment are taken out of service for disposal it is recommended that the following instructions are adhered to:

a) In order to prohibit the 'bringing back into service' of of equipment by persons unknown, it should be rendered unusable in order to avoid improper re-use.

b) Alternatively all such items of equipment should be stripped into their component form for 'material composition disposal' e.g. base metals, plastics, fabrics etc and be subject to normal industrial waste re-cycling processes.

c) Bio-degradable items should be subject to normal industrial waste disposal processes. Ensure that no plastic, rubber or composite materials are disposed of by incineration.

d) Ensure that all fluid waste e.g. lubricating oils and greases, anti-freeze agents, refrigerant fluids or corrosive inhibitors should be separated and disposed of by authorised salvage disposal or recycling systems ensuring that none is permitted to enter a waste water system.

2 Control System

2.1 Controller

2.1.1 The microprocessor based compressor controller and the SR Drive® controller are housed in a single control unit which also contains the operator keypad and displays. The control unit is mounted on the door of the control panel.

2.1.2 A gate drive board isolates the microelectronics in the control unit from the power electronic circuits and provides monitoring and protection for the four insulated gate bi-polar transistor (IGBT) power switches. The IGBTs are used to turn the motor phases on and off and, in conjunction with the electronic controller, to control the motor phase current and in turn the torque and speed of the SR motor.

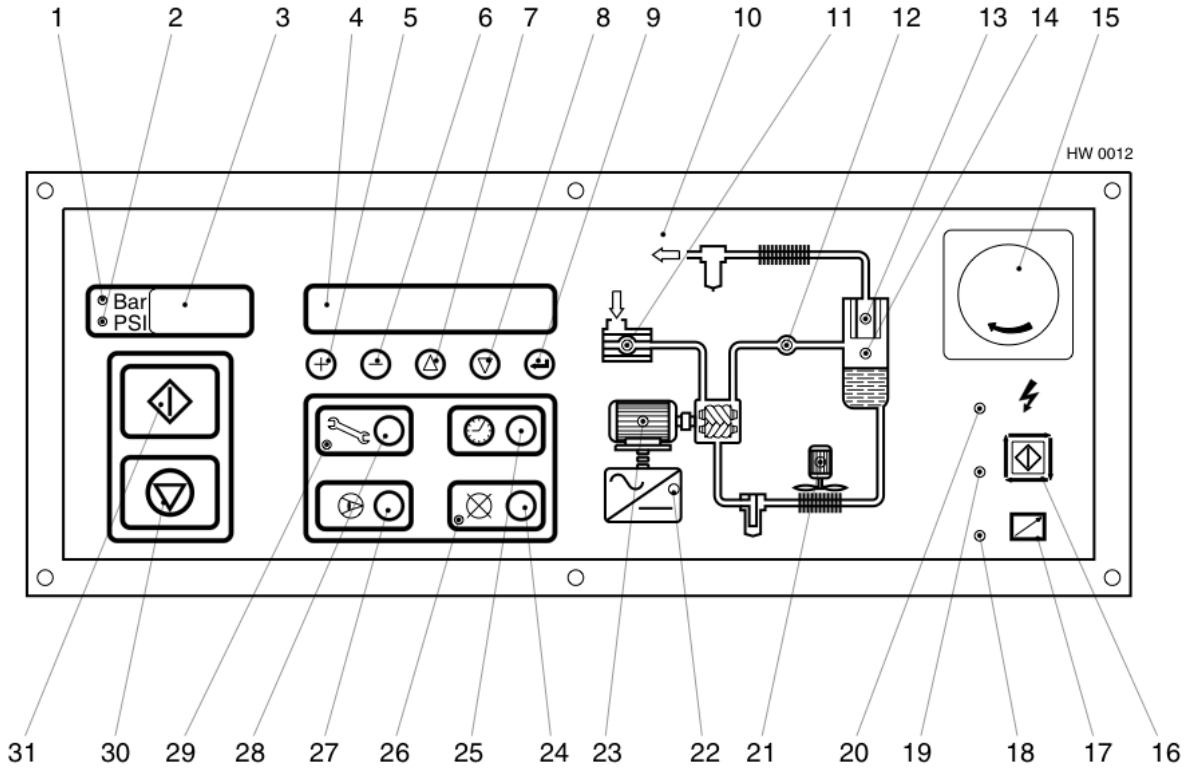


Fig. 2.1 - Control Panel

1. Bar Units Indicator
2. Psi Units Indicator
3. Delivery Pressure Display
4. Status and Message Display
5. Plus
6. Minus
7. Up
8. Down
9. Enter
10. Mimic Diagram
11. Intake Filter Change Lamp
12. High Delivery Temperature Lamp
13.* Reclaimer Element Check Lamp
14. Excess Pressure Lamp
15. Emergency Stop
16. Auto Restart Legend
17. Remote Control Legend
18. Remote Control Lamp
19. Auto Restart Lamp
20. Power on Lamp
21. Fan Motor Overload Lamp
22. Power Converter Fault Lamp
23. Main Motor Fault Lamp
24. Reset
25. Hours
26. Reset Lamp
27. Data View
28. Service
29. Service Lamp
30. Stop
31. Start

* L120SR only

2.2 Earlier Models - 345SR & 475SR

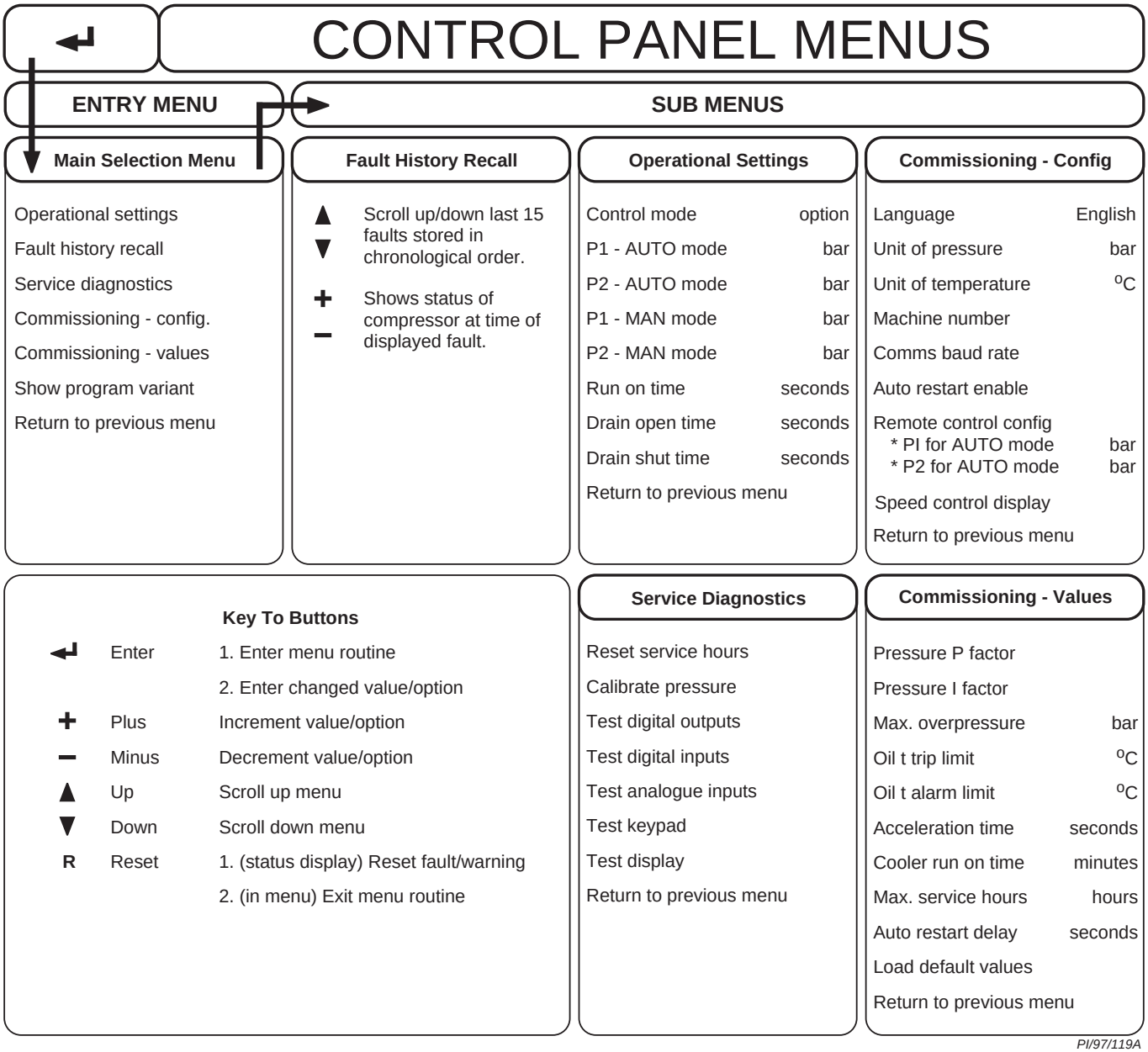


Fig. 2.2 - Control Panel Menus - 345SR, 475SR

* See section 3.1.2 for further details

2.3 Later Models - L45SR, L75SR & L120SR

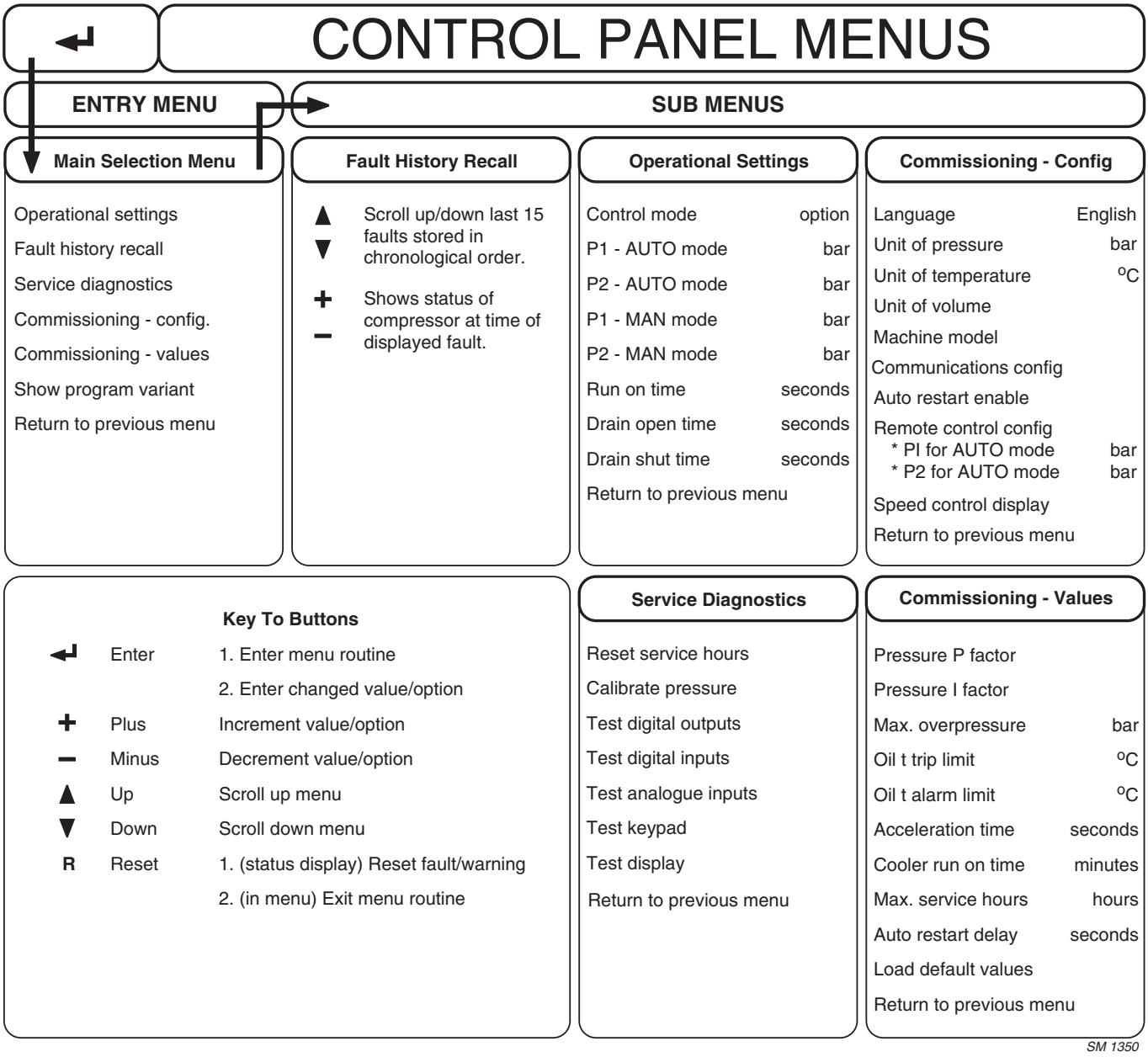


Fig. 2.3 - Control Panel Menus - L45SR, L75SR & L120SR

* See section 3.1.2 for further details

2.4 Default Settings - General

2.4.1 Default settings for a number of the operational settings are stored in the controller. These are suitable for operating the compressor in most normal situations.

2.4.2 The compressor can use these settings as operational settings. Unless the compressor is reprogrammed during commissioning, the default settings will be those used by the compressor.

2.4.3 The compressor may be re-programmed with different settings at most times, and the operational settings may be restored to the default values, by choosing the 'Load default values' option in the 'Commissioning – values' sub-menu.

Note: Alteration of the working setting values requires the use of the access code.

2.4.4 It is not possible to change any parameters while the Emergency Stop button is pressed. This is because when Emergency Stop is pressed (input open circuit) the power failure detection is inhibited. The controller therefore assumes a power failure possibility and suspends all data storage to prevent corruption should the power fail during storage operation. A message 'Emergency Stop' is shown if a change is attempted.

2.4.5 Access Code Details

- Customer Code:

  SERVICE, HOURS, SERVICE, HOURS.

- Overcurrent Repeated Reset Lockout:

  VIEW, SERVICE, SERVICE, SERVICE.

- Model Designation:

  SERVICE, SERVICE, VIEW,VIEW.

- Maximum Speed Limit:

  HOURS, VIEW, VIEW, HOURS.

(See fig. 2.1 for button details).

⚠ **Caution: For later models with Control P/No C20606/280. See section 2.7 for further details.**

2.4.6 The following is a list of default settings together with the range and size of the increments/decrements available for each setting.

2.5 Default Settings - 345SR, 475SR models

Setting	Unit	Minimum	Maximum	Step	Default Value
*P1 for AUTO mode	bar	5·1	13·4	0·1	7·4
*P2 for AUTO mode	bar	5·0	13·0	0·1	7·0
P1 for AUTO mode	bar	5·1	13·4	0·1	7·4
P2 for AUTO mode	bar	5·0	13·0	0·1	7·0
P1 for MAN mode	bar	5·1	13·4	0·1	7·0
P2 for MAN mode	bar	5·0	13.2	0·1	6·3
Max. overpress	bar	6·0	13·6	0·1	7·7
Acceleration time	second	0	240	1	10
Cooler run-on time	minute	4	12	1	4
Run on time	second	20	240	1	20
Drain open time	second	1	20	1	5
Drain shut time	second	10	120	1	30
Oil t trip limit	°C	85	125	1	110
Oil t alarm limit	°C	85	125	1	105
Max. service hours	hour	1000	2000	100	2000
Machine number	number	1	99	1	1
Comms baud rate		110	9600	options	9600
Auto restart delay	second	10	240	1	10
Remote control config		Start/Stop	Comms. Control	option	disabled
Auto restart		Enabled – Disabled		option	disabled
Pressure P factor		1	100	1	30
Pressure I factor		1	100	1	15

Note: The ‘Max. overpressure’ must be set above P1 settings.

* See section 3.1.2 a) - Pressure Range Select - for further details

2.6 Default Settings - L45SR, L75SR, L120SR models.

Setting	Unit	Minimum	Maximum	Step	Default Value
P1 for AUTO mode	bar	5·1	13·4 (11.9)*	0·1	7·4
P2 for AUTO mode	bar	5·0	13·0 (11.5)*	0·1	7·0
*P1 for AUTO mode	bar	5·1	13·4 (11.9)*	0·1	7·4
*P2 for AUTO mode	bar	5·0	13·0 (11.5)*	0·1	7·0
P1 for MAN mode	bar	5·1	13·3 (11.8)*	0·1	7·0
P2 for MAN mode	bar	5·0	13.0 (11.5)*	0·1	6·3
Max. overpress (L120SR)	bar	6·0	14.3 (12·8)*	0·1	7·7
Max. overpress (L45SR, L75SR)		6·0	13·6	0·1	7·7
Acceleration time	second	0	240	1	10
Cooler run-on time	minute	4	12	1	4
Run on time	second	20	240	1	20
Drain open time	second	1	20	1	5
Drain shut time	second	10	120	1	30
Oil t trip limit	°C	85	125	1	110
Oil t alarm limit	°C	85	125	1	105
Max. service hours	hour	1000	2000	100	2000
Machine number	number	1	99	1	1
Auto restart delay	second	10	240	1	10
Auto restart		Enabled – Disabled		option	disabled
Remote start/stop (see 3.1.2 b))		Enabled - Disabled		option	disabled
Pressure P factor		1	100	1	30
Pressure I factor		1	100	1	15
Input X01/4 (see Section 3.1.2)		Disabled to Start Inhibit		option	disabled
Input X01/6 (see Section 3.1.2)		Disabled to Start Inhibit plus Pressure Range select		option	Pressure Range sel
Input X01/7 (see Section 3.1.2)		Disabled to Start Inhibit plus Remote Start/Stop		option	Remote start/stop
Output X08/10 (see Section 3.1.3)		Group Fault to Low Temp alarm		option	disabled
Output X09/2 (see Section 3.1.3)		Group Fault to Low Temp alarm		option	Group Fault
Output X09/3 (see Section 3.1.3)		Group Fault to Low Temp alarm		option	Available
Output X09/4 (see Section 3.1.3)		Disabled to Start Inhibit		option	Group Trip
Communications config		Disabled - SmartAir control - Communications control		option	disabled

* See section 3.1.2 a) - Pressure Range Select - for further details. Figures in brackets are for L120SR-11 machines only.

Note: The 'Max. overpressure' must be set above P1 settings.

2.7 Models L45SR, L75SR and L120SR Fitted With Controller No. C20606-280

2.7.1 This controller is fitted to LI20SR compressors as standard and supersedes controller C20606-180 as fitted to models L45SR and L75SR from the following serial numbers:

L45SR- F180-0850

L75SR- F170-0650

2.7.2 All functions and features of controller C20606-280 are identical to C20606-180 with the exception of the additional functions of Instantaneous Flow Display and Accumulated Volume Display as detailed below:-

a) Flow Display:
This is shown on the lower line of the text display using the View button. The units may be changed in the Commissioning - config menu.

b) Accumulated Volume:
This is shown on the lower line of the text display using the Hours button. The air volume is calculated every second but the display is only updated every 10 minutes. The units are the same as selected for the flow display selection. The accumulated air volume cannot be reset back to zero.

Note:- Provision is made to estimate and display the instantaneous air flow being delivered by the compressor and the accumulated air volume produced by the machine since first start up. The flow is calculated from speed alone and, because of processing limitations, is based on the best fit straight line data at 8 bar.g working pressure. Thus the flow value (and consequently the accumulated volume) can at best be an estimate as no account is taken of pressure and local conditions.

2.8 Specific Input and Action for Phase Monitor Relay - Revised Power Supply Failure Detection.

2.8.1 The control system has two methods of power failure detection. Within the controller, an internal circuit monitors two phases of the incoming ac voltage and will trigger the power failure routine if two successive cycles are not detected. External to the controller, a phase monitor relay, connected to a controller input, monitors each phase and will signal to the controller input if any phase goes below 70% of the set voltage or the phase order is reversed. The phase monitor will automatically reset within 500rns when correct conditions are restored.

2.8.2 The controller itself is designed to operate for about 0.5 secs following loss of incoming power. Thus it has time to take action and store essential data prior to shutdown. The action taken following power failure detection from either source is the same. The compressor will be shutdown and then the controller will shutdown. When power to the controller is available it will reboot. The recovery action when power is restored depends on the status of the machine at time of power failure.

a) Compressor stopped ('Ready to Start')

In this condition, the controller will reboot to display 'Ready to Start'. These occurrences will not be logged as it has no consequence to the system and would normally occur in a routine power off situation.

Should the controller remain powered (in event that the failure was on a phase not supplying controller) then on rebooting, the display will show 'Start Inhibited - Power supply fault' and the charging circuits will not be actioned. On reset of the monitor, the controller will again reboot to ensure correct charging sequence.

b) Compressor Running or in Standby

The fault in this case will be stored in the fault history. Should the controller remain powered then on rebooting, the display will show 'Start Inhibited - Power supply fault' and the charging circuits will not be actioned. When the monitor resets, the controller will reboot again to ensure correct charging sequence.

If power to the controller is lost, then after reboot, depending on which circuit triggered first, an alarm will be displayed with either message 'Power fail Fault' (controller internal circuit) or message 'Power supply fault' (phase monitor relay) and the fault logged.

Manual reset will not be required (except to clear display and 'service' L.E.D.) and, if enabled, the machine will auto restart to previous state.

Note that because this feature is only operable while the machine is 'available', any powerdip or failure occurring after a controlled stop, but before the motor is switched off, will result in a reboot to 'Ready to Start' without

the 'Power fail/supply fault' indicated. This is the standard machine action.

c) Overcurrent repeated reset lockout

A limit on multiple attempts at resetting a persistent overcurrent trip occuring when attempting to start a machine has been introduced. Thus: only two start attempts, resulting in immediate overcurrent trip, are allowed. After the second attempt, reset of the trip fault is inhibited and the message 'Reset Inhibited' displayed for 2 secs.

Once the fault has been investigated and rectified, the trip can then only be reset using access code "view service service service". Entering this code will perform all resets returning machine to 'Ready to Start' state.

If the reset inhibited fault is present when the power is removed and restored, the trip will be reinstated when the controller reboots. This will have priority over any other trip.

A successful start to loaded on the second attempt will reset the inhibit counter back to zero. The inhibit is also reset after 24hrs with the controller powered. An overcurrent trip while the machine is loaded, will not trigger the inhibit counter.

The reset attempt number will be logged within the fault. The history and will be displayed alongside the status message e.g.:

'Starting 1'.

Where the fault is cleared and reset using the code, this will also be logged and displayed alongside the status message e.g.:

'Starting 2C'.

d) Digital Input & Output Configuration

All spare I/O and remote control channels are now configurable for optional input functions or status outputs. The channels available depend on the compressor model. Remote control inputs now configurable include those formally reserved exclusively for 'Remote Start/Stop' and 'Secondary Pressure Select'. However these remain the default configuration for those channels and the functions are only available on those specific channels respectively. The Remote Start/Stop function enable is only possible when the channel is configured for Remote Start/Stop.

Input functions available are Disabled (input ignored), Trip or Alarm Type 1 (active at all times), Trip or Alarm Type 2 (active when the machine is 'Running'), Trip or Alarm Type 3 (active when the machine is Offload and Onload) and Start Inhibit.

Output status conditions available are Disabled, Available, Group Alarm, Group Trip, Service Due, Group Alarm & Trip, Running, Loaded, Low Temperature Alarm & Group Fault.

e) Other Menu Functions

Other menu changes include: (Updated model designations now include the L120SR. The menu items available depend on the machine model. Access Code: "Service Service View View")

- Baud rate adjust removed.
- Revised limits for pressure & over pressure.
- The cooling fan run on time has been reduced from 4 minutes to 2 minutes.

f) Maximum Speed Limitation

A menu has been added to allow the machine to be 'derated' for applications where the available power is limited. This allows the maximum speed (and thus the maximum power input) to be defined. Entry to this menu requires an access code.

A speed limit value is introduced which, after the normal limitations (pressure effect, start up limit) have been calculated, adds a further restriction of maximum speed. On model change, the speed limit is automatically changed to the normal maximum for that model. The speed may be adjusted between the limits in 50 r.p.m. steps. The low limit is approximately 30% of the normal maximum speed. The actual ranges are:

L45SR: 1500 - 5000 rpm

L75SR: 1450 - 4800 rpm

L120SR: 1100 - 3750 rpm.

The speed limit is changed by entering access code "hours view view hours" at any request for access code while in the Commissioning Configuration Menu only (e.g. press *'PLUS'* while viewing language). It will be rejected if the machine is running. This reduces the Commissioning Configuration menu to just one otherwise unseen item i.e. Speed limit that is displayed for adjustment as normal using plus, minus and enter keys. On exit from the menu (either using 'Return to previous menu' or RESET), the display returns to

Normal Display. This ensures that the code is cancelled.

If there is no key activity for 60sec, the display returns to Normal Display.

The speed display bar graph still shows load relative to normal full load speed i.e. L45SR limited to 3000rpm will show max 60%. Likewise the percent load bands are relative to full load speed.

g) Diagnostics Menu Access

Access to Analogue and Digital input menus is available while the machine is running as these are view-only menus. Fault action is still operable but will not be displayed until diagnostics exited.

3 Electrical System

WARNING

- Refer to the safety procedures before operating the compressor unit.
- Lethal voltages are used in this equipment. Use extreme caution when carrying out electrical checks. Isolate the power supply before starting any maintenance work.
- Before opening the door of the power converter compartment, switch the power supply OFF at isolator and wait for 12 minutes to allow the dc link capacitors to discharge to a safe level. Check that the DC link capacitors have fully discharged before starting work on the compressor.

Note: Any work on the electrical system should be carried out by CompAir or by a trained and certified Distributor.

3.1 Remote Control and Monitoring Connections

Three remote input options and three (five on L120SR) remote output options are available. The cable connections required are shown as broken lines on the controller digital inputs and outputs on the electrical connection diagrams on pages 21 to 48.

3.1.1 Inputs

⚠ **Caution: Do not connect any input terminal pin to a voltage source other than X3/1 as this will result in permanent damage to the module.**

Each of the three inputs is activated by connecting the appropriate terminal pin to the input terminal X3/1.

This can be achieved by connecting the input pin and the common terminal to a volt free remote switch, relay contact, PLC output or any switching device.

Note: Remote input cables must be at least 1.0 mm2 in size. The maximum cable length from the compressor to a remote device must not exceed 800 metres.

The function of some digital inputs are configurable. These are:

a) Input X01/6
Message: ‘Remote Fault 1’ unless Pressure Range Select selected

b) Input X01/7
Message: ‘Remote Fault 2’ unless Remote Start/Stop selected

c) Input X01/4
Message: ‘Remote Fault 3’

The functions available are defined below and may be selected using the Remote Control Config menu within the Commissioning Config Menu.

Default functions are assigned to each input and some functions are only available on specified inputs.

3.1.2 Configurable Input Functions

a) Pressure Range Select

This is available on input X01/6 only and is the default function for this input.

Connecting to the pressure range select input enables the selection of a secondary set of Target and Off-load pressure set points. Using a suitable external timer this input can be used to vary the operating pressure of the compressor at different times. This facility enables energy savings to be made during periods when a lower compressed air network pressure can be used.

b) Remote Start/Stop

This is available on input X01/7 only and is the default function for this input.

Connecting to the remote start/stop input enables starting and stopping of the compressor from remote equipment.

When this function is selected an open connection on this input will cause a remote stop and a link is necessary for keypad start. However the Remote Start function is by default disabled and needs to be enabled (separate menu item) for the remote start function to operate.

With Remote Start enabled, the keypad start button is disabled and needs to be enabled

(separate menu item) for the remote start function to operate. With Remote Start enabled, the keypad start button is disabled and a closing contact on this input will cause a machine start.

Also note that selecting another function for this input will automatically disable the Remote Start and Remote Stop functions; an open connection will not cause a stop.

c) Trip Type 1

An open connection will cause a trip at all times.

d) Trip Type 2

An open connection will cause a trip when the motor is running.

e) Trip Type 3

An open connection will cause a trip when status is 'Onload' or 'Offload'.

f) Alarm Type 1

An open connection will cause an alarm at all times.

g) Alarm Type 2

An open connection will cause an alarm when the motor is running.

h) Alarm Type 3

An open connection will cause an alarm when status is 'Onload' or 'Offload'.

i) Start Inhibit

Will prevent a compressor from starting when a fault is sensed but will not stop a compressor if already started. When activated the display will show 'Start Inhibited'. This function is not a shutdown trip or alarm and will only function while the connection is open. It is not recorded in the Fault History log.

3.1.3 Outputs

a) Configurable Outputs

(i) Outputs on pins X09/2, 3 & 4

These three configurable outputs are transistor switched and only suitable for driving low current (50mA each max) 24v DC devices. A DC interface relay must be used (see 1.3.2)

(ii) Outputs on pins X08/5 & 6 and X08/9 & 10 (L120SR only)

These two additional outputs are relay outputs providing a normally open contact only. Note, therefore, that some functions (e. g. Group Trip) are energised for healthy and the relay will present a closed contact for OK.

As supplied, these contacts are connected to the 24v AC ancillary equipment system supply and are suitable for driving 24v AC devices subject to the total load on the transformer. It is, therefore, recommended that 24v AC interface relays are used connected between X08/6 or X08/10 and terminal X1/1.

If VOLT FREE contacts are required for use with an externally supplied device, then the power supply link between X08/5 or X08/9 and terminal X2/1 MUST be removed. The external monitor should be connected directly to the appropriate contact pair (X08/5 & 6 or X08/9 & 10). Contacts are rated at 250V AC 8A.

b) Output Relays

The outputs are 24v dc transistor switched with a maximum rating of 25mA and an interface relay must be used. Each output must be connected directly to a relay module, as specified below, in order to achieve a relay contact output suitable for remote applications external to the compressor starter enclosure.

Parts required for each additional output:

Qty	Description	Part Number
1	Relay - 24 V dc	98475-64
1	Relay Base	98475-65

c) Relay Specification

Single switching contact with a common, normally open (N/O) and normally closed (N/C) connection rated at 250V - 5 Amps maximum.

Note: The relay 24V dc coil is not bi-directional and must be connected to controller output as follows :

- Relay terminal '5' must be connected to pin X09/1.
- Relay terminal '1' must be connected to pin X09/2, 3 or 4 as appropriate.

The functions available are defined below and may be selected using the Remote Control Config menu within the Commissioning Config Menu.

Default functions are assigned to each output. An interface relay must be used with these

outputs - see following diagrams for connection information.

3.1.4 Configurable Output Functions

a) Group Fault

This is the default for output X09/2.

A group fault output will be energised when power is applied and no alarm or trip conditions are detected.

The output will de-energise when an alarm including service due, a shutdown trip or power loss occurs.

b) Available

This is the default for output X09/3.

A compressor available output will energise when the compressor is 'running' or in the 'standby' state. This output indicates that the compressor has been started and is available to automatically respond to a fall in system pressure without manual intervention.

c) Group Alarm

A group alarm output will be energised when power is applied and no alarm condition is detected. The output will de-energise when an alarm or power loss occurs.

d) Group Trip

This is the default for output X09/4.

A group trip output will be energised when power is applied and no trip conditions are detected.

The output will de-energise when a shutdown trip or power loss occurs.

e) Service Due

The service due output will energise when the service hours countdown timer has reached zero hours and a routine service is due.

f) Group Alarm + Trip

A group trip + alarm output will be energised when power is applied and no alarm or trip conditions are detected.

The output will de-energise when an alarm excluding service due, a shutdown trip or power loss occurs.

g) Running

A running output will energise when the compressor main motor is running.

h) On Load

The on load output will energise when the compressor is on load.

i) Low Temperature Alarm

A Low Temperature Alarm output will energise when the Low Temperature Alarm is active.

3.1.5 4 - 20mA Compressor Speed Output

An output is provided to enable remote monitoring of compressor speed. The output range is from 4mA (0 rev/min) to 20mA (5000 rev/min).

3.1.6 RS485 Communications

a) The SureScan control unit is compatible with the electrical RS485 communications standard. The communication parameters are:

- 9600 baud, 8 data bits, no parity and 1 stop bit.

b) The message protocol is a proprietary multimaster protocol compatible with the SmartAir Air Systems Control Units and with the Active Network Interface for connection to PCs etc.

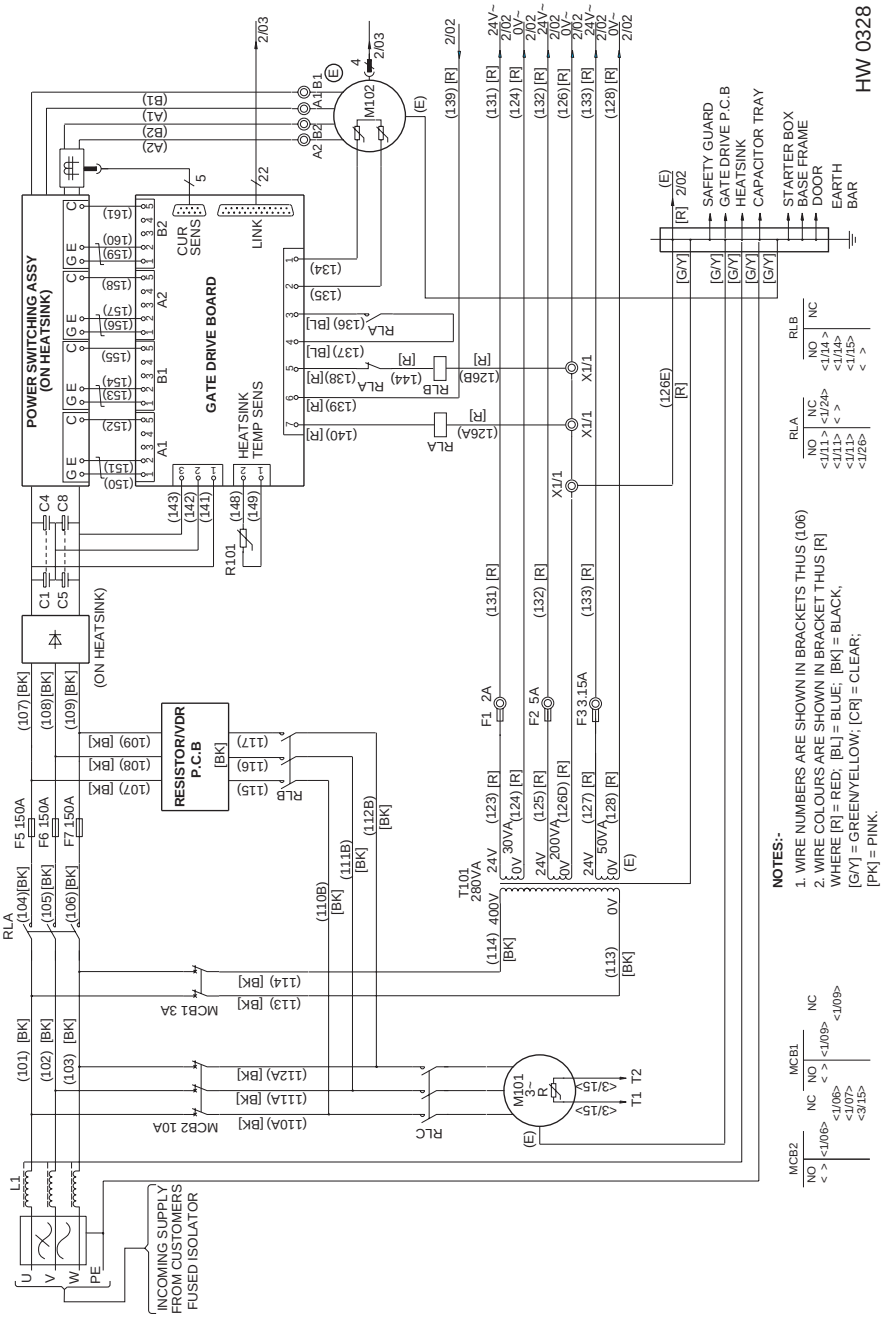


Fig. 3.1 - Electrical Connection Diagram - 345SR, L45SR (1 of 3)

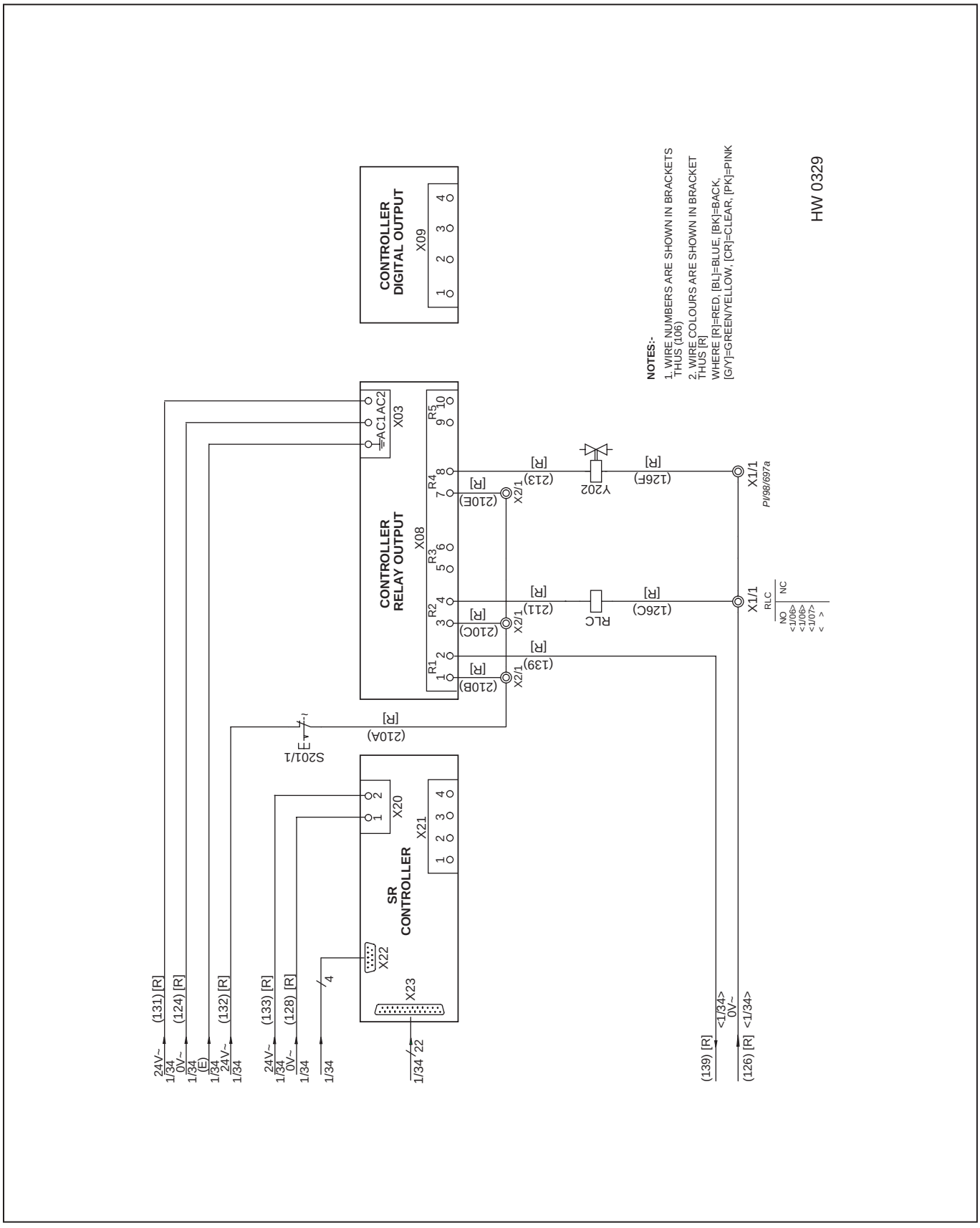


Fig. 3.2 - Electrical Connection Diagram - 345SR, L45SR (2 of 3)

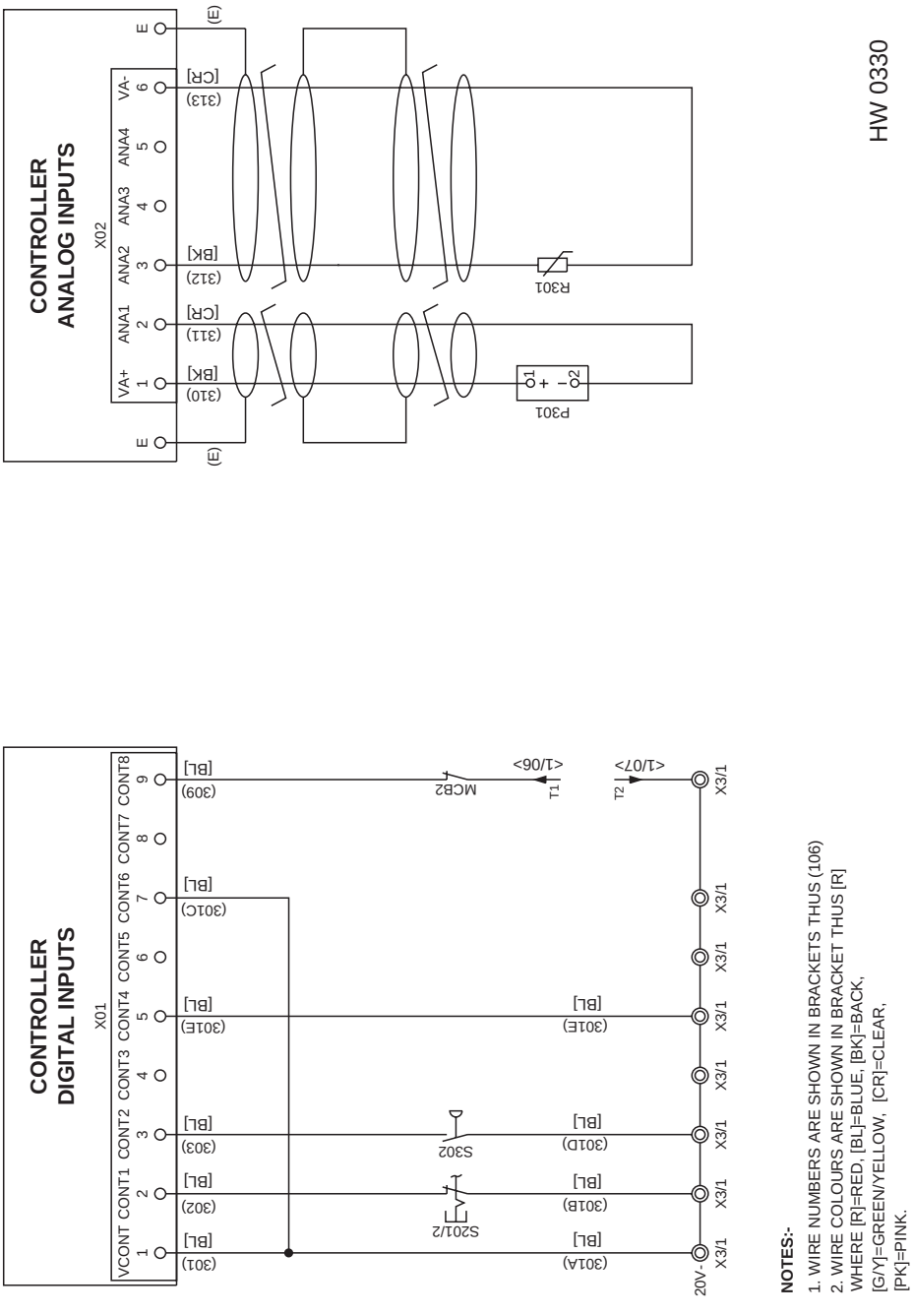


Fig. 3.3 - Electrical Connection Diagram - 345SR, L45SR (3 of 3)

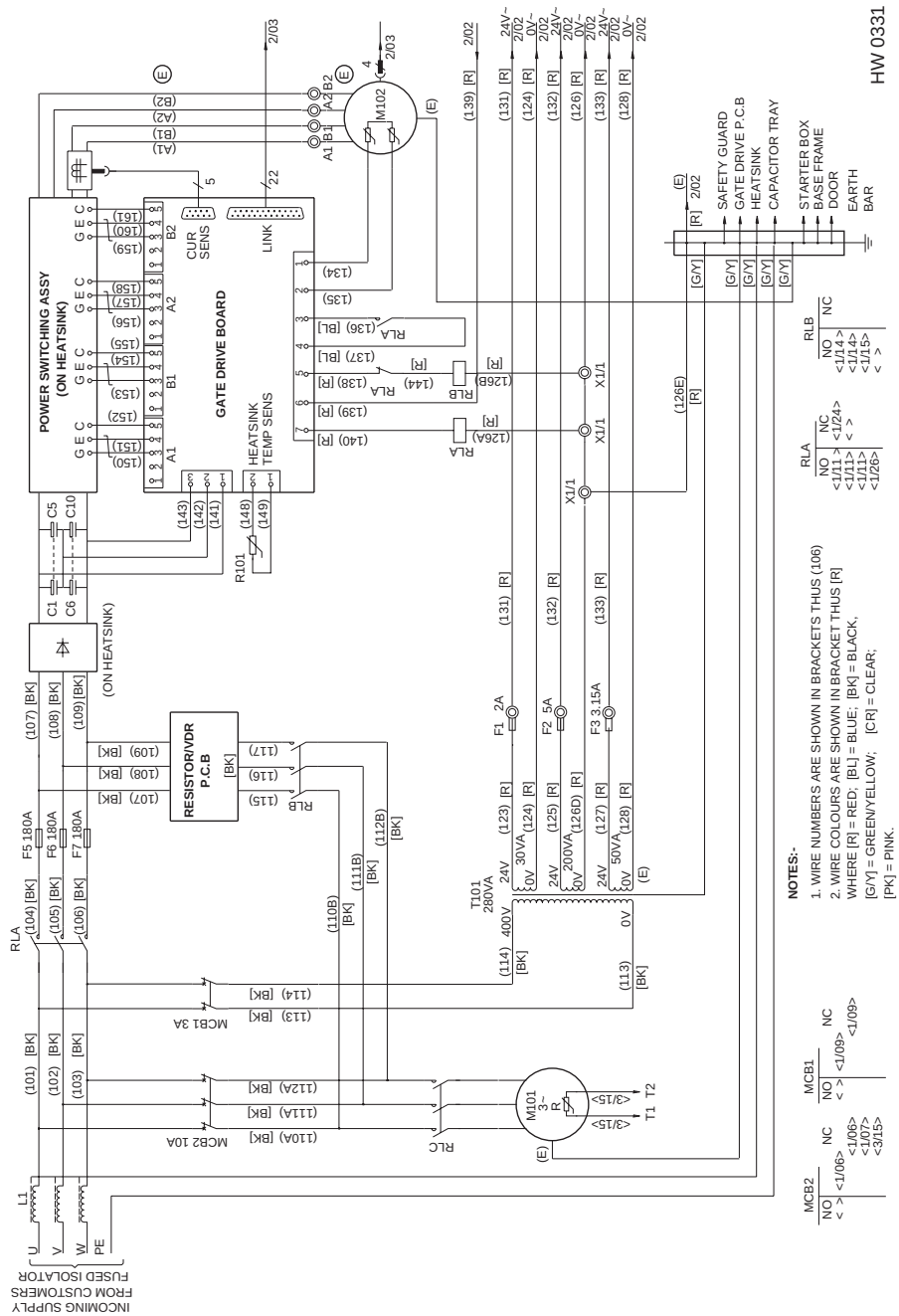


Fig. 3. 4 - Electrical Connection Diagram - 475SR, L75SR (1 of 3)

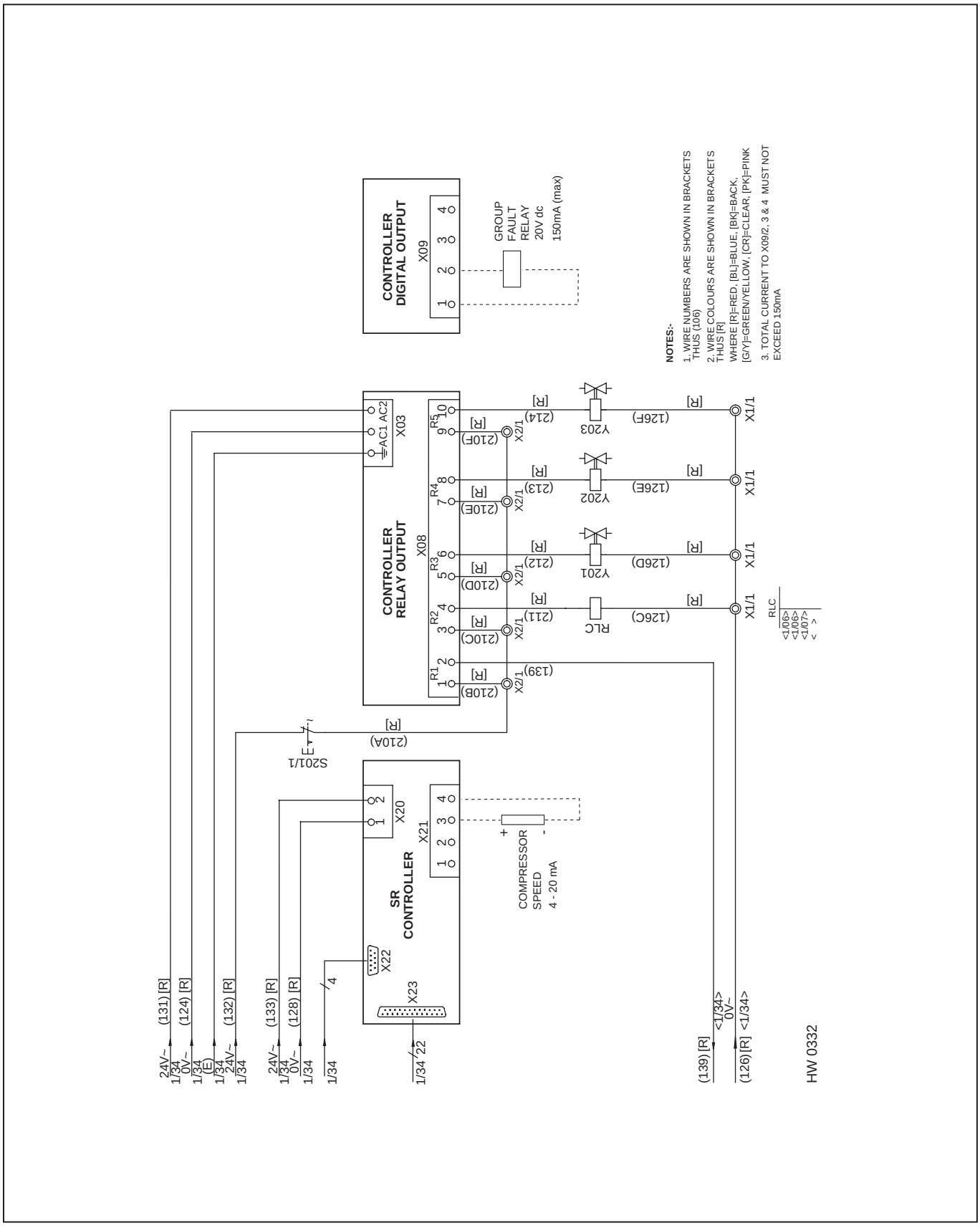


Fig. 3.5 - Electrical Connection Diagram - 475SR, L75SR (2 of 3)

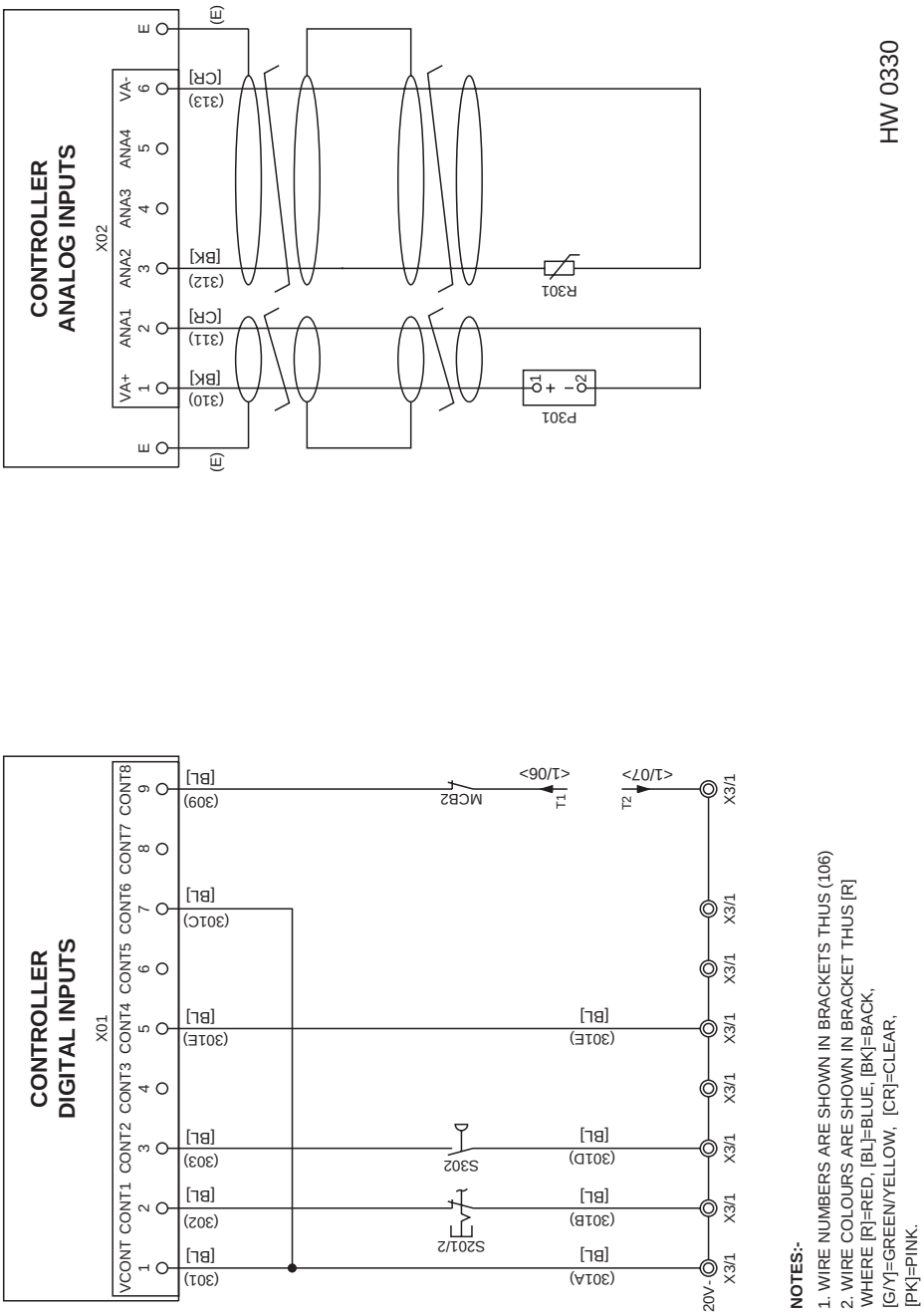


Fig. 3.6 - Electrical Connection Diagram - 475SR, L75SR (3 of 3)

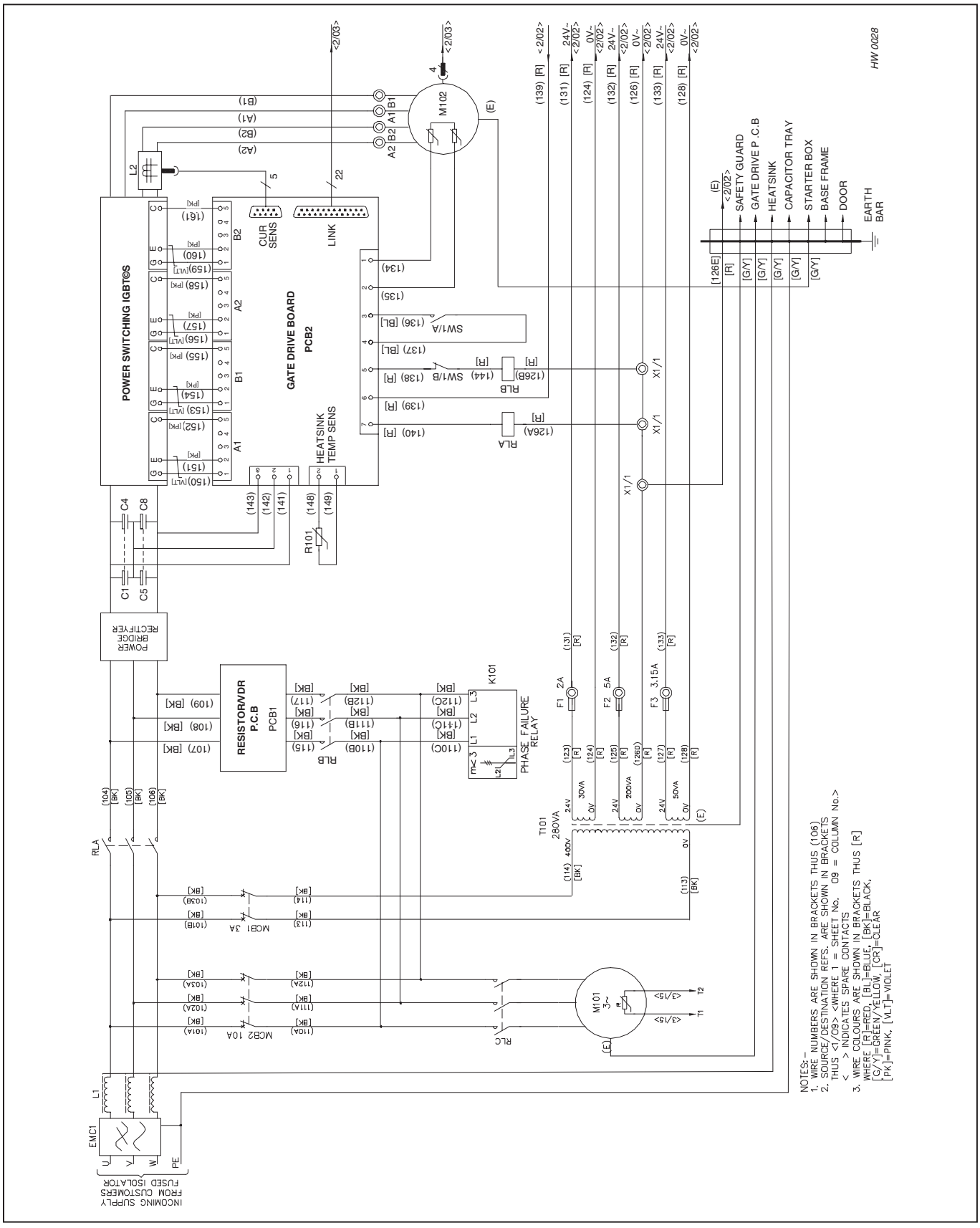


Fig. 3.7 - Electrical Connection Diagram - L45SR (1 OF 3)
With Phase Failure Relay

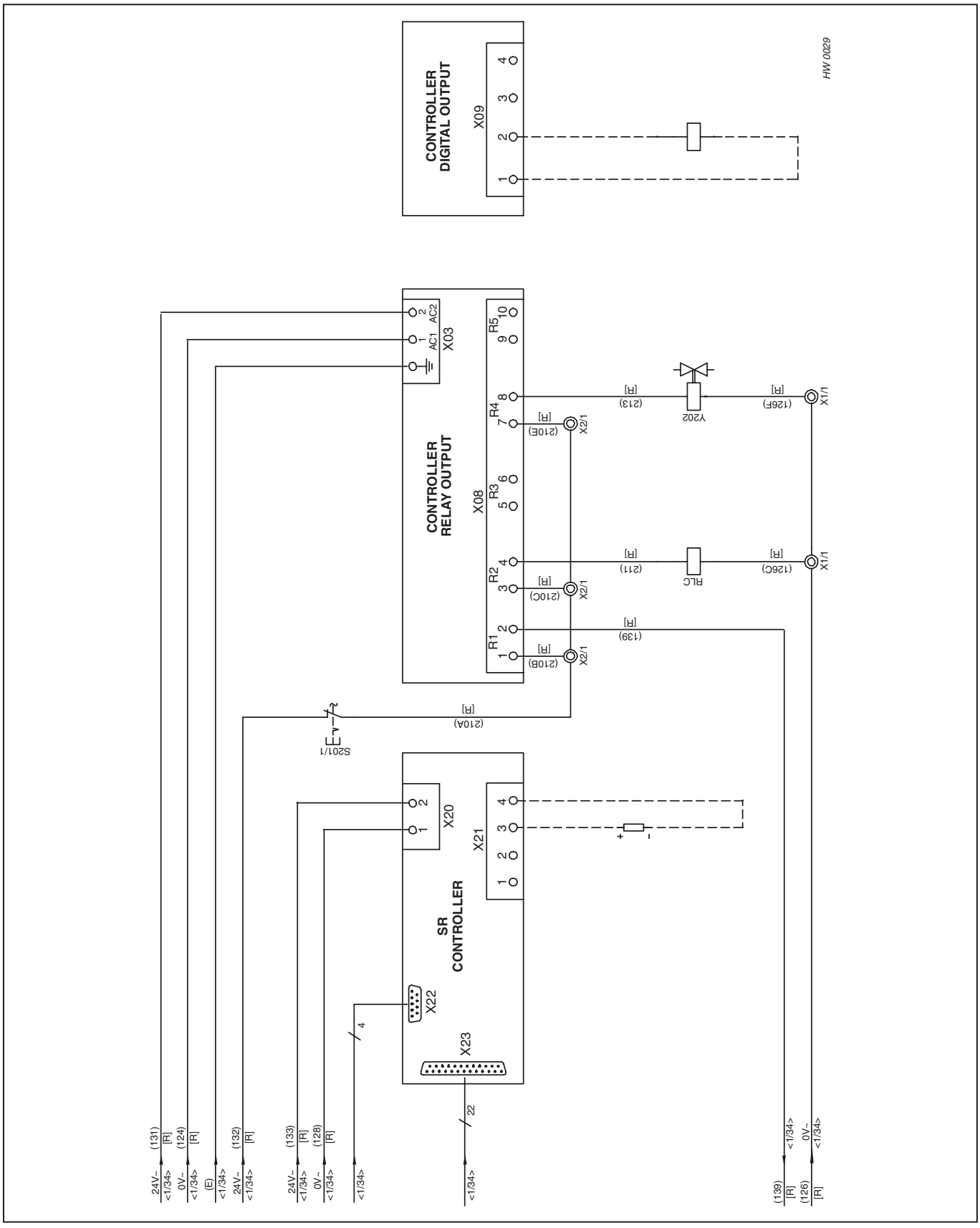


Fig. 3.8 - Electrical Connection Diagram - L45SR (2 OF 3)
With Phase Failure Relay

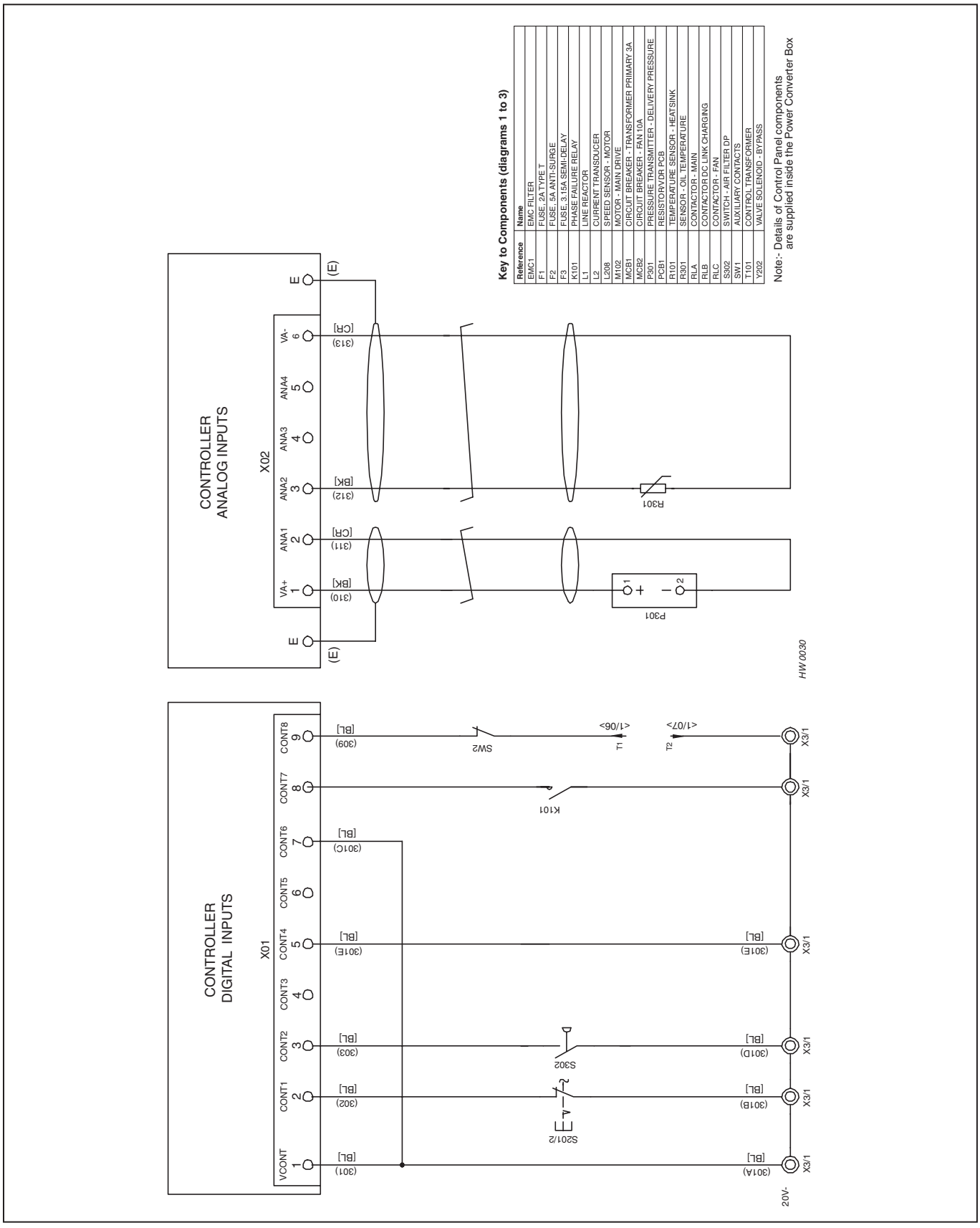


Fig. 3.9 - Electrical Connection Diagram - L45SR (3 OF 3)
With Phase Failure Relay

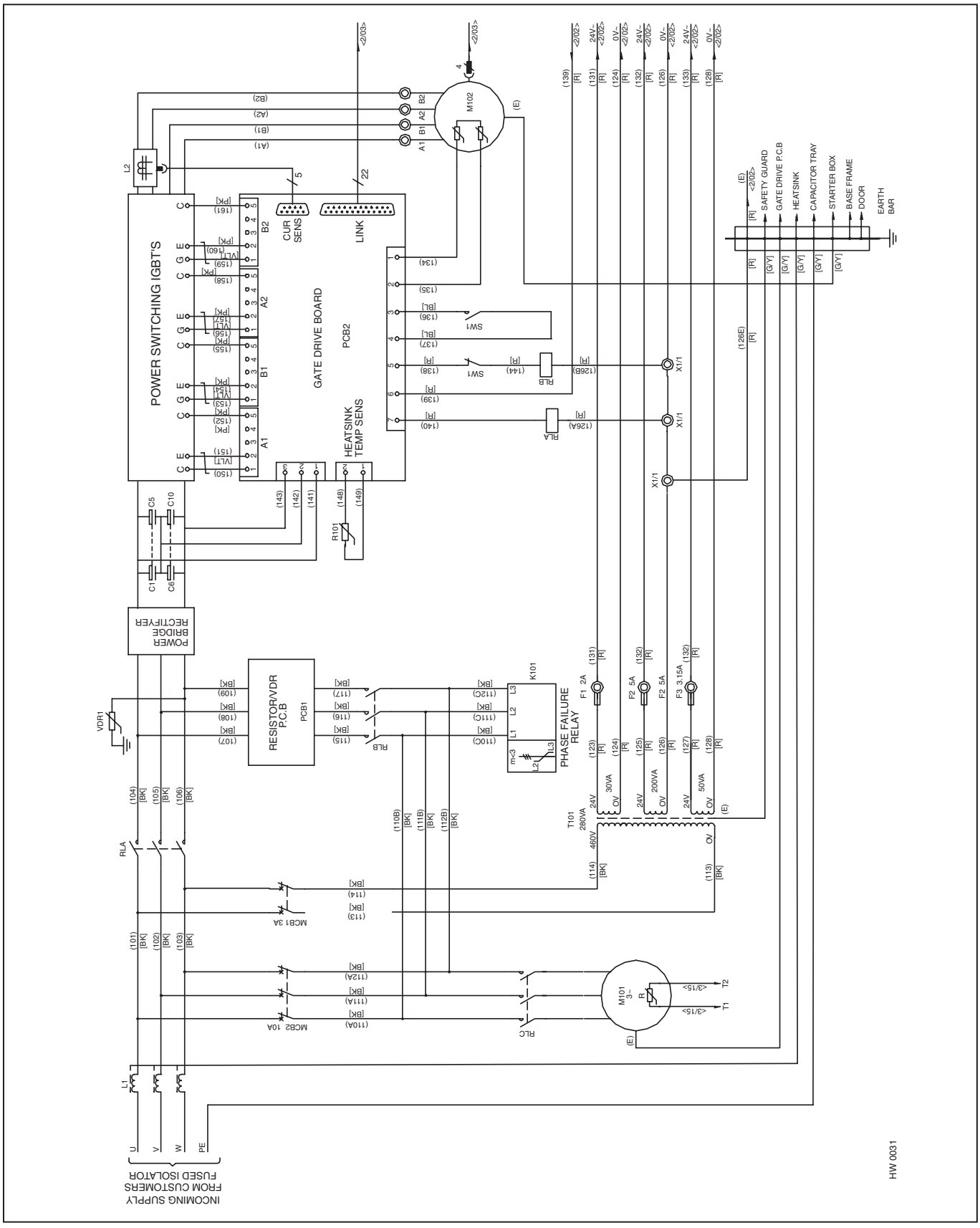


Fig. 3.10 - Electrical Connection Diagram - L75SR (1 of 3)
With Phase Failure Relay

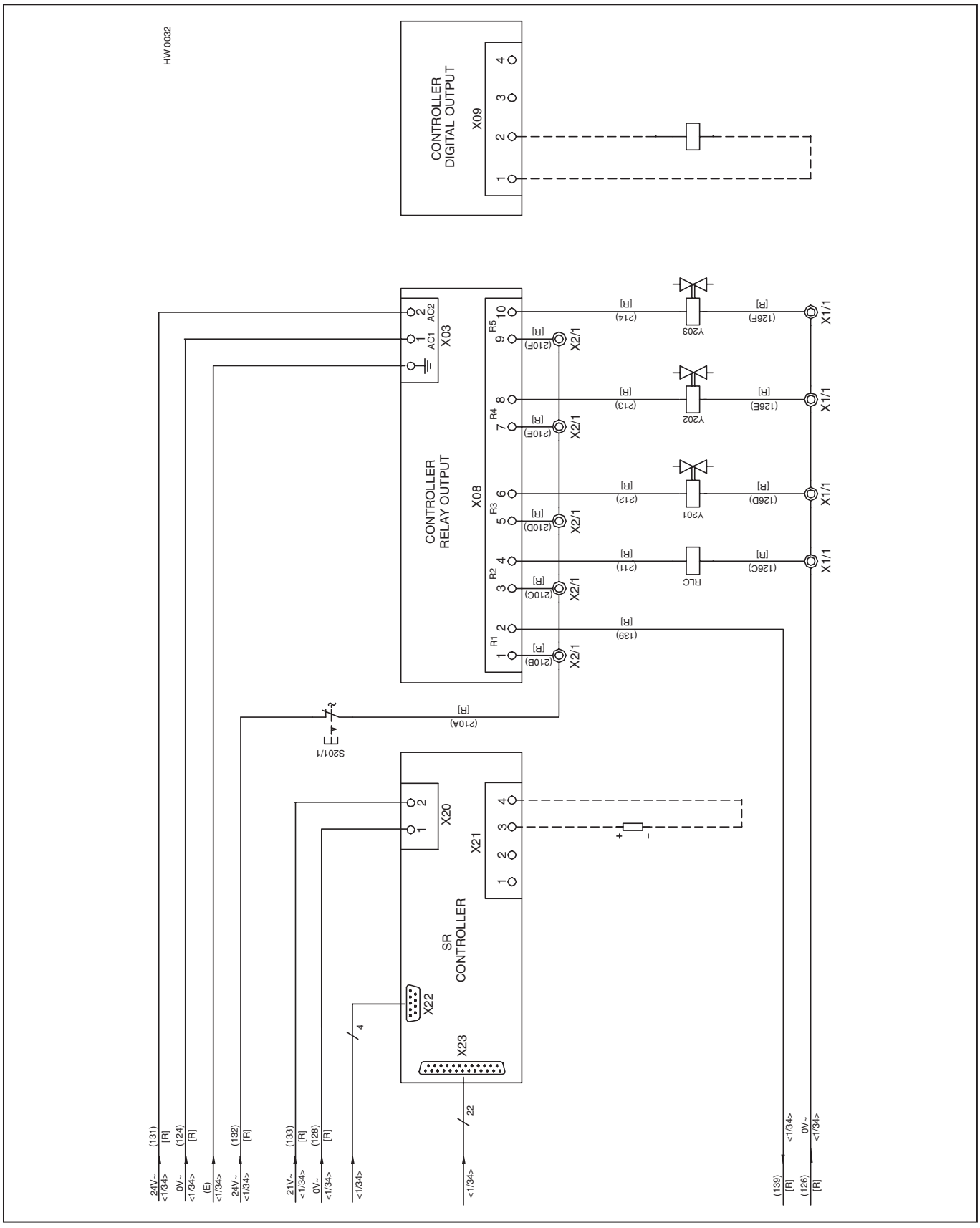


Fig. 3.11 - Electrical Connection Diagram - L75SR (2 of 3)
With Phase Failure Relay

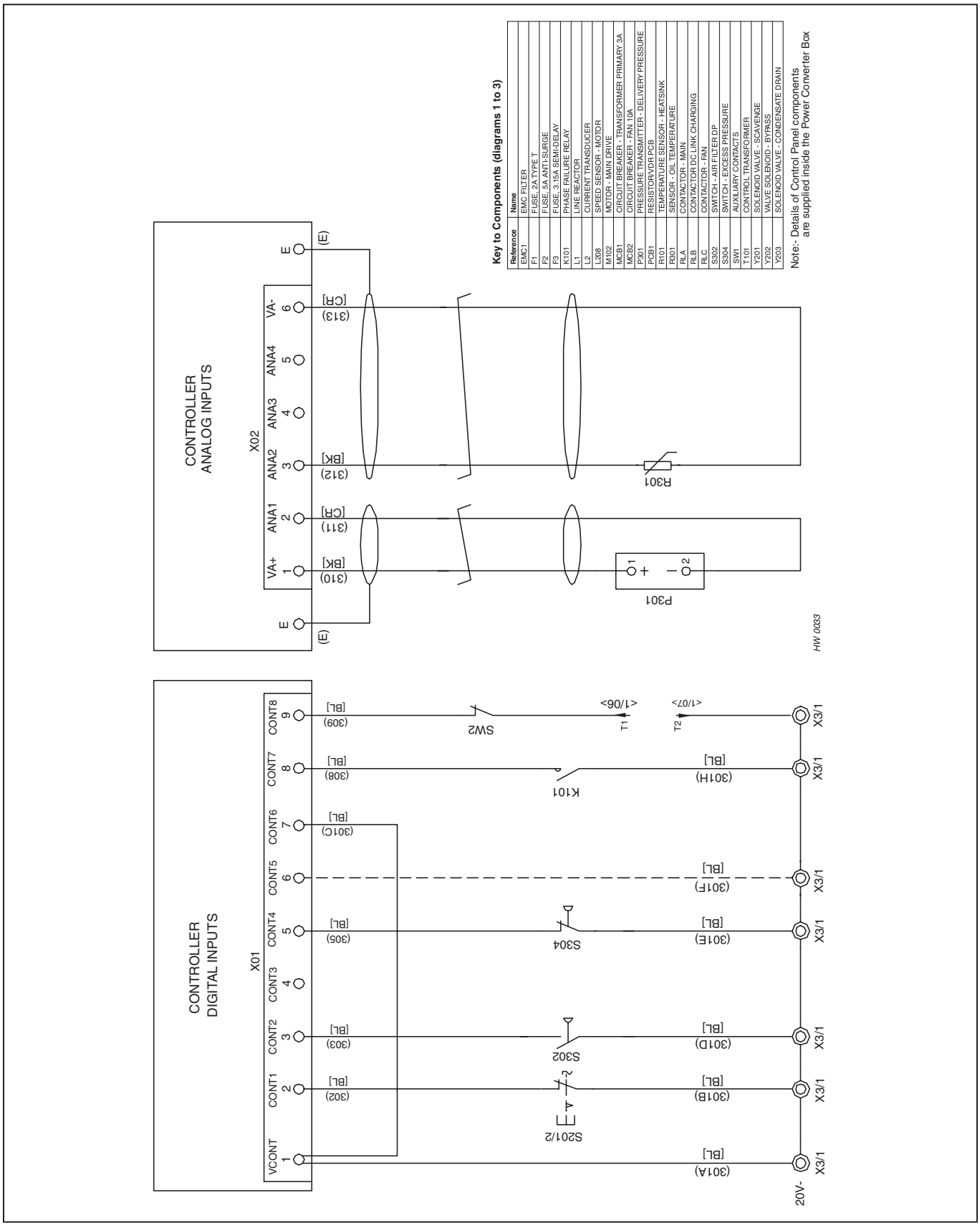


Fig. 3.12 - Electrical Connection Diagram - L75SR (3 of 3)
With Phase Failure Relay

3.1.8

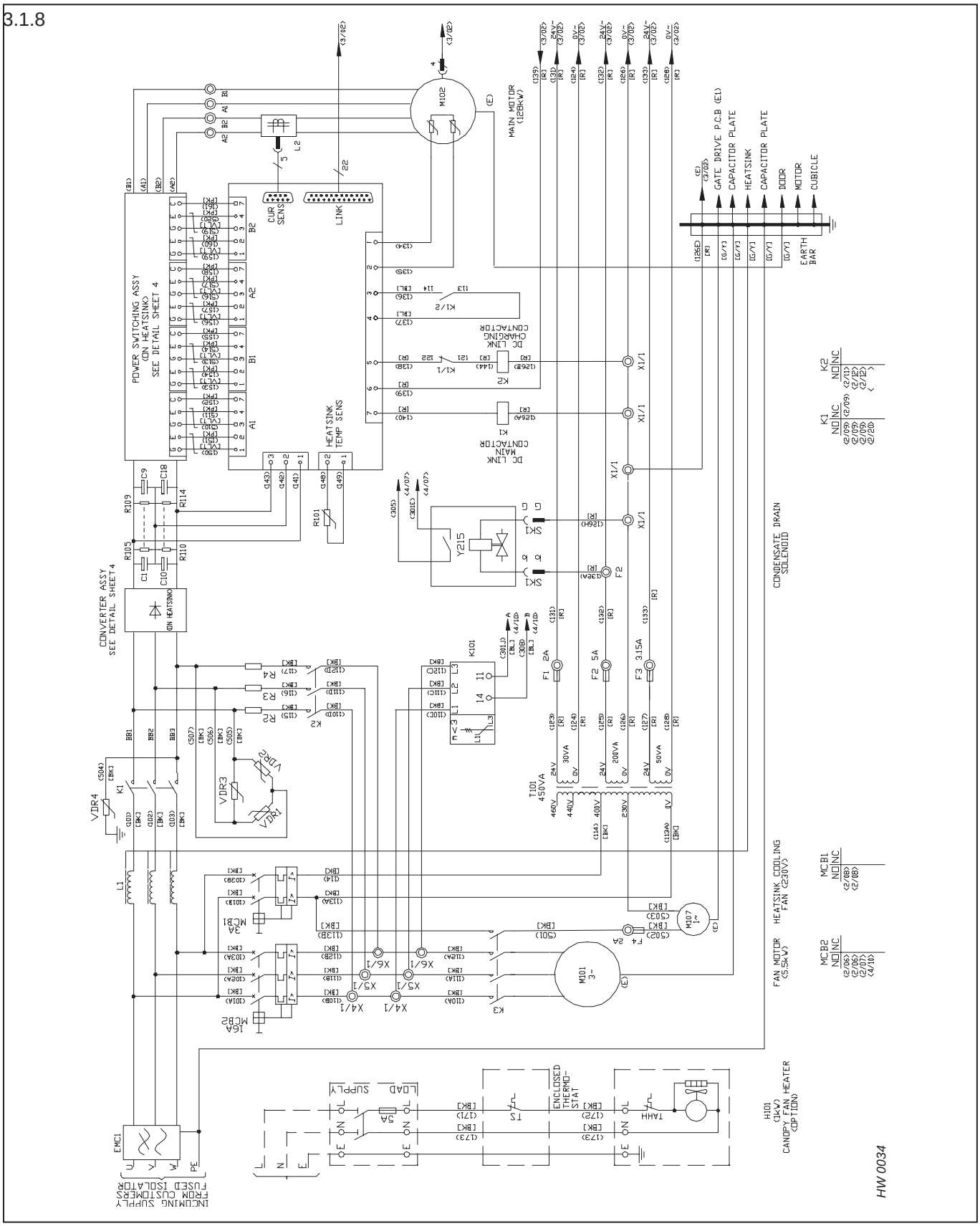


Fig. 3.13 - Electrical Connection Diagram - L120SR (1 of 4)

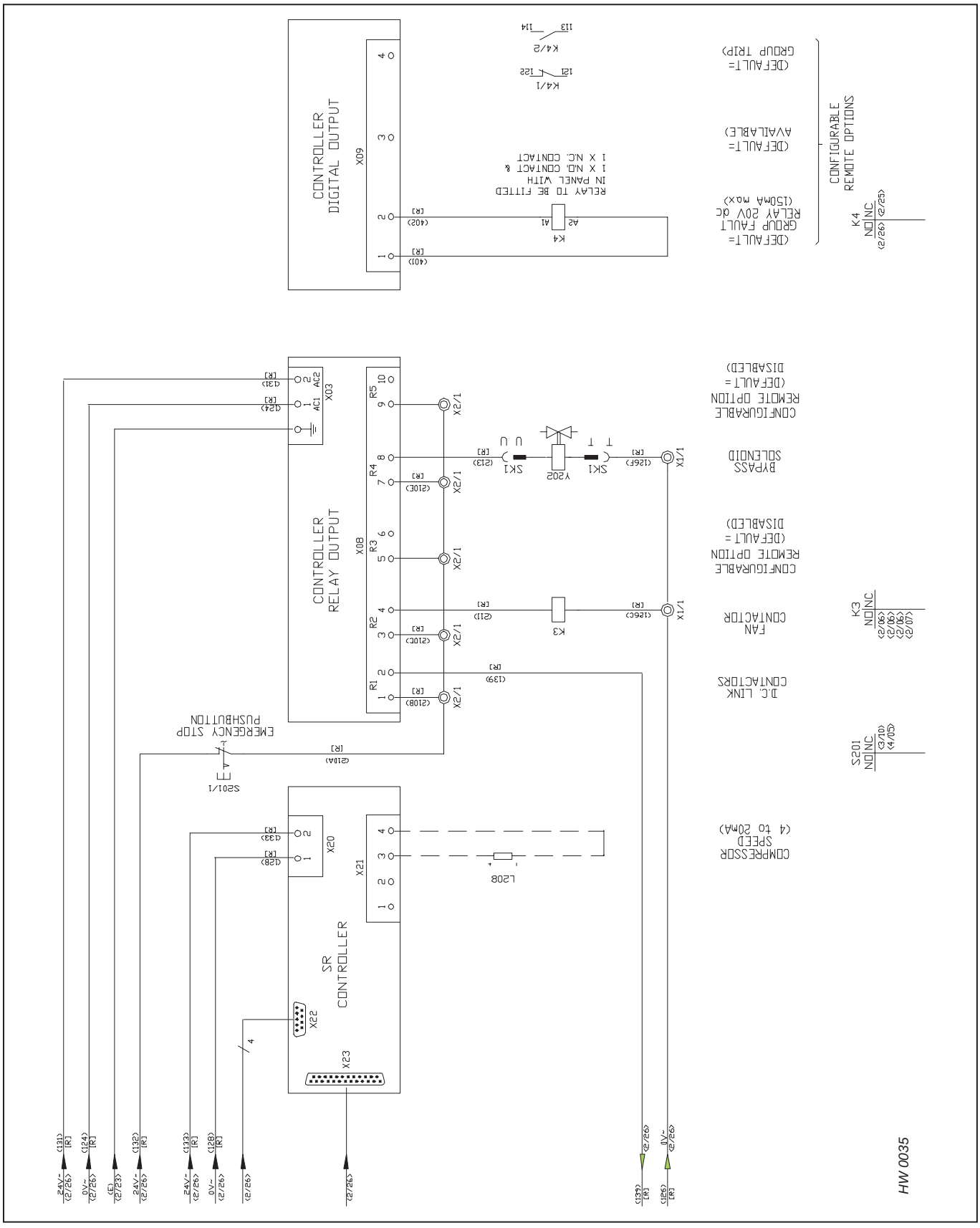


Fig. 3.14 - Electrical Connection Diagram - L120SR (2 of 4)

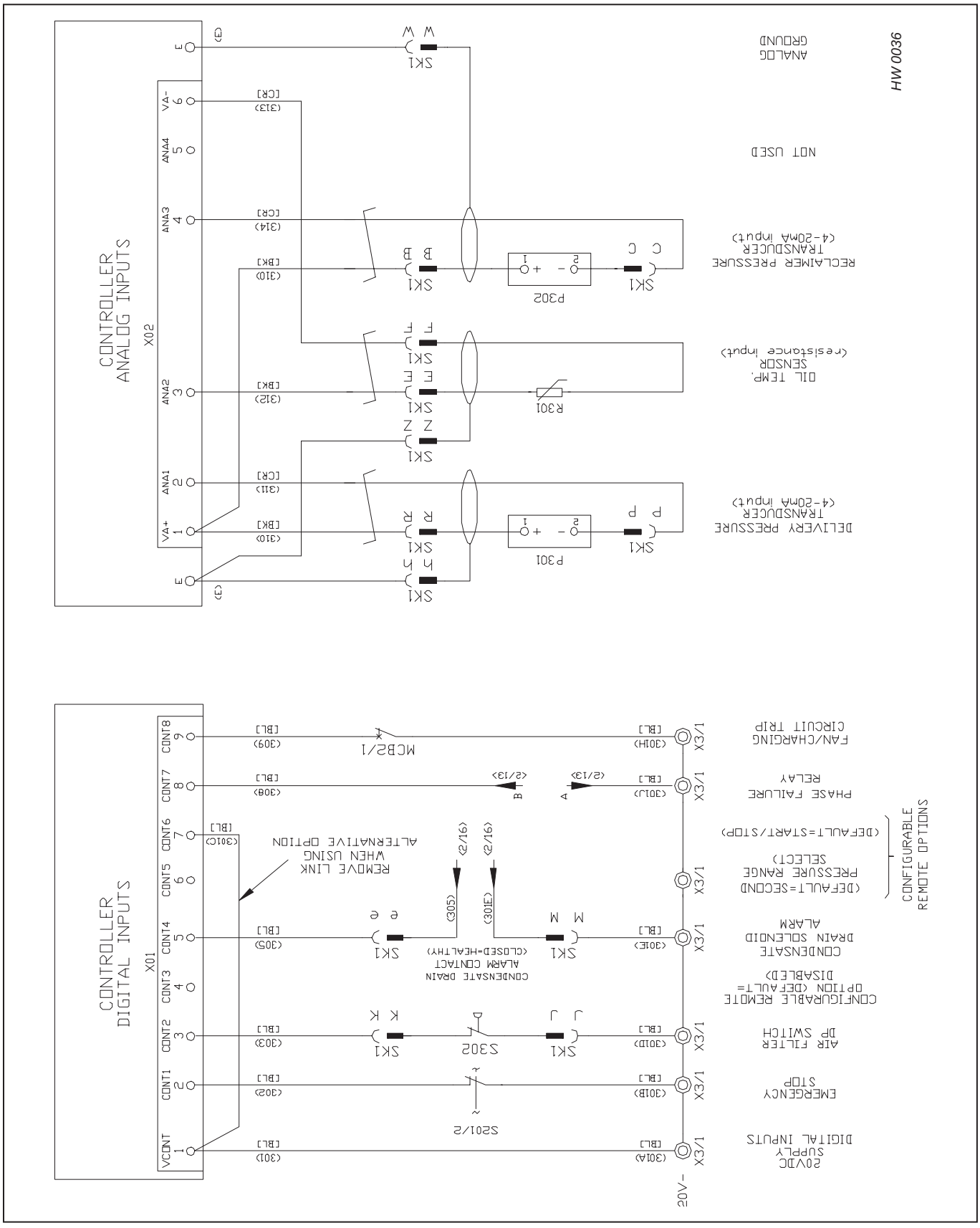
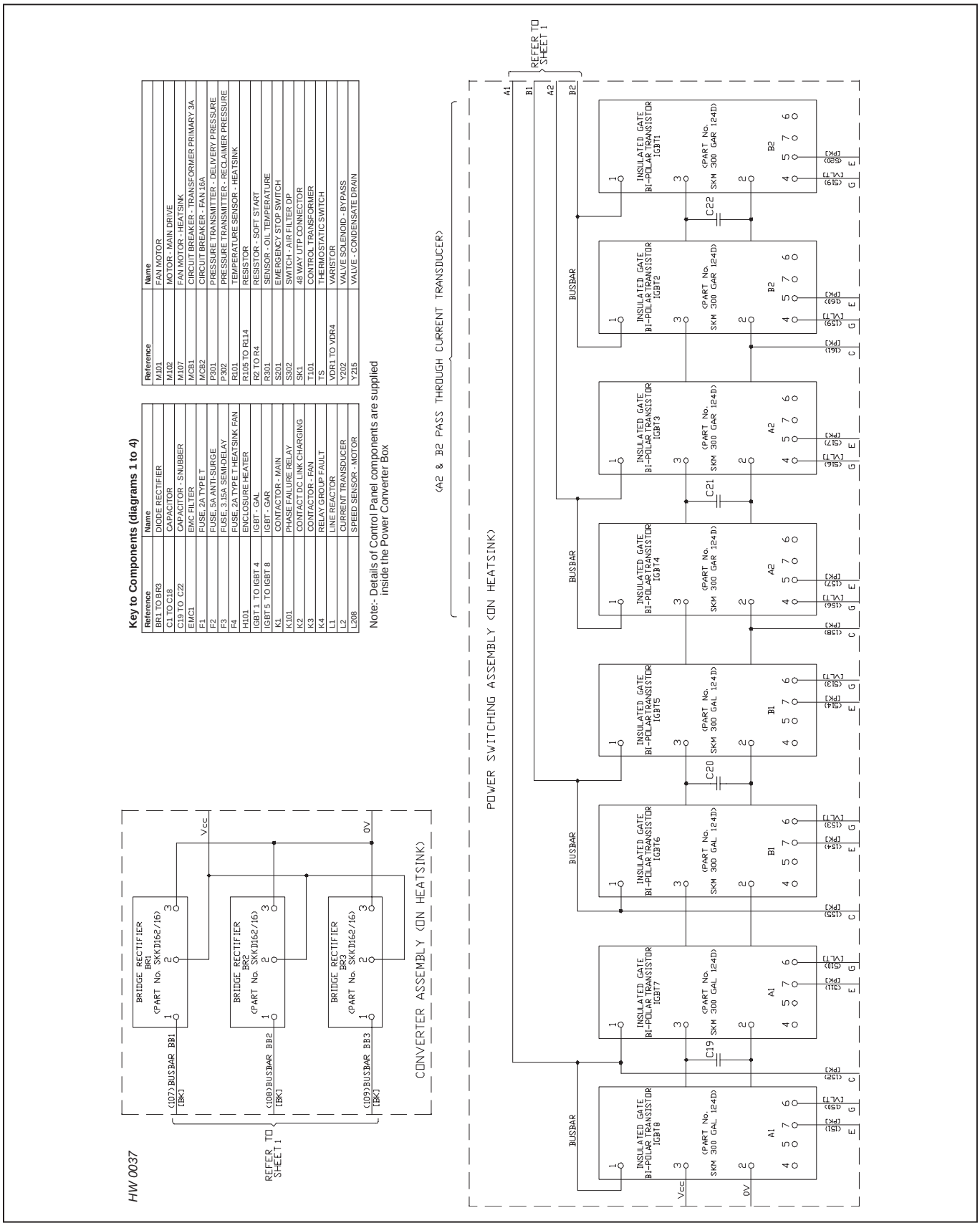


Fig. 3.15 - Electrical Connection Diagram - L120SR (3 of 4)



Key to Components (diagrams 1 to 4)

Reference	Name
BR1 TO BR3	DIODE RECTIFIER
C1 TO C18	CAPACITOR
C19 TO C22	CAPACITOR - SNUBBER
EMC1	EMC FILTER
F1	FUSE, 2A TYPE T
F2	FUSE, 5A ANTI-SURGE
F3	FUSE, 3.15A SEMI-DELAY
F4	FUSE, 2A TYPE T HEATSINK FAN
H101	ENCLOSURE HEATER
IGBT 1 TO IGBT 4	IGBT - GAL
IGBT 5 TO IGBT 8	IGBT - GAR
K1	CONTACTOR - MAIN
K101	PHASE FAILURE RELAY
K2	CONTACT DC LINK CHARGING
K3	CONTACTOR - FAN
K4	RELAY GROUP FAULT
L1	LINE REACTOR
L2	CURRENT TRANSDUCER
L208	SPEED SENSOR - MOTOR

Reference	Name
M101	FAN MOTOR
M102	MOTOR - MAIN DRIVE
M107	FAN MOTOR - HEATSINK
MCB1	CIRCUIT BREAKER - TRANSFORMER PRIMARY 3A
MCB2	CIRCUIT BREAKER - FAN 16A
P301	PRESSURE TRANSMITTER - DELIVERY PRESSURE
P302	PRESSURE TRANSMITTER - RECLAIMER PRESSURE
R101	TEMPERATURE SENSOR - HEATSINK
R105 TO R114	RESISTOR
R2 TO R4	RESISTOR - SOFT START
R301	SENSOR - OIL TEMPERATURE
S201	EMERGENCY STOP SWITCH
S302	SWITCH - AIR FILTER DP
SK1	48 WAY UTP CONNECTOR
T101	CONTROL TRANSFORMER
TS	THERMOSTATIC SWITCH
VDR1 TO VDR4	VARISTOR
Y202	VALVE SOLENOID - BYPASS
Y215	VALVE - CONDENSATE DRAIN

Note:- Details of Control Panel components are supplied inside the Power Converter Box

Fig. 3.16 - Electrical Connection Diagram - L120SR (4 of 4)

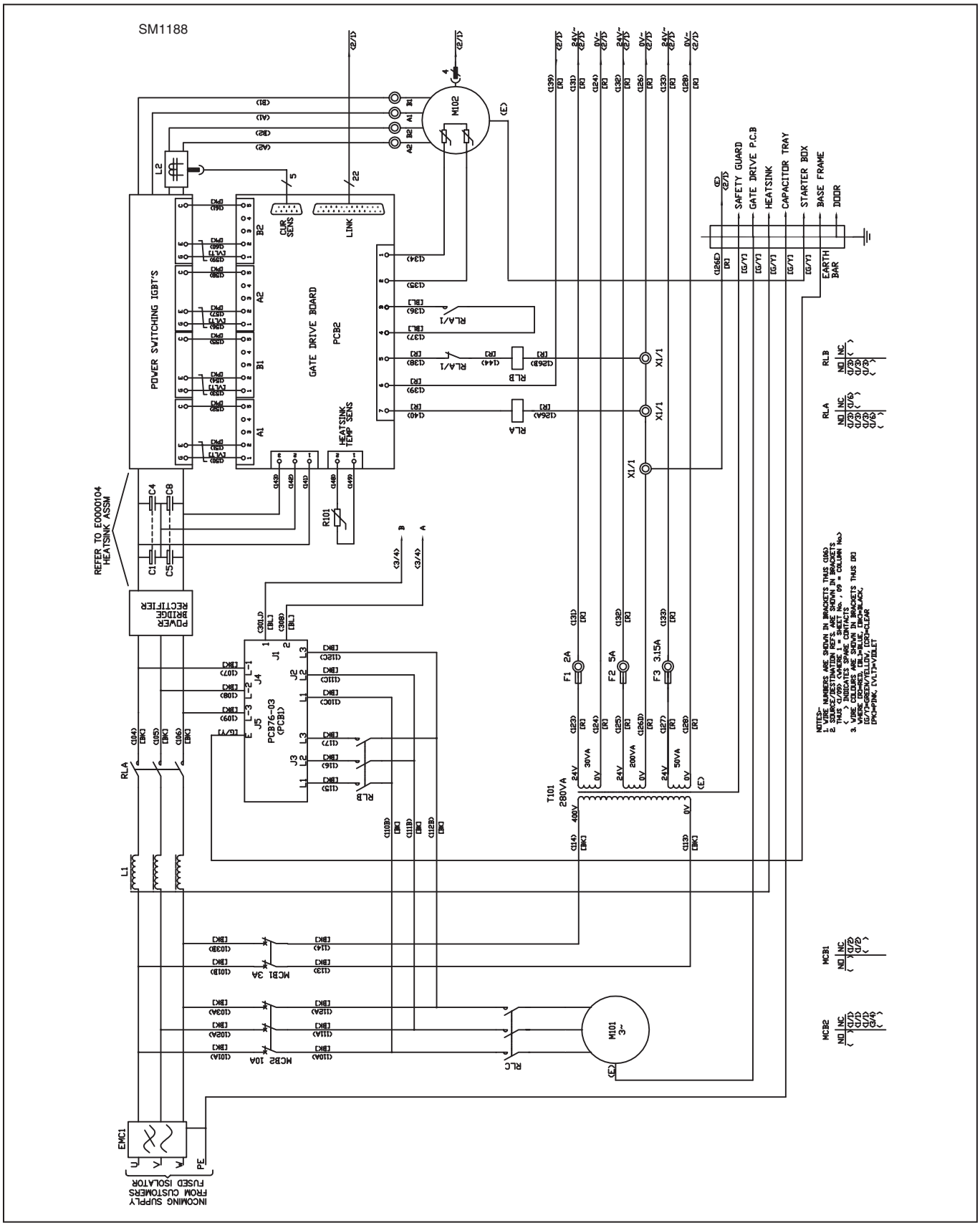


Fig. 3.17 - Electrical Connection Diagram - L45SR
With Phase Monitoring / Phase Failure PCB - (1 of 4)

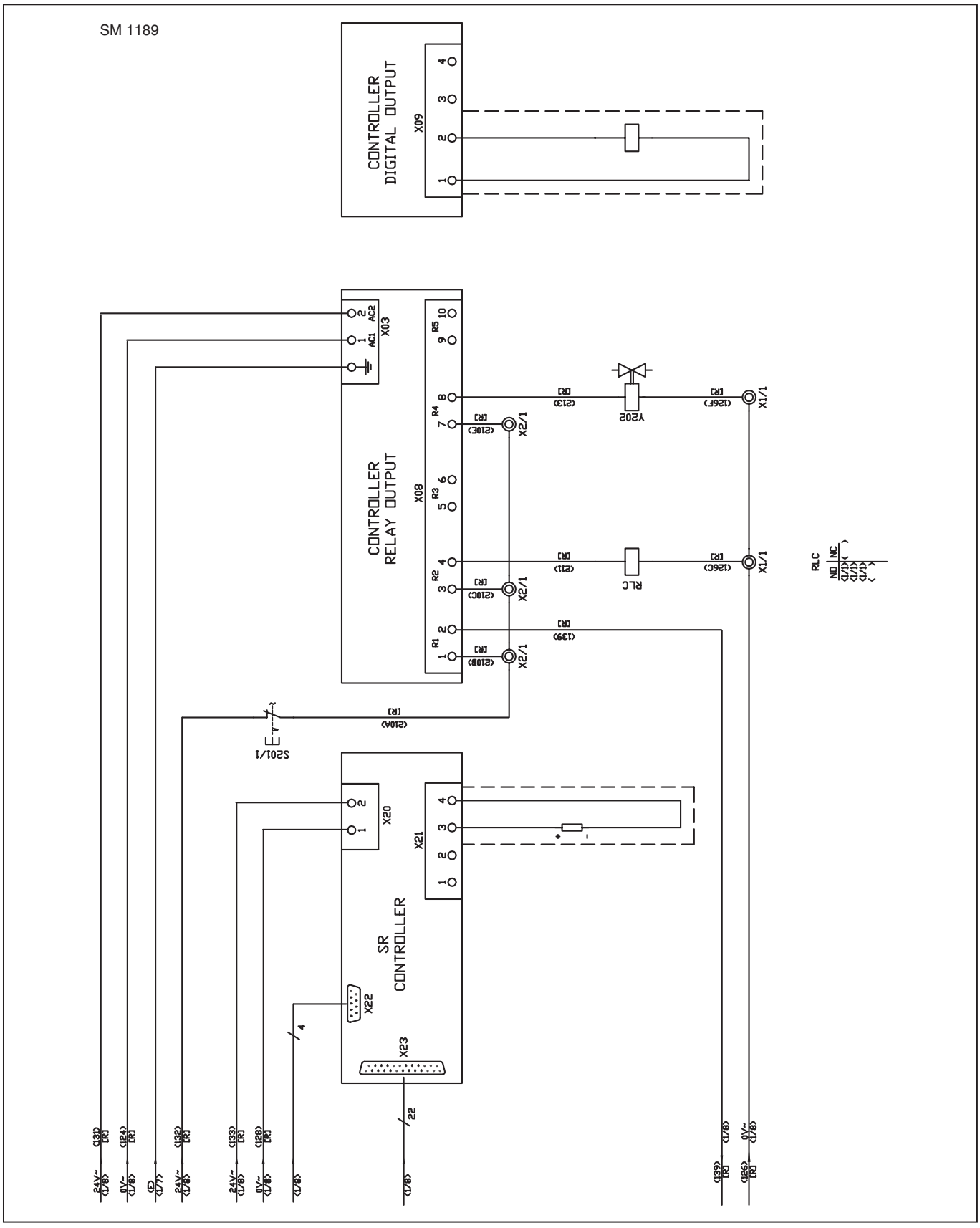


Fig. 3.18 - Electrical Connection Diagram - L45SR
With Phase Monitoring / Phase Failure PCB - (2 of 4)

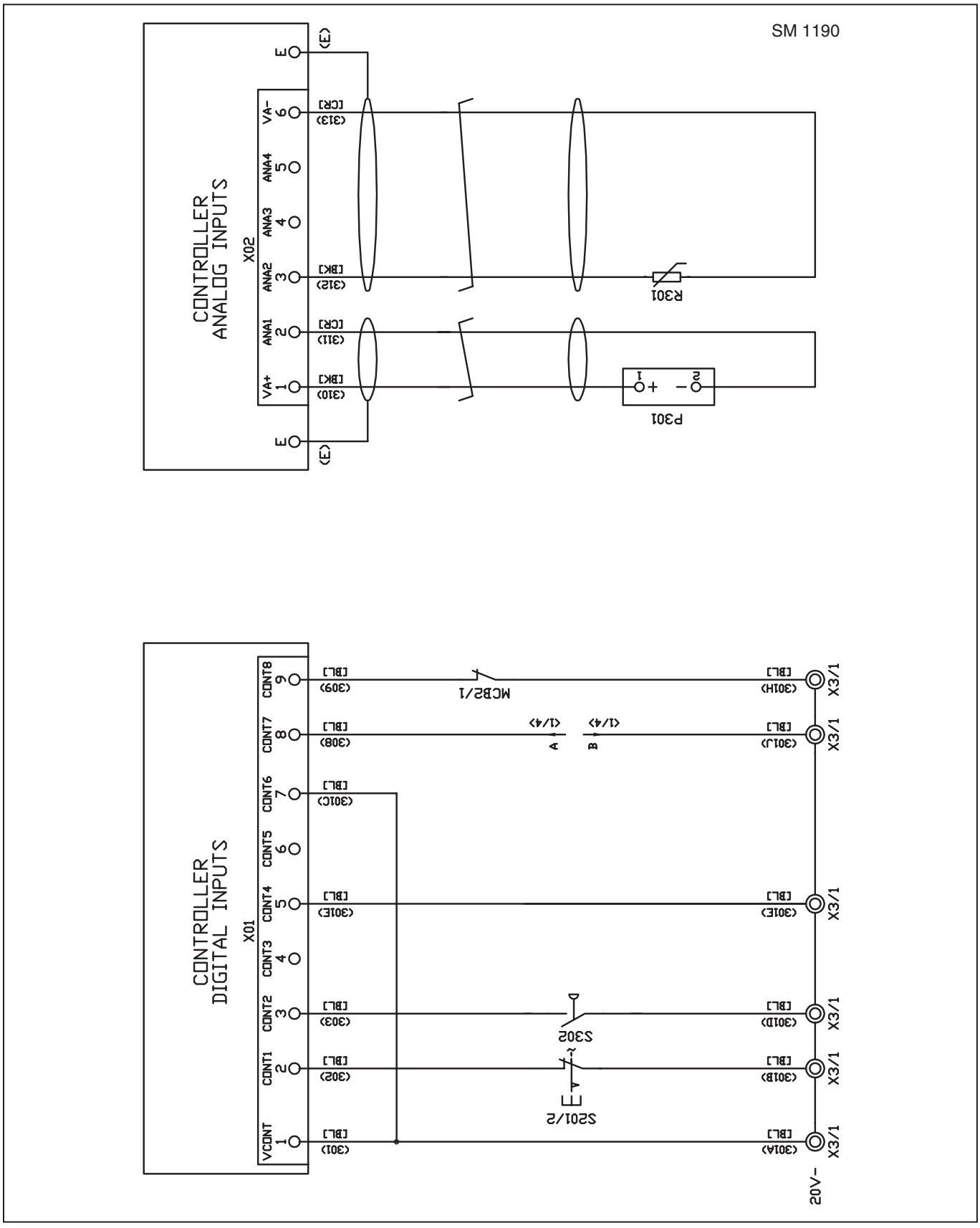


Fig. 3.19 - Electrical Connection Diagram - L45SR
With Phase Monitoring / Phase Failure PCB - (3 of 4)

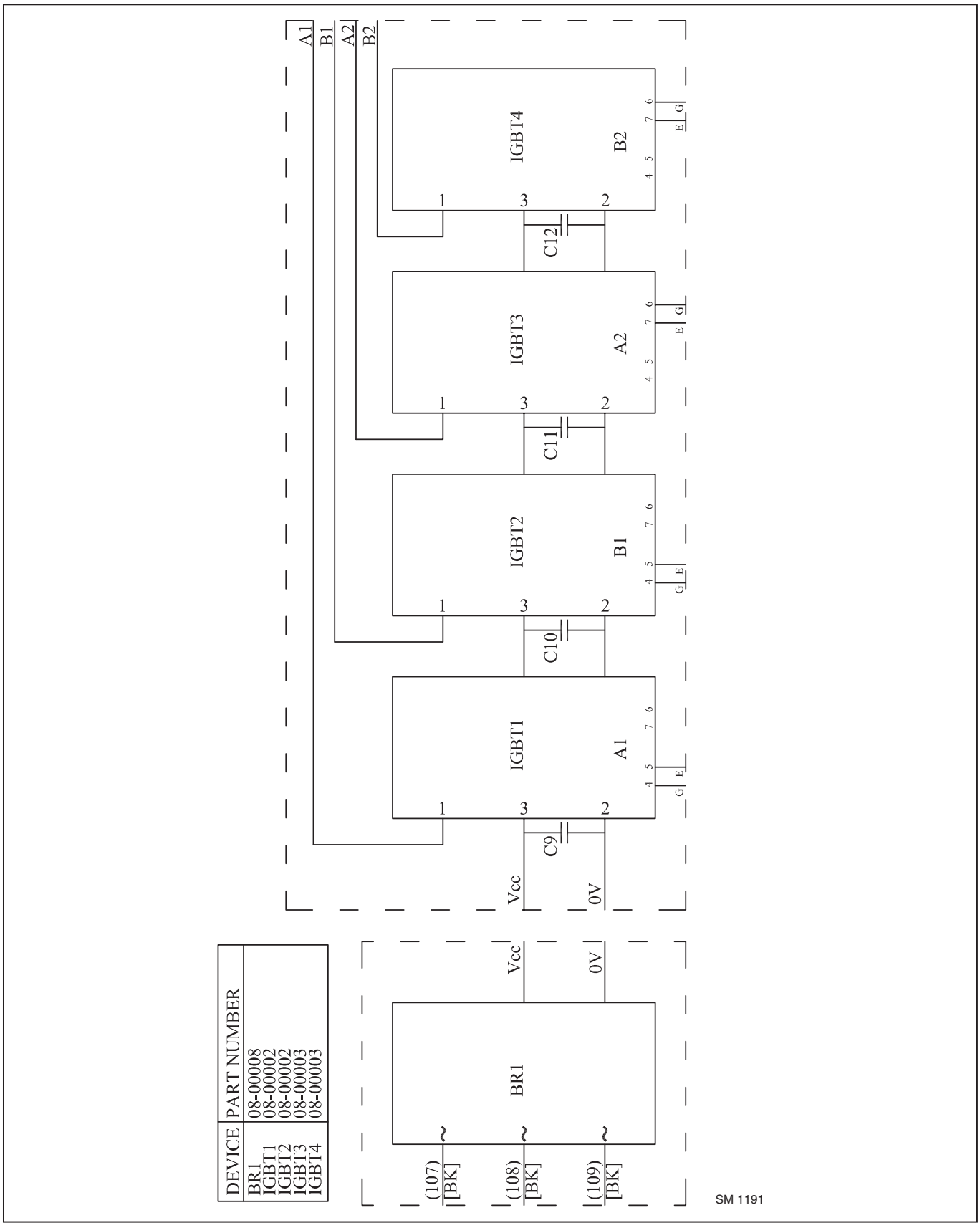


Fig. 3.20 - Electrical Connection Diagram - L45SR
With Phase Monitoring / Phase Failure PCB - (4 of 4)

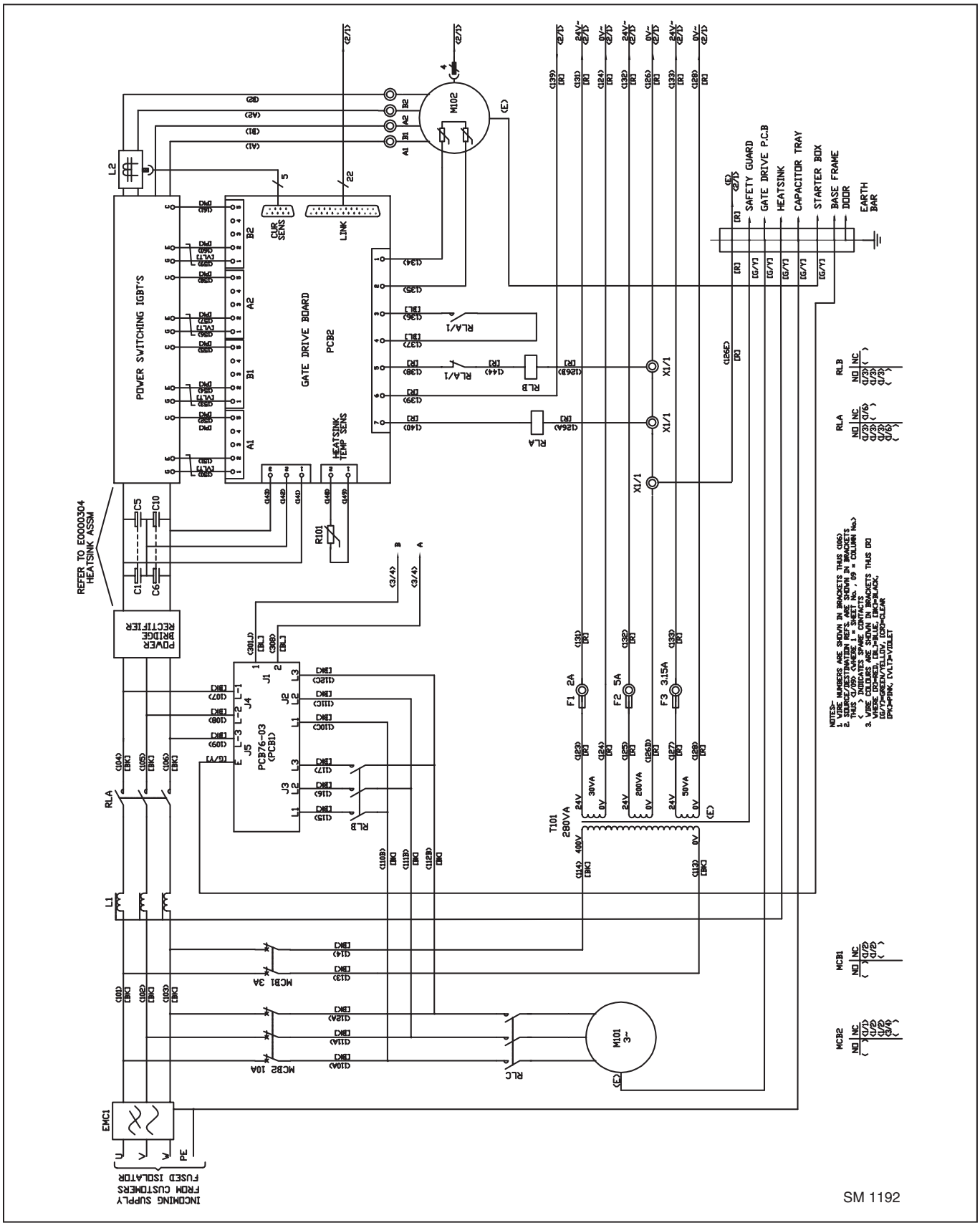


Fig. 3.21 - Electrical Connection Diagram - L75SR
With Phase Monitoring / Phase Failure PCB - (1 of 4)

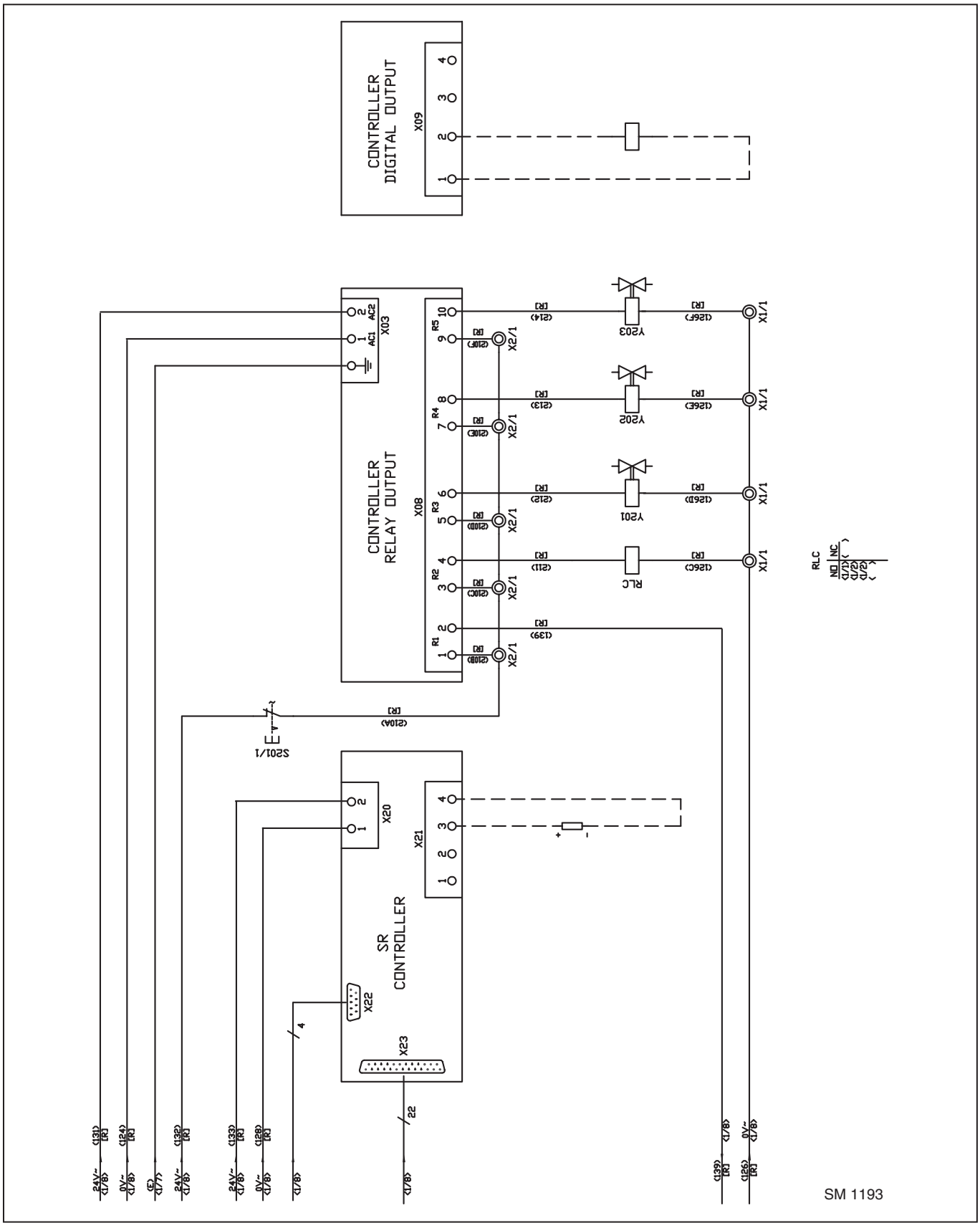


Fig. 3.22 - Electrical Connection Diagram - L75SR
With Phase Monitoring / Phase Failure PCB - (2 of 4)

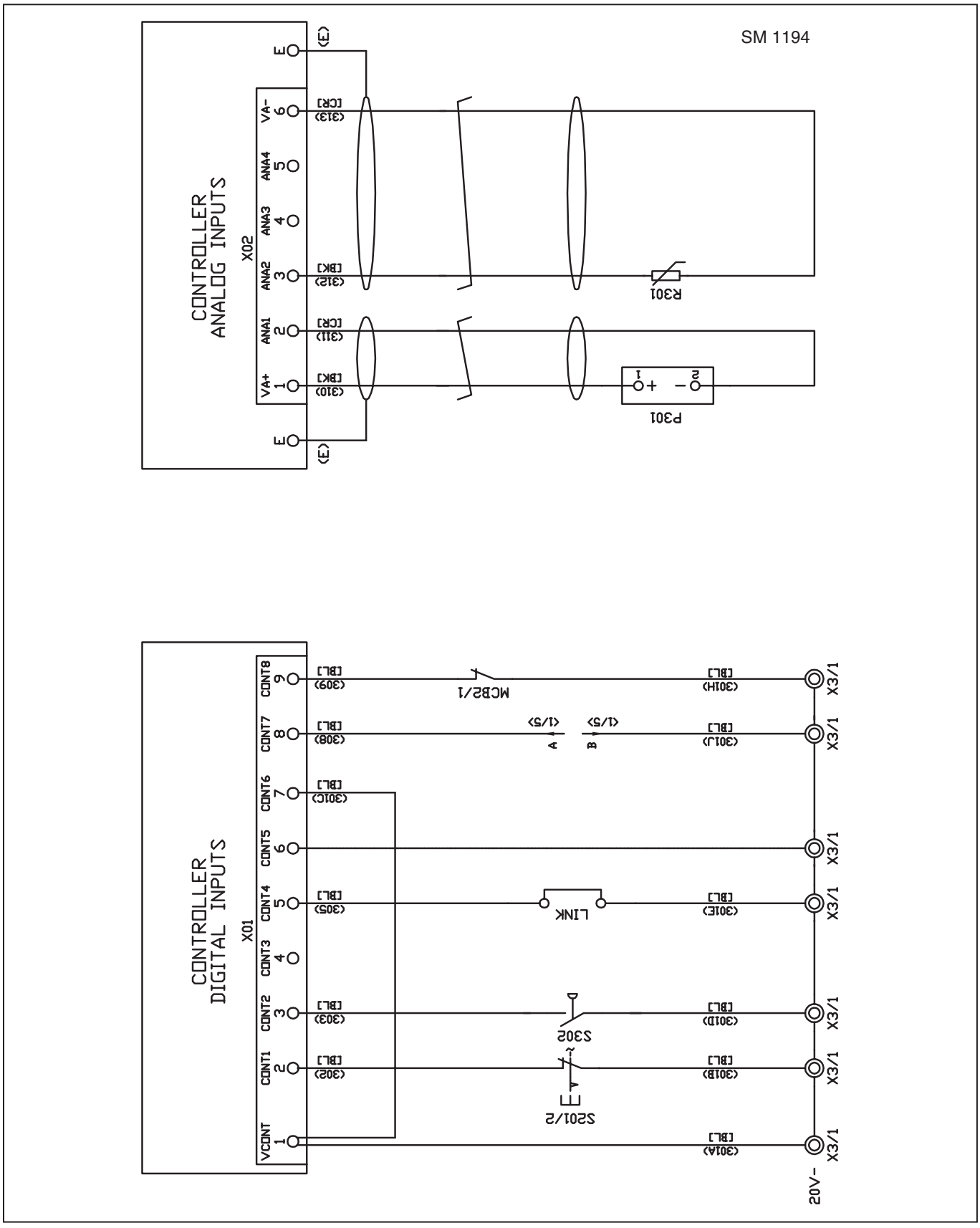
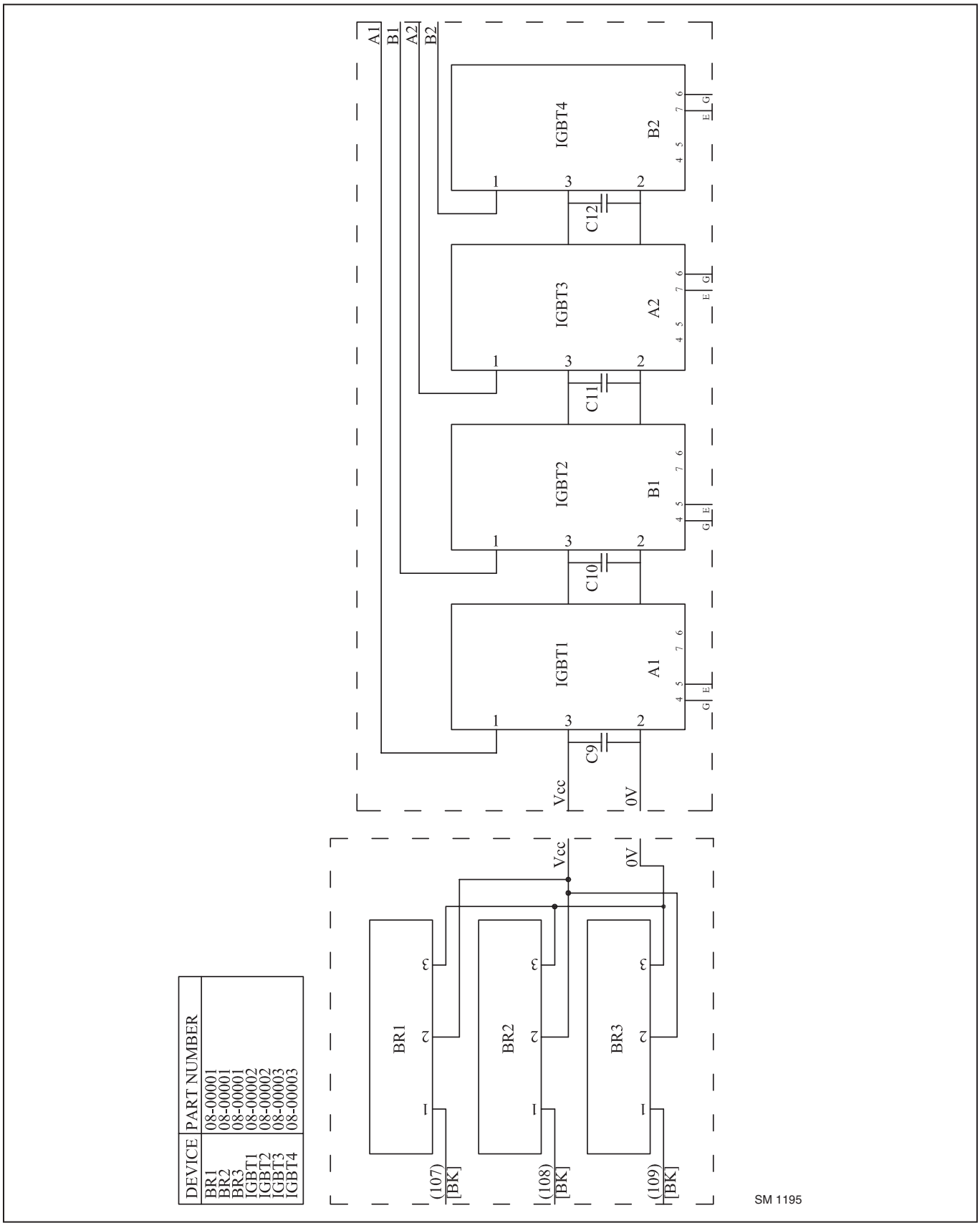


Fig. 3.23 - Electrical Connection Diagram - L75SR
With Phase Monitoring / Phase Failure PCB - (3 of 4)



DEVICE	PART NUMBER
BR1	08-00001
BR2	08-00001
BR3	08-00001
IGBT1	08-00002
IGBT2	08-00002
IGBT3	08-00003
IGBT4	08-00003

Fig. 3.24 - Electrical Connection Diagram - L75SR
With Phase Monitoring / Phase Failure PCB - (4 of 4)

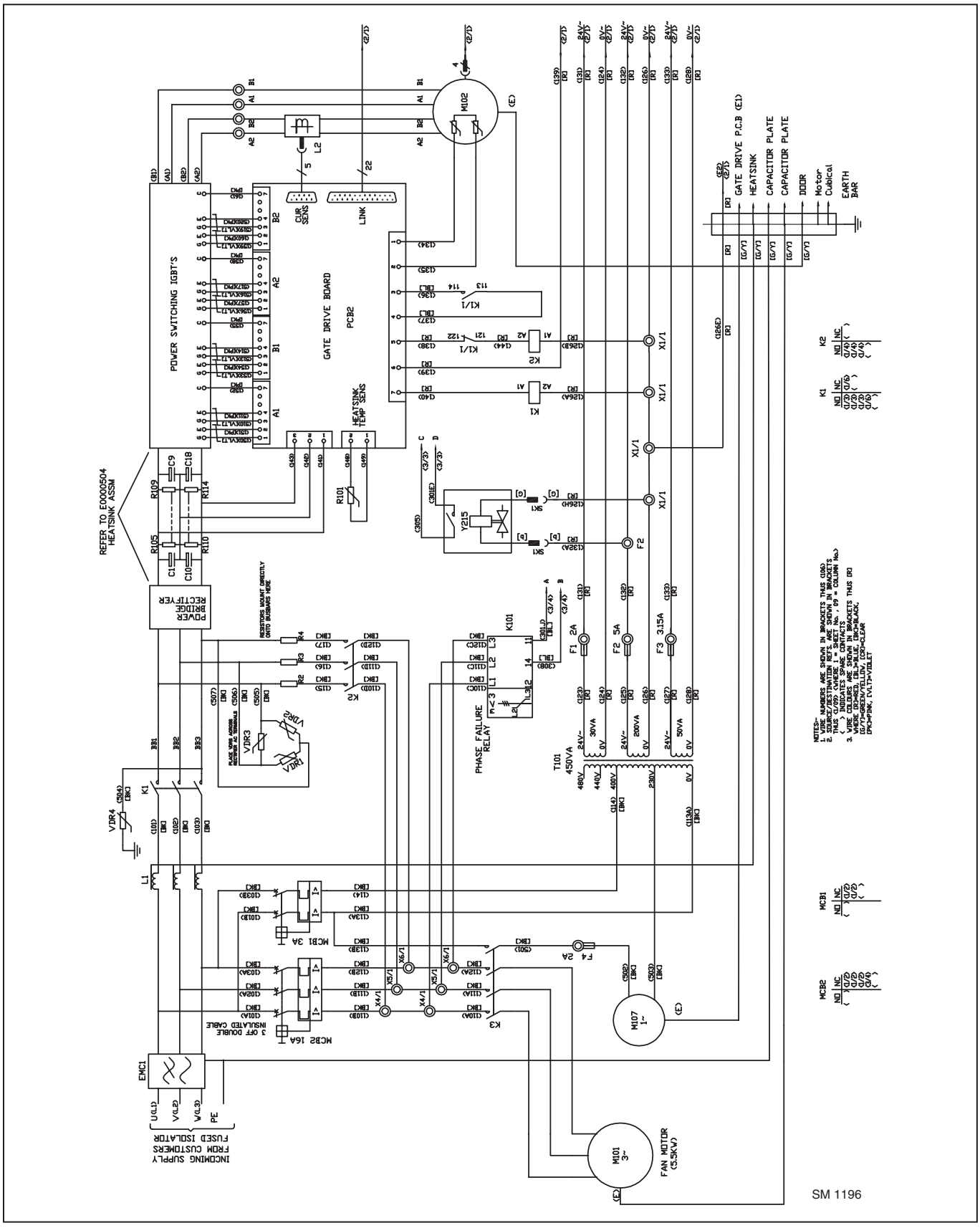


Fig. 3.25 - Electrical Connection Diagram - L120SR With Phase Monitoring / Phase Failure PCB - (1 of 4)

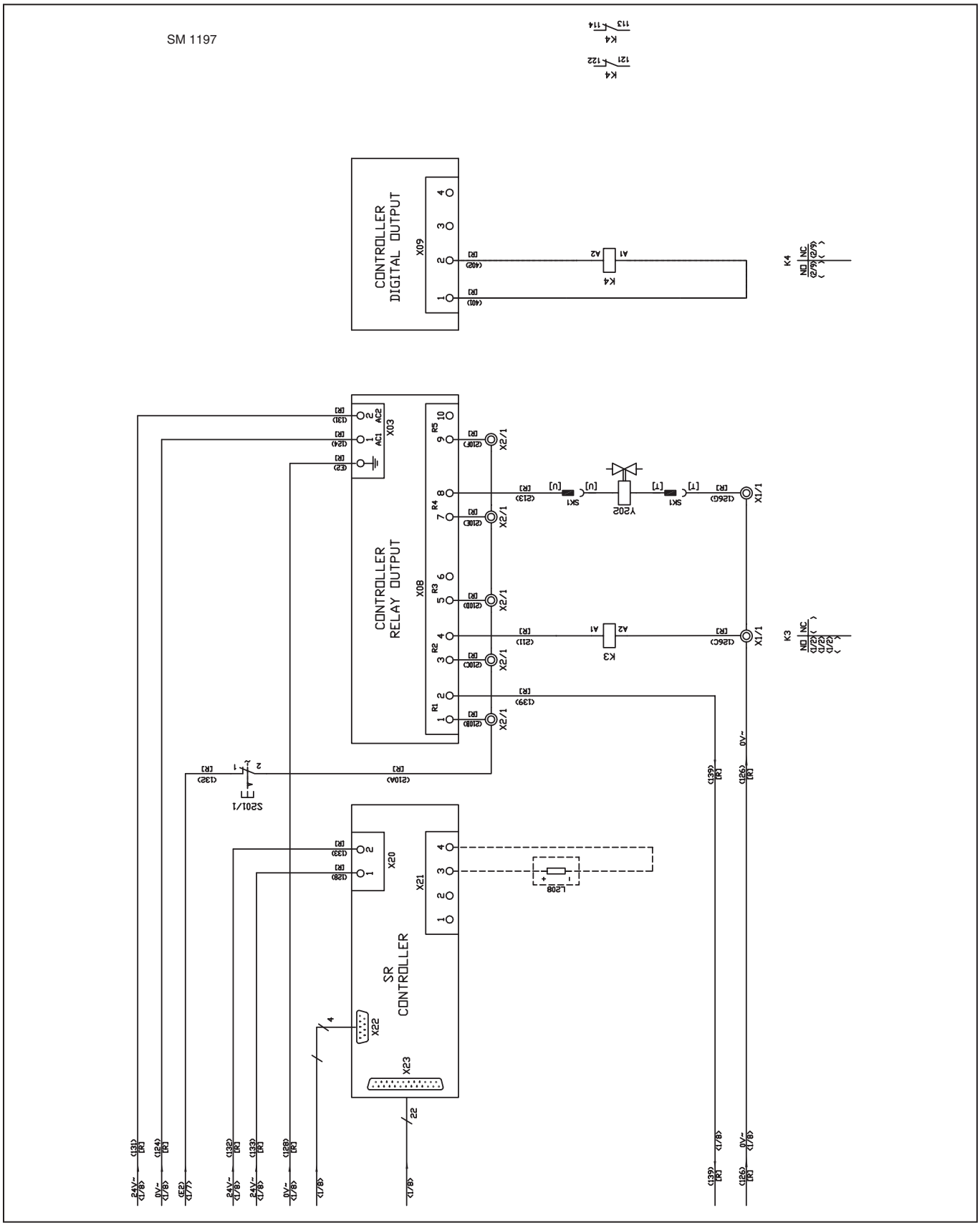


Fig. 3.26 - Electrical Connection Diagram - L120SR With Phase Monitoring / Phase Failure PCB - (2 of 4)

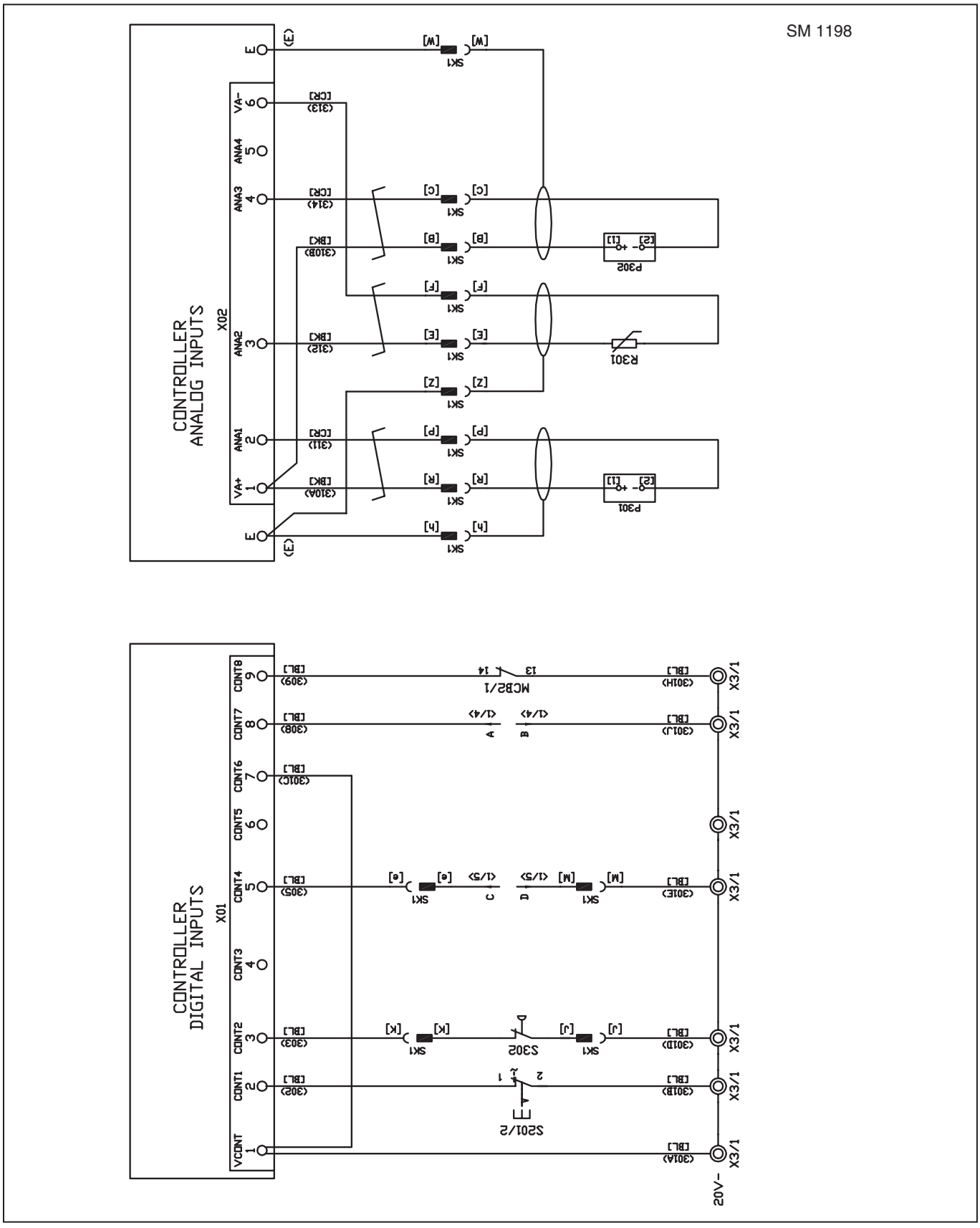


Fig. 3.27 - Electrical Connection Diagram - L120SR
With Phase Monitoring / Phase Failure PCB - (3 of 4)

3.1.7

SM 1199

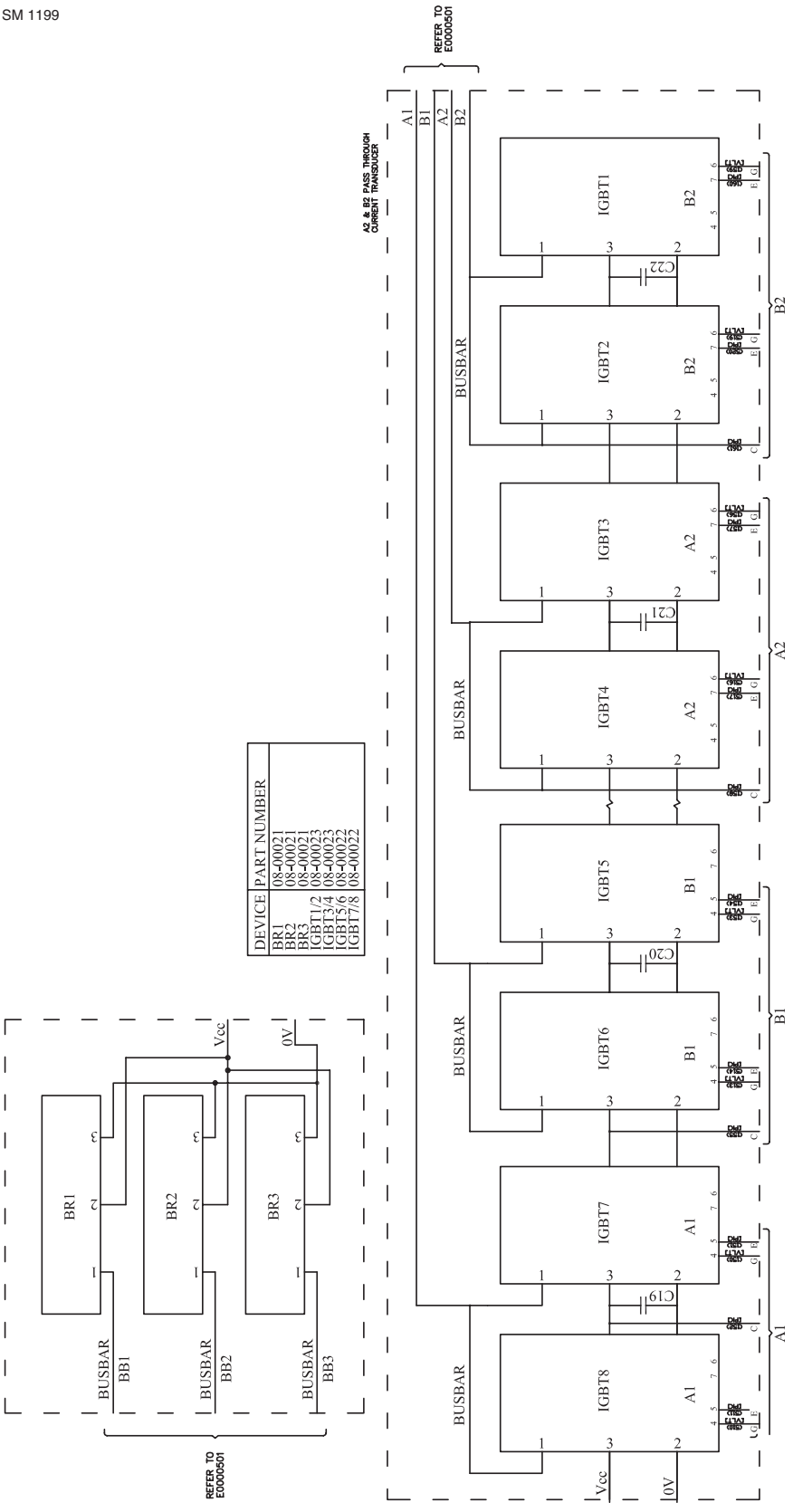


Fig. 3.28 - Electrical Connection Diagram - L120SR With Phase Monitoring / Phase Failure PCB - (4 of 4)

4 Fault Diagnosis

WARNING

- Refer to the safety procedures before operating the compressor unit.
- Lethal voltages are used in this equipment. Use extreme caution when carrying out electrical checks. Isolate the power supply before starting any maintenance work.
- Before opening the door of the power converter compartment, switch the power supply OFF at isolator and wait for 12 minutes to allow the dc link capacitors to discharge to a safe level. Check that the DC link capacitors have fully discharged before starting work on the compressor.

⚠ **Caution: Fault finding by control card substitution without following the correct fault finding procedures is not recommended. A fault may exist which could cause damage to the substitute card.**

4.1 Test Equipment

4.1.1 To carry out checks on the electrical components and the circuit cards inputs and outputs the following test equipment will be required:-

⚠ **Caution: Do not use a test meter with less than a 20,000 ohm/V specification to avoid loading effects and to prevent damage to IC's during testing.**

⚠ **Caution: The circuit boards carry CMOS devices. When replacing circuit boards avoid touching connector pins and devices on the boards to prevent static damage to components. Take anti-static precautions as far as possible such as transporting the circuit boards in anti-static bags.**

a) Test meter

A digital multimeter with diode and capacitor test functions is required for the tests carried out in this section. The meter resistance test voltage should not exceed 1·5V. Always ensure that the meter and test leads are rated for the voltage being measured:

DC -0-1000V is normally sufficient.
AC -0-600V rms.

A suitable test meter is the Fluke 179 or equivalent.

b) Clip-on ammeter

This should be suitable for measuring currents up to 600 amps. A suitable ammeter is the Heme 6-200 A model or equivalent.

c) Insulation tester

The tester should have a 1000V test voltage. A suitable tester is the Megger BM222 or equivalent.

d) DC voltage generator

The generator should provide a maximum of 30V DC at a maximum current of up to 1 A. A suitable generator is obtainable from Thurlby Thandar Instruments or equivalent.

e) IGBT Tester

IGBT Tester part number 98506-24 can be ordered from CompAir UK Ltd.

f) Slave air supply

The air supply should be capable of generating a pressure above 5.5 bar and be fitted with an accurately calibrated gauge.

g) Inductance tester

The tester should be capable of measuring in the uF and mH ranges.

A suitable tester is the AVO Megger B131 or equivalent.

4.2 Cage-Clamp Screwless Terminals

4.2.1 The connections on the controller terminal blocks are fitted with cage-clamp screwless terminals. The cage-clamp design ensures that the clamping force adjusts to sizes of cable between 1 mm2 and 2·5 mm2. This results in a corrosion free contact area and compensates for any deformation of the cable end due to temperature or vibration.

4.2.2 Cable connection or removal

a) Strip the insulation from the end of the cable to leave approximately 8 mm of bare wire.

b) Insert a screwdriver with a blade end width of 3 mm into the terminal slot and push to the end stop.

c) Insert (or remove) the cable.

d) Withdraw the screwdriver to leave the cable clamped.

e) Check the connection by lightly pulling on the cable.

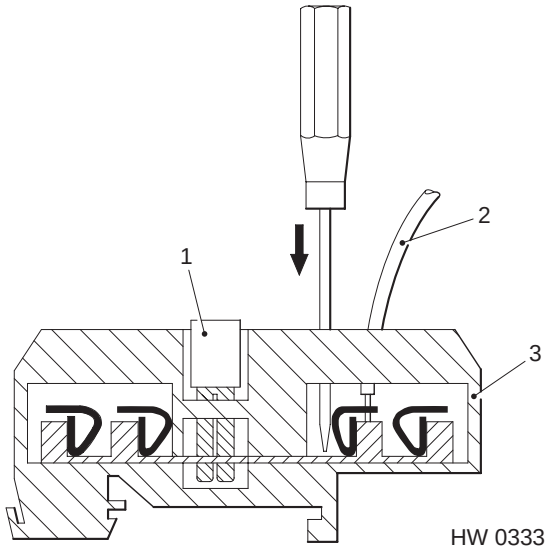


Fig. 4.1 - Cable Connection or Removal

1. Terminal Jumper Connection
2. Cable
3. Terminal Block

4.3 Power Supplies

⚠⚠ **Caution: The high voltage (primary) and low voltage (secondary) circuits must NOT be connected in any way (e.g. via test probes, wiring etc.)**

4.3.1 To check the 24V AC supply circuits

(Refer to Electrical Connection Diagrams)

a) Measure the AC voltages of all the secondary outputs of the control transformer. Always measure across the transformer output terminals and NOT between each terminal and earth.

b) The voltage of each output should be as indicated ±10%. If one of the voltages is incorrect, renew the transformer. If all the voltages are incorrect see 4.3.2 ‘To check the main power supply’.

c) Check the fuses contained in the fused terminal blocks F1, F2 and F3. Renew any blown fuse. If a fuse blows repeatedly continue to check along the circuit for any short circuits or failed devices, as explained in detail throughout this Chapter.

d) Measure the AC voltage between pins 1 and 2 of controller terminal X03. The voltage should be the same as measured in 2 above. Check the wiring if the voltage is incorrect.

e) Measure the AC voltage between pins 1 and 2 of controller terminal X20. The voltage should be the same as measured in point 2. Check the wiring if the voltage is incorrect.

4.3.2 To check the main power supply

a) Measure and record the voltage between the Red and Yellow, the Red and Blue, and the Yellow and Blue incoming phases. In addition measure the AC voltage between the primary connections of control transformer T101. The readings should be within 10% of the specified working voltage on the compressor nameplate.

b) Measure and record any voltage drop during a motor start sequence. Excessive voltage drop will cause tripping problems.

4.4 Control Inputs

⚠⚠ **Caution: The high voltage (primary) and low voltage (secondary) circuits must NOT be connected in any way (e.g. via test probes, wiring etc.)**

4.4.1 To check the air filter differential pressure switch

a) L45SR and L75SR models

The air filter differential pressure switch contacts are normally open. This indicates that the air filter element differential pressure is within limits. When the filter requires changing the contacts of the switch close.

1. Disconnect the cables from the pressure switch.
2. Check that the pressure switch is open circuit by checking continuity between the switch terminals.
3. Renew the pressure switch if closed circuit.
4. Refer to the electrical connection diagrams to verify the wiring connections from the controller to the pressure switch.

b) L120SR models

A visual filter condition indicator is fitted adjacent to the air intake filter. This is also a switch.

The indicator is a vacuum indicator and when the set point of 65 mbar vacuum is reached it will send a signal to the controller to flag up a warning. The switch is normally open and can be checked in the normal manner as above.

Note: The indicator has to be manually reset by pressing the yellow button (1) on the bottom (see fig. 4.2).

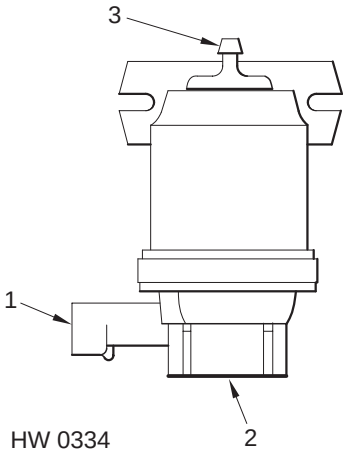


Fig. 4.2 - Air Filter Indicator Switch

4.4.2 To check the emergency stop circuit

a) The Emergency Stop button has two contacts which will open if the Emergency Stop button is pressed. One contact is connected to the 24V AC power supply circuit to the controller outputs. This contact will interrupt the power supply to the motor contactors and control solenoids in the event of an Emergency Stop. The other contact is connected to the DC input circuits of the controller. The two circuits must NOT be connected in any way, e.g. via test probes, wiring etc.

b) Refer to the electrical connection diagrams to check the continuity of the emergency stop wiring.

4.5 Control Outputs

⚠⚠ **Caution: The high voltage (primary) and low voltage (secondary) circuits must NOT be connected in any way (e.g. via test probes, wiring etc.)**

4.5.1 Relay Output (connector X08)

a) Ensure the Emergency Stop input has not been operated before checking the outputs, see para. 4.2 ‘To Check the Emergency Stop Circuit’

b) The motor contactors and load solenoid controller outputs are all relay contacts.

c) When checking an output ensure the AC supply to X08/1,3,5,7 & 9 is within 10% of the nominal voltage.

d) Measure the voltage between the transformer secondary 0V terminal and the output terminal, while the output is operated using the Test Digital Outputs function.

e) If an output fails to function renew the controller.

f) Continue to check the output voltage along the circuit being tested. Renew any connections or wiring as necessary.

g) If the voltage across the terminals of the contactor or solenoid coil being tested is correct when the controller output is switched on, but the device fails to function, renew the contactor coil or solenoid.

4.6 Sensors

⚠⚠ **Caution: The high voltage (primary) and low voltage (secondary) circuits must NOT be connected in any way (e.g. via test probes, wiring etc.)**

4.6.1 To check the pressure sensors

The Pressure Sensors are 4-20 mA types, 0-13.8 Bar (L45SR and L75SR) and 0-16 Bar (L120SR). The current in the sensor 24V DC supply wires will change in proportion to the pressure acting on the Pressure Sensor. The controller monitors the current signal and processes the information to give a pressure display.

a) Switch power off.

b) Remove the plug from the pressure sensor, switch power ON and ignore any displayed fault message.

c) Measure the DC voltage between terminals 1 and 2 of the plug. The reading should be between 20V and 28V.

d) If the voltage is incorrect, see 4.3.1 'To check the 24V AC supply circuits'.

e) Re-connect the pressure sensor plug and disconnect one of the plug wires.

f) Connect the multimeter between the disconnected end of the wire and the plug terminal.

g) Apply a calibrated known pressure to the sensor and measure the dc current in the sensor circuit. The reading should be as given in the Pressure Sensor output table below.

h) If the current is not within ± 5% of the figure given check the wiring and connections of the pressure sensor circuit.

i) Renew the pressure sensor if no wiring or connection faults can be found.

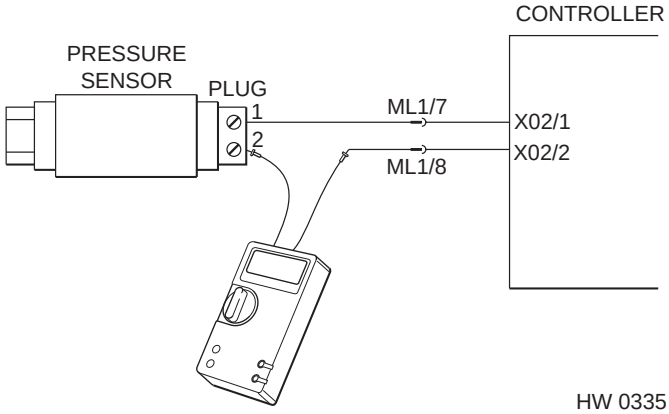


Fig. 4.3 - Measuring The Pressure Sensor Current

Pressure (bar)	Sensor Output (mA) L45SR, L75SR	Sensor Output (mA) L120SR	Pressure (bar)	Sensor Output (mA) L45SR, L75SR	Sensor Output (mA) L120SR
0.0	4.00	4.00	8·5	13.86	12.50
0·5	4.58	4.50	9·0	14.44	13.00
1·0	5.16	5.00	9·5	15.02	13.50
1·5	5.74	5.50	10·0	15.60	14.00
2·0	6.32	6.00	10·5	16.18	14.50
2·5	6.90	6.50	11·0	16.75	15.00
3·0	7.48	7.00	11·5	17.33	15.50
3·5	8.06	7.50	12·0	17.91	16.00
4·0	8.64	8.00	12·5	18.49	16.50
4·5	9.22	8.50	13·0	19.07	17.00
5·0	9·80	9.00	13·5	19.65	17.50
5·5	10·38	9.50	13.8	20.00	17.80
6·0	10·96	10.00	14.0	n/a	18.00
6·5	11·54	10.50	14.5	n/a	18.50
7·0	12·12	11.00	15.0	n/a	19.00
7·5	11.50	11.50	15.5	n/a	19.50
8·0	12.00	12.00	16.0	n/a	20.00

Fig. 4.4 - Pressure Sensor Output Table

4.6.2 To check the air/oil temperature sensors

The temperature sensors are spreading resistance type thermistors. The resistance of the thermistors will increase as the applied temperature increases. The controller monitors the resistance and processes the information to give a temperature display.

a) Switch power off, disconnect the cables from the temperature sensor and measure its resistance. If an accurate measurement is required, drain the air-end, remove the temperature sensor and the sensing tip and place in a calibrated oil temperature bath.

Warning: Risk of injury from hot oil under pressure.

b) The sensor resistance depends on the temperature, see the temperature/sensor resistance table below. If the measured resistance equates to an error of more than ± 2°C different from the figure given below, renew the sensor.

c) If the resistance is correct, re-connect the sensor cables.

d) Disconnect temperature sensor cables from controller terminal plug (X02/3 & 6).

e) Measure the resistance between the disconnected cable ends. If the resistance is not as given in the table, renew cables as necessary.

f) If the resistance is correct, renew the controller.

Temperature (°C)	Sensor Res. (ohms)
0	1605
5	1678
10	1762
15	1848
20	1927
25	2008
30	2092
40	2263
50	2448
60	2638
70	2844
80	3058
90	3282
100	3520
110	3772
120	4043

Fig.4.5 - Temperature Sensor Resistance Table

4.7 Controller

Caution: When working with static sensitive components, ie, circuit cards and memory IC's etc, always take antistatic precautions as follows:-

(i) Always transport static sensitive components in anti-static bags or containers.

(ii) Never touch the metal pins of electronic IC devices.

(iii) Never place static sensitive components onto a metal surface. Always place directly into an anti-static bag or container.

(iv) Always ensure any body static is discharged before handling static sensitive components by touching an earthed surface at regular intervals.

4.7.1 Description

a) The controller consists of two microprocessor units, the application subcontroller, and the motor drive subcontroller.

b) The application subcontroller contains three cards which together run the application program to control and monitor the compressor and keypad functions of the controller. An application program IC is fitted to this unit.

c) The motor drive subcontroller contains two cards and is mounted adjacent to the application subcontroller and connected by a three wire internal serial link. Motor drive program ICs, which are fitted to this unit, control the speed of the motor drive as required by the application program and return condition and fault data from the drive circuits to the application program.

4.7.2 Application Control Program IC

Instructions for renewing the control program IC within a SureScan controller:

a) Remove the controller from the compressor.

b) Remove the screws located adjacent to the electrical plug connections on the rear of the controller.

c) Using a spanner, remove the (plug securing) nuts adjacent to the sub-D connections.

d) Remove the six rear controller enclosure securing screws (do not remove the earth tag and stud adjacent to X03).

e) Remove the rear controller cover.

f) The control program IC can be removed without dismantling the three circuit cards. To eliminate the possibility of re-connection errors, it is recommended that the circuit cards are not dismantled.

Note: Before removal of the control program IC, make a note of the orientation and position of the IC in its socket. Note the orientation marks on the IC, socket and circuit board.

g) Using a small screwdriver, or similar tool, carefully remove the control program IC from its socket.

h) Insert the new control program IC. Check the orientation and ensure that each pin enters the socket correctly. (The pins must not bend underneath the IC during insertion.)

i) When re-assembling the controller, refit the six rear cover securing screws first to hold the cover in place but do not tighten. Then refit the remaining screws and nuts before finally tightening the rear cover screws.

Note: Ensure that the ribbon cable is not trapped or displaced when replacing the cover.

j) Re-connect to compressor and test.

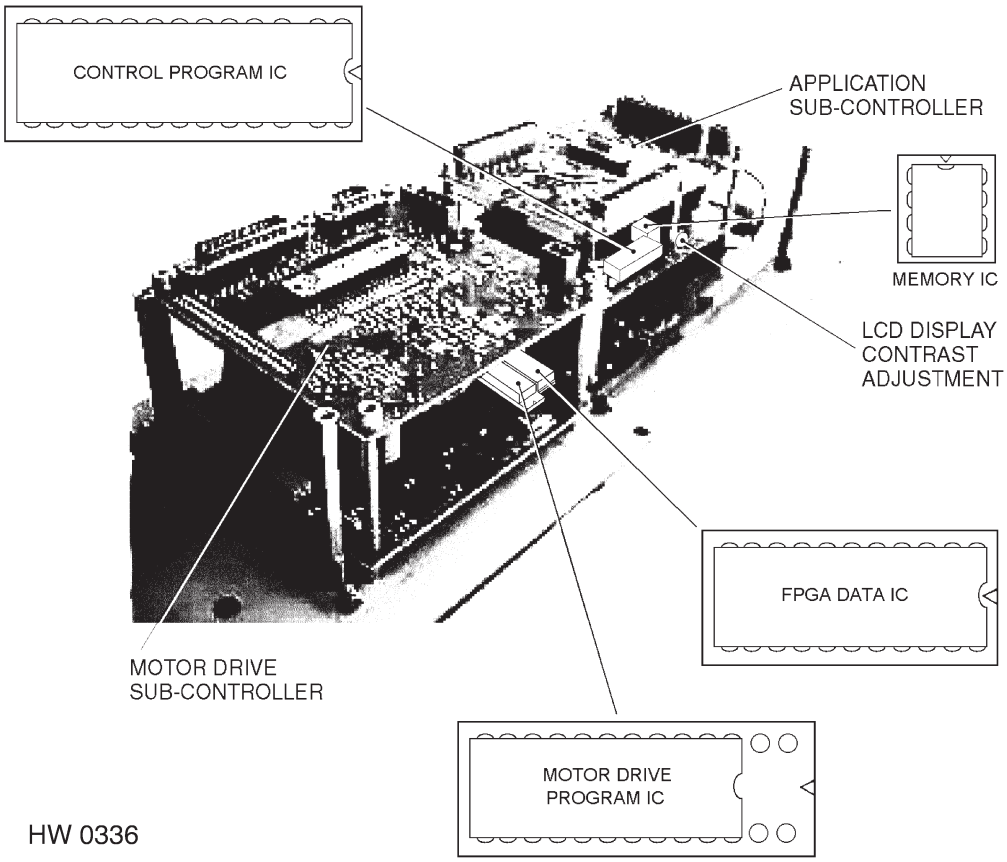


Fig. 4.6 - Arrangement of Controller Cards

4.7.3 Motor Drive Program IC

a) Normally it is not necessary to change the motor drive program IC. However some control programs also require the drive program to be updated. If one of these control programs is installed without the corresponding drive IC change, the message 'Wrong SR Drive program' will be displayed.

b) To change this IC follow the basic instructions for the control program. However to gain access it will be necessary to fold the upper card to one side. No connections need to be disturbed. Note also the position of the unused sockets at the notch end.

4.7.4 FPGA Data IC

A need to change this IC is not anticipated. However, if required, use the same procedure as above.

4.8 SR Fault Location

4.8.1 SR Current Sensor Fault (figs. 4.7 and 4.8)

a) The SR drive current sensor circuit has detected a fault.

b) Refer to the flow chart in figs. 4.7 and 4.8 for the fault finding procedure.

4.8.2 SR Motor High Temperature Fault

Under normal operating conditions the resistance of the thermistors in the SR motor windings should be 50 to 500 ohms. Possible causes of high temperature are:

(i) High ambient temperature.

(ii) Motor cooling air intake grille blocked.

(iii) Pre-filter blocked.

(iv) Open circuit in thermistor cables.

(v) Recirculation of exhaust air from cooler within the compressor.

4.8.3 SR Motor Overcurrent (fig. 4.9)

a) Occurs if the current sensor signal indicates excessive SR motor phase current.

b) Refer to the flow chart in fig. 4.9 for the fault finding proceedure.

c) Attempting to repeatedly start a compressor with an SR motor overcurrent fault will produce a start inhibit.

4.8.4 DC Link High Voltage Fault (figs. 4.10, 4.11)

a) This fault occurs when the DC link voltage is excessive.

b) Refer to the flow chart in figs. 4.10 and 4.11 for the fault finding procedure.

⚠ **Caution: When measuring the DC link voltage use a suitable test meter and leads (1000V test voltage) and attach the leads to the DC link using 'crocodile' clips.**

c) Route the leads to ensure that the enclosure door can be closed and fastened before applying power.

4.8.5 DC Link Low Voltage Fault (figs. 4.12, 4.13)

a) This fault occurs when the DC link voltage is below operating level.

b) Refer to the flow chart in figs. 4.12, 4.13 for the fault finding procedure.

4.8.6 SR Position Sensor Fault

This fault occurs when the SR motor position sensor cable is disconnected or the position sensor is faulty.

4.8.7 SR Motor Overspeed Fault

This fault occurs when the SR motor measured speed exceeds the normal operating speed. Possible causes are:

1.Fault in speed control harness, eg broken wire or cable screen.

2.Fault in controller.

4.8.8 SR Motor Stall Fault (fig. 4.14)

a) This fault occurs when the SR motor speed remains below 300rpm for 1 second.

b) Refer to the flow chart in fig. 4.14 for the fault finding procedure.

4.8.9 DC Link Charge Fault (fig. 4.15)

a) This fault occurs during the 5 second charge period if the voltage does not exceed expected level. At 5 seconds the voltage should exceeed the following figure.

420V Serial Nos F170-0112 to F170-0353

485V Serial Nos F170-0354 onwards

485V Serial Nos F171-0100 onwards

485V Serial Nos F180-0106 onwards

b) Refer to the flow chart in fig. 4.15 for the fault finding procedure.

4.8.10 Heatsink Temperature Sensor Fault

This fault occurs when the resistance of the heatsink temperature sensor is outside of it's working range. Possible causes are:

a) Broken wire.

b) Faulty sensor.

4.8.11 Heatsink High Temperature Fault

This fault occurs when the measured heatsink temperature is above 90°C (L45SR and L75SR) or 95°C (L120SR). Possible causes are:

a) High ambient temperature.

b) Pre-filter blocked.

c) Heatsink cooling duct blocked.

d) Heatsink cooling duct missing.

e) Heatsink dirty.

f) Power converter filters blocked.

g) Heatsink cooling fan faulty (L120SR only)

Note: When the heatsink temperature is above 85°C (L45SR and L75SR) or 90°C (L120SR), the drive will start to limit the speed.

4.8.12 Main Contactor Fault

This fault occurs if the main contactor auxiliary contact is open when the contactor output is energised.

A main contactor fault condition can also be produced with the fitting of a phase failure retrofit kit. This occurs when the incoming phases are transposed [#].

Possible causes are:

a) The potentiometer is set incorrectly for the national AC supply voltage.

b) An imbalance in the national AC supply voltage.

c) A faulty phase failure relay auxiliary contact.

d) A faulty main contactor coil.

[#] Earlier model 345SR & 475SR only

4.8.13 SR Power Supply Fault *

There has been an interruption in the power supply.

4.8.14 Internal Comms Fault

This condition exists when there is a fault on the Surescan controller or there has been a brief interruption in the power supply.

4.8.15 SR PCB Internal Fault

This condition occurs when there is a fault on the Surescan controller or there has been a brief interruption in the power supply.

4.8.16 Start Inhibit *

This fault condition has two possible causes.

a) Initial power up with incoming phases transposed.

b) Excessive starting of machine with SR motor overcurrent fault. *

*An access code is required to reset the fault. Also see next section 4.8.17 - 'LSR Phase Monitoring / Phase Failure PCB'.

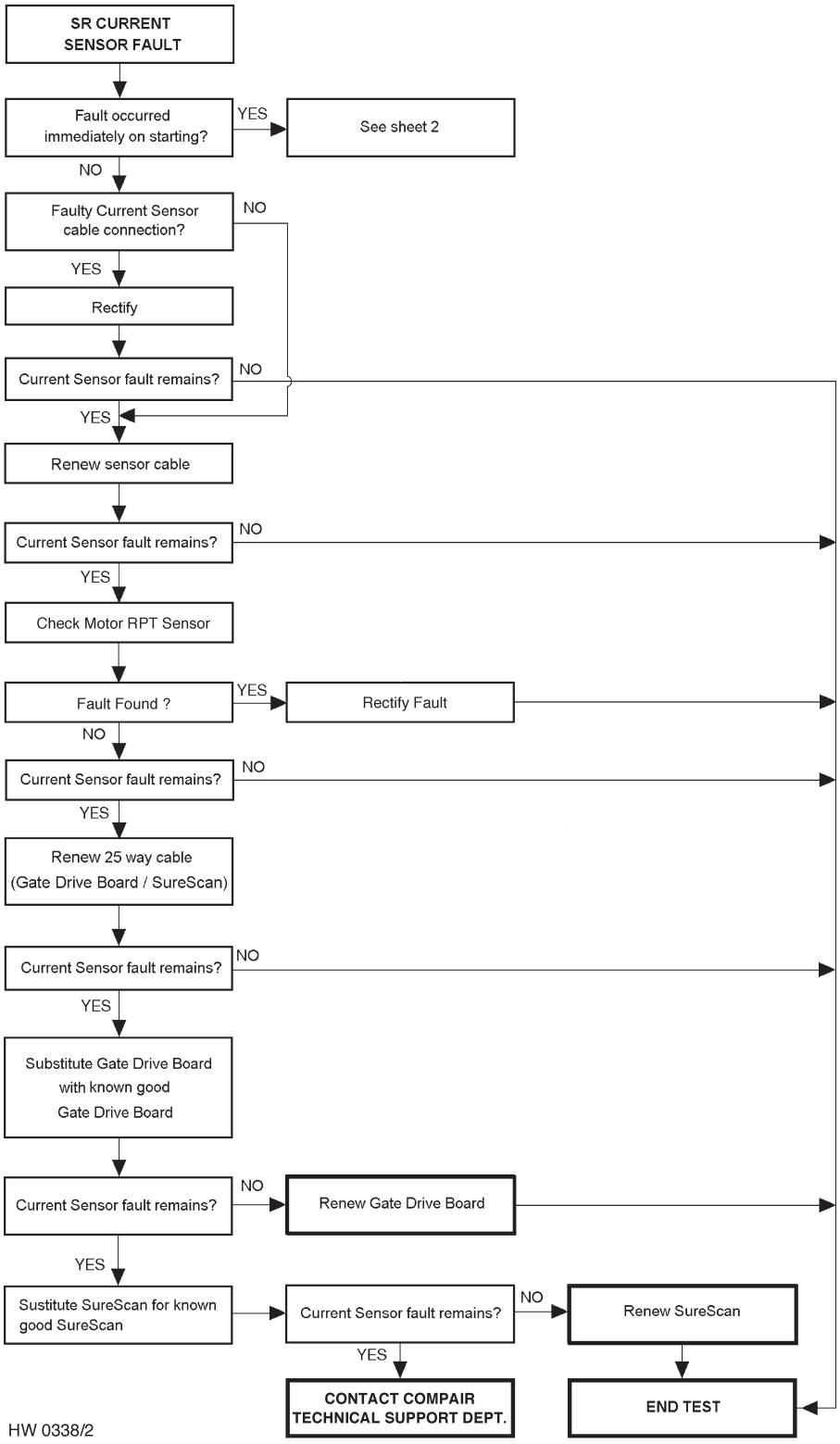


Fig 4.7 - SR Current Sensor Fault (1 of 2)

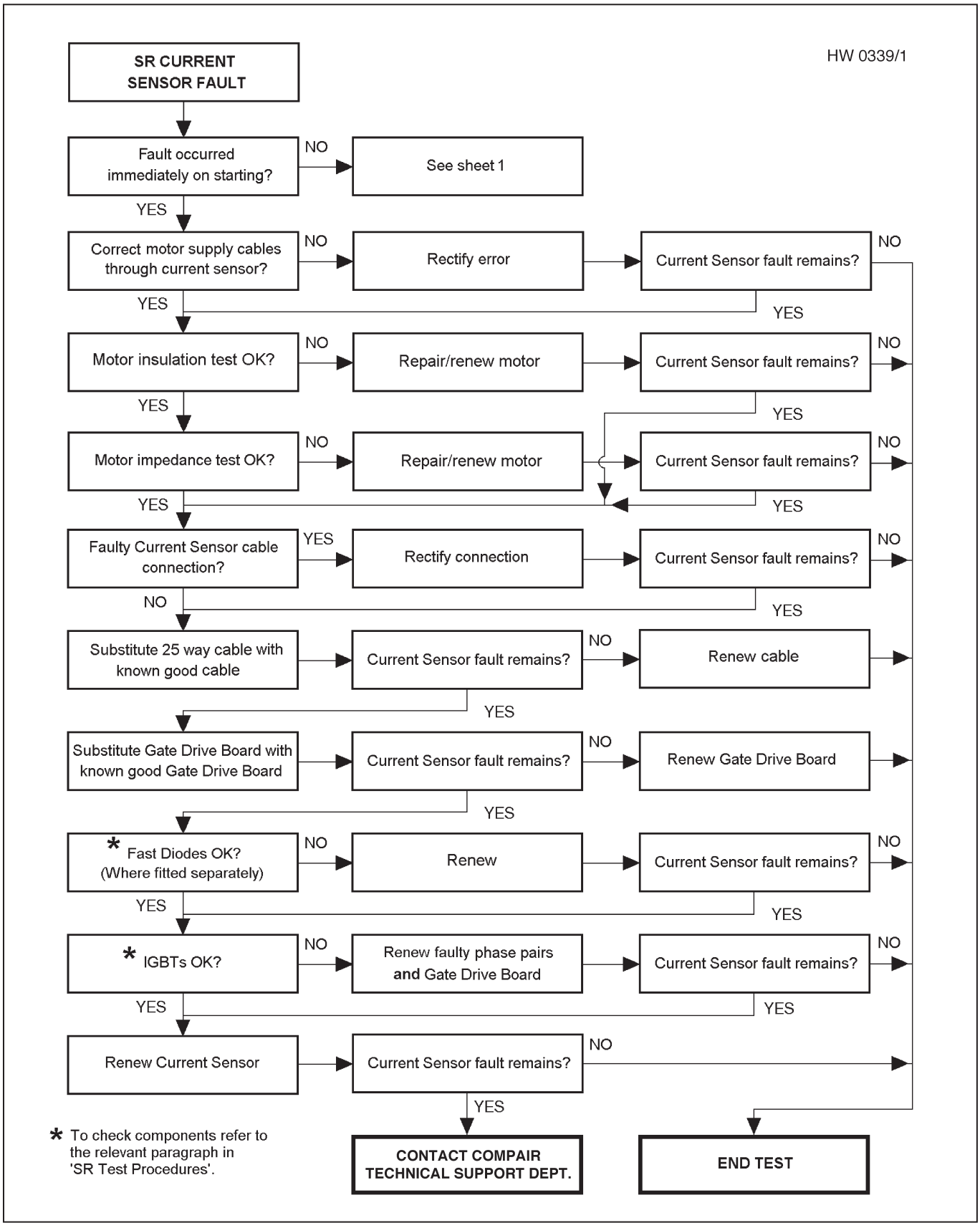


Fig. 4.8 - SR Current Sensor Fault (2 of 2)

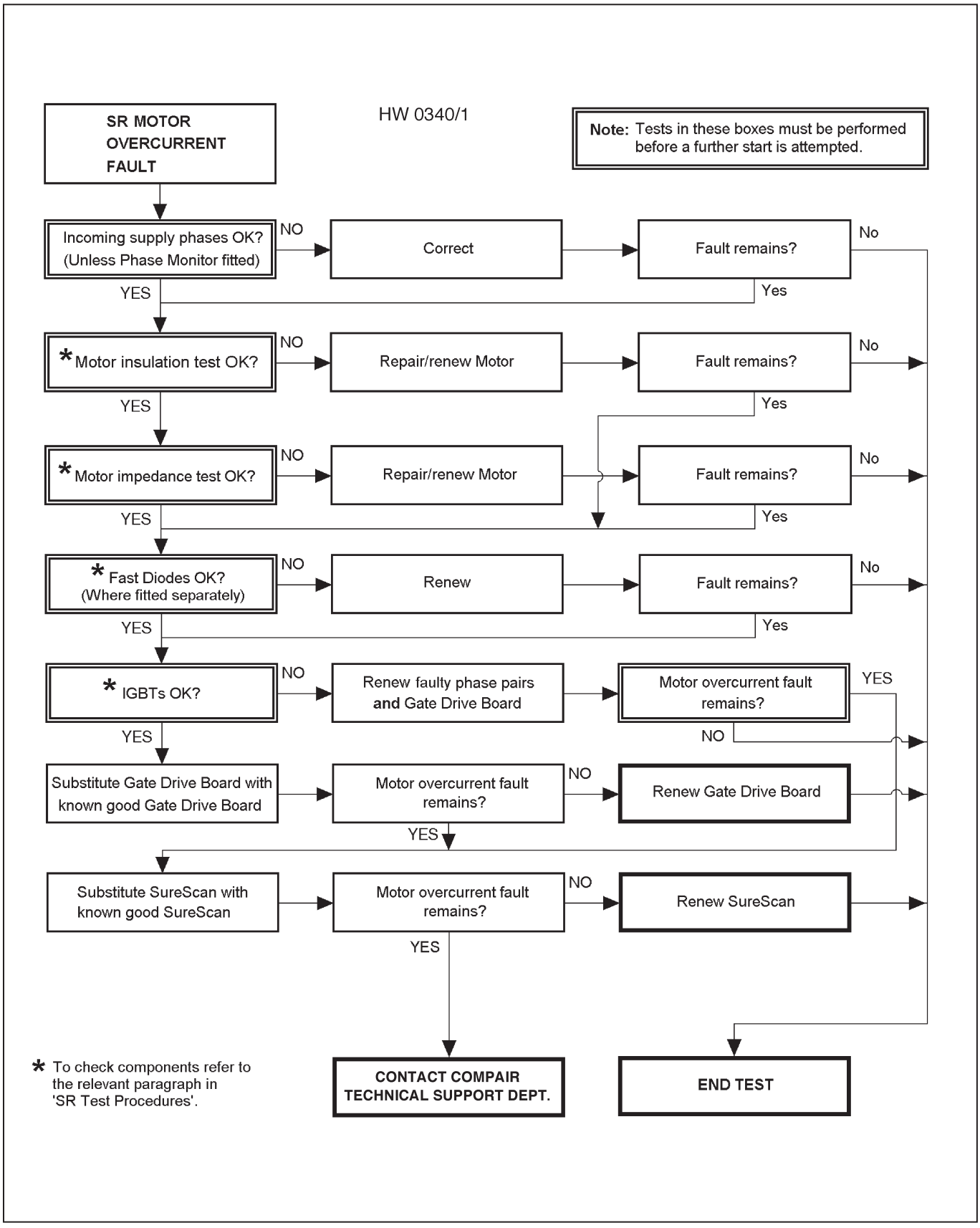


Fig. 4.9 - Motor Overcurrent Fault

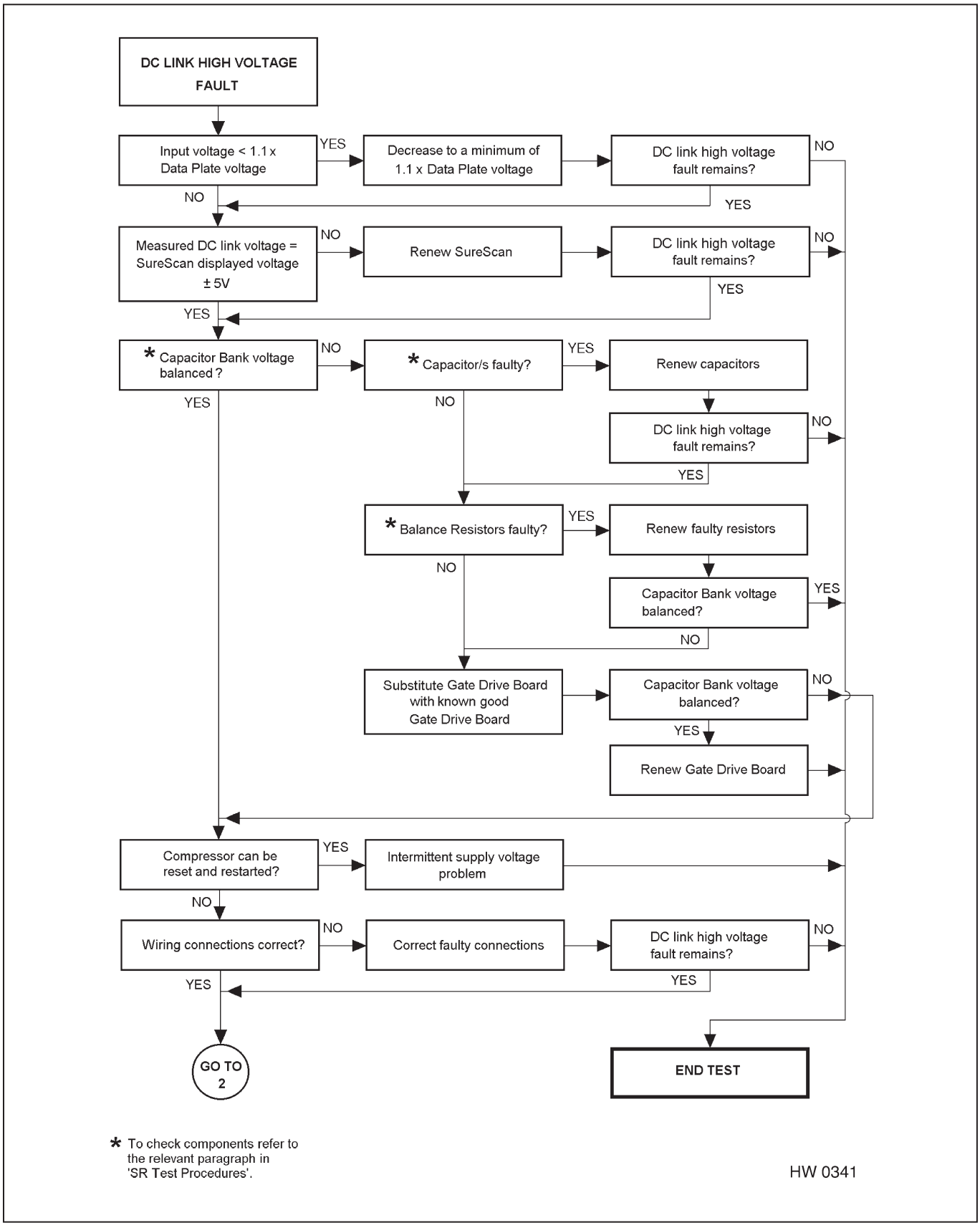


Fig. 4.10 - Link High Voltage Fault (1 of 2)

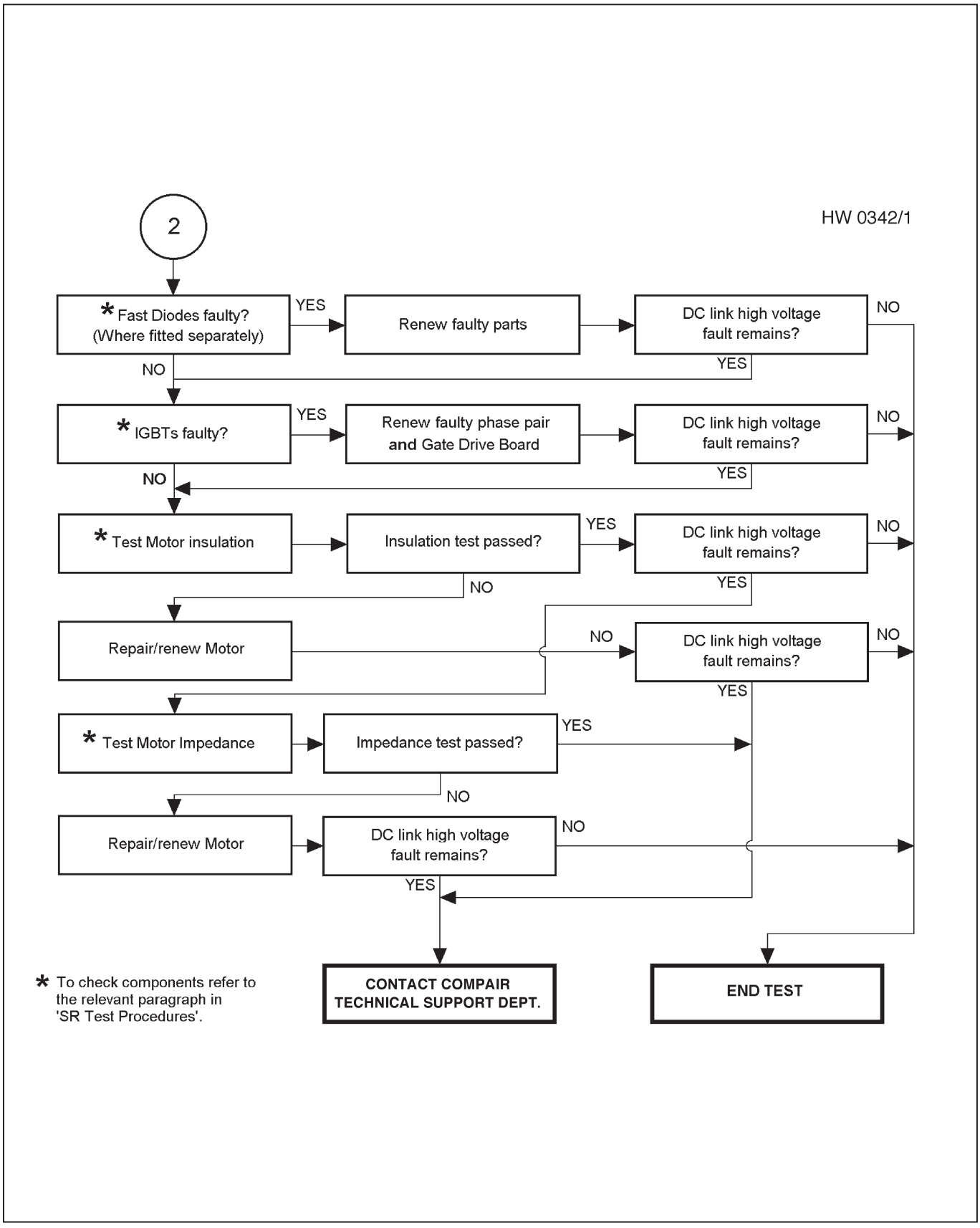


Fig. 4.11 - Link High Voltage Fault (2 of 2)

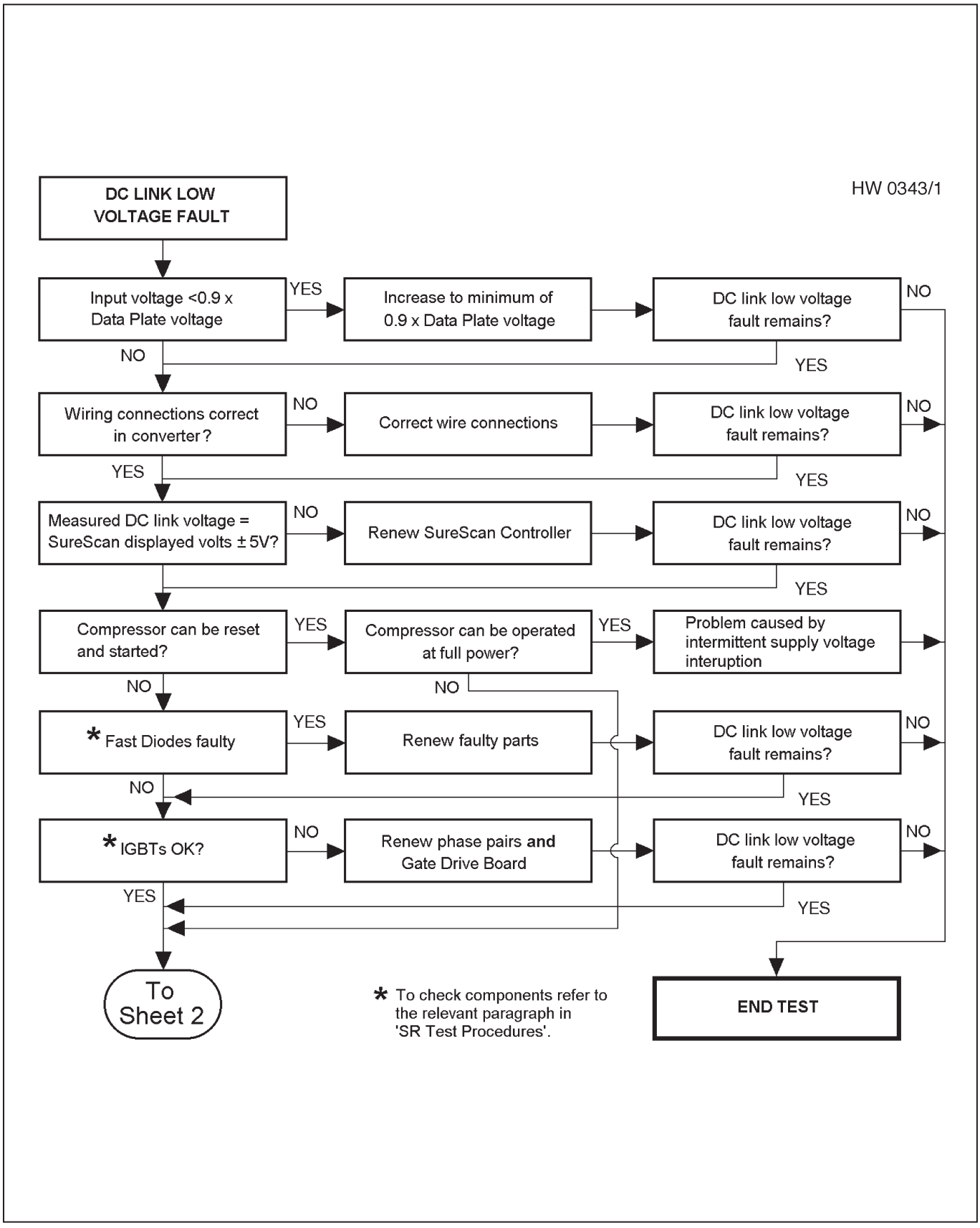


Fig. 4.12 - Link Low Voltage Fault (1 of 2)

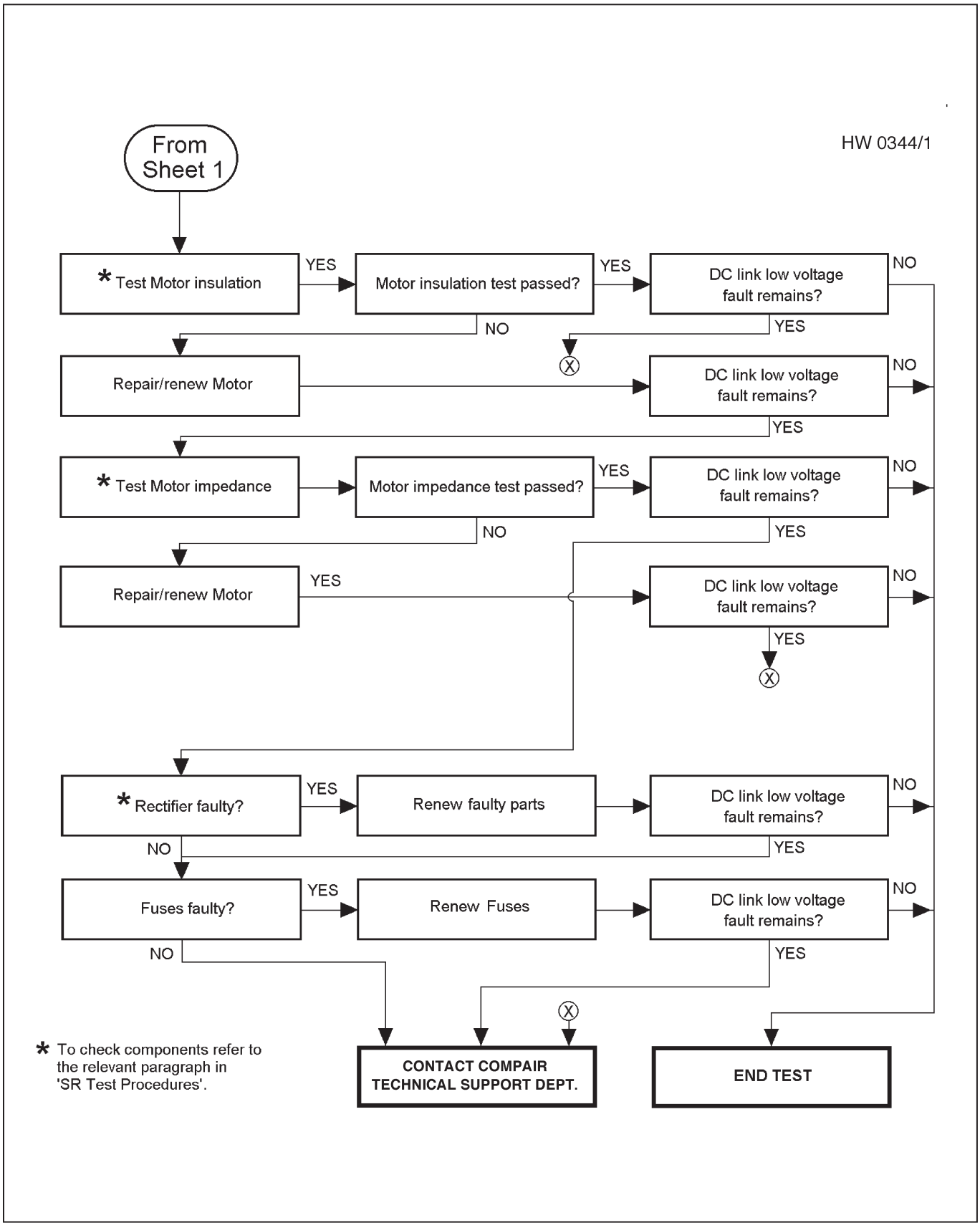


Fig. 4.13 - Link Low Voltage Fault (2 of 2)

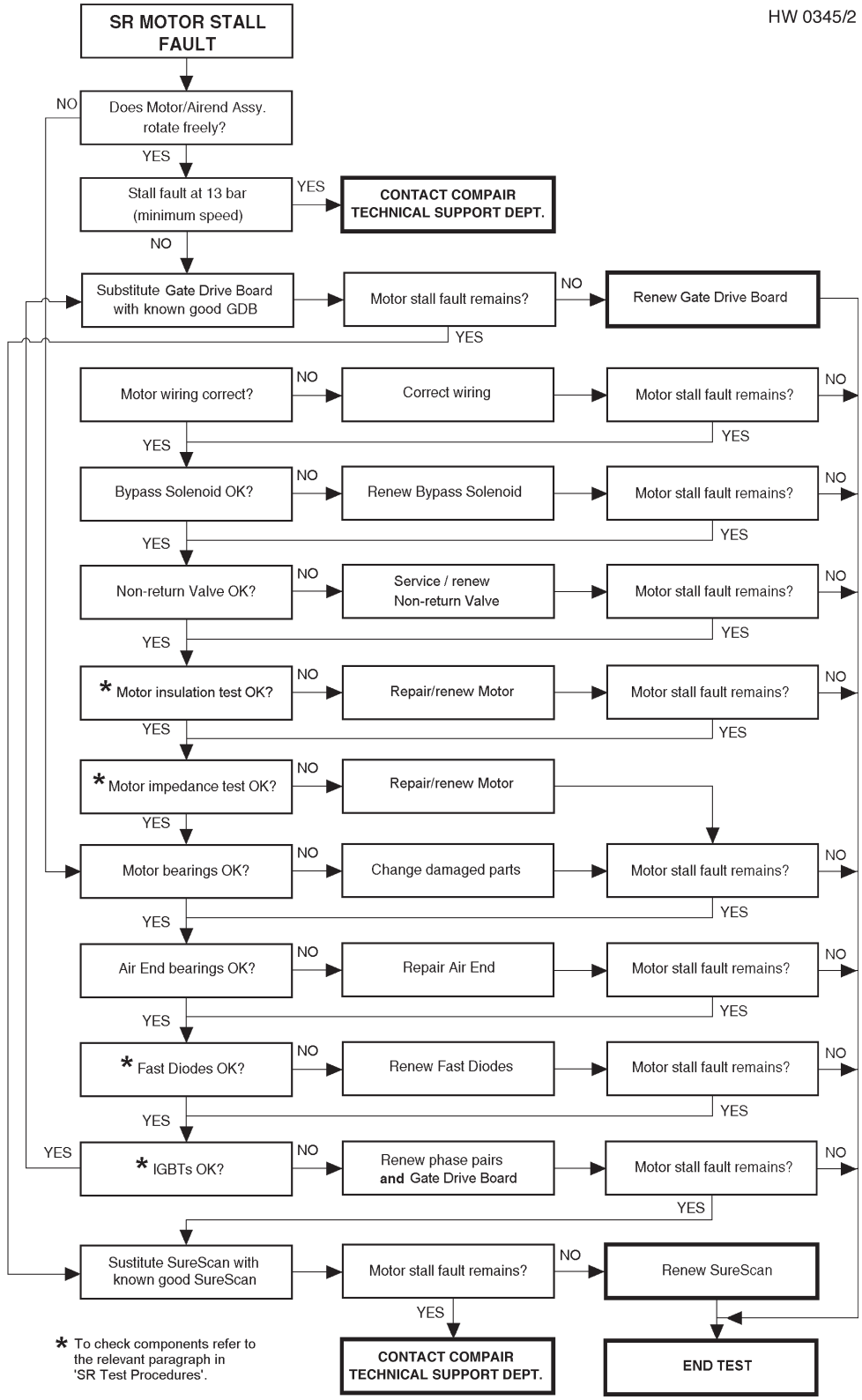


Fig. 4.14 - Motor Stall Fault

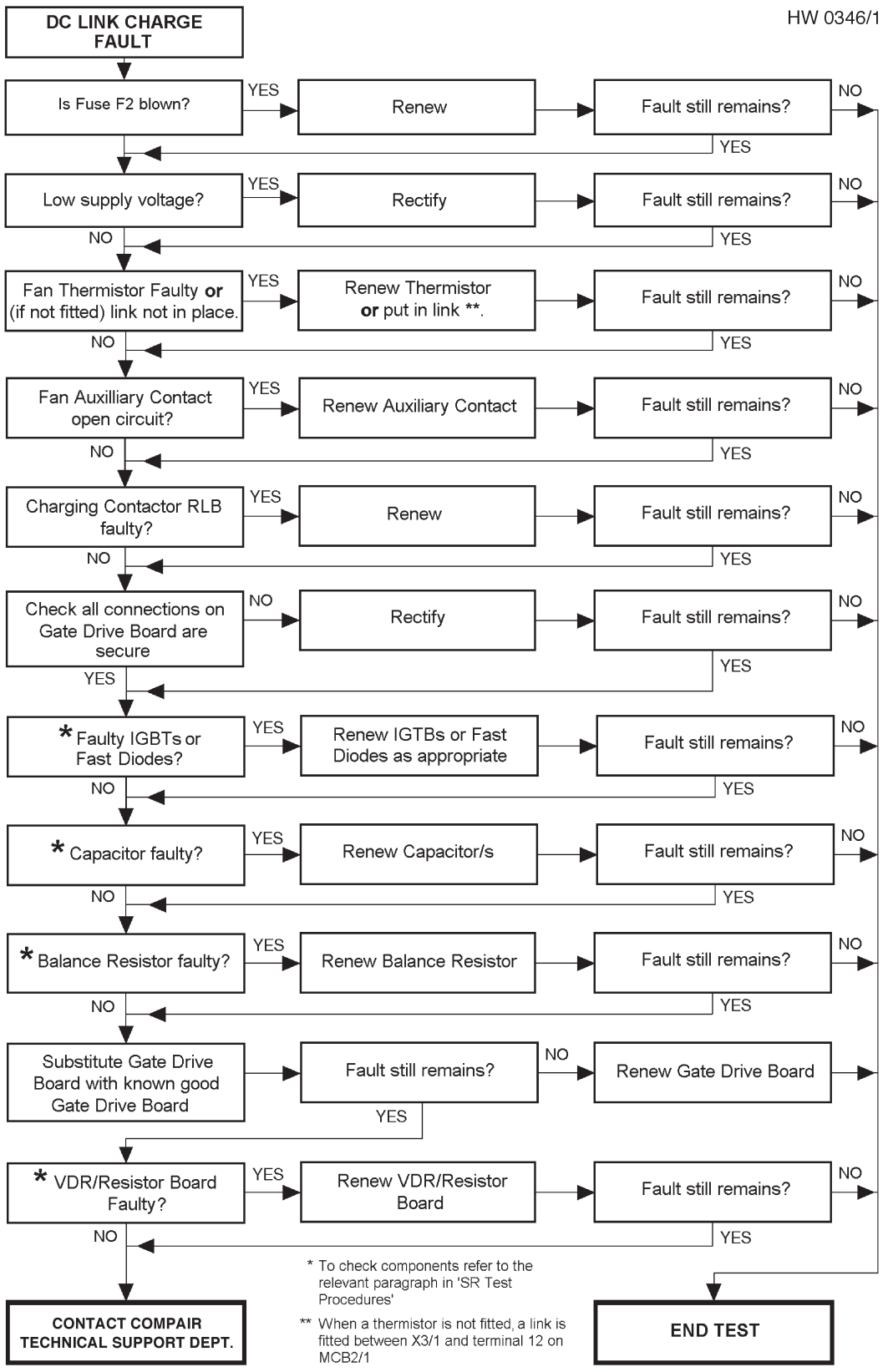


Fig. 4.15 - DC Link Charge Fault

4.8.17 LSR phase monitoring / phase failure PCB

PCB part no. SR05-00060 replaces the former “Soft Start Resistor & VDR” PCB.

a) Symptoms:

Machines that feature circuit board SR05-00060 have been known to suffer spurious trip conditions, giving erroneous indication of ‘Phase Failure’ or ‘Phase Rotation Fault’, despite the power supply being healthy. This has been caused by a defective Phase Monitoring / Phase Failure PCB.

b) Action:

In the event of the symptoms above occurring, the PCB must be renewed.

When renewing the PCB, service personnel should note that the polarity of output connection ‘J1’ is extremely important. The PCB has an optically-isolated solid-state output, NOT a relay. Transposition of the output wires will also create an incorrect fault indication. In the event that LED D14 is illuminated (indicating that the power supply is healthy) but the fault remains, this will prove that the output terminals have been transposed.

Note: The positive ‘+’ lead must be connected to J1, pin 1, and the negative ‘-’ lead must be connected to J1, pin 2.

4.9 SR Test Procedures - Safety

WARNING

- Refer to the safety procedures before operating the compressor unit.
- Lethal voltages are used in this equipment. Use extreme caution when carrying out electrical checks. Isolate the power supply before starting any maintenance work.
- Before opening the door of the power converter compartment, switch the power supply OFF at isolator and wait for 12 minutes to allow the dc link capacitors to discharge to a safe level. Check that the DC link capacitors have fully discharged before starting any maintenance work.

4.10 Diode Device Test Procedures

Fast diodes as separate modules are only fitted to machines with serial numbers:

F170/0112 to F170/0353 and

F180/0101 to F180/0168

To carry out a functional test on any diode device proceed as follows:

⚠ **Caution: All electrical connections and connection bars must be removed from a device before it can be tested.**

Use a digital multimeter equipped with a diode test function (fig. 4.16). If the forward voltage does not compare with the value shown in figs. 4.17 - 4.19, the device is faulty.

Note: Each diode should also be tested for reverse conduction. No diode should conduct in reverse.

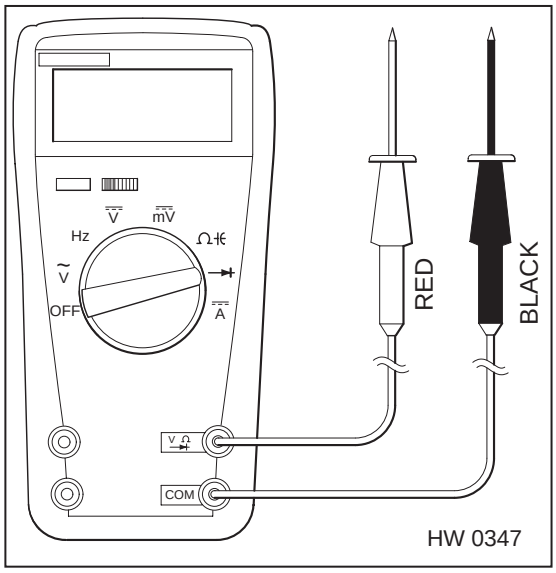


Fig. 4.16 - Typical Digital Multimeter

4.10.1 Fast Diode Module (Common Cathode)

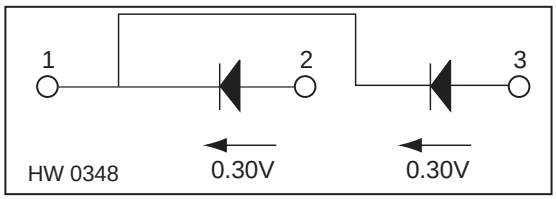


Fig. 4.17 - Fast Diode Module (Common Cathode)

Note: This diode is fitted near the top of the heat sink, in between IGBTs A2 and B2. Check the terminal numbers before carrying out a test.

4.10.2 Fast Diode Module (Common Anode)

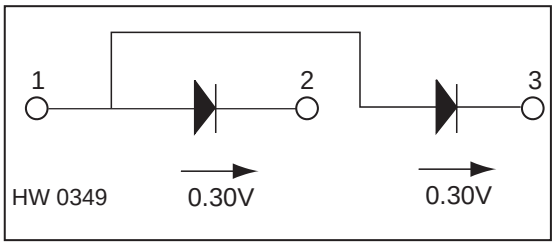


Fig. 4.18 - Fast Diode Module (Common Anode)

Note: From serial numbers F170-0354 and F180-0106 onwards the fast diode is located within the IGBT (see section 4.11, 'IGBT Test Procedures').

4.10.3 Rectifier Diode Module

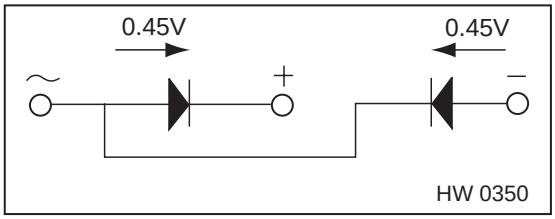


Fig. 4.19 - Rectifier Diode Module

Note: There are three rectifier diodes fitted at the top of the heatsink (L75SR) or the bottom of the heatsink (L45SR and L75SR). There is a diagram on the rectifier diode module(s) to indicate the circuit. Test accordingly.

4.11 IGBT (Insulated Gate Bipolar Transistor) Test Procedures

⚠ **Caution: All electrical connections and connection bars must be removed from a device before it can be tested.**

4.11.1 Using IGBT tester, CompAir part number 98506-24, connect as shown below. In the illustrations below the two ends of the same connecting wire are shown by ‘a’ or ‘b’.

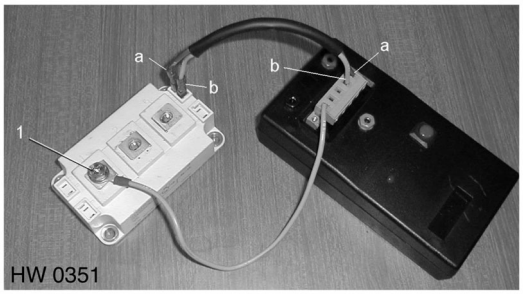


Fig. 4.20 - Connecting tester to IGBT type GAL

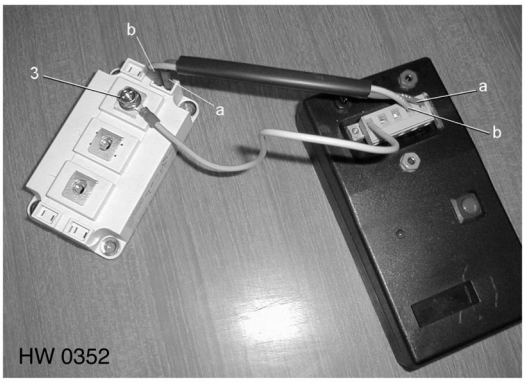


Fig. 4.21 - Connecting tester to IGBT type GAR

a) In normal operation the lamp will light when the test button is switched ON.

b) If the lamp does not light when the test button is switched ON an open circuit is indicated.

c) If the lamp remains lit with the button ON or OFF a short circuit is indicated.

4.11.2 Dual IGBT (Insulated Gate Bipolar Transistor)

a) These devices contain two IGBTs and are fitted to machines from serial numbers F170-0354 and F180-0106 onwards.

b) One of the IGBTs is forced open circuit by linking its gate connection to the emitter enabling the internal fast diode to be tested.

c) On the right hand side of the IGBT there are four tab terminals, two of which are linked together. To locate the diode circuit it is necessary to determine which of these terminals are linked.

d) If the link is made between tab terminals E1 and G1 the diode can be measured between screw terminals C2E1 and C1.

e) If the link is made between tab terminals E2 and G2 the diode can be measured between screw terminals C2E1 and E2.

Note: Refer to section 4.10, 'Diode Test Procedures'.

f) The IGBT can now be located and tested.

g) If the link is made between tab terminals E1 and G1 the transistor connections are:

Gate - G2 Emitter - E2 Collector - C2E1

h) If the link is made between tab terminals E2 and G2 the transistor connections are:

Gate - G1 Emitter - C2E1 Collector - C1

Note: Refer to section 4.11, 'IGBT Test Procedures'.

⚠ **Caution: Always ensure the correct tab terminals are linked when replacing an IGBT.**

4.11.3 Latest Semikron IGBTs

Test as in 4.11 and then test with diode tester according to the diagram on the IGBT.

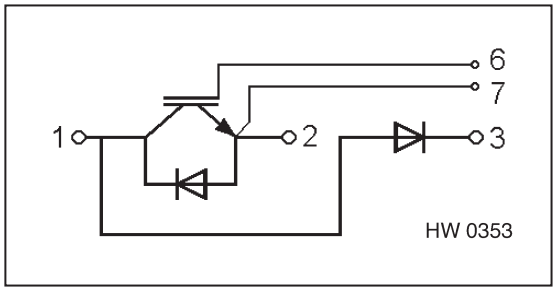


Fig. 4.22 - Circuit of IGBT type GAL

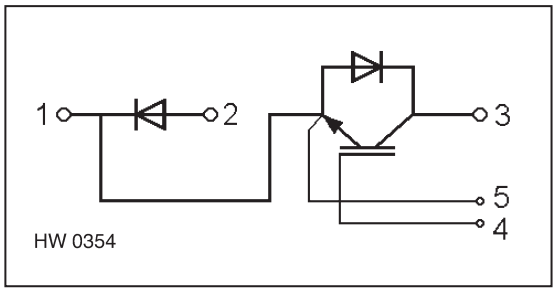


Fig. 4.23 - Circuit of IGBT type GAR

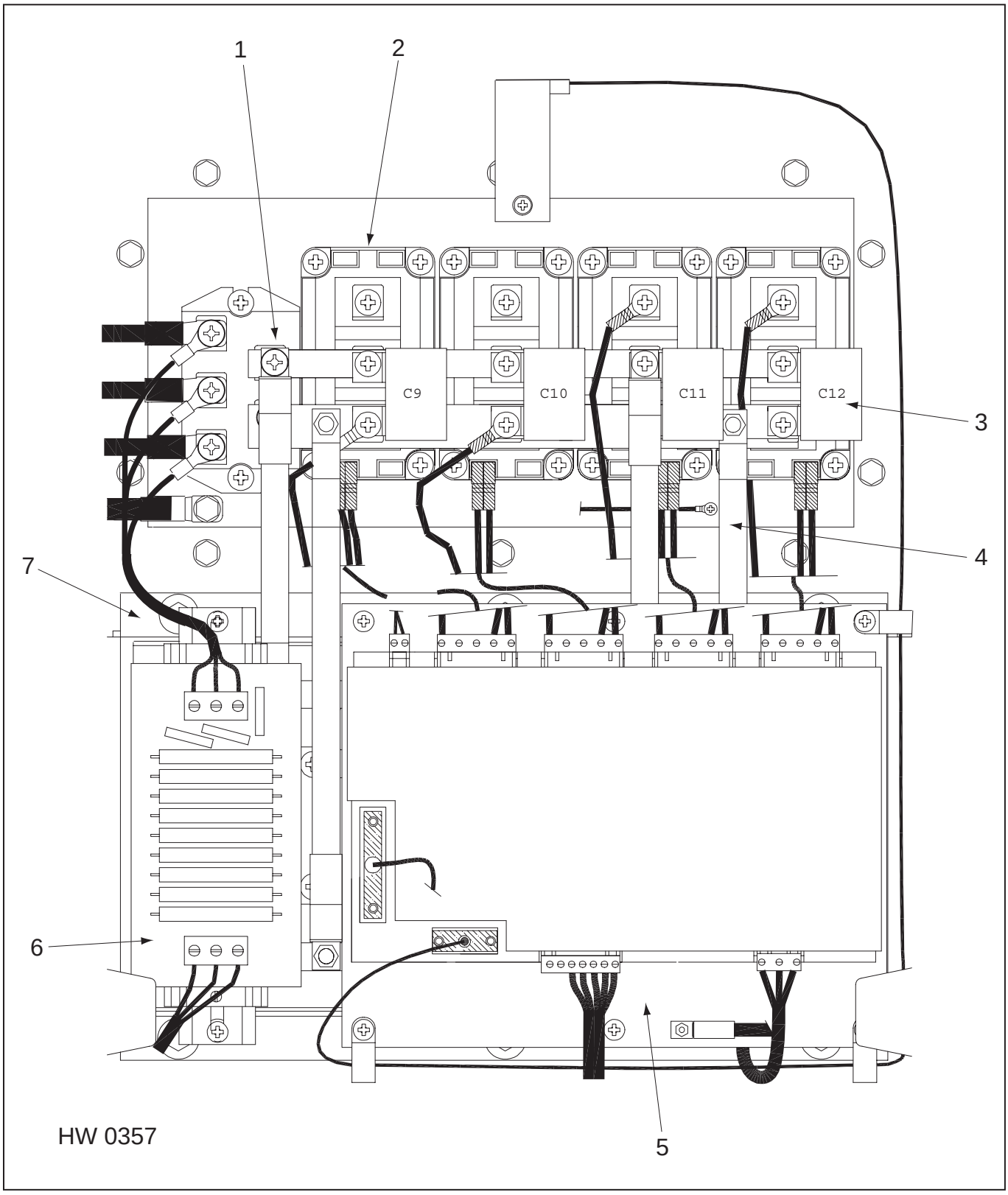


Fig. 4.24 - L45SR Power Converter Assembly

1. Rectifier Diodes
2. IGBTs
3. Snubber Capacitors
4. Busbars
5. Gate Drive Board
6. VDR/Resistor Board
7. Capacitor Box

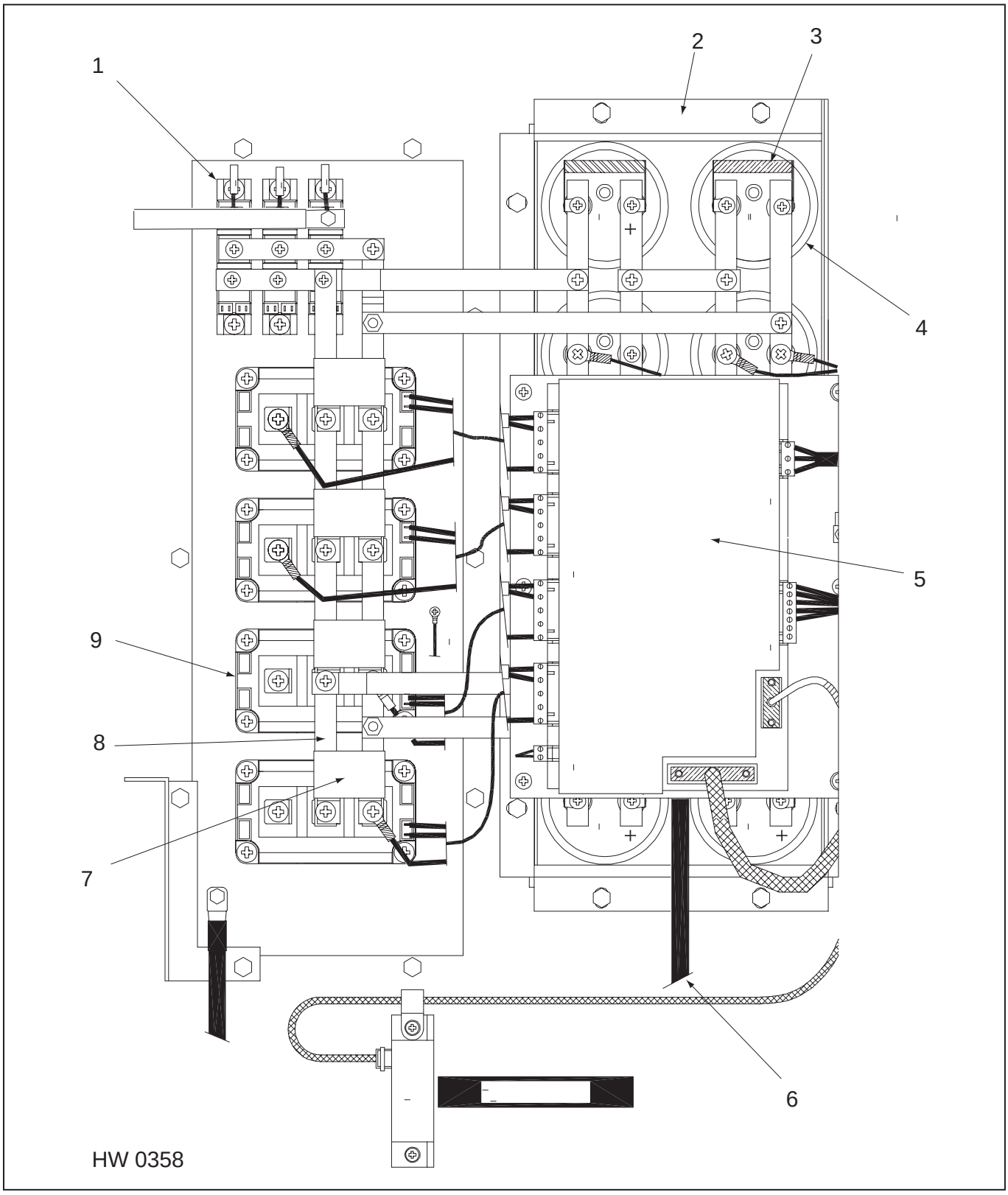


Fig. 4.25 - L75SR Power Converter Assembly

1. Rectifier Diodes
2. Capacitor Box
3. Balance Resistors
4. Capacitors
5. Gate Drive Board
6. Earth
7. Snubber Capacitors
8. Busbars
9. IGBTs

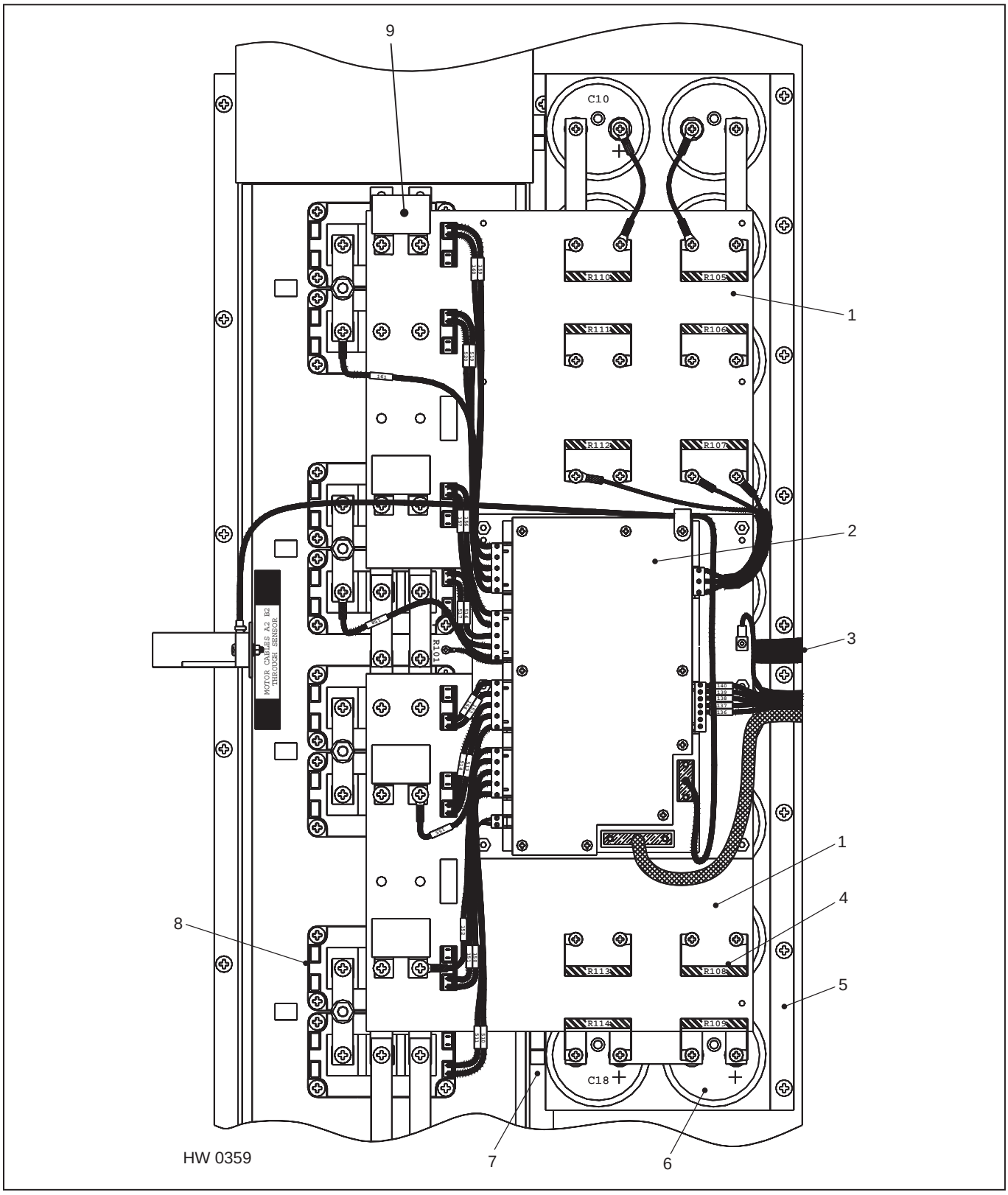


Fig. 4.26 - L120SR Power Converter Assembly

1. Laminated Busbar
2. Gate Drive Board
3. Earth Lead
4. Balance Resistors
5. Capacitor Box
6. Capacitors
7. Lift-off Hinges
8. IGBTs
9. Snubber Capacitors

4.12 IGBT Removal and Fitting Instructions

4.12.1 Removal (L45SR and L75SR)

a) Open power converter door and remove all electrical guards.

b) Disconnect motor cables from IGBTs.

c) Disconnect vertical bus bars / snubber capacitors from IGBTs and remove.

d) Carefully disconnect the pink and violet wires from the IGBTs.

e) Undo mounting screws for IGBTs and remove. Remove IGBTs from heatsink.

f) Clean residue compound from heatsink with a mild degreaser. Ensure that there is no spillage on to other components.

4.12.2 Refitting (L45SR and L75SR)

a) Clean the back of the IGBT's from any remaining thermal compound.

b) Uniformly coat the back of the IGBT with thermal compound (DOW CORNING DC 340). Use a rubber roller for this process to ensure an even coating of approx 0.02-0.03mm thick.

c) Refit the IGBT's in the correct order as shown hand tightening the screws in a diagonal sequence.

d) Tighten the screws again in a diagonal sequence to a torque of 5Nm maximum.

e) Refit wires from gate drive board

f) Refit busbars and snubber capacitors to a torque of 5Nm.

g) Refit motor cables.

h) Refit electrical guards.

4.12.3 Removal (L120SR)

a) Open power converter door and remove all electrical guards.

b) Disconnect motor cables from IGBTs.

c) Disconnect wires and leads from gate drive board.

d) Remove gate drive board

e) Disconnect pink and violet wires from IGBTs

f) Remove laminated bus bars, all balance resistors and snubber capacitors.

g) Undo mounting screws for IGBTs and remove.

h) Clean residue compound from heatsink with a mild degreaser. Ensure that there is no spillage on to other components.

4.12.4 Refitting (L120SR)

a) Clean the back of the IGBT's from any remaining thermal compound.

b) Uniformly coat the back of the IGBT with thermal compound (DOW CORNING DC 340). Use a rubber roller for this process to ensure an even coating of approx 0.02-0.03mm thick.

c) Refit the IGBT's in the correct order as shown hand tightening the screws in a diagonal sequence. Tighten to a maximum of 5Nm.

d) Refit laminated busbars, balance resistors and snubber capacitors. Tighten IGBT connections to 5Nm maximum and capacitor connections to 2Nm maximum.

e) Refit Gate Drive Board.

f) Refit wires to Gate Drive Board and IGBTs.

g) Refit motor cables.

h) Refit Electrical Guard.

4.13 To Check Capacitor Bank Voltage Imbalance

4.13.1 With the compressor stopped, isolated and the DC link discharged, connect a 30V dc power supply to the dc link busbars. The power supply should have a current limit of not more than 2A. connect the supply +ve to the +ve on the dc link. Switch on the 30V supply.

4.13.2 Check that both the dc link LEDs on the gate drive board are dimly lit.

4.13.3 Using a digital multimeter check that the dc link is charged to the voltage of the dc power supply.

4.13.4 Check that the dc link is balanced to within ± 0.4V, ie each bank of series connected capacitors are charged to the same voltage within ± 0.4V.

4.13.5 If this fails disconnect the capacitor sensing connections from the gate drive board (3 pin connector) and repeat 1, 3 and 4. If the dc link is now balanced the gate drive board is faulty.

4.13.6 If this test fails, test the capacitors and the balance resistors (see 4.15).

4.14 Electrolytic Capacitor Test Procedures

4.14.1 Electrolytic Capacitor Test

⚠ **Caution: All electrical connections and connection bars must be removed from a device before it can be tested.**

a) Check that the blow-hole plug (fig. 4.27) is intact. If the plug has blown the capacitor is faulty. Check for distortion of the case.

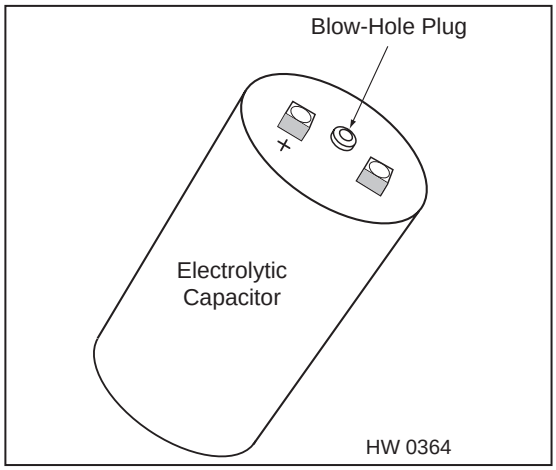


Fig. 4.27 - Capacitor

b) Measure the voltage across the terminals of the capacitor. Although the DC link voltage has been completely discharged to 0V before removing the bus bars, it is possible for the capacitors to recover a small charge voltage. If any voltage exists, hold one of the balance resistors across the terminals until the voltage is dissipated to zero.

⚠ **Caution: The resistor may become warm when held across the terminals.**

c) Using the recommended digital multimeter switched to the resistance/capacitance position (Ω ⊣⊢) (fig. 4.28), hold the red probe on the positive terminal of the capacitor and the black probe on the unmarked terminal.

d) If the capacitor is good the meter reading will start to increase slowly from an initial low resistance level. This is due to the small test voltage generated by the multimeter slowly charging the the capacitor.

e) If the capacitor is open circuit (faulty) the meter will immediately indicate a very high resistance in excess of 1000k ohms or OL (over range).

4.14.2 Electrolytic Capacitor Measurement

a) Use the recommended digital multimeter switched to the resistance/capacitance measuring range (Ω ⊣⊢). Press the yellow button (1) to select capacitance measurements.

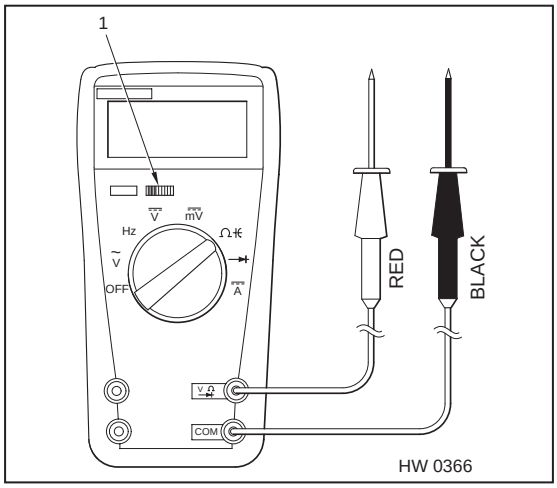


Fig. 4.28 - Typical Multimeter

b) Hold the red probe on the positive terminal of the capacitor and the black probe on the unmarked terminal. Note: the meter will indicated overload if there is a residual charge in the capacitor. The capacitor should then be discharged using a balance resistor.

c) Wait until a steady reading is obtained,the meter will take a little time to switch to the correct range.

d) The reading for a good capacitor should be in the range 2640 to 3960 uF.

4.15 To Check Capacitor Bank Balance Resistors

Disconnect each balance resistor from the capacitor before measuring its resistance. The resistance should compare with the marking on the resistor.

4.15.1 To Check VDR/Resistor Board (L45SR and (L75SR) *

WARNING

- Before removing the safety guards or disconnecting or connecting the motor leads, switch the AC power supply OFF at isolator and wait for 12 minutes to allow the dc link capacitors to discharge to a safe level. Check that the dc link capacitors have fully discharged before starting work on the compressor.

a) Isolate AC power supply.

b) Measure resistance across terminals A to A1, B to B1 and C to C1 on the board. The resistance should be 33 ohms ± 3 ohms in each case.

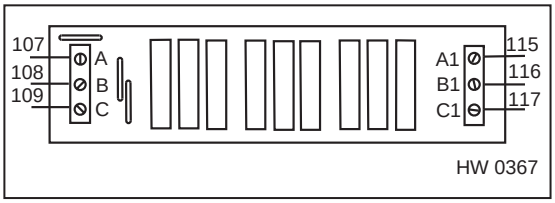


Fig. 4.29 - VDR/Resistor Board (L45SR, L75SR)

4.15.2 L120SR Resistors

Check the resistor values are within the range shown on the side of the resistors.

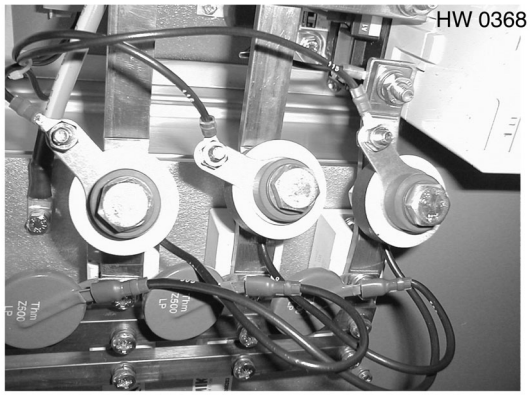


Fig. 4.30 - Resistor (L120SR) *

* Later models have Phase Monitoring / Phase Failure PCB. Test as per Fig. 4.29)

4.16 Capacitor Removal and Refitting Instructions

4.16.1 Removal (L45SR AND L75SR)

a) Open power converter door and remove all electrical guards.

b) Disconnect all the leads to the gate drive board and remove gate drive board.

c) L45SR only: Disconnect and remove VDR Resistor Board

d) Remove all busbars from the IGBTs and the rectifier diodes to the capacitors, including balance resistors.

e) Remove earth wire from capacitor box at the earth bar.

f) Remove capacitor housing box.

g) Remove capacitor plate from housing box.

h) Unscrew nylon back nuts holding capacitors to plate.

4.16.2 Refitting (L45SR AND L75SR)

a) Refitting is the reversal of removal.

b) Ensure busbars to capacitors are only tightened to 2Nm max.

4.16.3 Removal (L120SR)

a) Remove all electrical guards.

b) Disconnect all leads to the gate drive board and remove gate drive board.

c) Remove both laminated bussbars from IGBT's /capacitors including balance resistors and snubber capacitors.

d) Remove both earth wires at the earth bar from capacitor boxes.

e) Remove screws from right hand side of capacitor boxes.

f) Swing capacitor boxes out on hinges and lift off.

g) Unscrew nylon back nuts holding capacitors to boxes.

4.16.4 Refitting (L120SR)

a) Refitting is the reversal of removal.

4.16.5 Ensure screws securing busbars are only tightened to 5Nm on IGBTs and 2Nrn on capacitors.

4.17 To Check the SR Motor

WARNING

- Before removing the safety guards or disconnecting or connecting the motor leads, switch the AC power supply OFF at isolator and wait for 12 minutes to allow the dc link capacitors to discharge to a safe level. Check that the dc link capacitors have fully discharged before starting work on the compressor.

4.17.1 Motor Insulation Test

(Test for end turn faults and faults to ground)

a) Ensure that the main power supply to the compressor is isolated.

Note: Use a calibrated 1000V insulation tester for insulation resistance tests.

b) Open starter door and remove upper and lower safety guards.

c) Disconnect all of the SR motor leads from power converter, including the SR motor thermistor cables.

d) Measure the insulation resistance between each motor winding phase, i.e. cables A1 and B1.

e) Measure the insulation resistance between each motor winding phase cable (A1 and B1) and earth.

f) The resistance reading in each case should be greater than 20 megohms.

g) If the insulation resistance is below 20 megohms renew/service the main motor.

⚠ **Caution: DO NOT apply power to a motor which has an insulation resistance of less than 20 megohms.**

4.17.2 Motor Inductance Test

(Test for turn to turn faults)

a) Ensure that the main power supply to the compressor is isolated.

b) Open the converter door and remove all guards.

c) Disconnect all SR motor leads from the power converter .

d) Use the meter specified in test equipment (para. 1).

e) Set the meter to measure 120Hz inductance (L).

f) Clip leads to phase A of the motor. Rotate the motor very slowly and note the lowest reading on the meter (this is Lmin). Rotate the motor again and note the highest reading on the meter (this is Lmax).

g) Repeat step f) for phase B.

h) Calculate the Lmax/Lmin ratio from the readings taken for each phase.

i) Compare the readings with the table below. The motor is deemed to be faulty if the values for Lmin and Lmax fall outside the ranges in the table and/or if the Lmax/Lmin ratio is less than 8.5

4.17.3 Acceptable ranges for motors

a) L45SR

Lmin (mH)	Lmax (mH)	Lmax/Lmin Ratio
1.30 min	13.00 min	> 8.50
1.65 max	18.00 max	

b) L75SR

Lmin (mH)	Lmax (mH)	Lmax/Lmin Ratio
0.95 min	9.50 min	> 8.50
1.20 max	16.00 max	

c) L120SR

Lmin (uH)	Lmax (mH)	Lmax/Lmin Ratio
595 min	5.60 min	> 8.50
730 max	7.50 max	

5 Parts Lists

Contents - Parts Lists

Guide only. Please refer to parts list supplied with compressor to confirm actual part numbers.

5.1 L45SR with Phase Protection Relay

CompAir

Part List: L45SR Power Converter 98155-14

Switched Reluctance drive technology from SR Drives Ltd.

Revision control					
Issue	I	J	K		
Date	09/04/02	30/03/04	26/08/04		
ECN No	M00161	M00200	M00232		
Actioned	EWDG	EWDG	EWDG		

No SM0004-01

DWN EWDG

Parts List issued for product:

Product Type
Serial No(s)
SRDML Label

Notes:

When ordering parts, prefix part code with "SR". Eg. "SR06-00031"

Caution: Guide only - refer to Parts List supplied with compressor to confirm actual part numbers.

Ref	Part Code	Description	Circuit Ref.
1	-	Gate Drive PCB (C20606-283)	PCB2
2	10-00003	Varistor	VDR1
3	07-00060	Cable	-
4	07-00081	Power Cable, (3 per) L1	-
5	13-00036	Terminal Block	-
6	-	-	-
7	07-00007	Current Transducer Cable Assembly	-
8	07-00005	Capacitor Loom	-
9	15-00043	Hinge (2 per)	-
10	07-00079	Control Loom	-
11	12-00012	Line Reactor	L1
12	12-00004	Current Transducer	L2
13	07-00043	Power Cable, L1-RLA/L3	-
14	07-00042	Power Cable, L1-RLA/L2	-
15	07-00041	Power Cable, L1-RLA/L1	-
16	07-00001	25 Way Cable Assembly	-
17	15-00045	Door Sealing Strip	-
18	-	-	-
19	07-00004	Rectifier Loom	-
20	05-00005	SR VDR Resistor PCB Assembly	PCB1
21	07-00012	Resistor VDR Loom	-
22	07-00016	Instrument Harness	-
23	07-00058	Earth Cable, Customer	-
24	07-00028	Harness, Motor Speed Sensor	-
25	07-00059	Earth Cable, Customer	-
26	07-00069	Power Cable, RLA/T1,T2 & T3 - BR1	-
27	-	-	-
28	-	-	-
29	-	-	-
30	-	-	-
31	-	-	-

Ref	Part Code	Description	Circuit Ref.
32	-	-	-
33	07-00019	Earth Cable, (4 per)	-
34	-	-	-
35	07-00020	Earth Cable, Back Plate-Earth Bar	-
36	07-00047	Earth Cable, Earth Bar-Door	-
37	06-00024	Earth Bar	-
38	07-00053	Cable - 110C	-
39	07-00054	Cable - 111C	-
40	07-00055	Cable - 112C	-
41	13-00037	Phase Failure Relay	K101
42	13-00060	4-6.3A Miniature Circuit Breaker	MCB2
43	13-00061	Auxiliary Contact	SW2
44	13-00027	3A Miniature Circuit Breaker	MCB1
45	-	-	-
46	-	-	-
47	13-00014	Fuse - 2A Type 'T'	F1
48	13-00012	Fuse - 5A Anti-surge	F2
49	13-00013	Fuse - 3.15A Semi-delay	F3
50	05-00052	Terminal Assembly	-
51	-	-	-
52	-	-	-
53	-	-	-
54	-	-	-
55	06-00032	Control Plate	-
56	06-00033	Control Hinge Plate	-
57	15-00044	Hinge (2 PER)	-
58	-	-	-
59	-	-	-
60	15-00040	Trunking - 0.16m (2 PER)	-
61	13-00001	Contactor	RLA
62	12-00014	Control Transformer	T101

Ref	Part Code	Description	Circuit Ref.
63	13-00003	Auxiliary Contact (2 PER)	SW1
64	15-00088	M6 Spacer (4 per)	-
65	13-00005	9A Miniature Contactor (2 per)	RLB,C
66	06-00031	Busbar - Copper (2 per)	-
67	06-00029	Busbar - Copper (2 per)	-
68	06-00030	Busbar - Copper (2 per)	-
69	06-00026	Busbar - Copper (2 per)	-
70	06-00025	Busbar - Copper (2 per)	-
71	06-00035	Busbar - Copper	-
72	06-00034	Busbar - Copper	-
73	06-00028	Capacitor Mounting Tray	-
74	06-00027	Capacitor Box	-
75	09-00002	Snubber Capacitor (4 per)	C9-12
76	09-00001	Capacitor (8 per)	C1-8
77	08-00008	Bridge Rectifier	BR1
78	08-0000_	IGBT Device - GAL (2 per)	IGBT3,4
79	08-0000_	IGBT Device - GAR (2 per)	IGBT1,2
80	07-00011	IGBT Loom - B2	-
81	07-00009	IGBT Loom - A2	-
82	07-00010	IGBT Loom - B1	-
83	07-00008	IGBT Loom - A1	-
84	05-00001	Thermistor Sensor	R101
85	10-00001	Resistor (6 per)	R1-6
86	06-00055	Door	-
87	-	Emergency Stop (98524-51)	-
88	-	Controller (C20606-280)	PCB3
89	15-00052	Flush Mounted Latch	-
90	06-00066	Finger Guard - Left Hand	-
91	06-00067	Finger Guard - Right Hand	-

Fig. 5.1 - L45SR Power Converter 98155 -14 (1of 5)

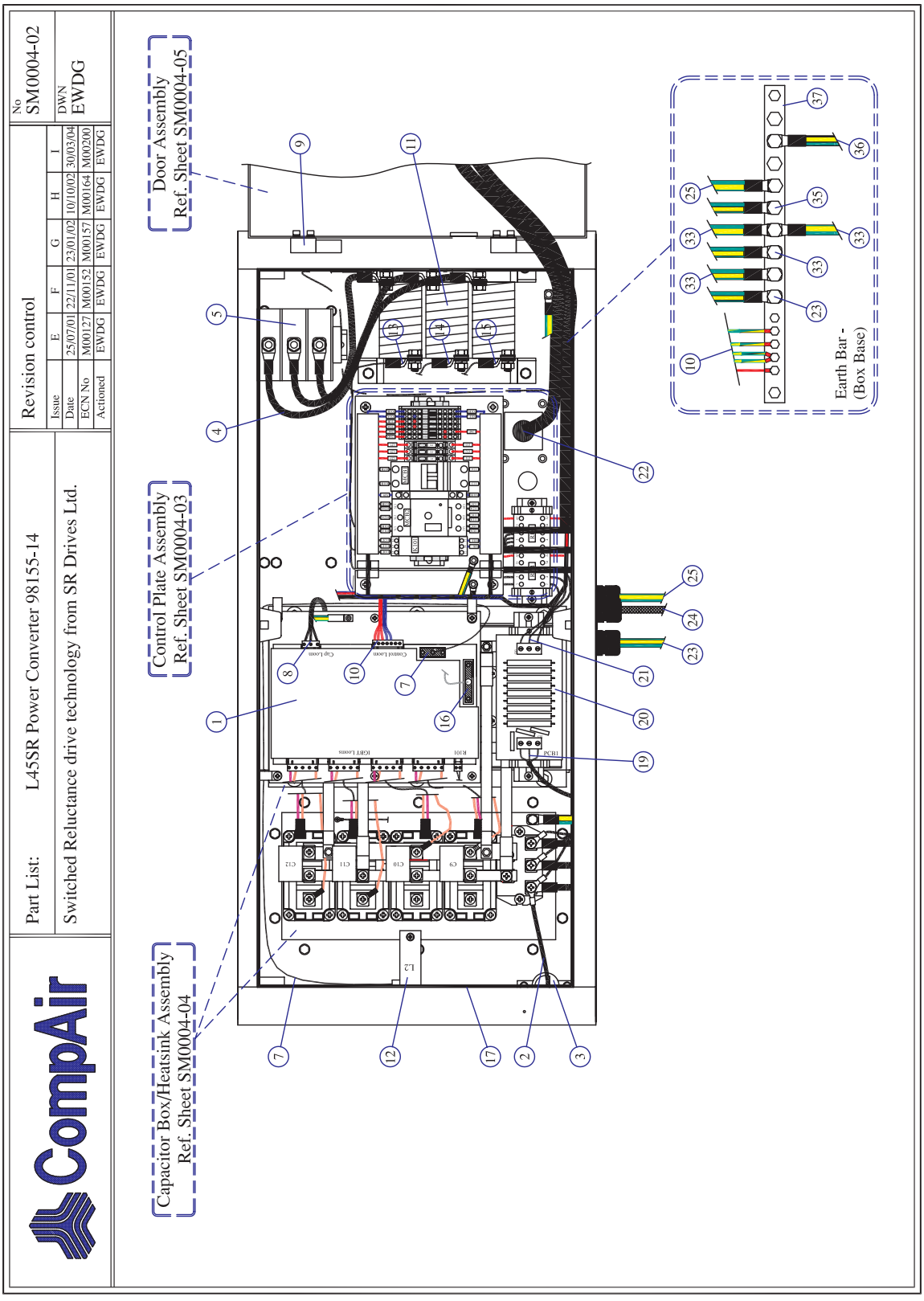


Fig. 5.2 - L45SR Power Converter 98155 -14 (2 of 5)

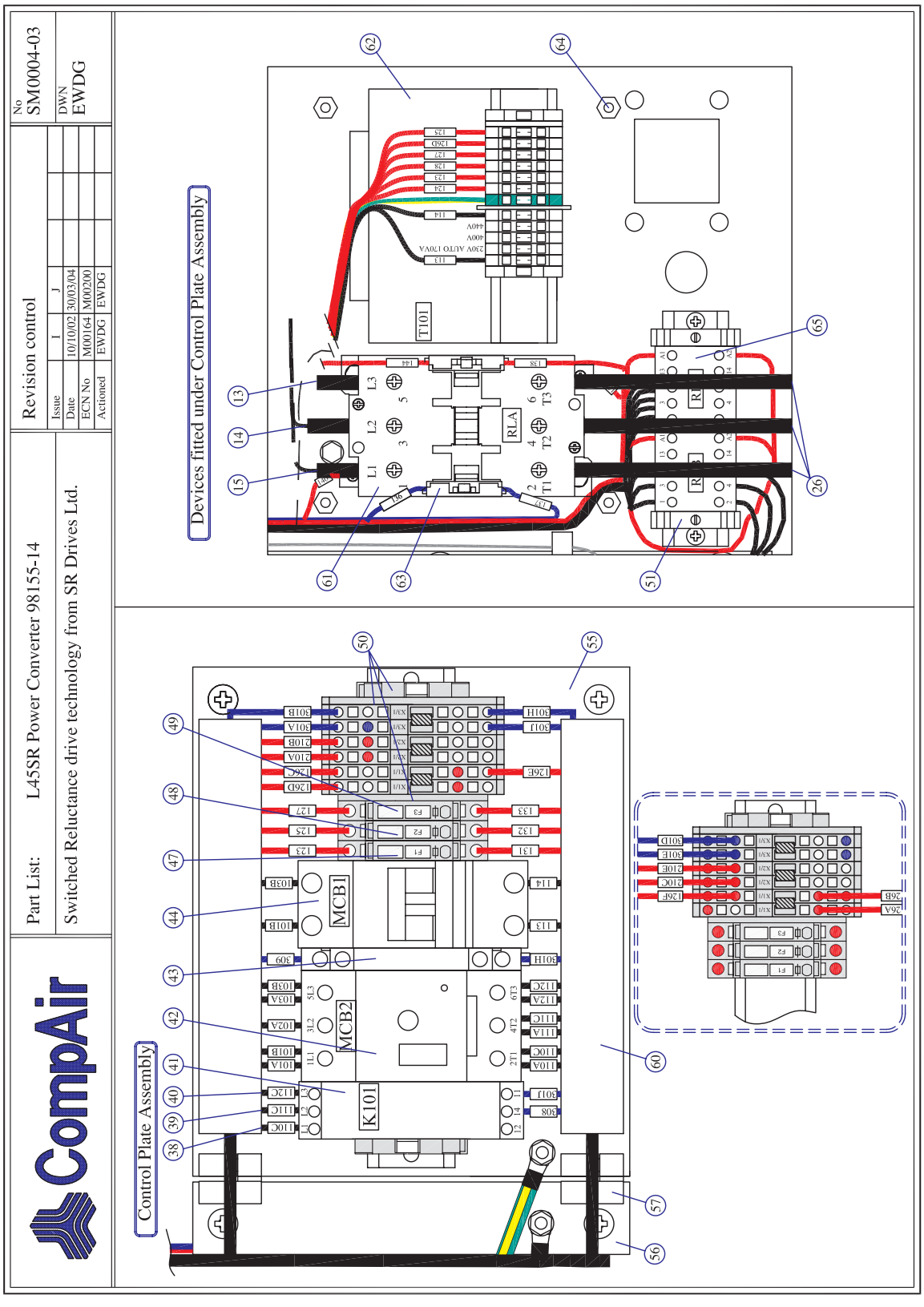


Fig. 5.3 - L45SR Power Converter 98155 -14 (3 of 5)

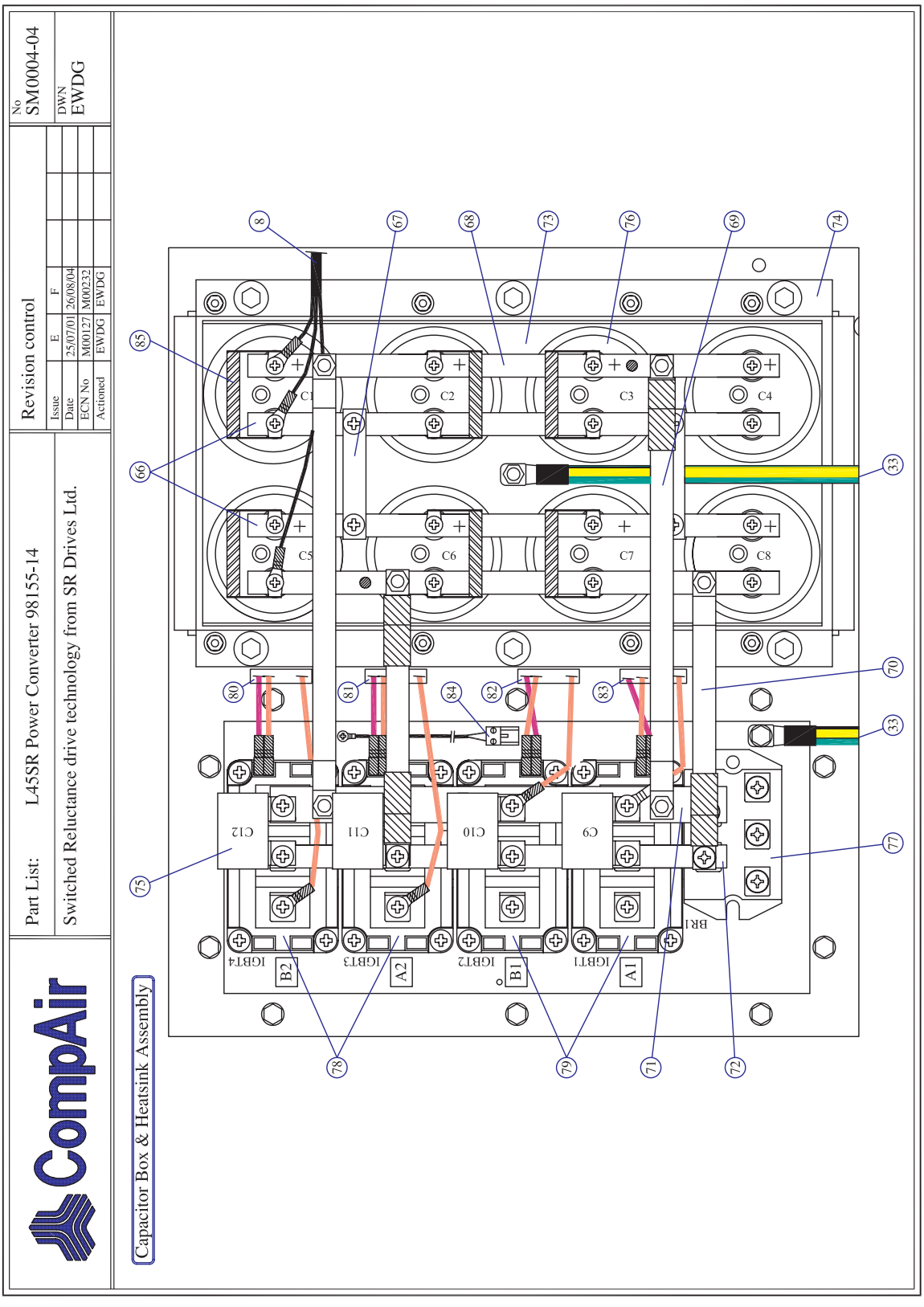


Fig. 5.4 - L45SR Power Converter 98155 -14 (4 of 5)

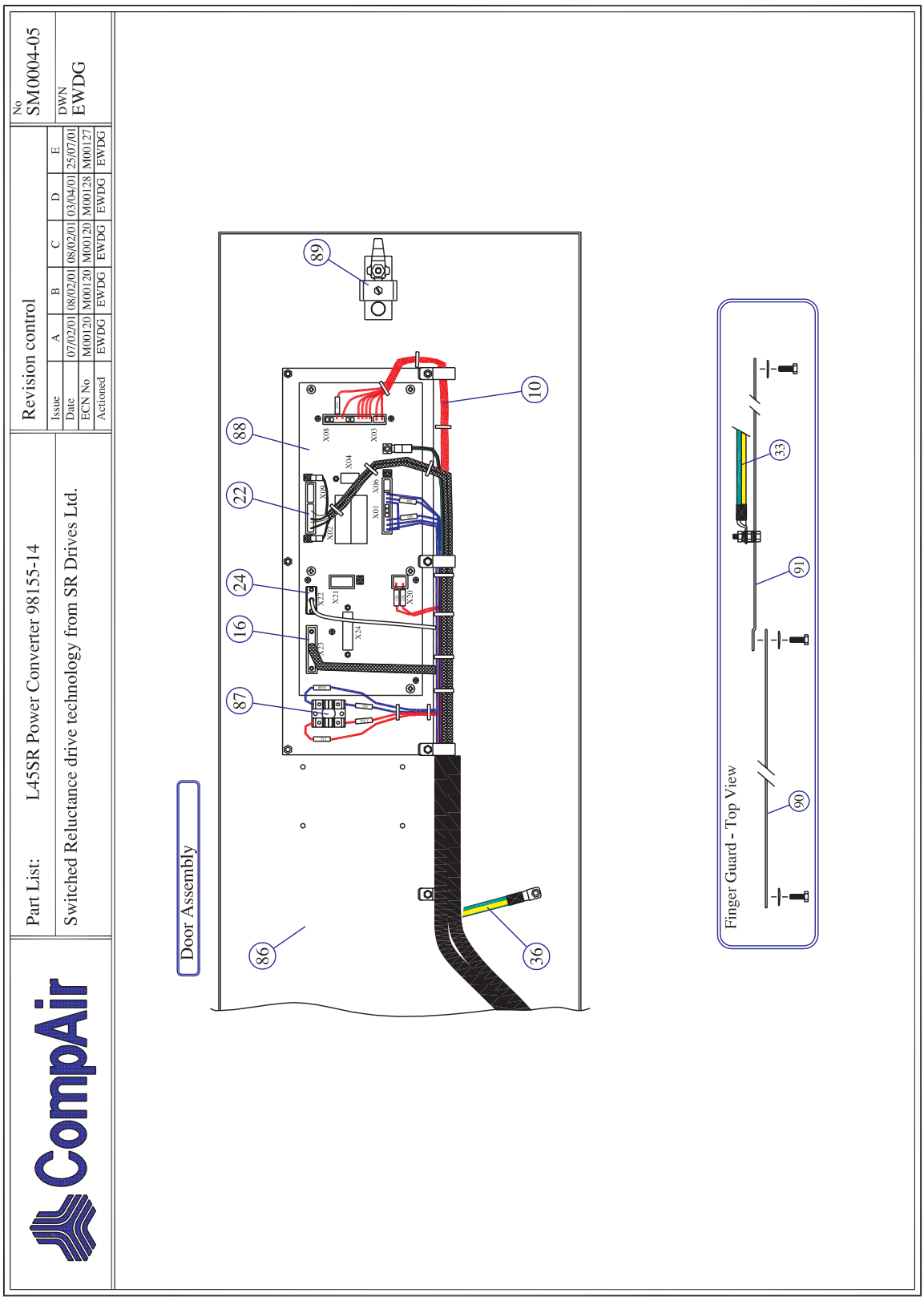


Fig. 5.5 - L45SR Power Converter 98155 -14 (5 of 5)

5.2 L45SR with Phase Monitoring/Phase Failure PCB

CompAir	Part List: L45SR Power Converter 98155-13	Revision control	No SM0003-01
	Switched Reluctance drive technology from SR Drives Ltd.		DWN EWDG

Issue	H	I	J
Date	31/03/04	11/06/04	26/08/04
ECN No	M00200	M00223	M00232
Actioned	EWDG	EWDG	EWDG

Parts List issued for product:

Product Type
Serial No(s)
SRDML Label

Notes:

When ordering parts, prefix part code with "SR". Eg. "SR06-00031"

Caution: Guide only - refer to Parts List supplied with compressor to confirm actual part numbers.

Ref	Part Code	Description	Circuit Ref.
1	-	Gate Drive PCB (C20606-283)	PCB2
2	07-00046	Power Cable, EMC1/L1 - L1	-
3	07-00045	Power Cable, EMC1/L2 - L2	-
4	07-00044	Power Cable, EMC1/L3 - L3	-
5	12-00006	EMC Filter	EMC1
6	07-00023	Earth Cable EMC1-Earth Bar	-
7	07-00007	Current Transducer Cable Assembly	-
8	07-00005	Capacitor Loom	-
9	15-00043	Hinge (2 per)	-
10	07-00150	Control Loom	-
11	12-00001	Line Reactor	L1
12	12-00004	Current Transducer	L2
13	07-00043	Power Cable, L1-RLA/L3	-
14	07-00042	Power Cable, L1-RLA/L2	-
15	07-00041	Power Cable, L1-RLA/L1	-
16	07-00001	25 Way Cable Assembly	-
17	15-00045	Door Sealing Strip	-
18	-	-	-
19	07-00004	Rectifier Loom	-
20	05-00060	Phase Fail Board	PCB1
21	06-00161	Mounting Plate, Phase Fail Board	-
22	07-00016	Instrument Harness	-
23	07-00058	Earth Cable, Customer	-
24	07-00028	Harness, Motor Speed Sensor	-
25	07-00059	Earth Cable, Customer	-
26	07-00069	Power Cable, RLA/T1,T2 & T3 - BR1	-
27	07-00053	Cable - 110C	-
28	07-00054	Cable - 111C	-
29	07-00055	Cable - 112C	-
30	07-00012	Resistor VDR Loom	-
31	-	-	-

Ref	Part Code	Description	Circuit Ref.
32	-	-	-
33	07-00019	Earth Cable, (4 per)	-
34	07-00023	Earth Cable, EMC1-Earth Bar	-
35	07-00020	Earth Cable, Back Plate-Earth Bar	-
36	07-00047	Earth Cable, Earth Bar-Door	-
37	06-00024	Earth Bar	-
38	-	-	-
39	-	-	-
40	-	-	-
41	-	-	K101
42	13-00060	4-6.5A Miniature Circuit Breaker	SW2
43	13-00061	Auxiliary Contact	MCB2
44	13-00027	3A Miniature Circuit Breaker	MCB1
45	-	-	-
46	-	-	-
47	13-00014	Fuse - 2A Type 'T'	F1
48	13-00012	Fuse - 5A Anti-surge	F2
49	13-00013	Fuse - 3.15A Semi-delay	F3
50	05-00052	Terminal Assembly, L45SR	-
51	13-00015	End Stop (2 per)	-
52	-	-	-
53	-	-	-
54	-	-	-
55	06-00032	Control Plate	-
56	06-00033	Control Hinge Plate	-
57	15-00044	Hinge (2 PER)	-
58	-	-	-
59	-	-	-
60	15-00040	Trunking - 0.16m (2 PER)	-
61	13-00001	Contactor	RLA
62	12-00003	Control Transformer	T101

Ref	Part Code	Description	Circuit Ref.
63	13-00003	Auxiliary Contact (2 PER)	SW1
64	15-00088	M6 Spacer (4 per)	-
65	13-00005	9A Miniature Contactor (2 per)	RLB,C
66	06-00031	Busbar - Copper (2 per)	-
67	06-00029	Busbar - Copper (2 per)	-
68	06-00030	Busbar - Copper (2 per)	-
69	06-00026	Busbar - Copper (2 per)	-
70	06-00025	Busbar - Copper (2 per)	-
71	06-00035	Busbar - Copper	-
72	06-00034	Busbar - Copper	-
73	06-00028	Capacitor Mounting Tray	-
74	06-00027	Capacitor Box	-
75	09-00002	Snubber Capacitor (4 per)	C9-12
76	09-00001	Capacitor (8 per)	C1-8
77	08-00008	Bridge Rectifier	BR1
78	08-00003	IGBT Device - GAL (2 per)	IGBT3,4
79	08-00002	IGBT Device - GAR (2 per)	IGBT1,2
80	07-00011	IGBT Loom - B2	-
81	07-00009	IGBT Loom - A2	-
82	07-00010	IGBT Loom - B1	-
83	07-00008	IGBT Loom - A1	-
84	05-00001	Thermistor Sensor	R101
85	10-00001	Resistor (6 per)	R1-6
86	06-00055	Door	-
87	-	Emergency Stop (98524-51)	-
88	-	Controller (C20606-280)	PCB3
89	15-00052	Flush Mounted Latch	-
90	06-00066	Finger Guard - Left Hand	-
91	06-00067	Finger Guard - Right Hand	-

Fig. 5.6 - L75SR Power Converter 98155 -13 (1 of 5)

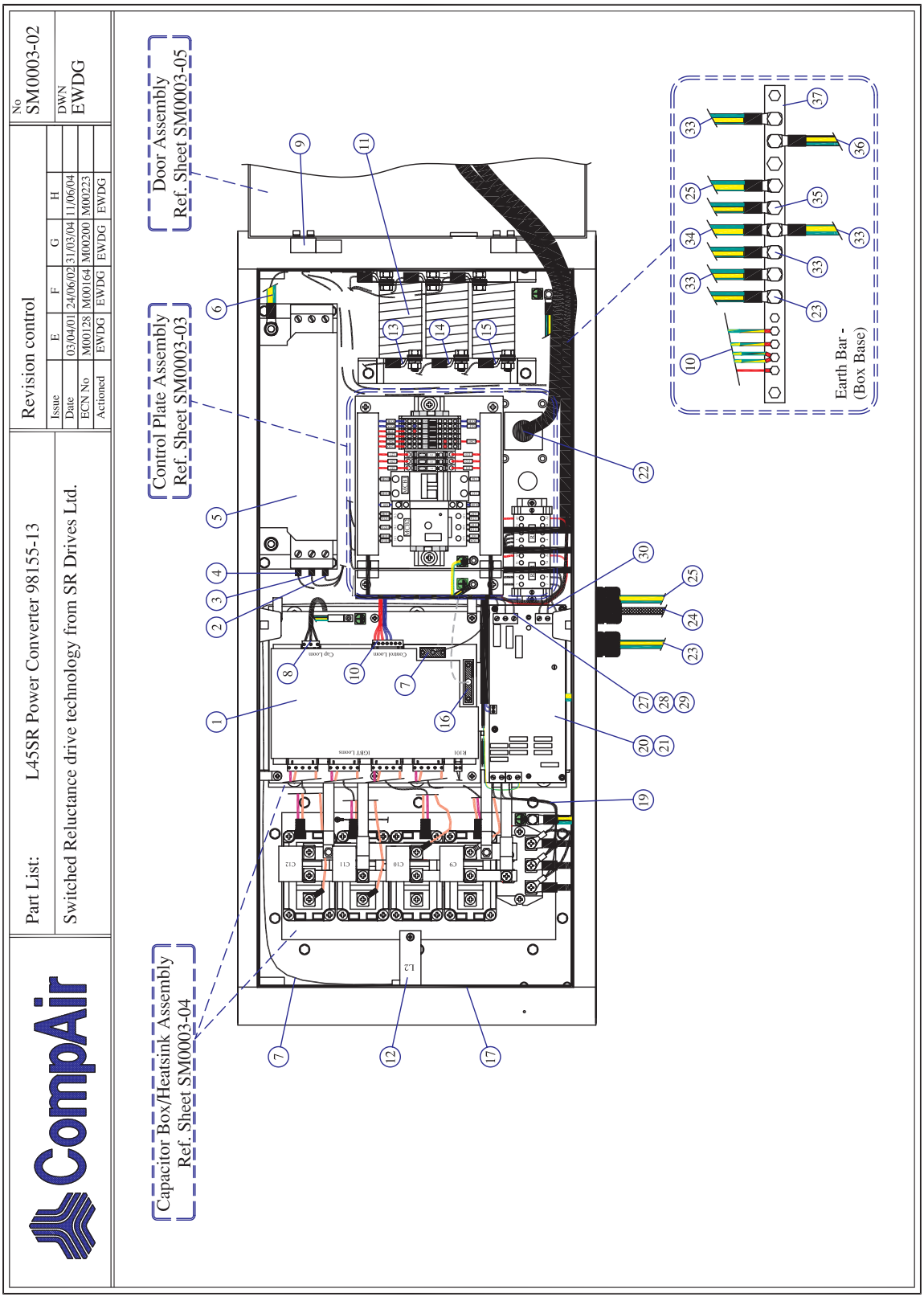


Fig. 5.7 - L75SR Power Converter 98155 -13 (2 of 5)

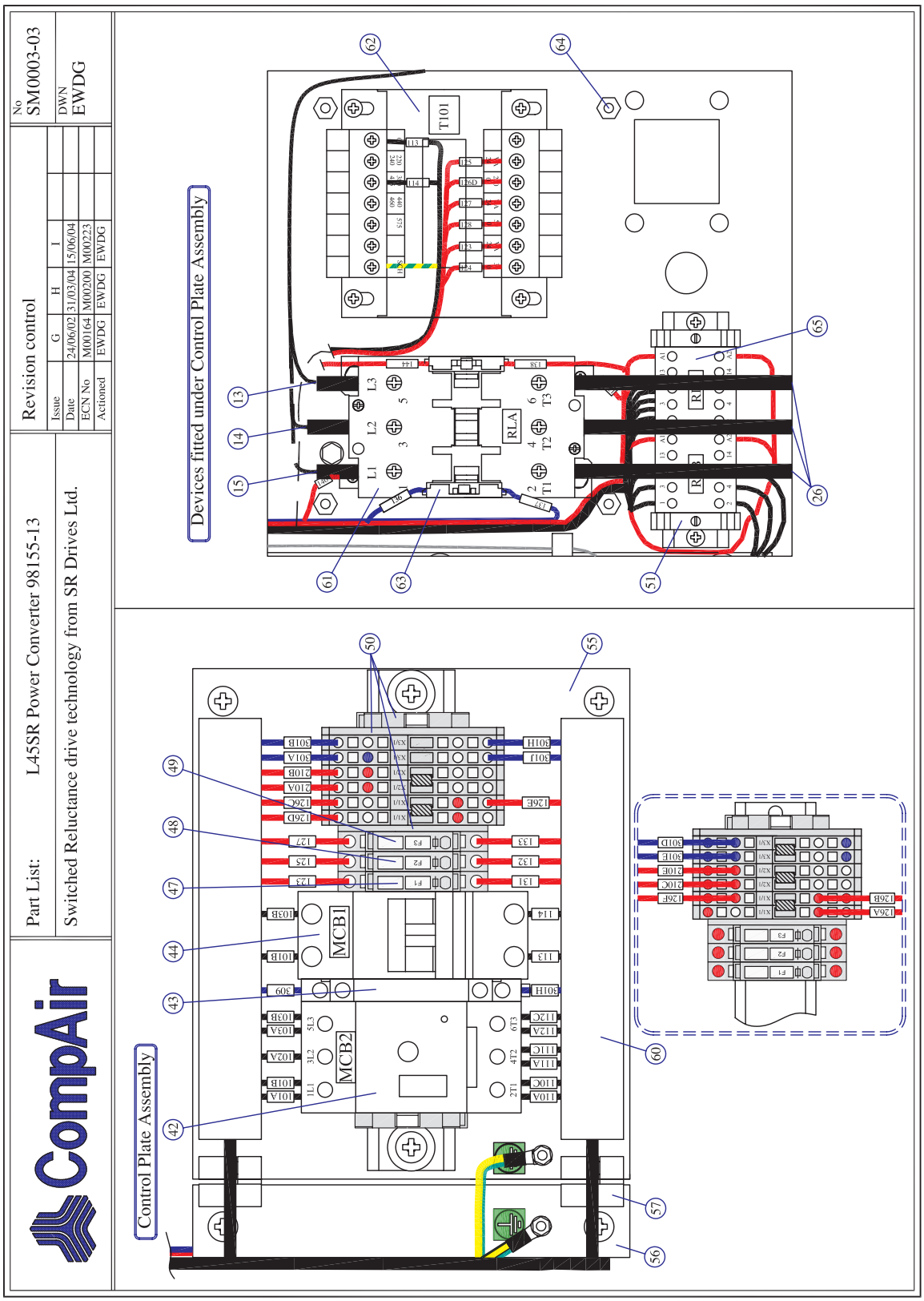


Fig. 5.8 - L75SR Power Converter 98155 -13 (3 of 5)

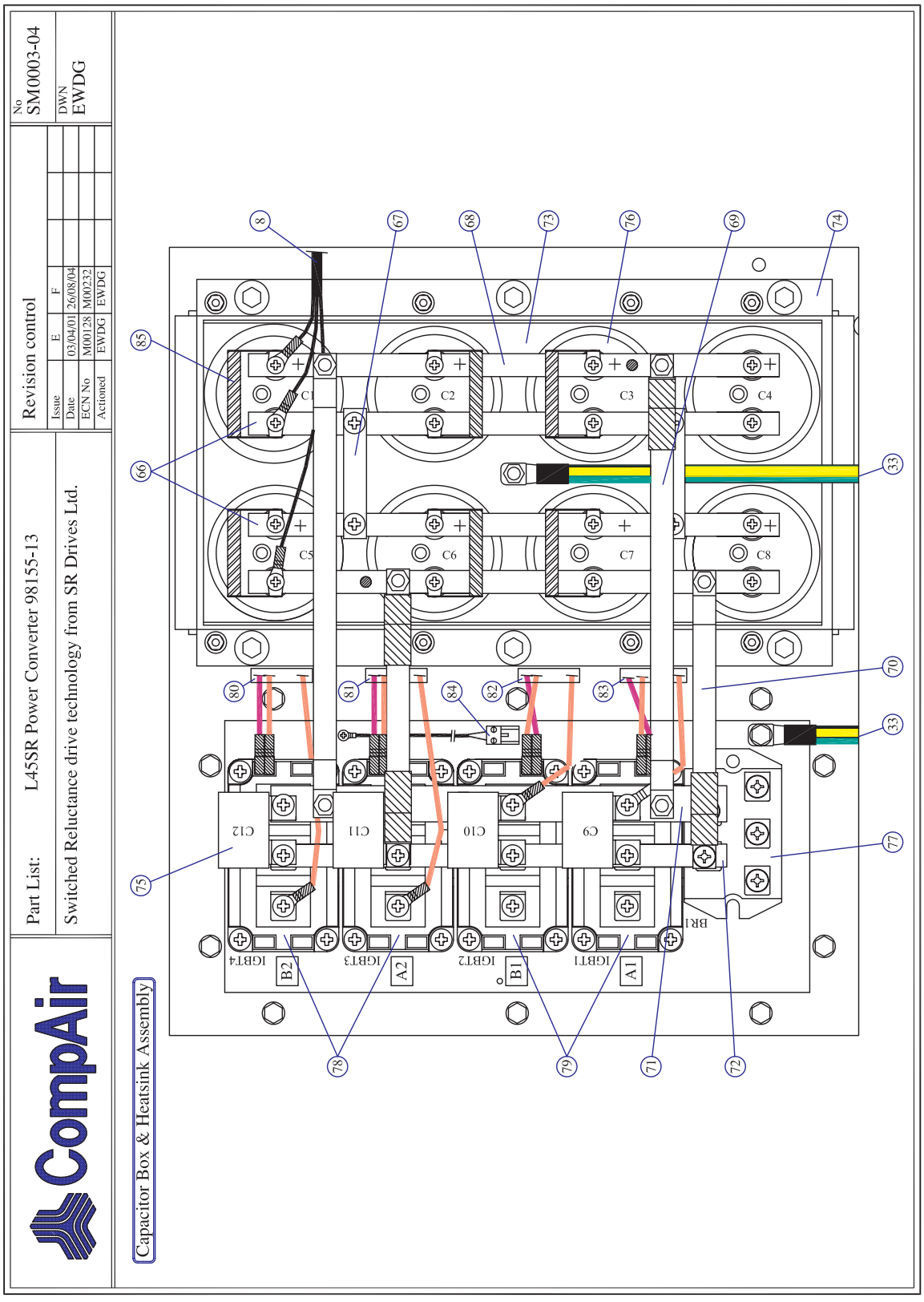


Fig. 5.9 - L75SR Power Converter 98155 -13 (4 of 5)

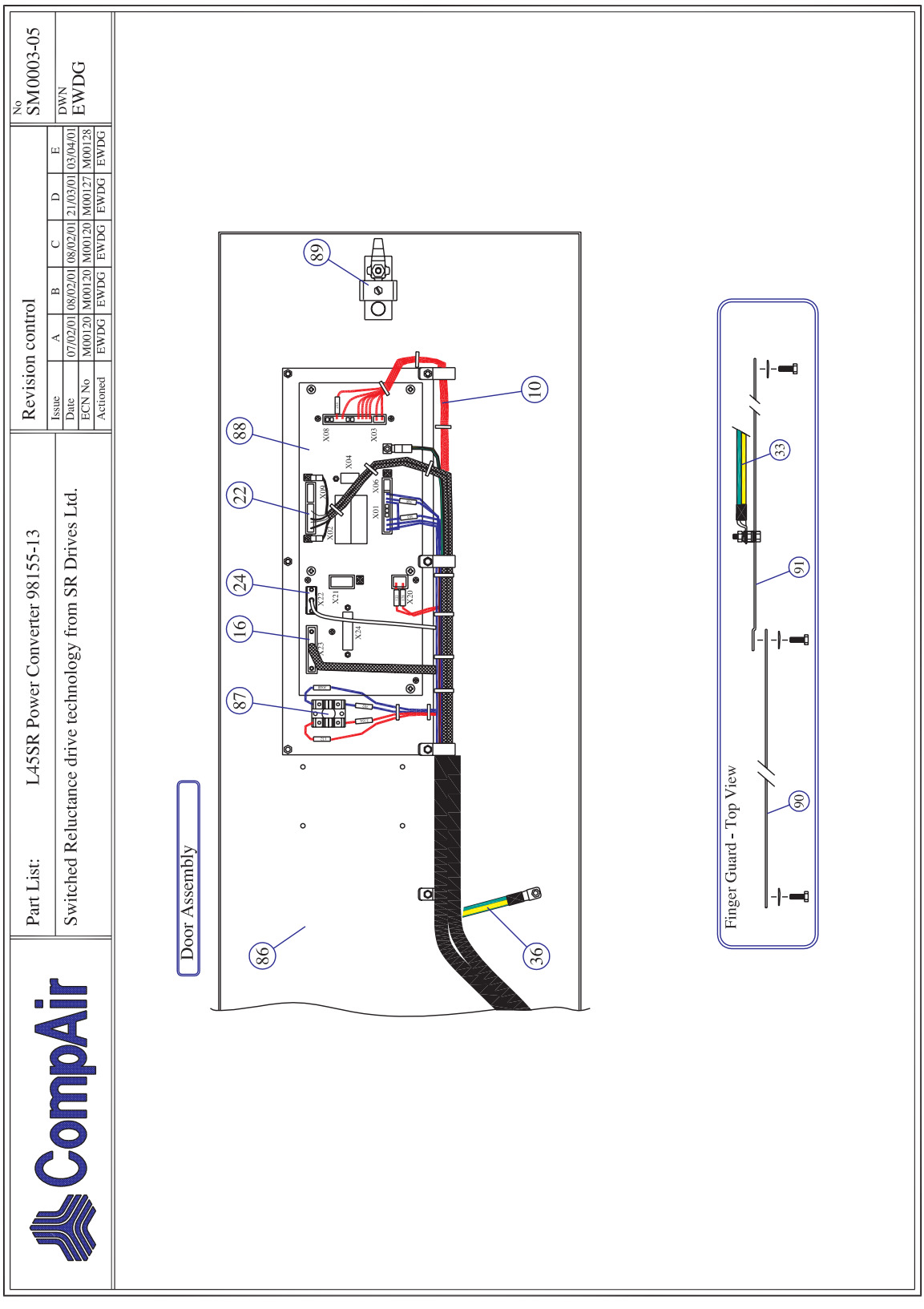


Fig. 5.10 - L75SR Power Converter 98155 -13 (5 of 5)

5.3 L75SR with Phase Protection Relay

CompAir	Part List: L75SR Power Converter 98155-16 Switched Reluctance drive technology from SR Drives Ltd.	Revision control	No SM0002-01 DWN EWDG

Revision control		
Issue	I	J
Date	08/04/02	18/03/03
ECN No	M00161	M00169
Actioned	EWDG	EWDG

Parts List issued for product:

Product Type
Serial No(s)
SRDML Label

Notes:

When ordering parts, prefix part code with "SR". Eg. "SR06-00053"

Caution: Guide only - refer to Parts List supplied with compressor to confirm actual part numbers.

Ref	Part Code	Description	Circuit Ref.
1	07-00002	25 Way Cable Assembly	-
2	-	Emergency Stop (98524-51)	-
3	-	Controller (C20606-280)	PCB3
4	07-00074	Cable - 101B	-
5	15-00047	Retaining Washer (2 per)	-
6	07-00076	Control Loom	-
7	15-00093	M6x35 Black Socket Head Screw	-
8	07-00017	Instrument Harness	-
9	06-00097	Busbar - Copper	-
10	06-00098	Busbar - Copper	-
11	06-00099	Busbar - Copper	-
12	07-00073	AC Input Loom	-
13	07-00075	Cable - 103B	-
14	07-00071	Rectifier Loom	-
15	06-00059	Door	-
16	06-00072	AC Input Loom	-
17	05-00005	SR VDR Resistor PCB Assembly	PCB1
18	-	-	-
19	-	Gate Drive PCB (C20606-283)	PCB2
20	13-00004	Auxiliary Contact	SW1
21	13-00002	Contactor Coil	RLA
22	12-00005	Current Sensor	L2
23	07-00024	Earth Cable - H'sink - Earth Bar	-
24	10-00003	Varistor	VDR1
25	07-00064	Current Transducer Cable	-
26	15-00043	Hinge (2 per)	-
27	07-00070	Power Cable (3 per) L1-RLA/T1,2,&3	-
28	07-00060	Varistor Cable	-
29	07-00080	Power Cable (3 per) L1	-
30	-	-	-
31	05-00025	Air Inlet Filter	-
32	15-00095	M6x20 Black Button Head Screw	-
33	06-00057	Air Inlet Grill	-
34	07-00025	Earth Cable (2 per)	-
35	15-00045	Door Sealing Strip (4.5m)	-
36	12-00011	Line Reactor	L1
37	06-00024	Earth Bar	-
38	07-00020	Earth Cable, (2 per) L1 & Box	-
39	07-00021	Earth Cable, Customer	-
40	13-00036	Terminal Block	-
41	07-00022	Earth Cable, Customer	-
42	06-00068	Finger Guard	-
43	15-00040	Cable Trunking - 0.5m (2 per)	-
44	13-00027	3A Miniature Circuit Breaker	MCB1
45	13-00007	6.3 - 10A Miniature Circuit Breaker	MCB2
46	13-00037	Phase Failure Relay	K101
47	13-00005	9A Miniature Contactor Coil (2 per)	RLB,C
48	12-00014	Control Transformer	T101
49	13-00021	Terminal End Plate	-
50	13-00016	Terminal Fuse Holder	-
51	13-00014	Fuse - 2A Type 'T'	F1
52	13-00012	Fuse - 5A Anti-surge	F2
53	13-00013	Fuse - 3.15A Semi-delay	F3
54	13-00018	Terminal End Plate	-
55	13-00020	Horizontal Jumper (3 per)	-
56	13-00015	End Stop (5 per)	-
57	13-00008	Auxiliary Contact	SW2
58	13-00017	Terminal Fuse Carrier (3 per)	-
59	13-00019	Terminal Block (6 per)	-
60	07-00027	Harness, Motor Speed Sensor	-
61	06-00053	Busbar - Copper	-
62	06-00050	Busbar - Copper	-
63	06-00049	Busbar - Copper (2 per)	-
64	06-00029	Busbar - Copper (2 per)	-
65	06-00051	Busbar - Copper	-
66	06-00048	Busbar - Copper (2 per)	-
67	06-00052	Busbar - Copper	-
68	06-00025	Busbar - Copper	-
69	06-00046	Capacitor Box	-
70	06-00047	Capacitor Mounting Tray	-
71	08-00001	Rectifier Diode (3 per)	BR1-3
72	08-00003	IGBT Device - GAL (2 per)	IGBT3,4
73	08-00002	IGBT Device - GAR (2 per)	IGBT1,2
74	07-00011	IGBT Loom - B2	-
75	07-00009	IGBT Loom - A2	-
76	07-00010	IGBT Loom - B1	-
77	07-00008	IGBT Loom - A1	-
78	09-00002	Snubber Capacitor (4 per)	C11-14
79	05-00001	Thermistor Sensor	R101
80	09-00001	Capacitor (10 per)	C1-10
81	10-00001	Resistor (6 per)	R1-6
82	07-00048	Cable - 110C	-
83	07-00049	Cable - 111C	-
84	07-00050	Cable - 112C	-

Fig. 5.11 - L75SR Power Converter 98155 -16 (1 of 4)

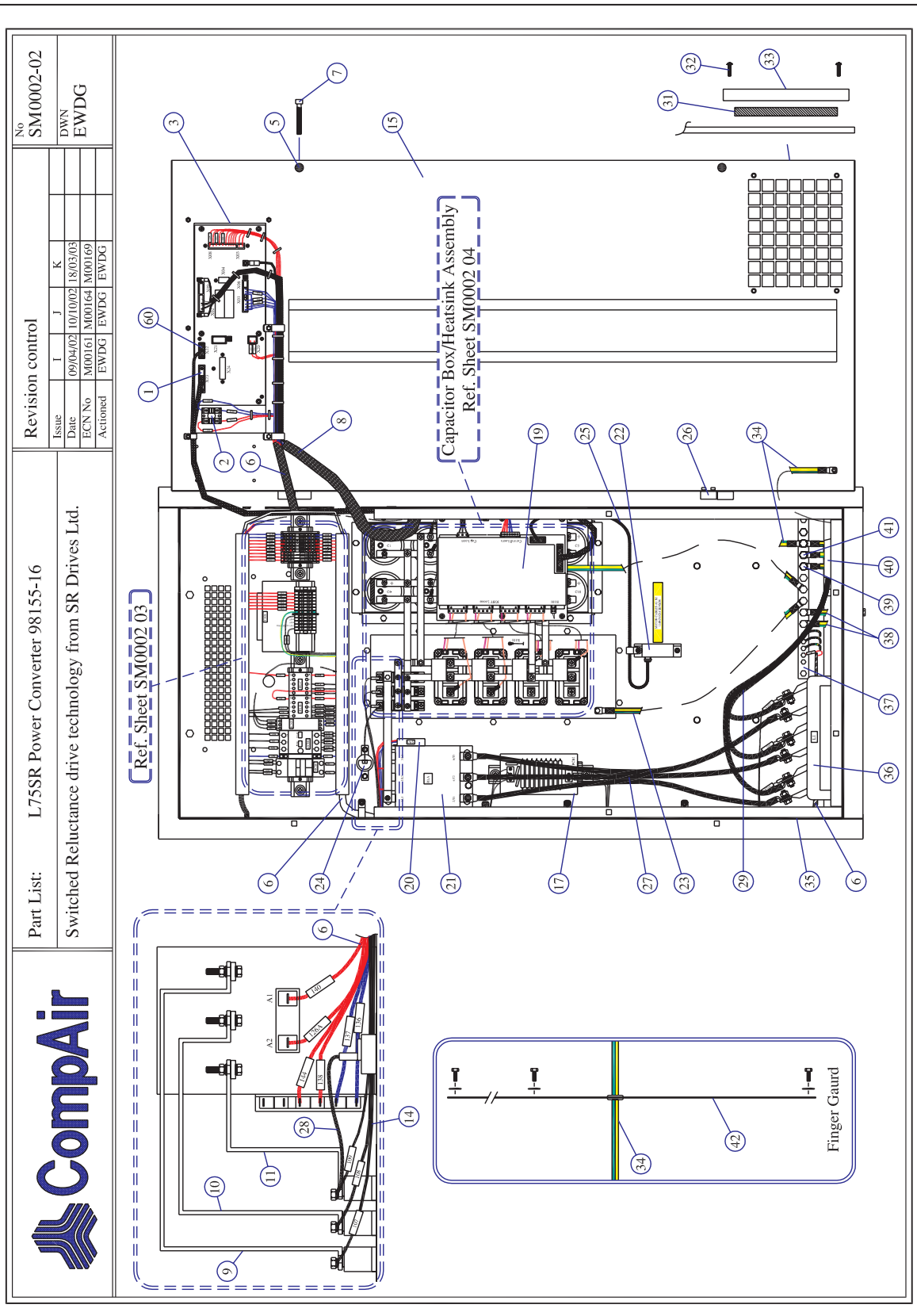


Fig. 5.12 - L75SR Power Converter 98155 -16 (2 of 4)

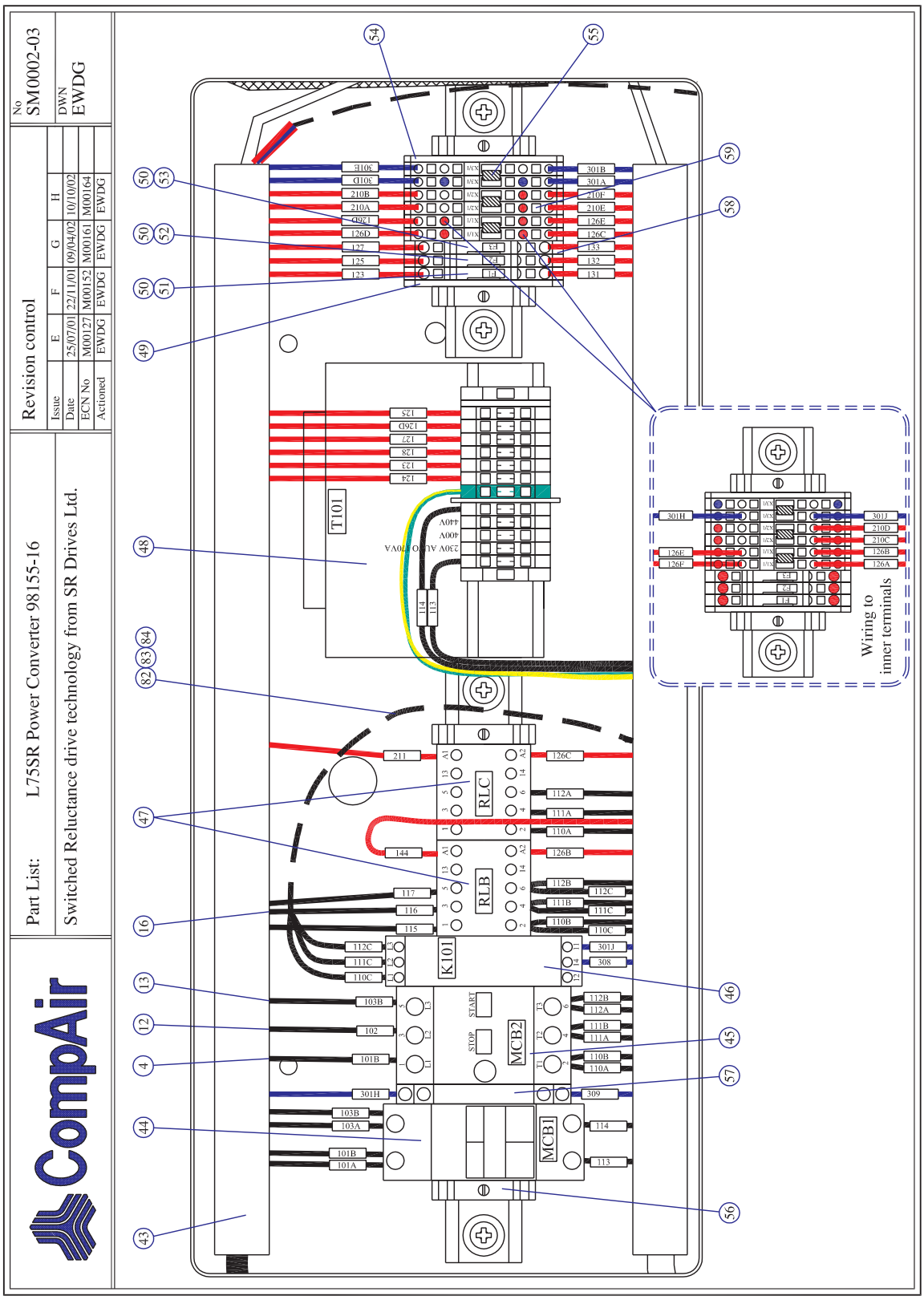


Fig. 5.13 - L75SR Power Converter 98155 -16 (3 of 4)

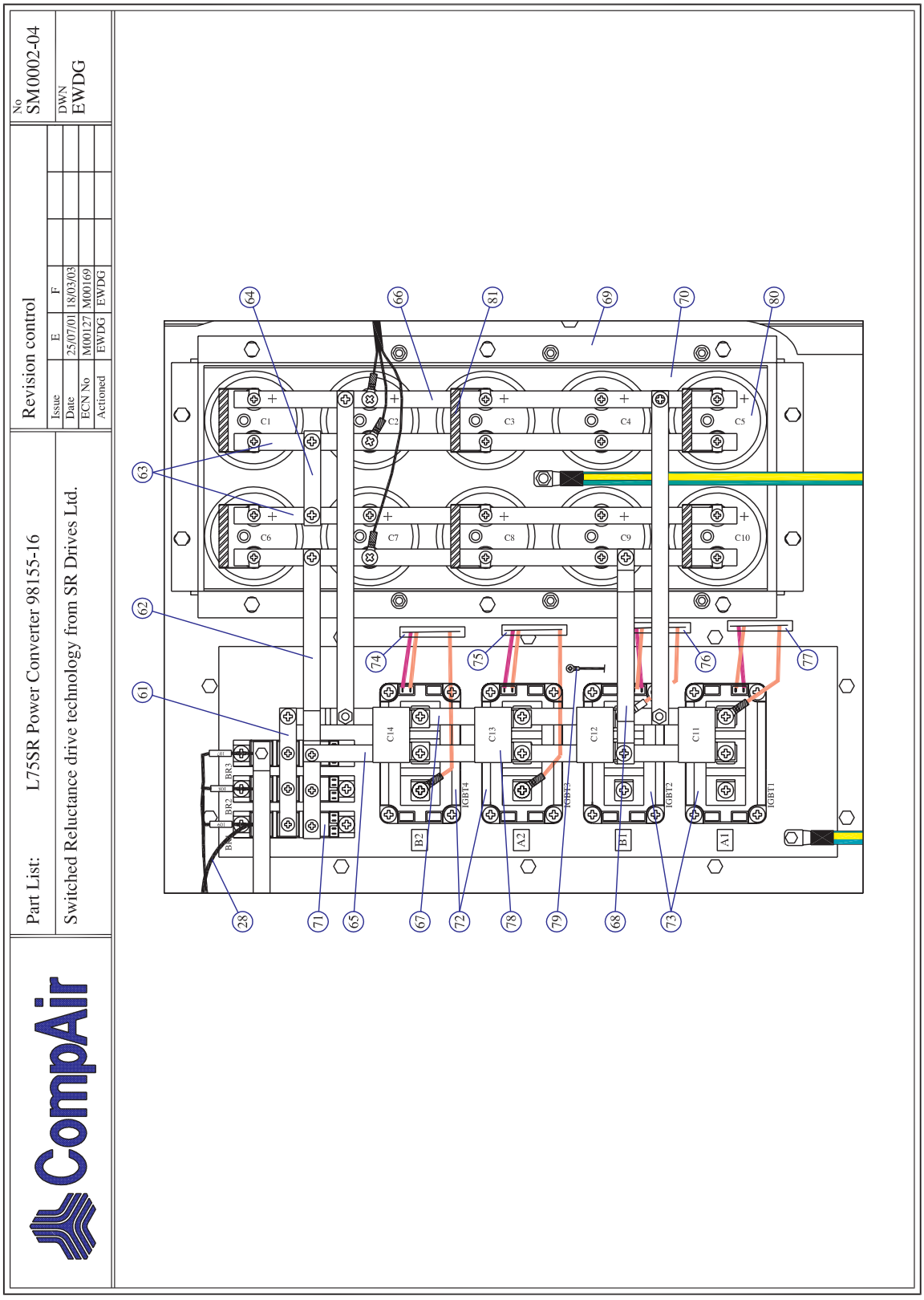


Fig. 5.14 - L75SR Power Converter 98155 -16 (4 of 4)

CompAir	Part List: L75SR Power Converter 98155-15 Switched Reluctance drive technology from SR Drives Ltd.	Revision control Issue: I / J / K Date: 12/03/03 / 28/06/04 / 09/07/04 ECN No: M00170 / M00225 / M00224 Actioned: EWDG / EWDG / EWDG	No SM0001-01 DWN EWDG

Parts List issued for product:

Product Type
Serial No(s)
SRDML Label

Notes:

When ordering parts, prefix part code with "SR". Eg. "SR06-00053"

Caution: Guide only - refer to Parts List supplied with compressor to confirm actual part numbers.

Ref	Part Code	Description	Circuit Ref.
1	07-00002	25 Way Cable Assembly	-
2	-	Emergency Stop (98524-51)	-
3	-	Controller (C20606-280)	PCB3
4	07-00074	Cable - 101B	-
5	15-00047	Retaining Washer (2 per)	-
6	07-00076	Control Loom	-
7	15-00093	M6x35 Black Socket Head Screw	-
8	07-00017	Instrument Harness	-
9	06-00097	Busbar - Copper	-
10	06-00098	Busbar - Copper	-
11	06-00099	Busbar - Copper	-
12	07-00073	AC Input Loom	-
13	07-00075	Cable - 103B	-
14	07-00071	Rectifier Loom	-
15	06-00059	Door	-
16	07-00072	AC Input Loom	-
17	05-00060	Phase Fail Board	PCB1
18	-	-	-
19	-	Gate Drive PCB (C20606-283)	PCB2
20	13-00004	Auxiliary Contact	SW1
21	13-00002	Contactor	RLA
22	12-00005	Current Sensor	L2
23	07-00024	Earth Cable, H'sink - Earth Bar	-
24	07-00033	Earth Cable, EMC1 - Earth Bar	-
25	07-00064	Current Transducer Cable	-
26	15-00043	Hinge (2 per)	-
27	07-00070	Power Cable, (3 per) L1-RLA/T1,2&3	-
28	-	-	-
29	07-00031	Power Cable, (3 per) EMC1/L1',2'&3'	-
30	12-00007	EMC Filter	EMC1

Ref	Part Code	Description	Circuit Ref.
31	05-00025	Air Inlet Filter	-
32	15-00095	M6x20 Black Button Head Screw	-
33	06-00057	Air Inlet Grill	-
34	07-00025	Earth Cable (2 per)	-
35	15-00045	Door Sealing Strip (4.5m)	-
36	12-00002	Line Reactor	L1
37	06-00024	Earth Bar	-
38	07-00020	Earth Cable, (2 per) L1 & Box	-
39	07-00021	Earth Cable, Customer	-
40	-	-	-
41	07-00022	Earth Cable, Customer	-
42	06-00068	Finger Guard	-
43	15-00040	Cable Trunking - 0.5m (2 per)	-
44	13-00027	3A Miniature Circuit Breaker	MCB1
45	-	-	-
46	-	-	K101
47	13-00005	9A Miniature Contactor (2 per)	RLB,C
48	12-00003	Control Transformer	T101
49	-	-	-
50	-	-	-
51	13-00014	Fuse - 2A Type 'T'	F1
52	13-00012	Fuse - 5A Anti-surge	F2
53	13-00013	Fuse - 3.15A Semi-delay	F3
54	05-00053	Terminal Assembly, L75SR	-
55	-	-	-
56	13-00015	End Stop (3 per)	-
57	13-00056	6.3 - 10A Miniature Circuit Breaker	MCB2
58	13-00061	Auxiliary Contact	SW2
59	-	-	-
60	07-00027	Harness, Motor Speed Sensor	-

Ref	Part Code	Description	Circuit Ref.
61	06-00053	Busbar - Copper	-
62	06-00050	Busbar - Copper	-
63	06-00049	Busbar - Copper (2 per)	-
64	06-00029	Busbar - Copper (2 per)	-
65	06-00051	Busbar - Copper	-
66	06-00048	Busbar - Copper (2 per)	-
67	06-00052	Busbar - Copper	-
68	06-00025	Busbar - Copper	-
69	06-00046	Capacitor Box	-
70	06-00047	Capacitor Mounting Tray	-
71	08-00001	Rectifier Diode (3 per)	BR1-3
72	08-00003	IGBT Device - GAL (2 per)	IGBT3,4
73	08-00002	IGBT Device - GAR (2 per)	IGBT1,2
74	07-00011	IGBT Loom - B2	-
75	07-00009	IGBT Loom - A2	-
76	07-00010	IGBT Loom - B1	-
77	07-00008	IGBT Loom - A1	-
78	09-00002	Snubber Capacitor (4 per)	C11-14
79	05-00001	Thermistor Sensor	R101
80	09-00001	Capacitor (10 per)	C1-10
81	10-00001	Resistor (6 per)	R1-6

Fig. 5.15 - L75SR Power Converter 98155 -15 (1 of 4)

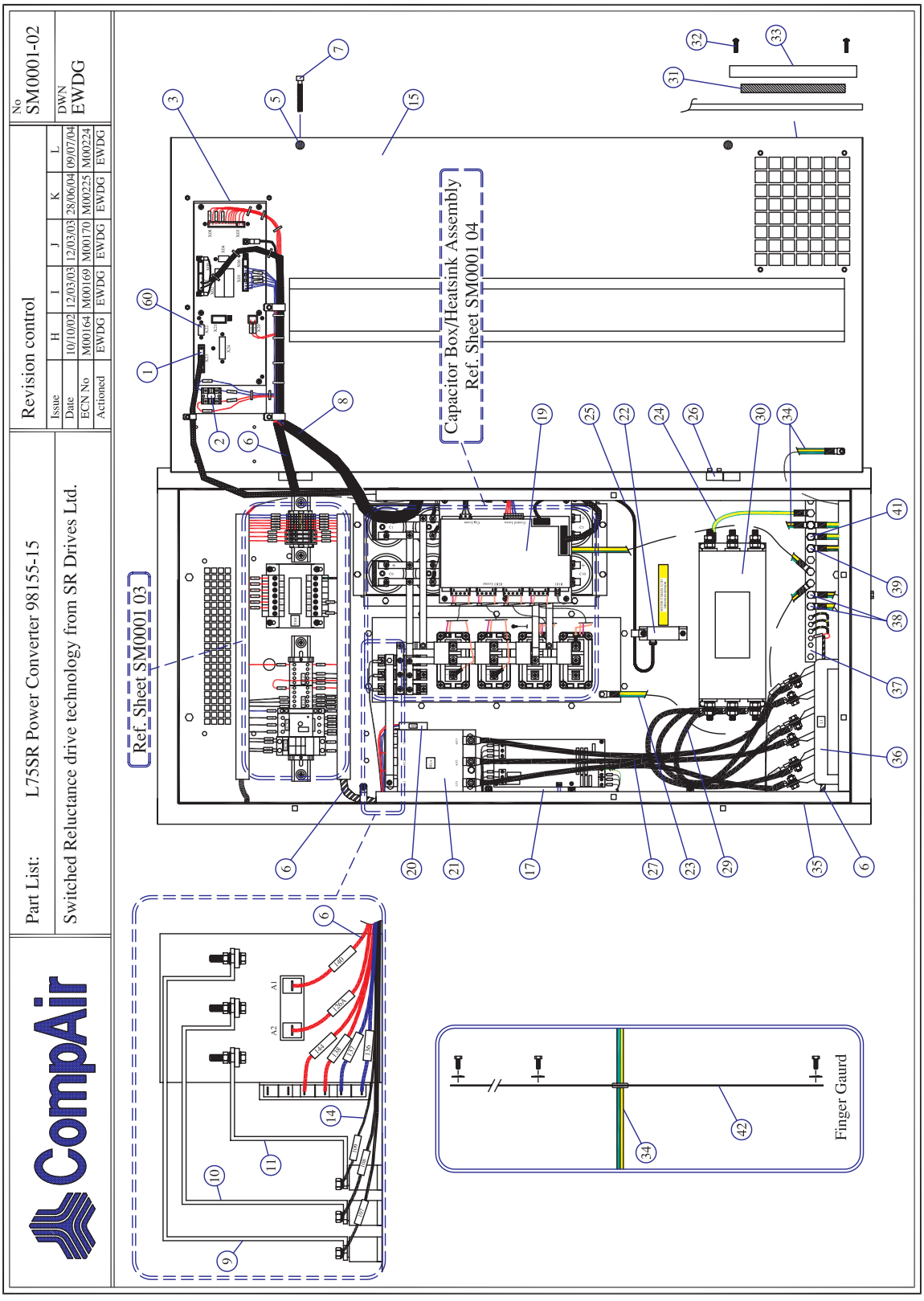


Fig. 5.16 - L75SR Power Converter 98155 -15 (2 of 4)

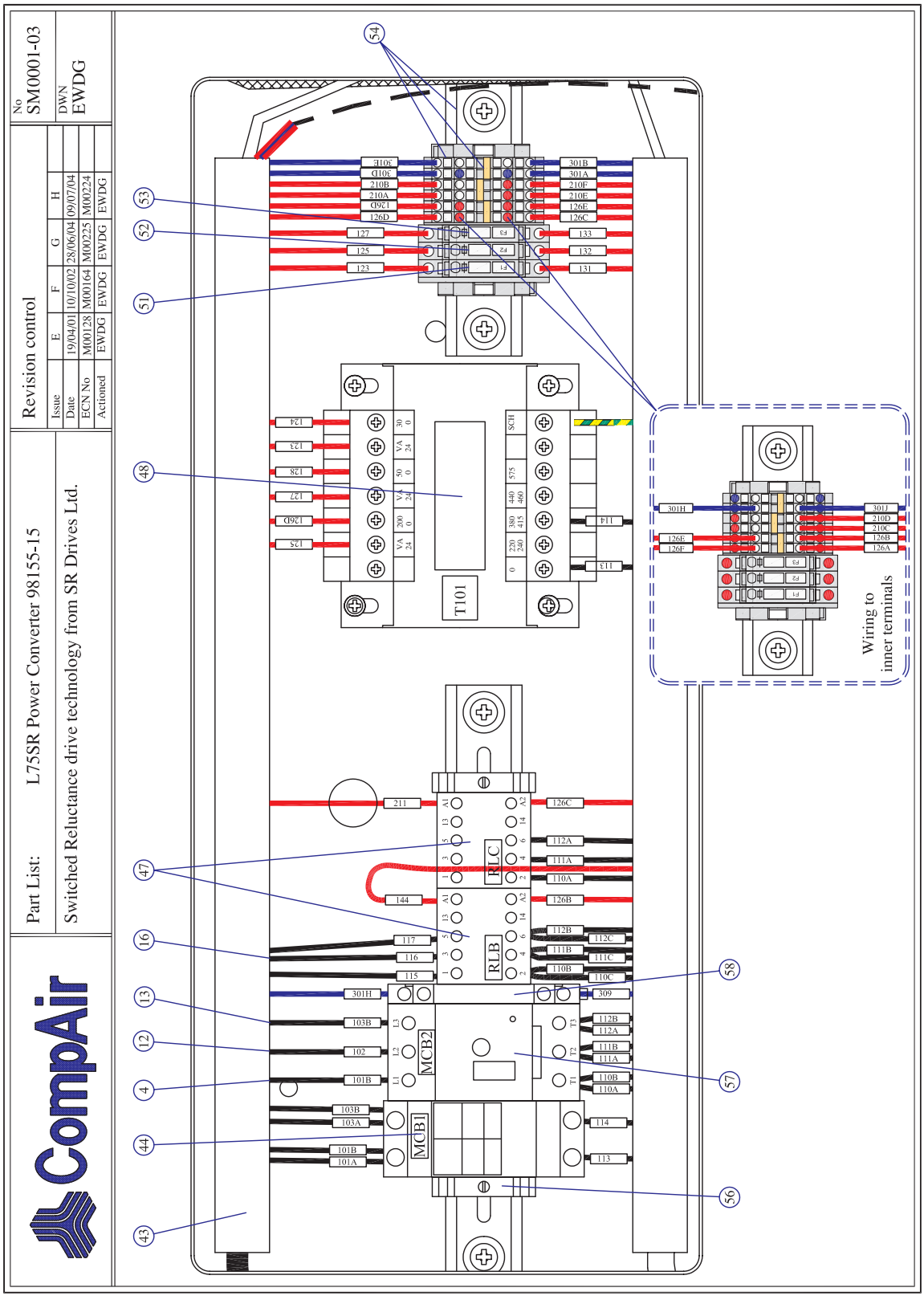


Fig. 5.17 - L75SR Power Converter 98155 -15 (3 of 4)

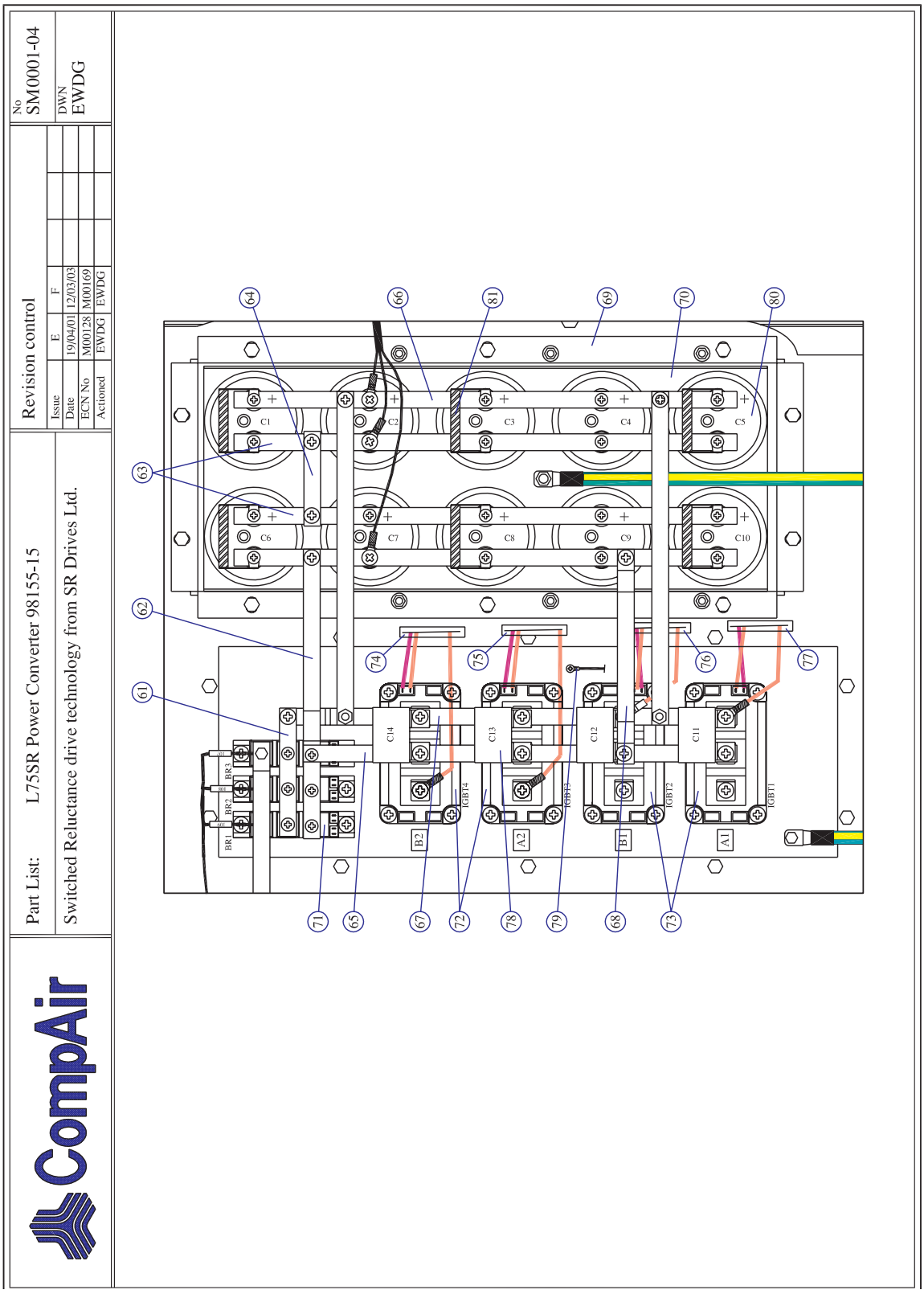


Fig. 5.18 - L75SR Power Converter 98155 -15 (4 of 4)

5.5 L120SR with Phase Protection Relay

CompAir	Part List: L120SR Power Converter 98155-11 Switched Reluctance drive technology from SR Drives Ltd.	Revision control	No SM0007-01 DWN EWDG

Issue	A	B	C
Date	25/09/01	01/04/04	15/04/04
ECN No	PROD	M00202	M00215
Actioned	EWDG	EWDG	EWDG

Parts List issued for product:

Product Type
Serial No(s)
SRDML Label

Notes:

When ordering parts, prefix part code with "SR". E.g.. "SR06-00103"
For parts with no part code, use (number) in description. E.g.. "98524-51"

Caution: Guide only - refer to Parts List supplied with compressor to confirm actual part numbers.

Ref	Part Code	Description	Circuit Ref.	Ref	Part Code	Description	Circuit Ref.	Ref	Part Code	Description	Circuit Ref.
1	15-00113	48 Way UTP Socket	SK1	32	13-00063	9 - 14A Miniature Circuit Breaker	MCB2	63	10-00003	Varistor	VDR4
2	15-00043	Hinge (3 per)	-	33	13-00037	Phase Failure Relay	K101	64	06-00103	Busbar - Copper	-
3	-	Emergency Stop (98524-51)	-	34	13-00013	Fuse - 3.15A Semi-delay	F3	65	06-00104	Busbar - Copper	-
4	07-00001	25 Way Cable Assembly	-	35	13-00012	Fuse - 5A Anti-surge	F2	66	06-00106	Busbar - Copper	-
5	07-00028	Harness, Motor Speed Sensor	-	36	13-00014	Fuse - 2A Type 'T' (2 per)	F1, 4	67	06-00105	Busbar - Copper	BR1-3
6	-	Controller (C20606-280)	PCB1	37	05-00054	Terminal Assembly	-	68	08-00021	Rectifier Diode (3 per)	VDR1-3
7	15-00052	Door Latch (2 per)	-	38	-	-	-	69	10-00005	Varistor (3 per)	R2-4
8	05-00032	Air Inlet Filter (2 per)	-	39	-	-	-	70	10-00006	Resistor, Soft Start (3 per)	-
9	06-00086	Air Inlet Grill (2 per)	-	40	-	-	-	71	06-00022	Busbar - Copper	K1
10	15-00026	M6 Spring (8 per)	-	41	-	-	-	72	13-00033	Contactor & Coil	K1/1
11	15-00021	M6x25 Hex Head (8 per)	-	42	-	-	-	73	13-00004	Auxiliary Contacts	-
12	15-00019	M6 Plain (8 per)	-	43	12-00026	Control Transformer	T101	74	-	Power Cable, L1/L1-K1/T1	-
13	12-00015	EMC Filter	EMC1	44	-	-	-	75	-	Power Cable, L1/L2-K1/T2	-
14	-	Power Cable, EMC1/L3'-L1/L3	-	45	09-00001	Capacitor (18 per)	C1-18	76	-	Power Cable, L1/L3-K1/T3	-
15	-	Power Cable, EMC1/L2'-L1/L2	-	46	06-00087	Capacitor Mounting Plate	-	77	-	Earth Cable - X1/1 (126E)	-
16	-	Power Cable, EMC1/L1'-L1/L1	-	47	10-00001	Resistor (10 per)	R105-114	78	-	Earth Cable - Fan (E3)	-
17	06-00075	Exhaust Duct	-	48	05-00020	Busbar, Laminated (2 per)	-	79	-	Earth Cable - PCB1 (E2)	-
18	12-00013	Line Reactor	L1	49	-	Gate Drive PCB (C20606-283)	PCB2	80	-	Earth Cable - PCB2 (E1)	-
19	-	Earth Cable, Finger Guard	-	50	07-00005	Capacitor Loom	-	81	-	Earth Cable - Box	-
20	-	Earth Cable, Door	-	51	06-00023	Capacitor Mounting Plate	-	82	-	Earth Cable - Gland Plate	-
21	15-00109	Document Pocket	-	52	08-00022	IGBT Device - GAL (4 per)	IGBT1-4	83	-	Earth Cable - Capacitor Plate	-
22	06-00090	Finger Guard	-	53	08-00023	IGBT Device - GAR (4 per)	IGBT5-8	84	-	Earth Cable - Line Reactor	-
23	15-00042	P-clip (4 per)	-	54	09-00002	Capacitor, Snubber	C19-22	85	-	Earth Cable - Capacitor Plate	-
24	-	-	-	55	07-00064	Current Transducer Cable	-	86	-	Earth Cable - Customer	-
25	-	-	-	56	12-00017	Current Transducer	L2	87	-	Earth Cable - Heatsink	-
26	13-00034	12A Miniature Contactor & Coil	K3	57	06-00088	Bracket, Current Transducer	-	88	-	Earth Cable - Customer	-
27	13-00027	3A Miniature Circuit Breaker	MCB1	58	06-00013	Busbar - Copper (2 per)	-	89	-	Earth Cable - EMC	-
28	13-00061	Auxiliary Contact	MCB2/1	59	05-00001	Thermistor Sensor	R101	90			
29	13-00005	9A Miniature Contactor & Coil	K2	60	06-00012	Busbar - Copper (2 per)	-	91			
30	13-00041	24V DC Relay	K4	61	06-00091	Busbar - Copper (4 per)	-	92			
31	13-00042	Relay Base	-	62	12-00020	Fan, Radial	-	93			

Fig. 5.19 - L120SR Power Converter 98155 -11 iss C (1 of 5)

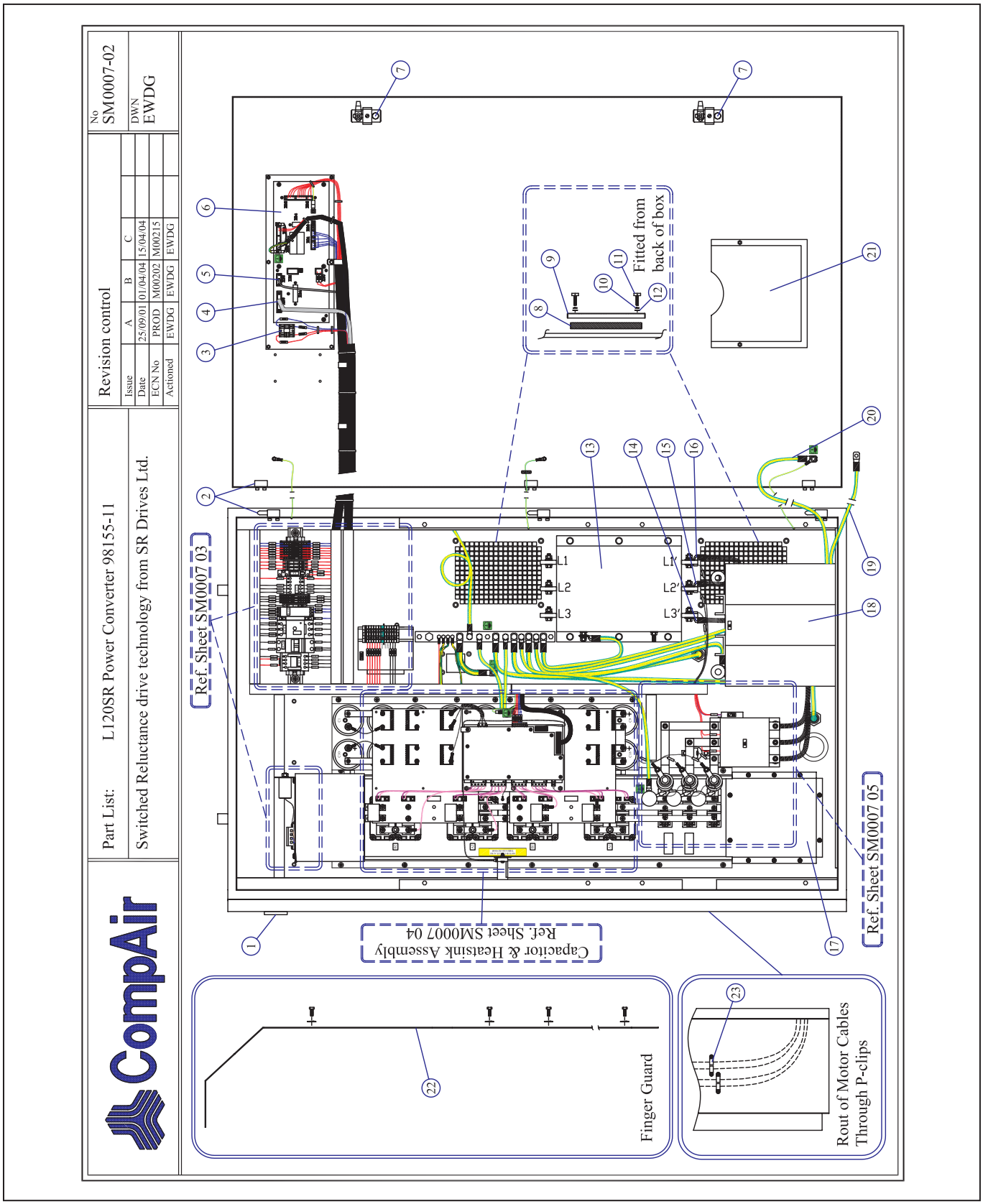


Fig. 5.20 - L120SR Power Converter 98155 -11 iss C (2 of 5)

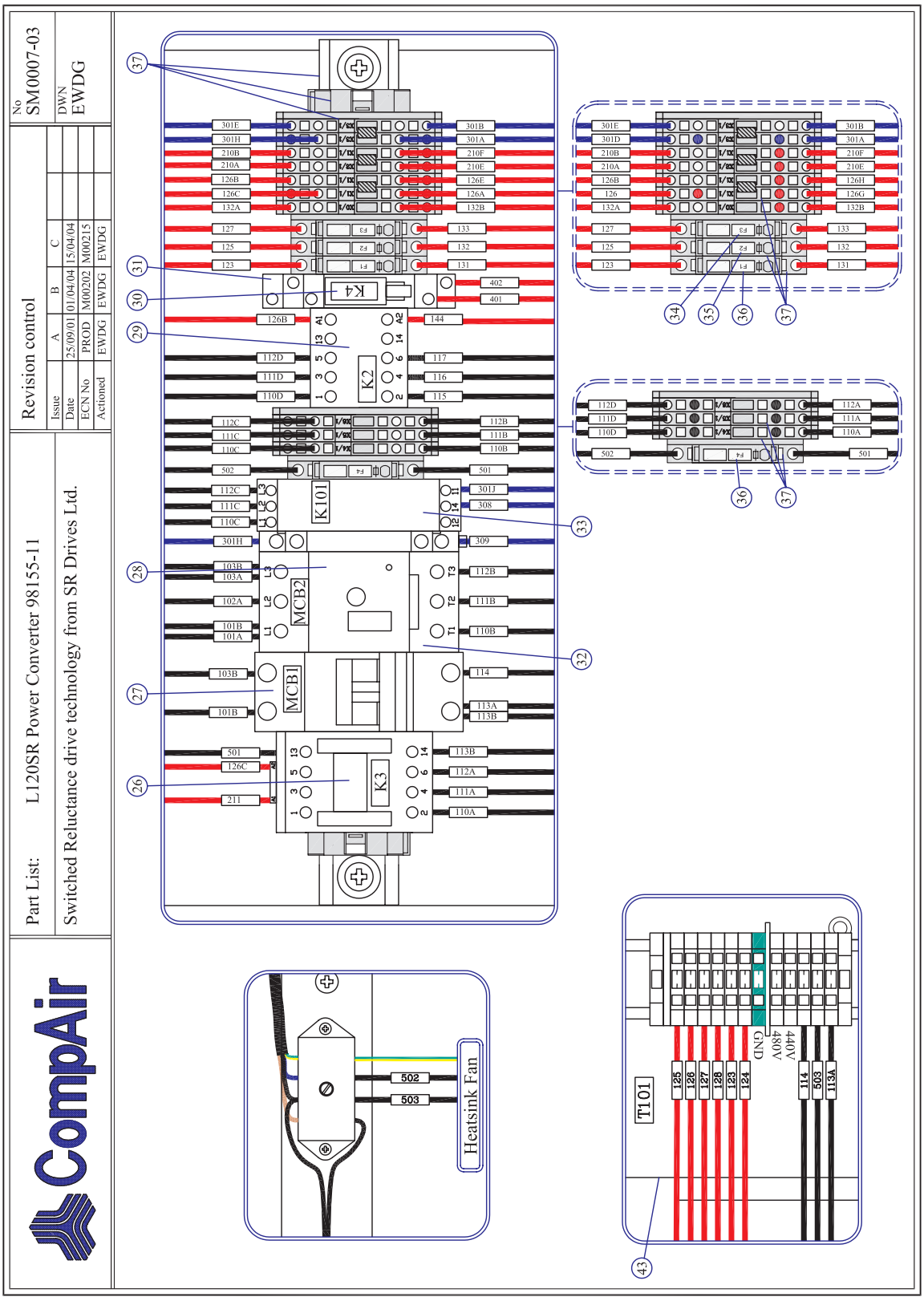


Fig. 5.21 - L120SR Power Converter 98155 -11 iss C (3 of 5)

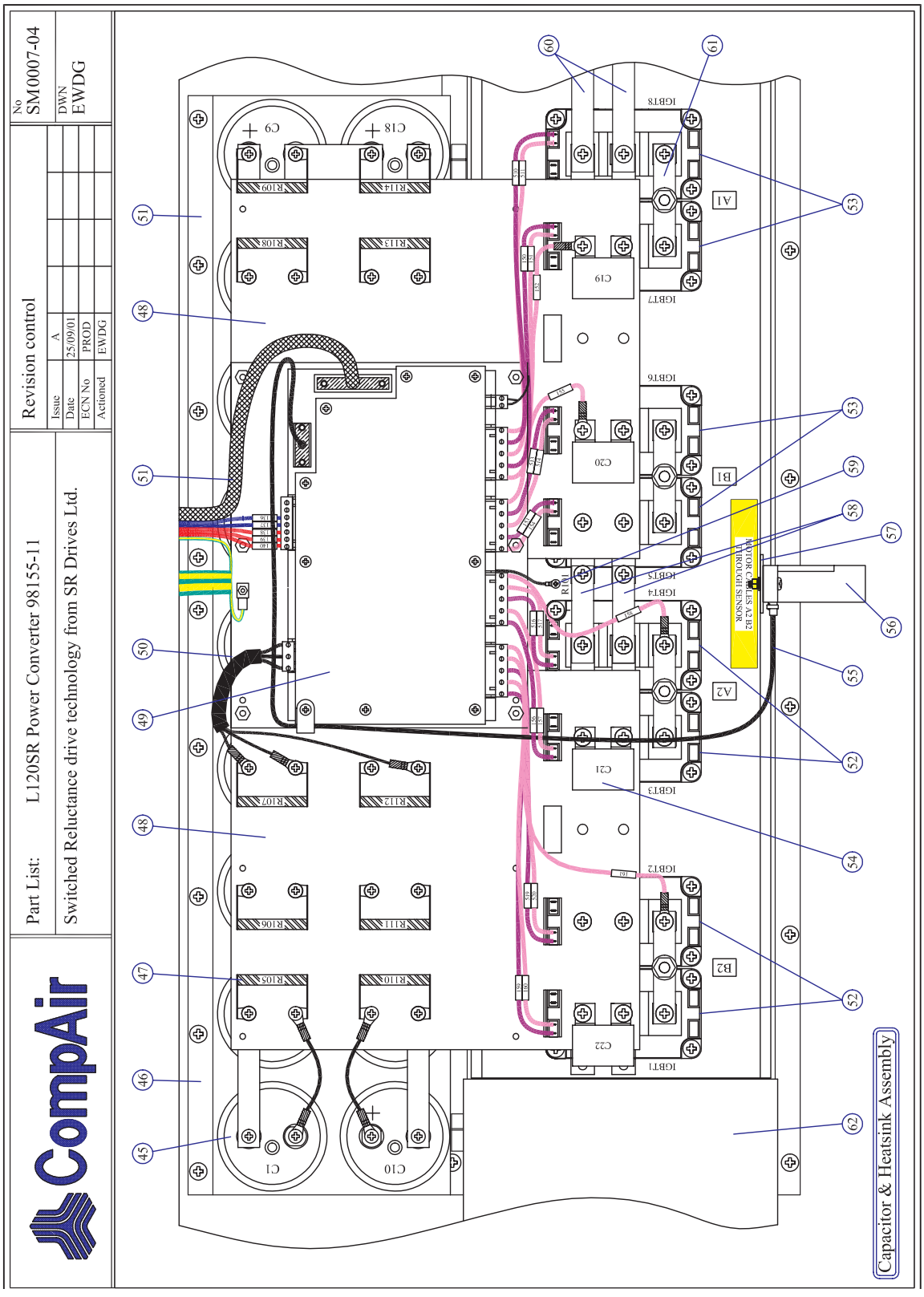


Fig. 5.22 - L120SR Power Converter 98155 -11 iss C (4 of 5)

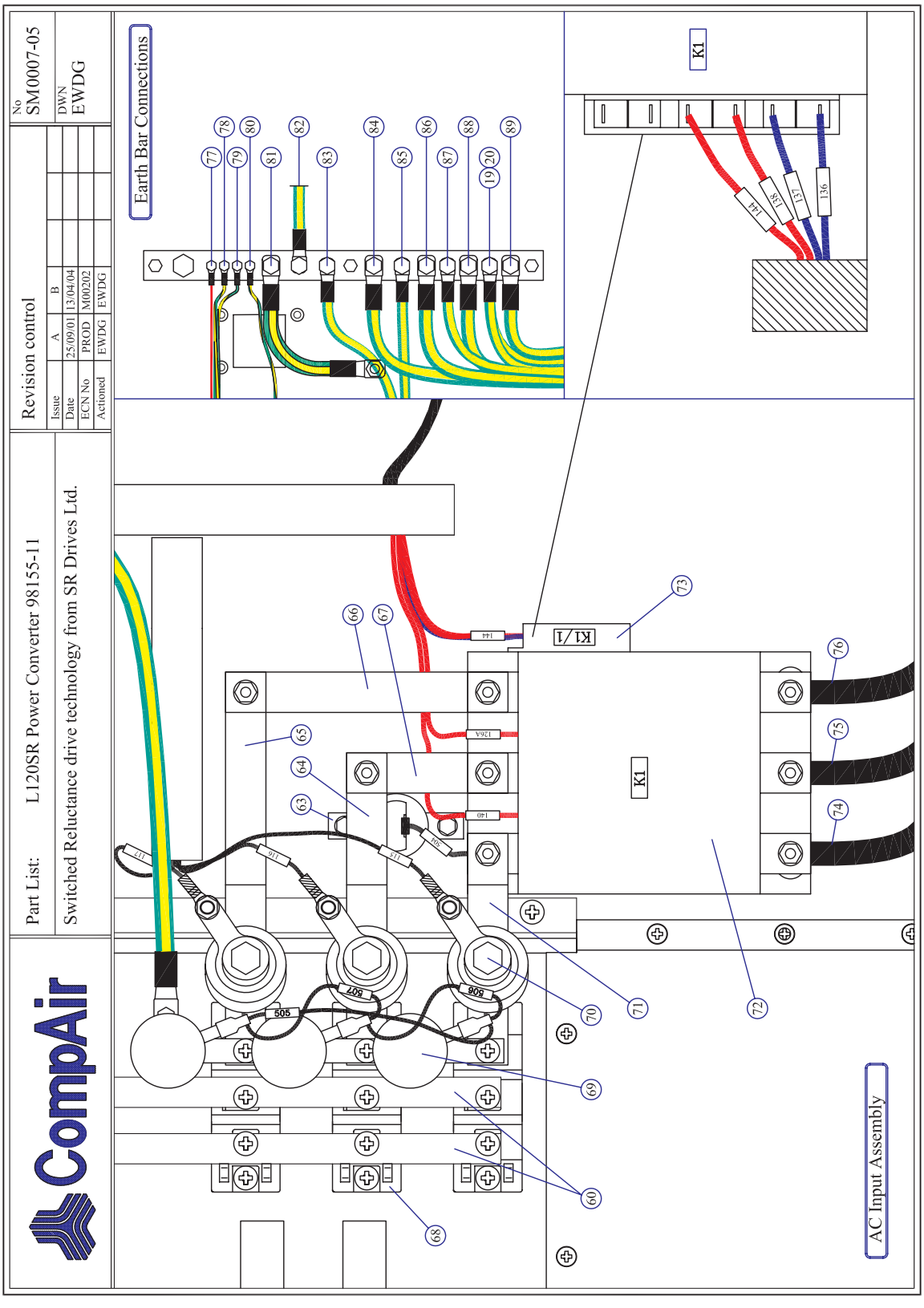


Fig. 5.23 - L120SR Power Converter 98155 -11 iss C (5 of 5)

CompAir	Part List: L120SR Power Converter 98155-11 Switched Reluctance drive technology from SR Drives Ltd.	Revision control					No SM0007-01 DWN EWDG
		Issue	A	B	C	D	
		Date	25/09/01	01/04/04	15/04/04	15/03/06	
		ECN No	PROD	M00202	M00215	M00296	
		Actioned	EWDG	EWDG	EWDG	EWDG	

Parts List issued for product:

Product Type
Serial No(s)
SRDML Label

Notes:

When ordering parts, prefix part code with "SR". E.g.. "SR06-00103"
For parts with no part code, use (number) in description. E.g.. "98524-51"

Caution: Guide only - refer to Parts List supplied with compressor to confirm actual part numbers.

Ref	Part Code	Description	Circuit Ref.
1	15-00113	48 Way UTP Socket	SK1
2	15-00043	Hinge (3 per)	-
3	-	Emergency Stop (98524-51)	-
4	07-00001	25 Way Cable Assembly	-
5	07-00028	Harness, Motor Speed Sensor	-
6	-	Controller (C20606-280)	PCB1
7	15-00052	Door Latch (2 per)	-
8	05-00032	Air Inlet Filter (2 per)	-
9	06-00086	Air Inlet Grill (2 per)	-
10	15-00026	M6 Spring (8 per)	-
11	15-00021	M6x25 Hex Head (8 per)	-
12	15-00019	M6 Plain (8 per)	-
13	12-00015	EMC Filter	EMC1
14	-	Power Cable, EMC1/L3'-L1/L3	-
15	-	Power Cable, EMC1/L2'-L1/L2	-
16	-	Power Cable, EMC1/L1'-L1/L1	-
17	06-00075	Exhaust Duct	-
18	12-00027	Line Reactor	L1
19	-	Earth Cable, Finger Guard	-
20	-	Earth Cable, Door	-
21	15-00109	Document Pocket	-
22	06-00090	Finger Guard	-
23	15-00042	P-clip (4 per)	-
24	-	-	-
25	-	-	-
26	13-00034	12A Miniature Contactor & Coil	K3
27	13-00027	3A Miniature Circuit Breaker	MCB1
28	13-00061	Auxiliary Contact	MCB2/1
29	13-00005	9A Miniature Contactor & Coil	K2
30	13-00041	24V DC Relay	K4
31	13-00042	Relay Base	-

Ref	Part Code	Description	Circuit Ref.
32	13-00063	9 - 14A Miniature Circuit Breaker	MCB2
33	-	-	-
34	13-00013	Fuse - 3.15A Semi-delay	F3
35	13-00012	Fuse - 5A Anti-surge	F2
36	13-00014	Fuse - 2A Type 'T' (2 per)	F1, 4
37	05-00054	Terminal Assembly	-
38	-	-	-
39	-	-	-
40	-	-	-
41	-	-	-
42	-	-	-
43	12-00026	Control Transformer	T101
44	-	-	-
45	09-00001	Capacitor (18 per)	C1-18
46	06-00087	Capacitor Mounting Plate	-
47	10-00001	Resistor (10 per)	R105-114
48	05-00020	Busbar, Laminated (2 per)	-
49	-	Gate Drive PCB (C20606-283)	PCB2
50	07-00005	Capacitor Loom	-
51	06-00023	Capacitor Mounting Plate	-
52	08-00022	IGBT Device - GAL (4 per)	IGBT1-4
53	08-00023	IGBT Device - GAR (4 per)	IGBT5-8
54	09-00002	Capacitor, Snubber	C19-22
55	07-00064	Current Transducer Cable	-
56	12-00017	Current Transducer	L2
57	06-00088	Bracket, Current Transducer	-
58	06-00013	Busbar - Copper (2 per)	-
59	05-00001	Thermistor Sensor	R101
60	06-00012	Busbar - Copper (2 per)	-
61	06-00091	Busbar - Copper (4 per)	-
62	12-00020	Fan, Radial	-

Ref	Part Code	Description	Circuit Ref.
63	-	-	-
64	06-00103	Busbar - Copper	-
65	06-00104	Busbar - Copper	-
66	06-00106	Busbar - Copper	-
67	06-00105	Busbar - Copper	BR1-3
68	05-00108	Phase Fail Board, High Power	PCB3
69	08-00021	Rectifier Diode (3 per)	VDR1-3
70	-	-	-
71	06-00022	Busbar - Copper	K1
72	13-00033	Contactor & Coil	K1/1
73	13-00004	Auxiliary Contacts	-
74	-	Power Cable, L1/L1-K1/T1	-
75	-	Power Cable, L1/L2-K1/T2	-
76	-	Power Cable, L1/L3-K1/T3	-
77	-	Earth Cable - X1/1 (126E)	-
78	-	Earth Cable - Fan (E3) & PCB1 (E4)	-
79	-	Earth Cable - PCB1 (E2)	-
80	-	Earth Cable - PCB2 (E1)	-
81	-	Earth Cable - Box	-
82	-	Earth Cable - Gland Plate	-
83	-	Earth Cable - Capacitor Plate	-
84	-	Earth Cable - Line Reactor	-
85	-	Earth Cable - Capacitor Plate	-
86	-	Earth Cable - Customer	-
87	-	Earth Cable - Heatsink	-
88	-	Earth Cable - Customer	-
89	-	Earth Cable - EMC	-
90			
91			
92			
93			

Fig. 5.24 - L120SR Power Converter 98155 -11 iss D (1 of 5)

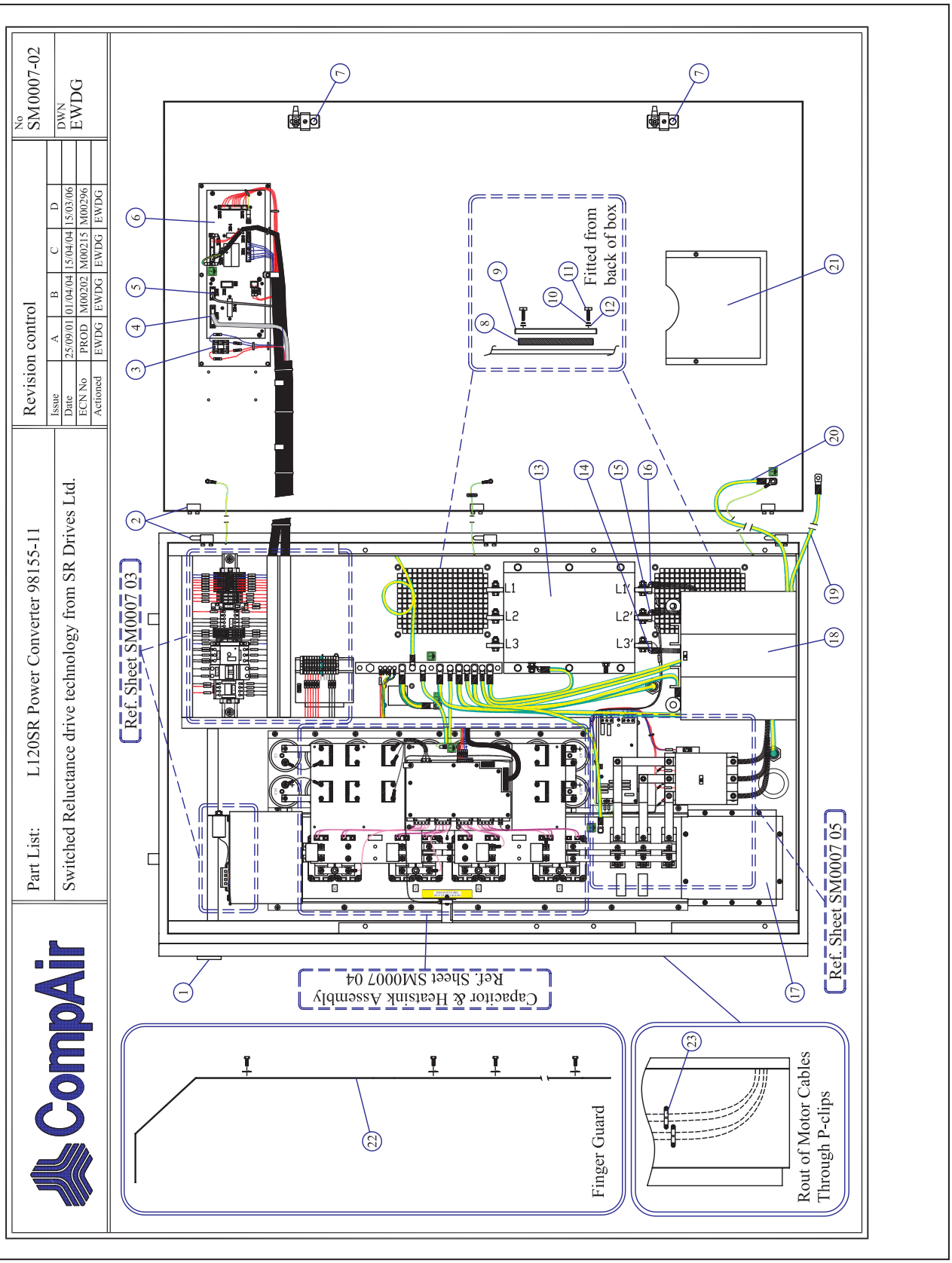


Fig. 5.25 - L120SR Power Converter 98155 -11 iss D (2 of 5)

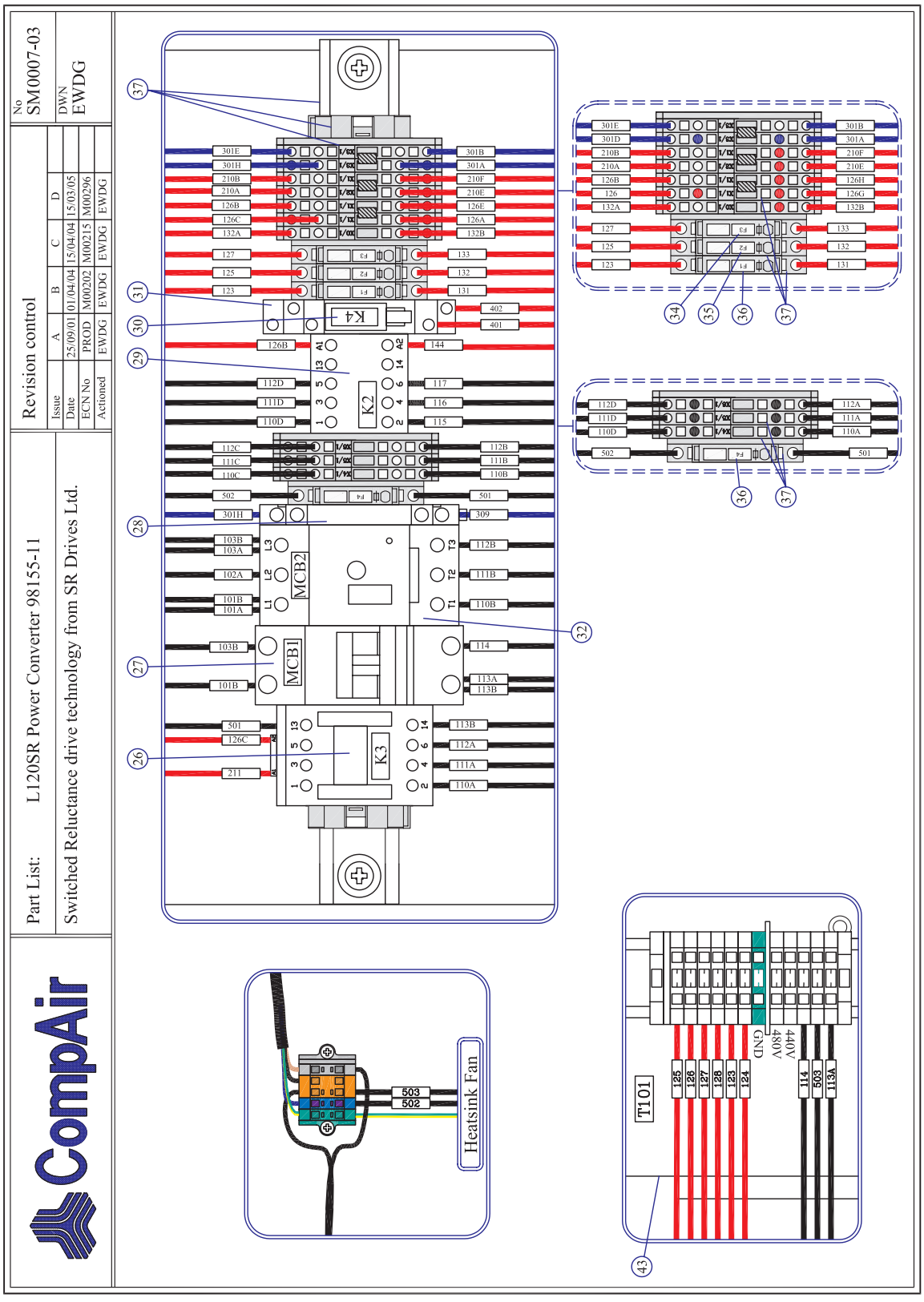


Fig. 5.26 - L120SR Power Converter 98155 -11 iss D (3 of 5)

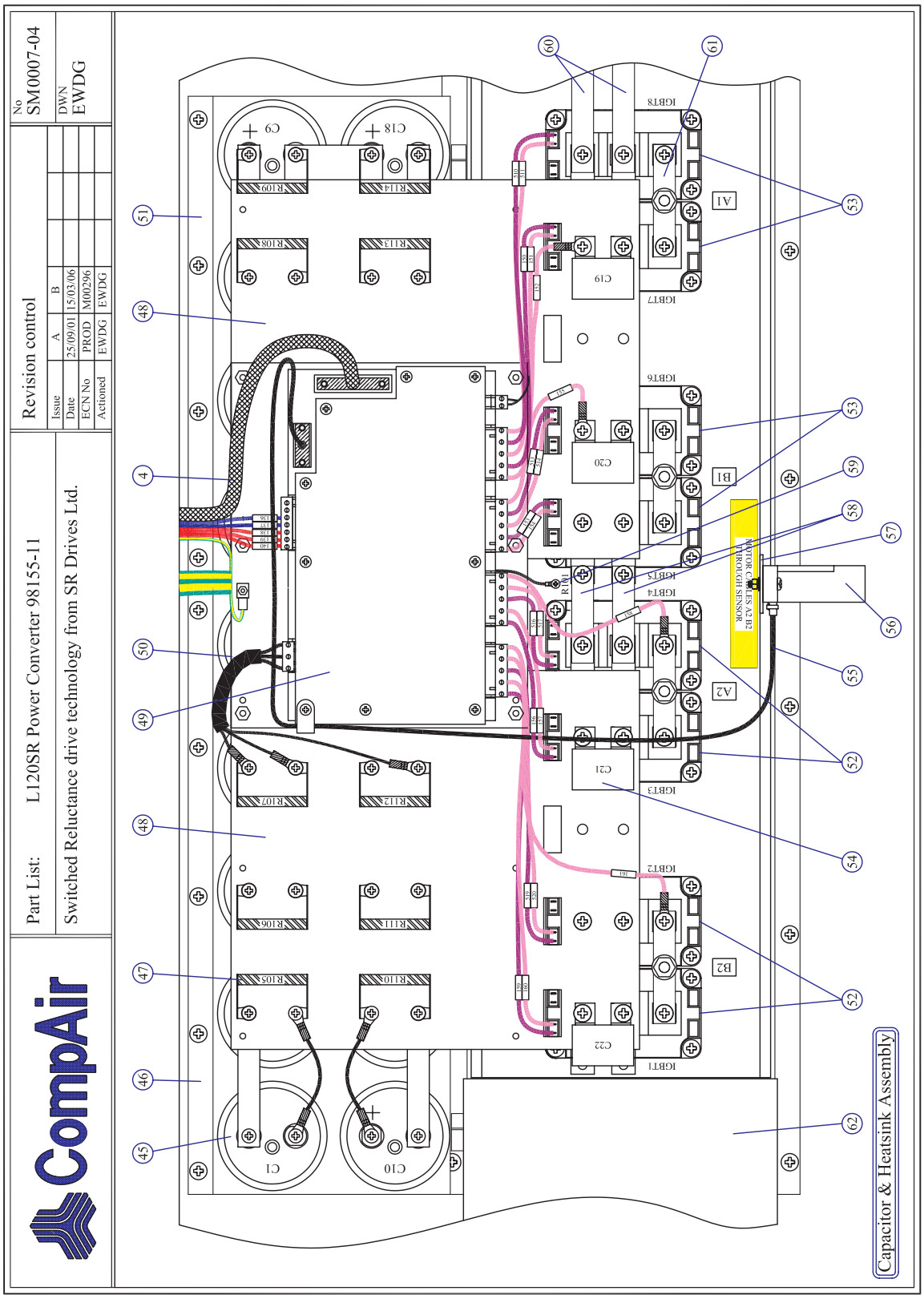


Fig. 5.27 - L120SR Power Converter 98155 -11 iss D (4 of 5)

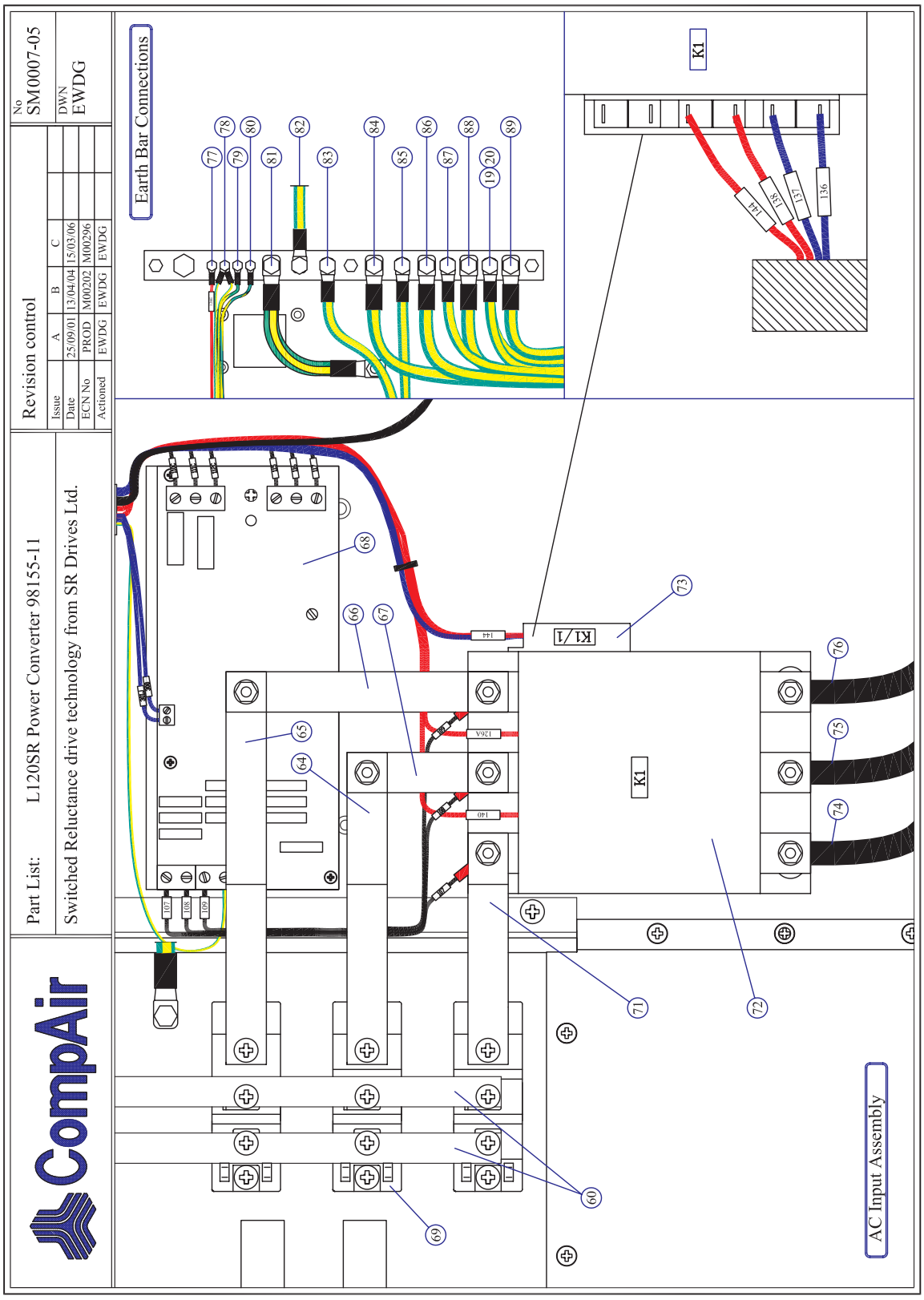


Fig. 5.28 - L120SR Power Converter 98155 -11 iss D (5 of 5)