
S O M A R

Three Phase Intelligent Motor Controllers

Powerboss[®]

Integra

Intelligent Programmer User Guide

“Failure to read these instructions prior to installation and use may result in damage to the starter and or the driven equipment and may render the warranty invalid”

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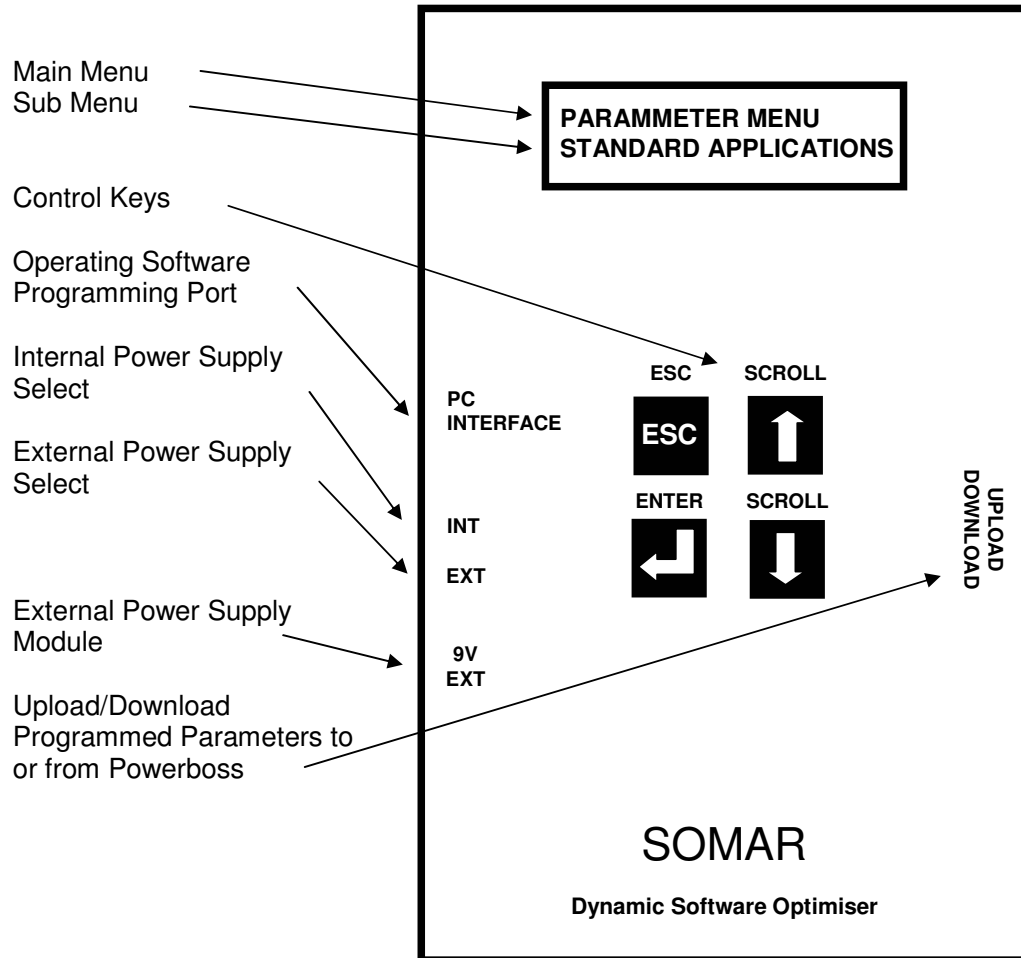
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DYNAMIC SOFTWARE OPTIMISER - OVERVIEW

WARNING - IMPORTANT INFORMATION
SWITCHES 1 - 4 MUST BE SET IN THE OFF (DOWN) POSITION TO ACCEPT THE PROGRAMMER.

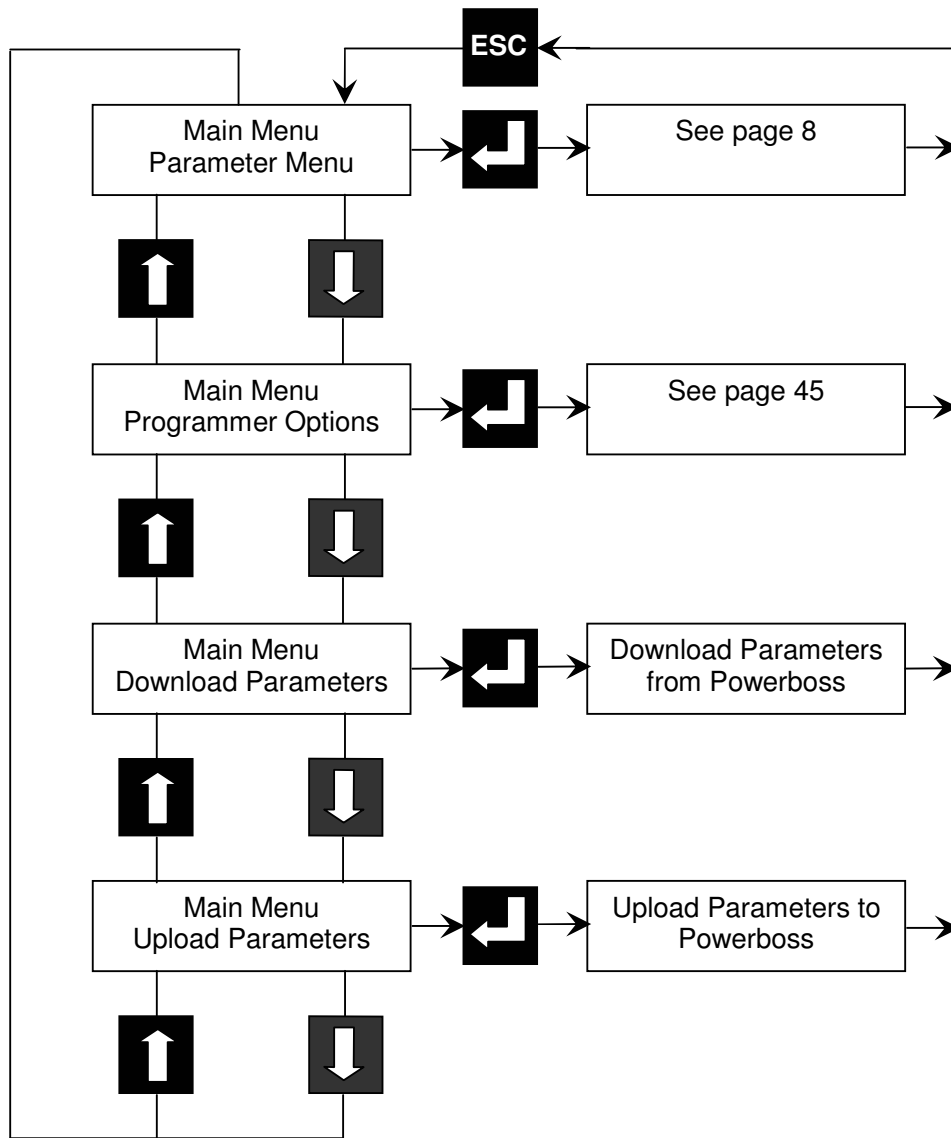


WARNING - IMPORTANT INFORMATION

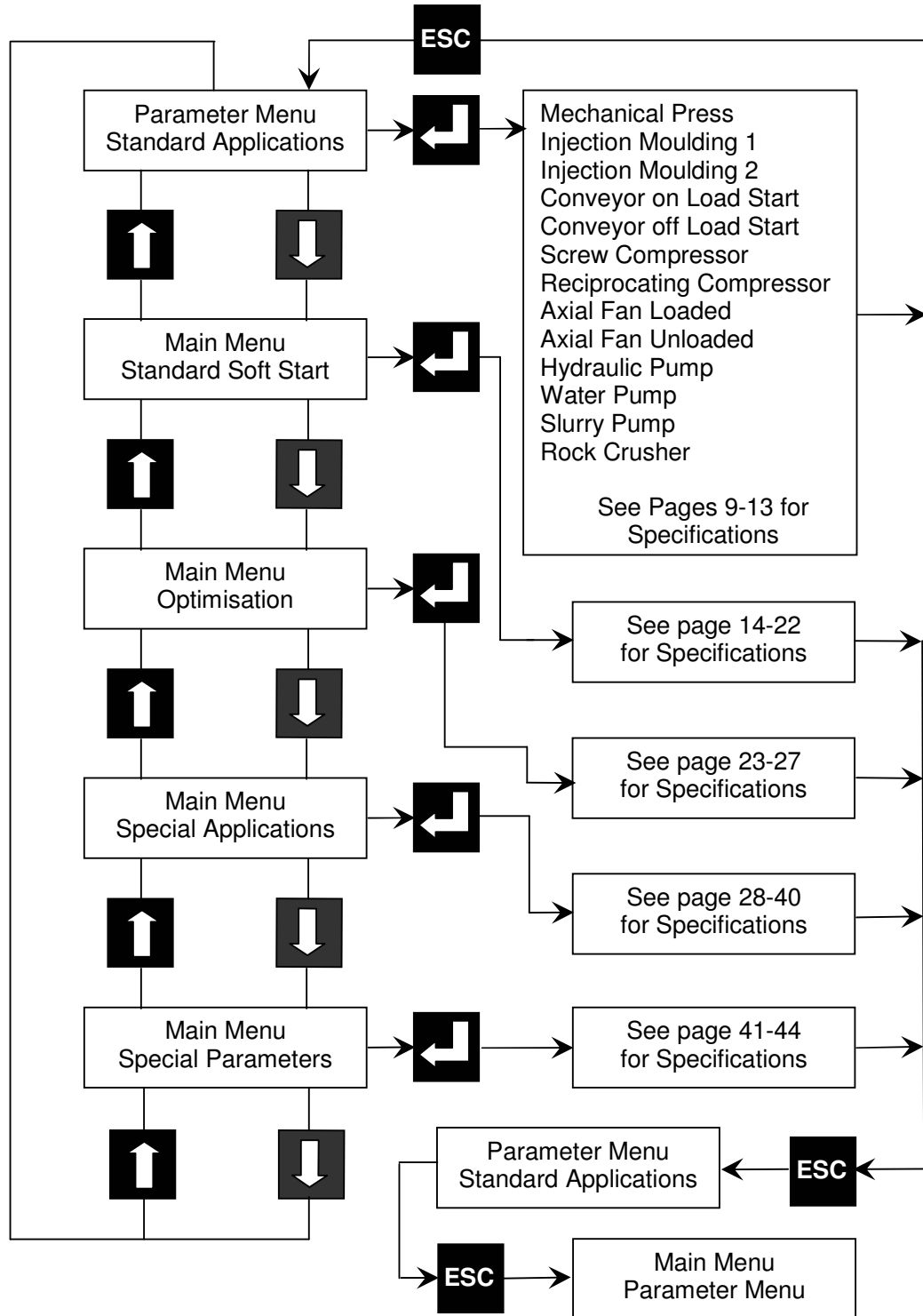
CONNECTING THE PROGRAMMER TO POWERBOSS WILL AUTOMATICALLY RESET TO ENABLE COMMUNICATION BETWEEN THE PRORAMMER AND POWERBOSS.

SWITCHES 1 - 4 MUST BE SET IN THE OFF (DOWN) POSITION TO ACCEPT THE PROGRAMMER.

BASIC MENU STRUCTURE



PARAMETER MENU

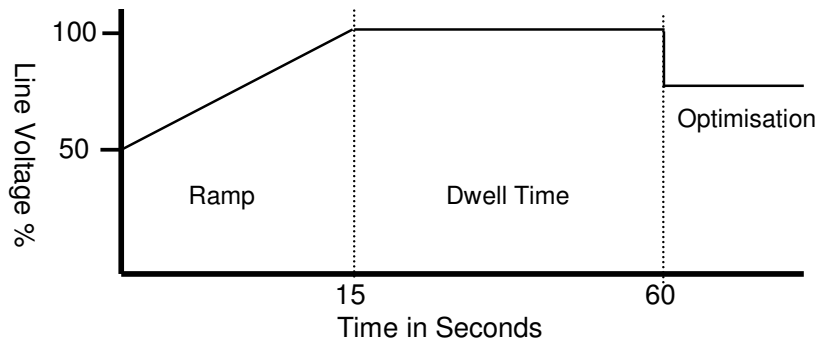


PARAMETER MENU - STANDARD APPLICATIONS

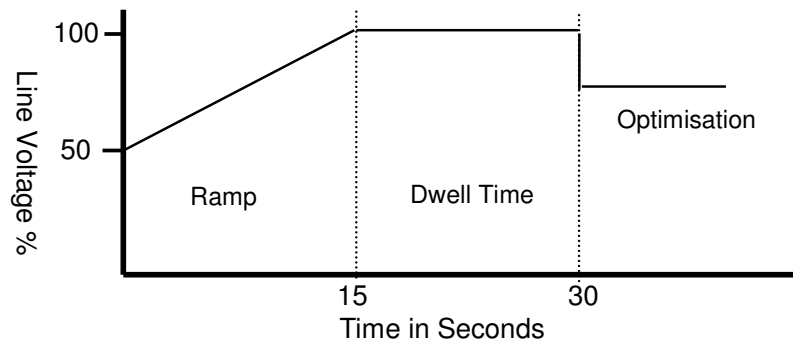
GENERAL

After selecting a Standard Application each of the individual parameters within the application can be changed as required. The supply frequency parameter must be set to suit the site requirements. **The default level is 50Hz.**

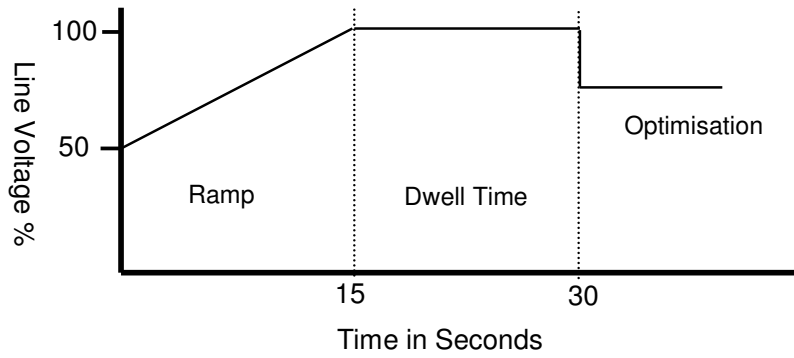
MECHANICAL PRESS



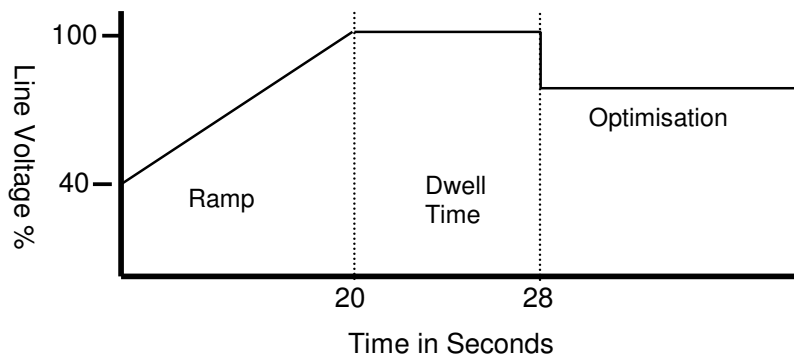
INJECTION MOULDING 1



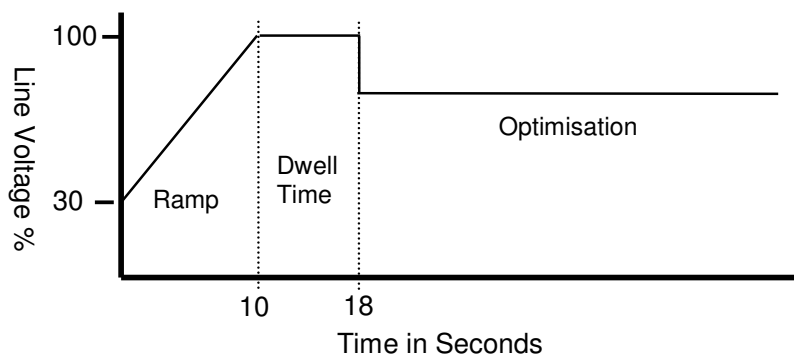
INJECTION MOULDING 2



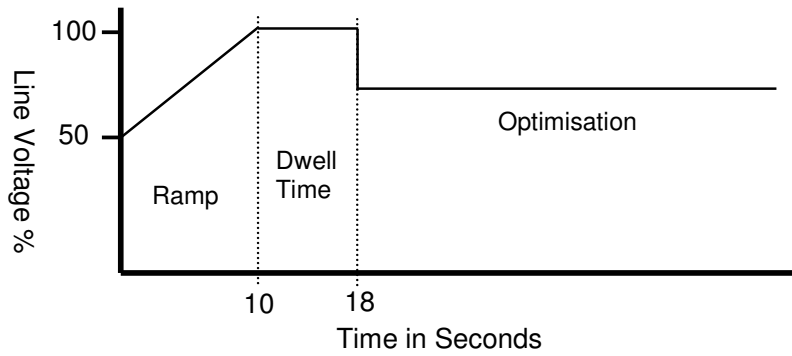
CONVEYOR ON LOAD START



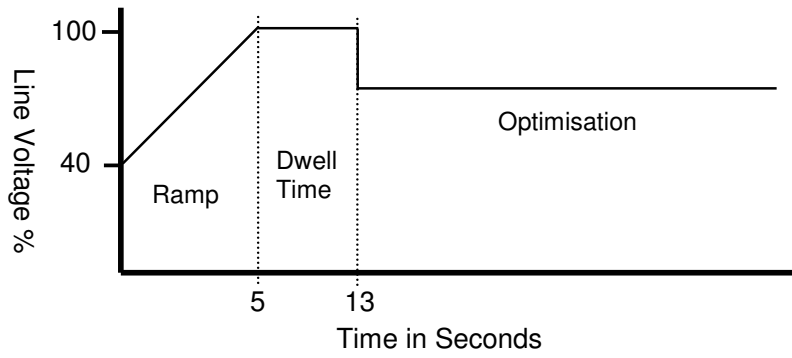
CONVEYOR OFF LOAD START



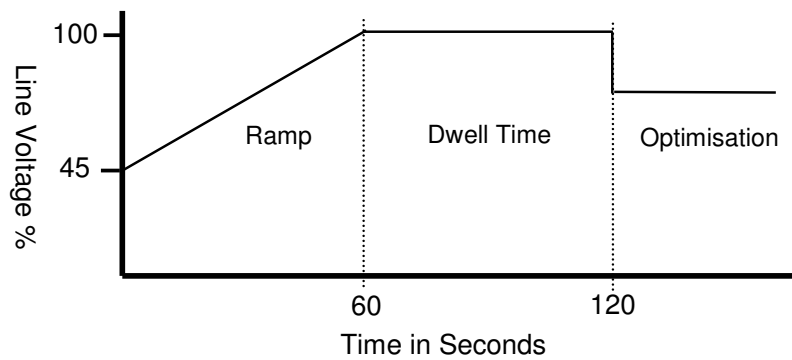
SCREW COMPRESSOR



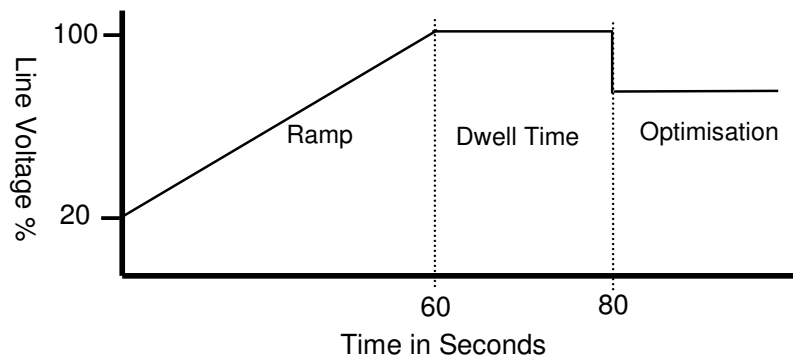
RECIPROCATING COMPRESSOR



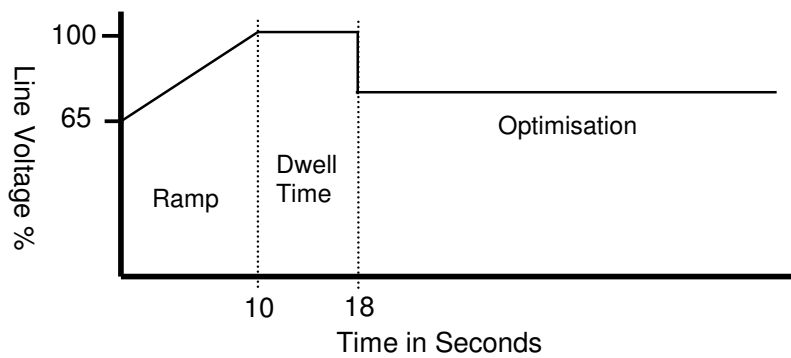
AXIAL FAN LOADED START



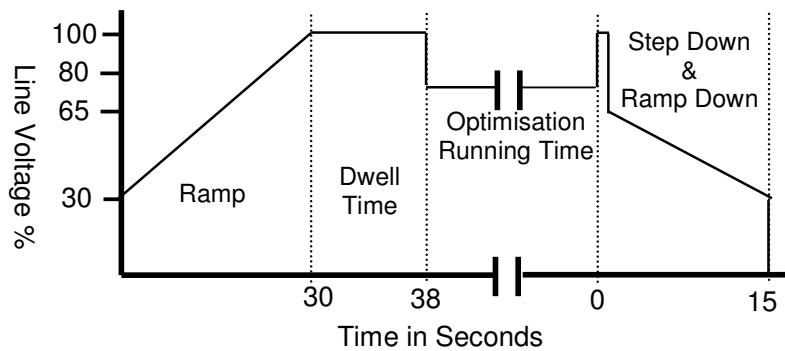
AXIAL FAN UNLOADED START



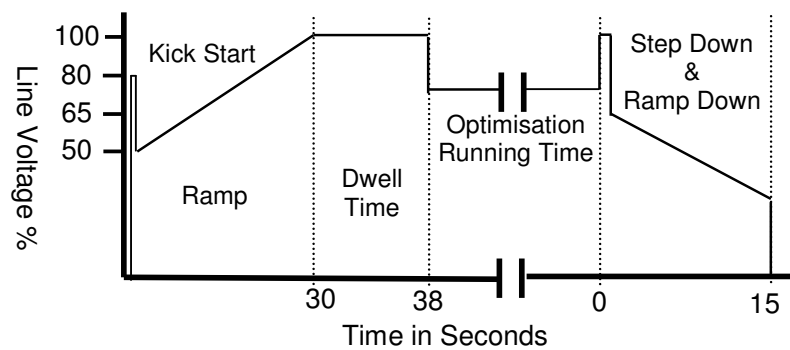
HYDRAULIC PUMP



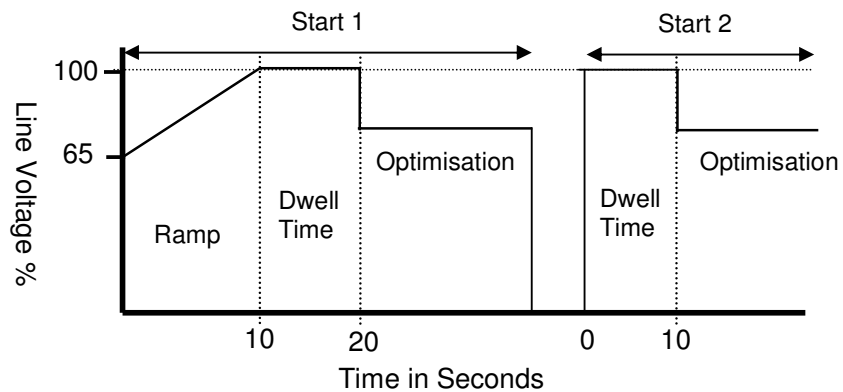
WATER PUMP



SLURRY PUMP



ROCK CRUSHER



If the above application is selected a DOL start can be selected (Start 2) by bridging terminals 3 and 4 on Terminal Block TB1. This feature is useful should a full torque start be required if the Crusher must be started when loaded.

SLIP RING MOTOR APPLICATIONS

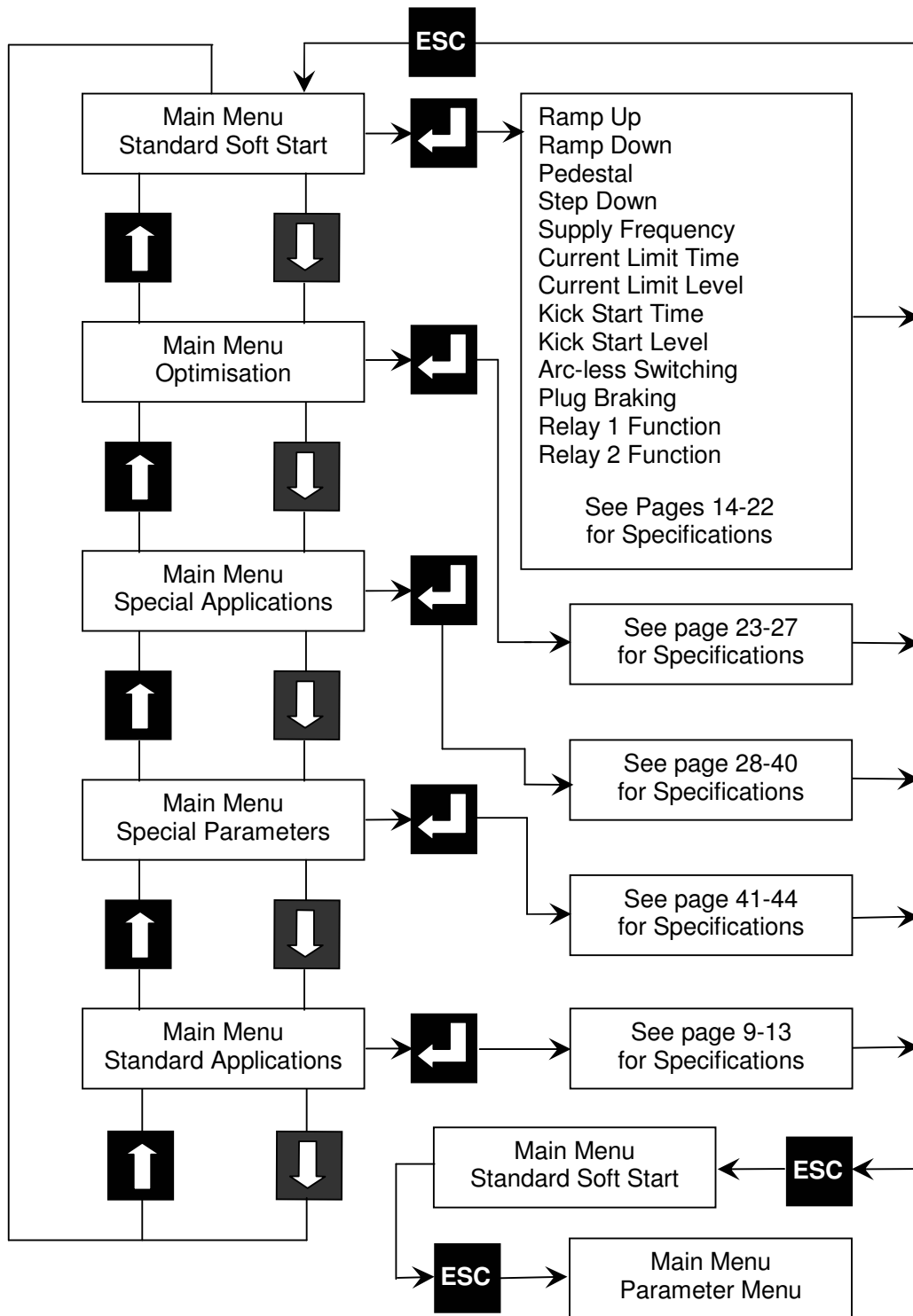
With Slip Ring Motor Applications the rotor starter provides the acceleration torque for the driven load. In no circumstances should the rotor starter be bypassed or modified.

Powerboss should be installed in the stator circuit as per cage motor applications, we recommend the following settings as a starting point.

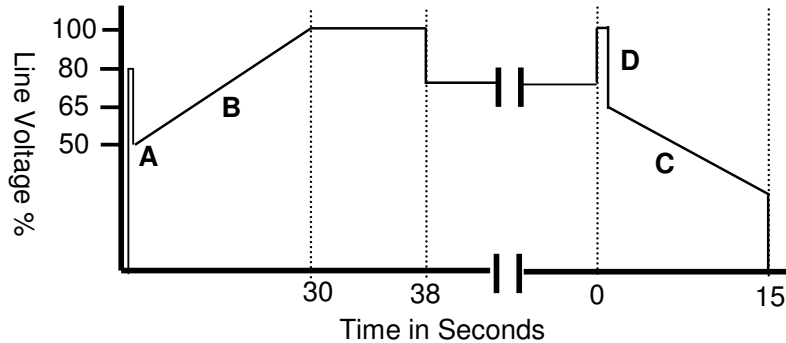
Pedestal Voltage	80%
Ramp Time	5 seconds
Dwell Time	60 Seconds

Installation drawings can be found on our distributor support web site on www.powersaver.com.br.

MAIN MENU - STANDARD SOFT START



STANDARD SOFT START PARAMETERS



SUPPLY FREQUENCY

The Supply Frequency must be set to either 50 or 60 Hz to suit the supply.

PEDESTAL VOLTAGE

The **Pedestal Voltage (A)** is the initial voltage that is applied to the motor at the moment of switch on. The pedestal should be set the motor shaft begins to rotate immediately Powerboss is asked to start. Increasing the pedestal voltage increases the motor torque by the square of that value. The pedestal is adjustable in increments of 1%, between 25 and 80% of the line voltage.

RAMP UP

The **Ramp Up time (B)** is the time taken to reach full voltage from the initial Pedestal Voltage setting. The Ramp Up time dictates the acceleration torque, and therefore, the acceleration time of the driven load. Setting a particular Ramp Up time will not guarantee that the motor will accelerate in the set time. The acceleration time is governed by a combination of the moment of inertia, for both the load and the motor, and the speed/torque curves of both the load and the motor.

The Ramp Up time is adjustable in increments of 1 second between 0 and 255 seconds.

RAMP DOWN

The **Ramp Down time (C)** is the time taken to reach the switch off voltage (30% line voltage) from the Step Down setting. Ramp Down is only useful on high static friction loads such as a Centrifugal Pump to reduce water hammer. Ramp Down works by reducing the motor terminal voltage, therefore motor torque, allowing the load to slow the motor down in a controlled manner.

The Ramp Down time is adjustable in increments of 1 second between 0 and 255 seconds.

STEP DOWN VOLTAGE

The Step Down voltage (**D**) is only used in conjunction with the Ramp Down feature and is set at a level to enable the load to immediately begin to slow the motor down. The Ramp Down then begins at this level.

The Step Down voltage is adjustable in increments of 1%, between 100 and 40% of the line voltage.

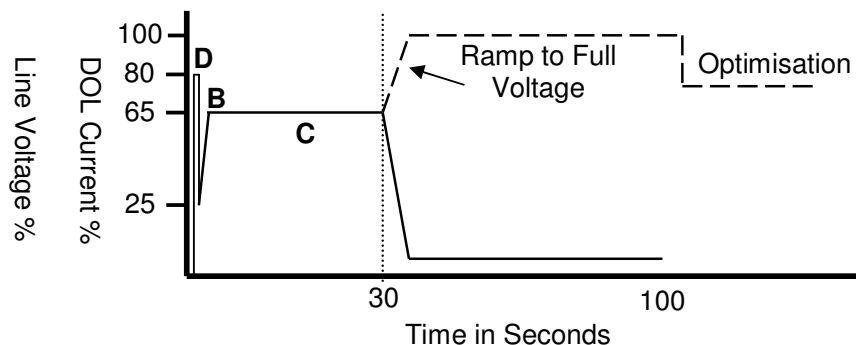
CURRENT LIMIT LEVEL AND TIME

The Current Limit feature can be useful when a ceiling is placed on the current that can be drawn from the mains supply by the supply authority. Typical use of the current limit feature would be to start a large, unloaded axial fan with the minimum current possible.

Powerboss would start the motor and Ramp Up the voltage to the set Current Limit (**B**) and hold the current for the programmed time limit (**C**). On reaching full speed the motor current would drop to near normal, at this point it can be seen that the Ramp Up continues with the voltage ramp to full voltage.

The Current Limit Level is adjustable in increments of 1%, between 25 and 80% of the direct on line (DOL) starting current.

The Current Limit Time is adjustable in increments of 1 second, between 0 and 255 seconds. If high starting currents are expected for longer periods of time a larger Powerboss may need to be fitted. See Powerboss manual for starting current ratings.



KICK-START LEVEL AND TIME

The Kick-Start feature (**D**) can be useful on high static friction loads such as a slurry pump and is used to break the static friction between the material and the motor.

The Kick-Start feature **should not be used** on any other type of load.

The Kick-Start Time is adjustable in increments of 0.1 second, between 0.1 and 25 seconds. The Kick-Start Level is adjustable between 25 and 80% of the line voltage in 1% increments.

ARCLESS SWITCHING

After the Powerboss start circuit is enabled the Arcless Switching feature introduces a delay before current is allowed to flow to the motor. This will allow the main contactor (K1) to close with zero current, therefore extending the life of the contactor.

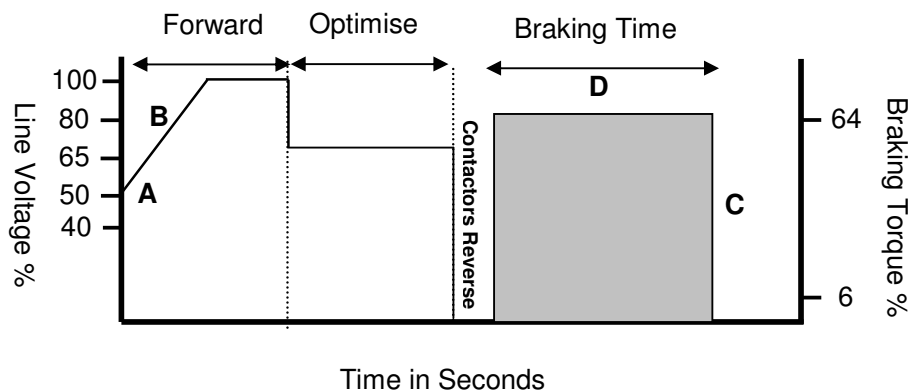
This feature can also be useful if the line contactor is placed on the output of Powerboss, thus enabling Powerboss to perform the fault routine without spurious tripping problems.

PLUG BRAKING (REVERSE TORQUE BRAKING)

This feature enables Powerboss to provide a soft start in the forward direction and Plug Braking in the reverse direction to provide braking torque to the driven load.

This feature can be used to safely provide a controlled stop for applications such as a Circular Saw or Band Saw.

If any other parameters are required such as additional Optimisation features, or the supply frequency need to be changed from the default level, these must be accessed in the Standard Soft Start Features, and Optimisation Menus.



FORWARD DIRECTION SOFT START

PEDESTAL VOLTAGE - FORWARD DIRECTION SOFT START

The **Pedestal Voltage (A)** is the initial voltage that is applied to the motor at the moment of switch on. The pedestal should be set the motor shaft begins to rotate immediately Powerboss is asked to start. Increasing the pedestal voltage increases the motor torque by the square of that value. The pedestal is adjustable in increments of 1%, between 25 and 80% of the line voltage.

RAMP UP - FORWARD DIRECTION SOFT START

The **Ramp Up** time (B) is the time taken to reach full voltage from the initial Pedestal Voltage setting. The Ramp Up time dictates the acceleration torque, and therefore, the acceleration time of the driven load.

The Ramp Up time is adjustable in increments of 1 second between 0 and 255 seconds.

CURRENT LIMIT LEVEL AND TIME - FORWARD DIRECTION SOFT START

The Current Limit feature can be useful when a ceiling is placed on the current that can be drawn from the mains supply by the supply authority. Typical use of the current limit feature would be to start a large, unloaded axial fan with the minimum current possible.

Powerboss would start the motor and Ramp Up the voltage to the set Current Limit and hold the current for the programmed time limit. On reaching full speed the motor current would drop to near normal.

The Current Limit Level is adjustable in increments of 1%, between 25 and 80% of the direct on line (DOL) starting current.

The Current Limit Time is adjustable in increments of 1 second, between 0 and 255 seconds. If high starting currents are expected for longer periods of time a larger Powerboss may need to be fitted. See Powerboss manual for starting current ratings.

PLUG BRAKING (REVERSE TORQUE BRAKING)

BRAKING TORQUE LEVEL AND TIME - PLUG BRAKING

When the stop signal is given Powerboss will then de-energise the forward contactor (K1) and select the reverse direction (braking) contactor (K2). Powerboss will then inject the set amount of Braking Torque for the set amount of time, after which Powerboss will turn off the thyristors, de-energise the reverse contactor and be ready for another start.

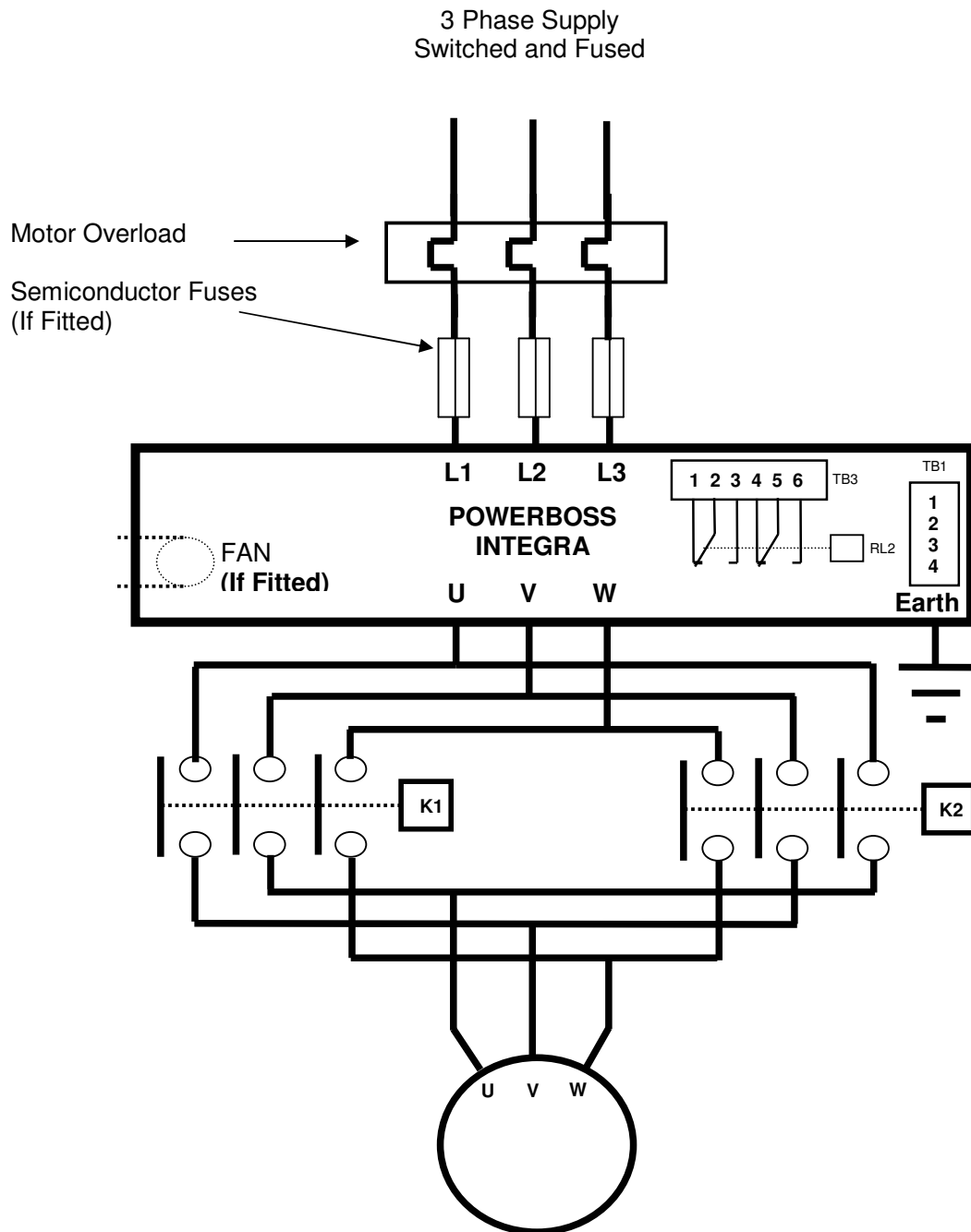
The Braking Torque Level (**C**) is adjustable in increments of 1%, between 6% and 64% of the direct on line (DOL) starting torque.

The Braking Torque Time (**D**) is adjustable in increments of 1 second, between 0 and 255 seconds. If high braking currents are expected for longer periods of time a larger Powerboss may need to be fitted. Contact the manufacturer for further details.

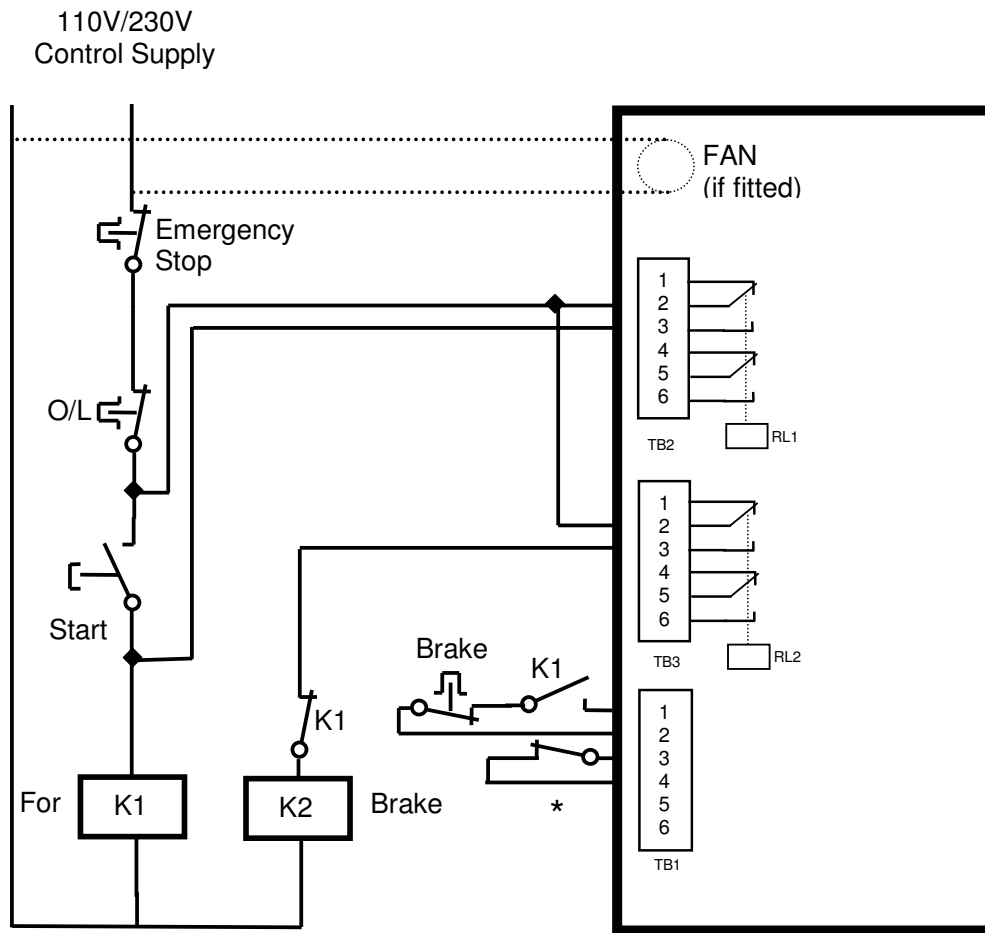
ZERO SPEED DETECTION - PLUG BRAKING

When accurate sensing of zero speed is required a normally closed contact from a proximity detector or similar can be connected into terminals 5 and 6 of terminal block TB1. When zero speed is detected the contact would then open forcing Powerboss to turn off the thyristors, de-energise the reverse contactor irrespective of the programmed braking time.

MAINS CONNECTIONS FOR PLUG BRAKING (REVERSE TORQUE BRAKING)



CONTROL CONNECTIONS FOR PLUG BRAKING (REVERSE TORQUE BRAKING)



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Note

* = Normally Closed Contact from optional speed sensing relay.

RELAY 1 FUNCTION

Relay 1 can be configured to act as either of the following:

1. Run Relay - Energises when a start signal is received and remains energised until a fault condition occurs or a stop signal is received.
2. Top of Ramp relay - Energises after the set Ramp Up Time.
3. Fault Relay - Energises on Power Up and de-energises in the event of a fault.
4. Fault Relay - De-energises on Power Up and energises in the event of a fault.

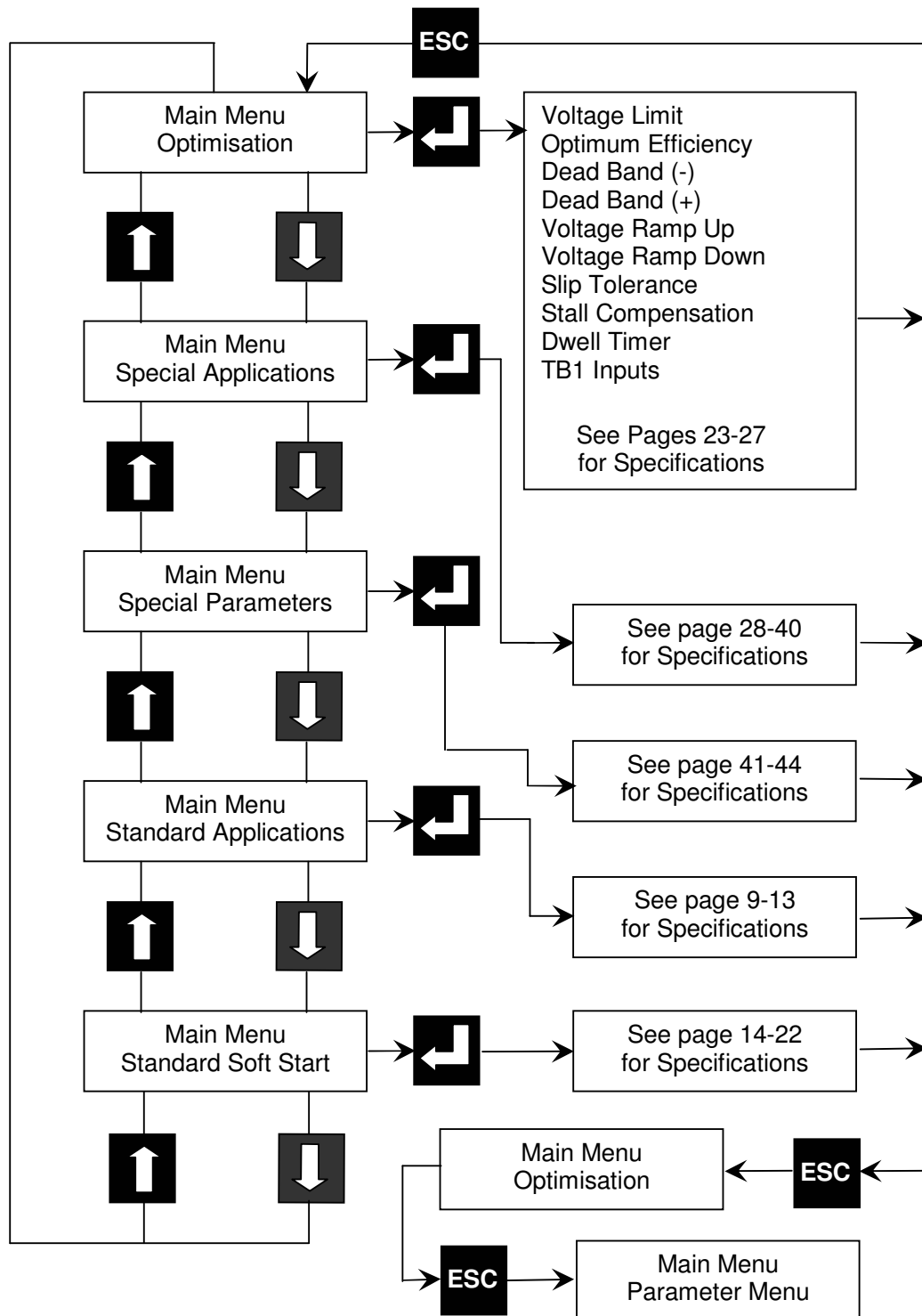
RELAY 2 FUNCTION

Relay 2 can be configured to act as either of the following:

1. Run Relay - Energises when a start signal is received and remains energised until a fault condition occurs or a stop signal is received.
2. Top of Ramp relay - Energises after the set Ramp Up Time.
3. Fault Relay - Energises on Power Up and de-energises in the event of a fault.

Fault Relay - De-energises on Power Up and energises in the event of a fault.

MAIN MENU - OPTIMISATION



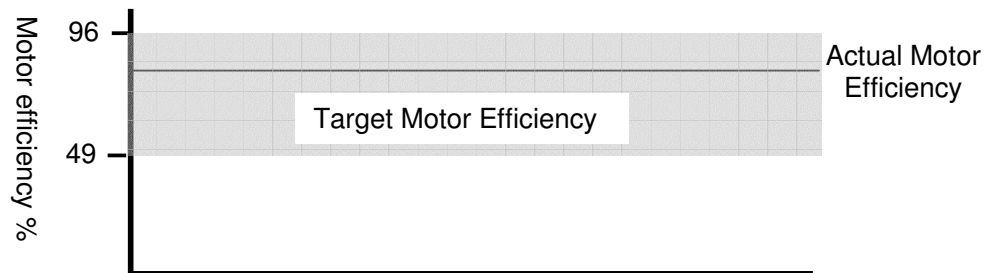
MAIN MENU - OPTIMISATION

VOLTAGE LIMIT

Sets the minimum voltage Powerboss will supply the motor during optimisation.

The Minimum Voltage Level is adjustable between 25 and 100% of the line voltage in 1% increments.

OPTIMUM EFFICIENCY



The Optimum Efficiency Setting dictates the point at which Powerboss will attain full voltage during the motors load cycle. Powerboss will automatically try and adjust Actual Motor Efficiency to the set Target Efficiency.

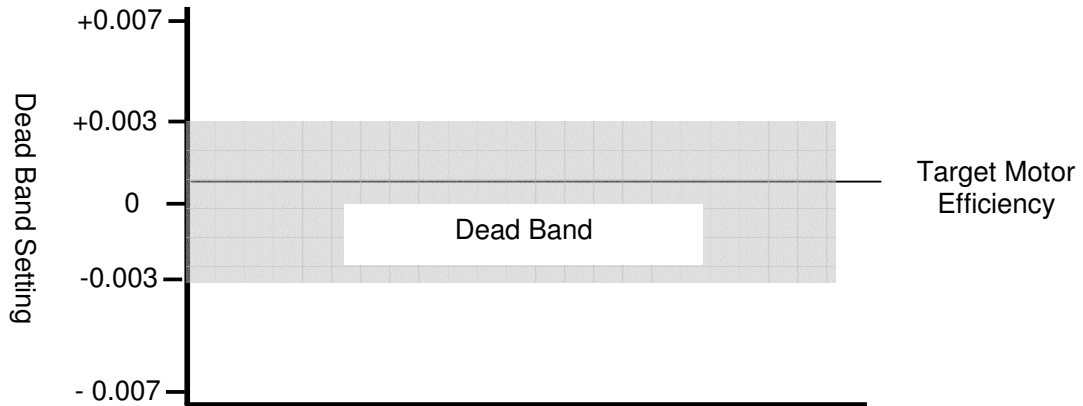
Adjusting the setting to high (95%) may restrict the output voltage of Powerboss at full motor load, adjusting the setting to low (50%) may force Powerboss from Optimisation to full voltage to soon, restricting savings

If Powerboss will not attain full voltage at full motor load, set the Programmer to Monitor Mode and monitor Actual Motor Efficiency, without Optimisation, at full load. Then adjust the Optimum Efficiency setting below the monitored value.

The Optimum Efficiency setting is adjustable between 49 and 96% in 1% increments.

The default setting of 82% is sufficient for most applications.

DEAD BAND



The Dead Band is the area above and below the target efficiency (See Optimum Efficiency) in which Powerboss will not react to a change in motor loading, thus creating a 'Dead Band' to ensure system stability.

If the system were to become unstable a larger band should be chosen.

Default Setting is +0.003 / -0.003 is suitable for most applications and is adjustable between 0.001 and 0.007 in 0.001 increments.

VOLTAGE RAMP UP - DEAD BAND

Voltage Ramp Up is the time taken to increase the voltage to the required level during Optimisation. Settable between 0.01 and 2.55 seconds in 0.01 second increments.

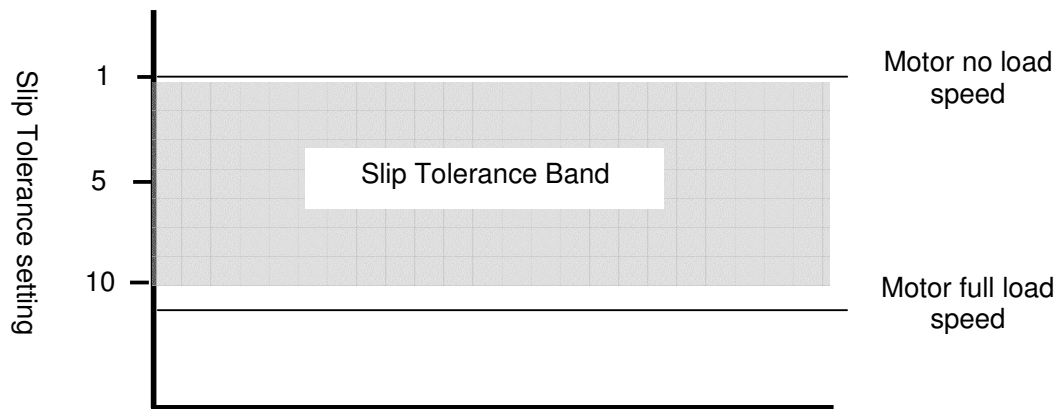
The default level of 0.2 seconds is sufficient for most applications.

VOLTAGE RAMP DOWN - DEAD BAND

Voltage Ramp Down is the time taken to decrease the voltage to the required level during Optimisation. Settable between 0.01 and 2.55 seconds in 0.01 second increments.

The default level of 0.2 seconds is sufficient for most applications.

SLIP TOLERANCE



The Slip Tolerance Setting will allow the motor to slow down to a set point during a no load condition before any Stall Compensation can take place. This feature allows a higher level of Optimisation during periods of no load on high inertia applications such as a flywheel press.

The default setting 5 is suitable for most applications and is adjustable between 1 and 10 in increments of 1.

STALL COMPENSATION - SLIP TOLLERANCE

Stall Compensation is an adjustable 'block' of voltage that is injected into the motor if the Slip Tolerance set point is exceeded. This feature is required to help the motor maintain its design speed.

The Stall Compensation is adjustable between 1 and 5 in increments of 1, 1 being the default level.

A higher level should be set for loads such as Injection Moulding machines.

DWELL TIME

The Dwell Time is the time between the end of the Ramp Up (start sequence) and Optimisation. The Dwell Time is settable between 0 and 255 seconds, the default being 10 seconds.

TB1 INPUTS

The inputs below can be programmed as shown if they are **not already** assigned by a previously selected application or parameter.

INPUT 1 FUNCTION

This function is the start command and is enabled by bridging terminals 1 and 2 on Terminal Block TB1 and cannot be changed.

INPUT 2 FUNCTION

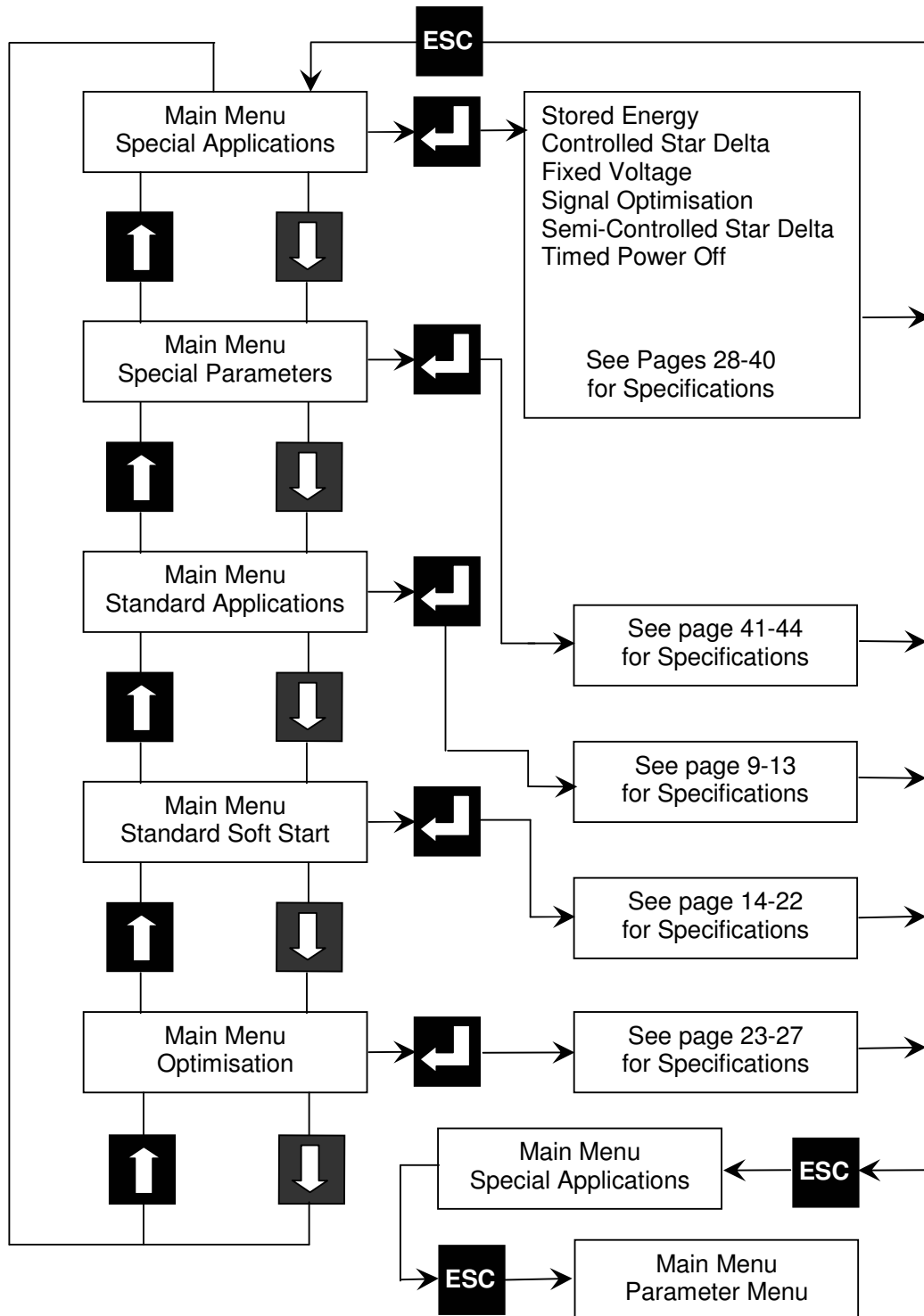
1. This input can be used to enable or disable Optimisation by either opening or bridging terminals 3 and 4 on Terminal Block TB1, either method is selectable.
2. This input can also be programmed to provide a direct on line start (100% voltage) to the motor. This feature can be used on Rock Crushing machines that periodically require a hard start when full.
3. This input can also be programmed to provide an input for a speed sensing relay to detect zero speed on Plug Braking Applications.

Default setting is unassigned.

INPUT 3 FUNCTION

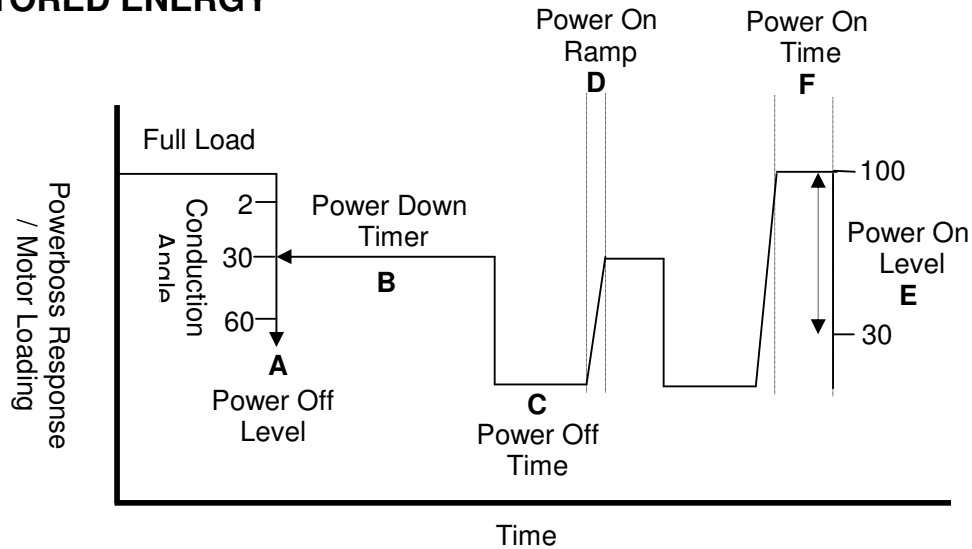
TB1 terminals 5 and 6 are assigned automatically by selecting a suitable application or parameter.

MAIN MENU - SPECIAL APPLICATIONS



MAIN MENU - SPECIAL APPLICATIONS

STORED ENERGY



The Stored Energy feature is useful for high inertia applications, such as a Circular Saw, where kinetic energy is stored in the rotating blade. To use this feature a normally open, volt free, contact from a sensor needs to be connected into terminals 5 and 6 on terminal block TB1, which is closed when the load is about to be applied, and opens again when the load is low. This will enable Powerboss to respond to the demand should the load appear during the Power Off Time. To use this feature, enter the Special Parameters Menu, select Store Energy and Enable.

POWER OFF LEVEL - STORED ENERGY

The Power Off Level (**A**) measures the Conduction Angle of the motor current at the working load and initiates the Power Down Timer when the conduction angle drops below the set value, indicating that the motor is running in the no load cycle.

In order to attain the settings the Conduction Angle can be monitored in all load conditions in the Monitor Mode.

The Power Off Level is adjustable between 2 and 60 motor efficiency in increments of 1, the default level is 30 and is adequate for most applications.

POWER DOWN TIMER - STORED ENERGY

The Power Down Timer (**B**) is the set time before Powerboss enters the Power Off and Power On phase.

The Power Down Timer is adjustable as follows.

0-60 minutes in 1 minute increments, 0-60 seconds in 1 second increments, the default level is 25 seconds and is suitable for most applications.

POWER OFF TIME - STORED ENERGY

The Power Off Time (**C**) is the period that the motor is allowed to coast with the power off. The time should be set so that the motor does not slow down to below 70% of the motors rated speed before the Power On phase is enabled.

The Power Off Time is adjustable between 0 and 255 seconds in 1 second increments.

The default level of 30 seconds is suitable for most applications.

POWER ON RAMP - STORED ENERGY

The Power On Ramp (**D**) is the time taken to increase the motor torque to the Power On Level from a fixed 'pedestal' level of 4% torque.

The Power On Ramp is adjustable between 0.01 and 2.55 seconds in 0.01 second increments. The default level of 30 (0.3 seconds) is suitable for most applications.

POWER ON LEVEL - STORED ENERGY

The Power On Level (**E**) is set level of torque that is required to enable the motor to accelerate to its rated speed after the Power Off Time.

The Power On Level is adjustable between 25 and 100% torque in 1% increments. The default level is 100%.

POWER ON TIME - STORED ENERGY

The Power On Time (**F**) is the period that the motor is supplied with power. The time should be set so that the motor attains its rated speed before the Power Off Time.

The Power On Time is adjustable between 0 and 255 seconds in 1 second increments.

The default level of 5 seconds is suitable for most applications.

RECOVERY RAMP TIME - STORED ENERGY

The Recovery Ramp is enabled when a signal is received from the external sensor connected to terminals 5 and 6 on terminal block TB1.

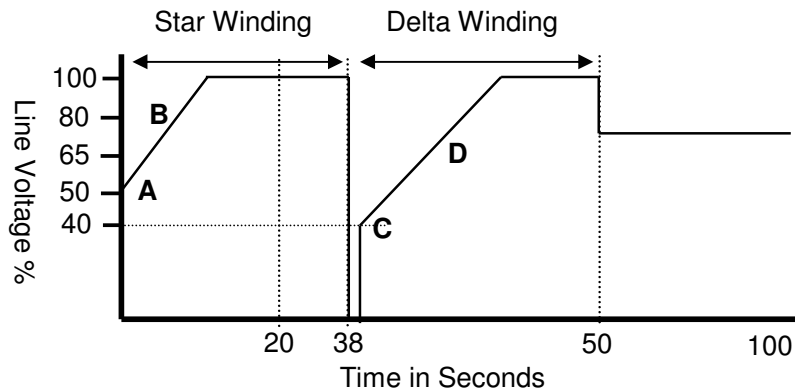
The Recovery Ramp will increase the motor torque to its maximum running torque over an adjustable period, the control loop is then complete and the process will start again.

The Recovery Ramp Time is adjustable between 0.01 and 2.55 seconds in 0.01 second increments. The default level of 10 (0.1 seconds) is suitable for most applications.

CONTROLLED STAR DELTA (CONTROLLED Y Δ)

This feature enables Powerboss to provide a soft start in both the Star and Delta windings of the motor and also to provide arcless switching for both contactors.

If any other parameters are required such as soft stop, additional Optimisation features, or the supply frequency need to be changed from the default level, these must be accessed in the Standard Soft Start Features, and Optimisation Menus.



STAR WINDING - (CONTROLLED Y Δ)

STAR WINDING - PEDESTAL VOLTAGE - (CONTROLLED Y Δ)

The **Pedestal Voltage (A)** is the initial voltage that is applied to the motor at the moment of switch on. The pedestal should be set the motor shaft begins to rotate immediately Powerboss is asked to start. Increasing the pedestal voltage increases the motor torque by the square of that value. The pedestal is adjustable in increments of 1%, between 25 and 80% of the line voltage.

STAR WINDING - RAMP UP - (CONTROLLED Y Δ)

The **Ramp Up** time (**B**) is the time taken to reach full voltage from the initial Pedestal Voltage setting. The Ramp Up time dictates the acceleration torque, and therefore, the acceleration time of the driven load.

The Ramp Up time is adjustable in increments of 1 second between 0 and 255 seconds.

STAR DWELL TIMER - (CONTROLLED Y Δ)

The Star Timer is the set time before Powerboss changes the winding configuration from Star into Delta. The timer is enabled after the Powerboss has reached full voltage.

The Star Timer is settable between 0 and 255 Seconds in 1 second increments.

STAR WINDING - CURRENT LIMIT LEVEL AND TIME - (CONTROLLED Y Δ)

The Current Limit feature can be useful when a ceiling is placed on the current that can be drawn from the mains supply by the supply authority. Typical use of the current limit feature would be to start a large, unloaded axial fan with the minimum current possible.

Powerboss would start the motor and Ramp Up the voltage to the set Current Limit and hold the current for the programmed time limit. On reaching full speed the motor current would drop to near normal.

The Current Limit Level is adjustable in increments of 1%, between 25 and 80% of the direct on line (DOL) starting current.

The Current Limit Time is adjustable in increments of 1 second, between 0 and 255 seconds. If high starting currents are expected for longer periods of time a larger Powerboss may need to be fitted. See Powerboss manual for starting current ratings.

DELTA WINDING - (CONTROLLED Y Δ)

DELTA WINDING - PEDESTAL VOLTAGE - (CONTROLLED Y Δ)

The **Pedestal Voltage (C)** is the initial voltage that is applied to the motor at the moment of switch on. The pedestal should be set the motor shaft begins to rotate immediately Powerboss is asked to start. Increasing the pedestal voltage increases the motor torque by the square of that value. The pedestal is adjustable in increments of 1%, between 25 and 80% of the line voltage.

DELTA WINDING - RAMP UP - (CONTROLLED Y Δ)

The **Ramp Up time (D)** is the time taken to reach full voltage from the initial Pedestal Voltage setting. The Ramp Up time dictates the acceleration torque, and therefore, the acceleration time of the driven load. Setting a particular Ramp Up time will not guarantee that the motor will accelerate in the set time. The acceleration time is governed by a combination of the moment of inertia, for both the load and the motor, and the speed/torque curves of both the load and the motor.

The Ramp Up time is adjustable in increments of 1 second between 0 and 255 seconds.

DELTA WINDING - CURRENT LIMIT LEVEL AND TIME - (CONTROLLED Y Δ)

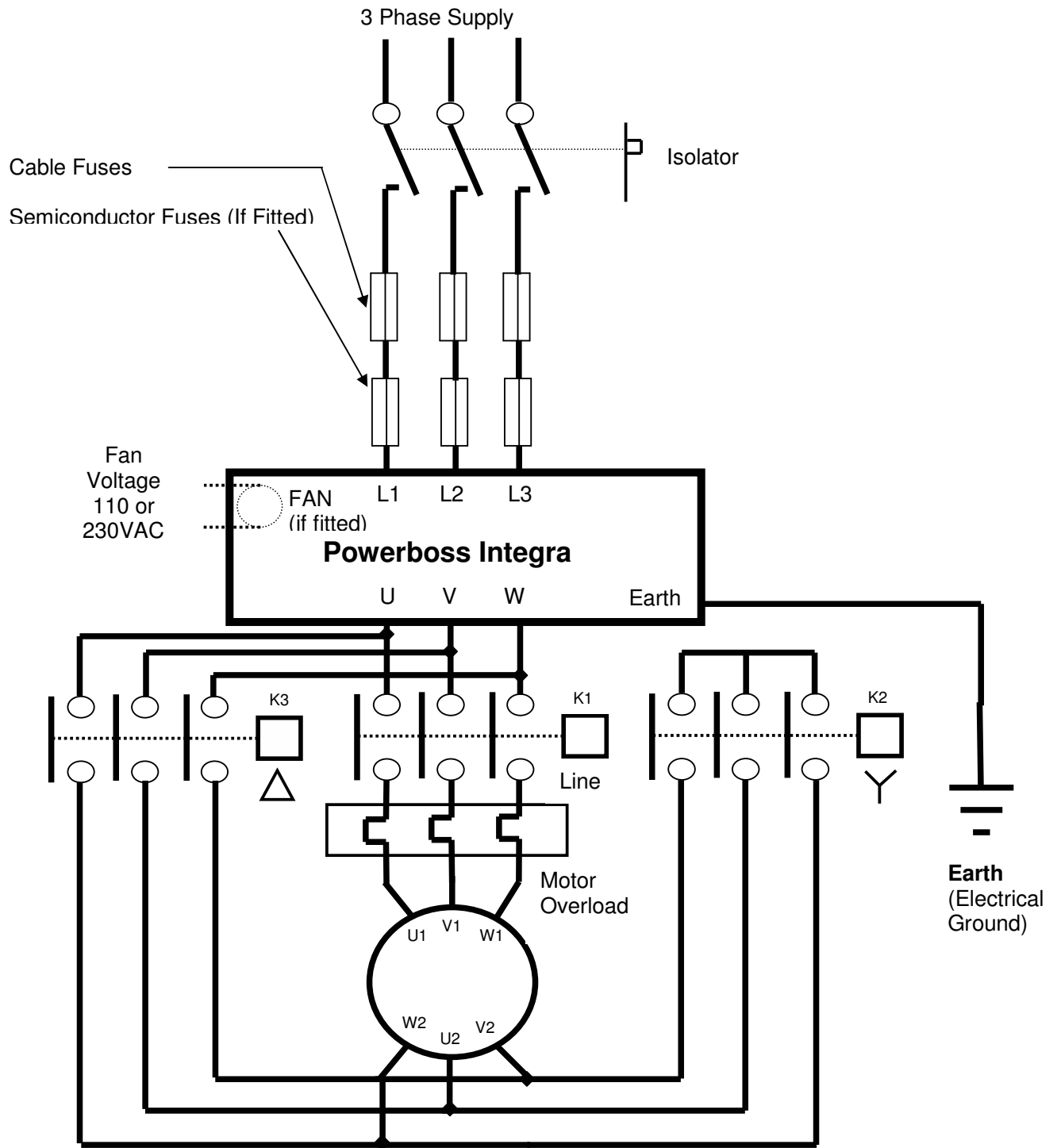
The Current Limit feature can be useful when a ceiling is placed on the current that can be drawn from the mains supply by the supply authority. Typical use of the current limit feature would be to start a large, unloaded axial fan with the minimum current possible.

Powerboss would start the motor and Ramp Up the voltage to the set Current Limit and hold the current for the programmed time limit. On reaching full speed the motor current would drop to near normal.

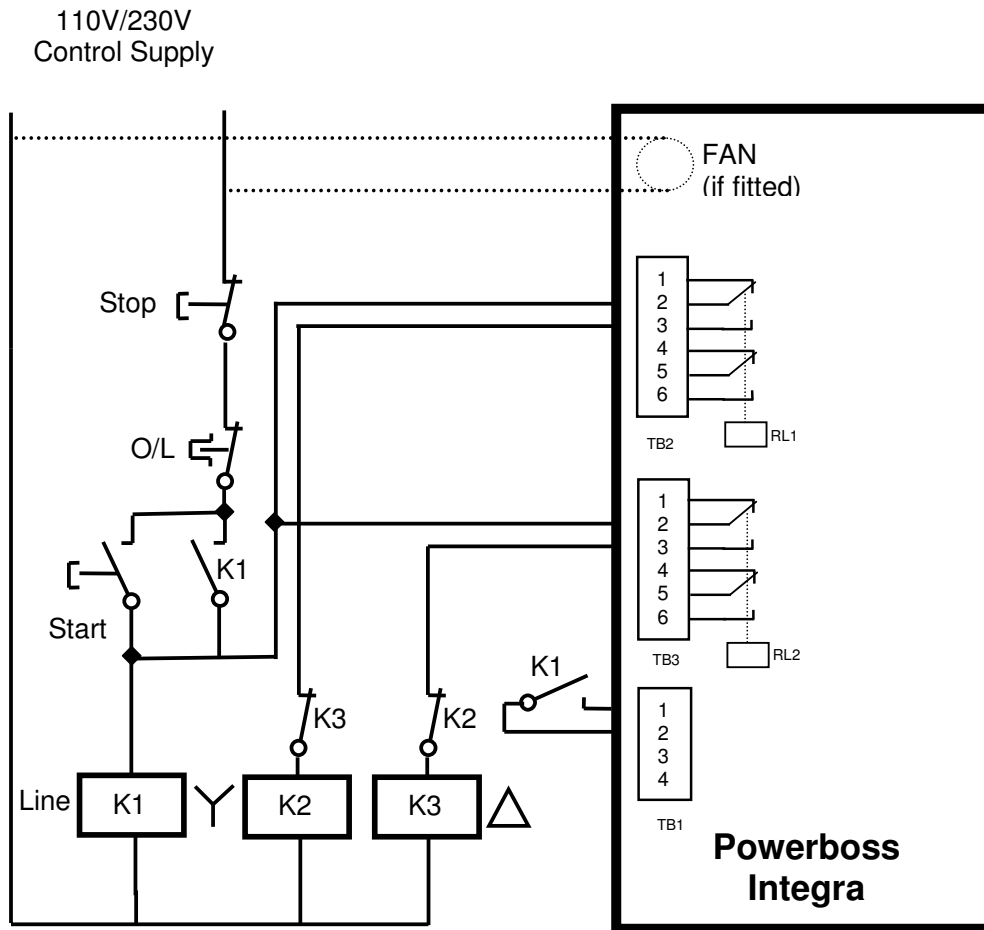
The Current Limit Level is adjustable in increments of 1%, between 25 and 80% of the direct on line (DOL) starting current.

The Current Limit Time is adjustable in increments of 1 second, between 0 and 255 seconds. If high starting currents are expected for longer periods of time a larger Powerboss may need to be fitted. See Powerboss manual for starting current ratings.

CONTROLLED STAR DELTA POWER CONNECTIONS



CONTROLLED STAR DELTA CONTROL CONNECTIONS



FIXED VOLTAGE

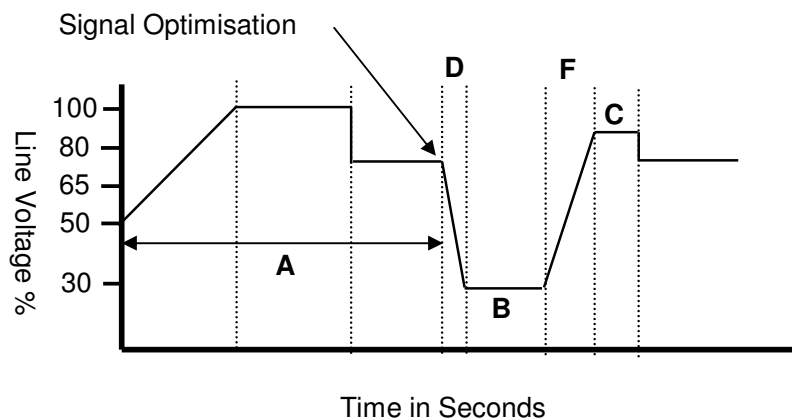
This feature enables Powerboss to be programmed to supply the motor with a fixed minimum voltage during optimisation. This feature may be useful if a resonance is present during normal optimisation, or the motor has a particularly poor speed torque curve causing the motor to appear to stall during optimisation.

The Fixed Voltage Level is adjustable between 25 and 100% voltage in 1% increments.

The default level is 80%, incrementing with the Enter Key will change the voltage in 5% steps.

Note If the Monitor Mode is selected the voltage level can be changed while the application is running, the Escape Key will return the Powerboss to full voltage. When the optimum level is reached the unit **must be** re-programmed in the Special Application Menu.

SIGNAL OPTIMISATION



The Signal Optimisation feature is useful on applications with a cyclic load, such as a Circular Saw in a Sawmill. To use this feature a normally open, volt free, contact from a sensor needs to be connected into terminals 5 and 6 on terminal block TB1.

This contact is opened when the load is about to be applied, and closes again when the load is low. This will enable Powerboss to achieve higher level of savings by introducing a higher level of optimisation, using a programmable Low Voltage Level, during the low load period.

The normal start sequence (A) (Ramp, Dwell Time and Optimisation) must take place before Signal Optimisation can be enabled.

To use this feature, enter the Special Parameters Menu, select Signal Optimisation and Enable.

LOW VOLTAGE LEVEL - SIGNAL OPTIMISATION

The Low Voltage Level is the level of voltage that Powerboss applies to the motor when the 'Signal Optimisation' contact is closed. The voltage should be set as low as possible without motor speed being adversely effected.

The Low Voltage Level (**B**) is adjustable between 25 and 100% voltage in 1% increments, the default level is 30%.

RETURN VOLTAGE LEVEL - SIGNAL OPTIMISATION

The Return Voltage Level is the level of voltage that Powerboss applies to the motor after the volt free contact from a sensor has opened indicating the load is about to be applied. This should be set to a level to prevent the motor from stalling when the load appears, normal optimisation is then enabled.

The Return Voltage Level (**C**) is adjustable between 25 and 100% voltage in 1% increments, the default level is 100%.

RAMP LOW VOLTAGE - SIGNAL OPTIMISATION

The Ramp Low Voltage (**D**) is the time taken for Powerboss to decrease the voltage from the normal optimisation level to the Low Voltage Level. To ensure system stability the time can be programmed between 0.01 and 2.55 seconds in 0.1 second increments.

RAMP RETURN VOLTAGE - SIGNAL OPTIMISATION

The Ramp Return Voltage (**F**) is the time taken for Powerboss to increase the voltage to the Return Voltage Level. To ensure system stability the time can be programmed between 0.01 and 2.55 seconds in 0.1 second increments.

ACTIVATE SIGNAL OPTIMISATION - INPUT 3 CONFIGURATION

Activate Input 3 - Open

Open contacts 5 and 6 on terminal block TB1 to activate signal optimisation.

Activate Input 3 - Close

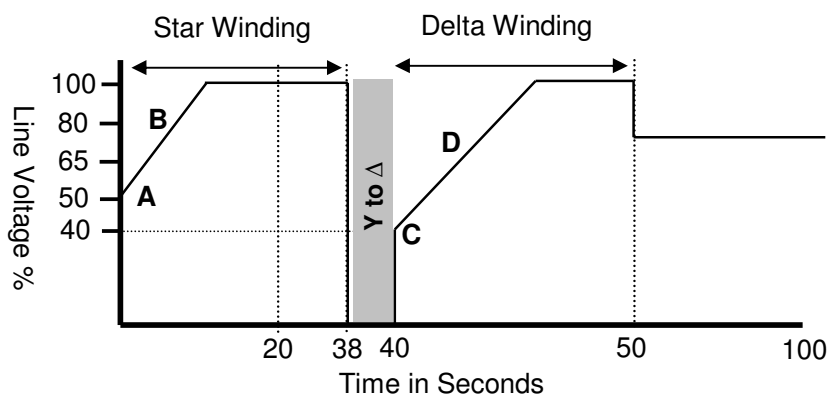
Close contacts 5 and 6 on terminal block TB1 to activate signal optimisation.

SEMI-CONTROLLED STAR DELTA (SEMI-CONTROLLED Y Δ)

This feature enables Powerboss to provide a soft start in both the Star and Delta windings of the motor. However, the Soft Start Parameters for the Star Winding must be set to ensure that full voltage is applied to the motor (Top of Ramp) within the external star timer setting. If Powerboss does not reach full voltage before the Star Timer has elapsed, the unit will Stop and not start in the Delta Configuration. This Application Set has the benefit of allowing you to keep the existing Star-Delta connections with only a few modifications.

If any other parameters are required such as soft stop, additional Optimisation features, or the supply frequency need to be changed from the default level.

These Parameters must be accessed in the Standard Soft Start Features, and Optimisation Menus.



STAR WINDING - (SEMI-CONTROLLED Y Δ)

STAR WINDING - PEDESTAL VOLTAGE - (SEMI-CONTROLLED Y Δ)

The **Pedestal Voltage (A)** is the initial voltage that is applied to the motor at the moment of switch on. The pedestal should be set the motor shaft begins to rotate immediately Powerboss is asked to start. Increasing the pedestal voltage increases the motor torque by the square of that value. The pedestal is adjustable in increments of 1%, between 25 and 80% of the line voltage.

STAR WINDING - CURRENT LIMIT LEVEL AND TIME -(SEMI-CONTROLLED Y Δ)

The Current Limit feature can be useful when a ceiling is placed on the current that can be drawn from the mains supply by the supply authority. Typical use of the current limit feature would be to start a large, unloaded axial fan with the minimum current possible.

Powerboss would start the motor and Ramp Up the voltage to the set Current Limit and hold the current for the programmed time limit. On reaching full speed the motor current would drop to near normal.

The Current Limit Level is adjustable in increments of 1%, between 25 and 80% of the direct on line (DOL) starting current.

The Current Limit Time is adjustable in increments of 1 second, between 0 and 255 seconds. If high starting currents are expected for longer periods of time a larger Powerboss may need to be fitted. See Powerboss manual for starting current ratings.

STAR WINDING - RAMP UP - (SEMI-CONTROLLED Y Δ)

The **Ramp Up** time (**B**) is the time taken to reach full voltage from the initial Pedestal Voltage setting. The Ramp Up time dictates the acceleration torque, and therefore, the acceleration time of the driven load.

The Ramp Up time is adjustable in increments of 1 second between 0 and 255 seconds.

DELTA WINDING - (SEMI-CONTROLLED Y Δ)

DELTA WINDING - PEDESTAL VOLTAGE - (SEMI-CONTROLLED Y Δ)

The **Pedestal Voltage** (**C**) is the initial voltage that is applied to the motor at the moment of switch on. The pedestal should be set the motor shaft begins to rotate immediately Powerboss is asked to start. Increasing the pedestal voltage increases the motor torque by the square of that value. The pedestal is adjustable in increments of 1%, between 25 and 80% of the line voltage.

DELTA WINDING - CURRENT LIMIT LEVEL AND TIME-(SEMI-CONTROLLED Y Δ)

The Current Limit feature can be useful when a ceiling is placed on the current that can be drawn from the mains supply by the supply authority. Typical use of the current limit feature would be to start a large, unloaded axial fan with the minimum current possible.

Powerboss would start the motor and Ramp Up the voltage to the set Current Limit and hold the current for the programmed time limit. On reaching full speed the motor current would drop to near normal.

The Current Limit Level is adjustable in increments of 1%, between 25 and 80% of the direct on line (DOL) starting current.

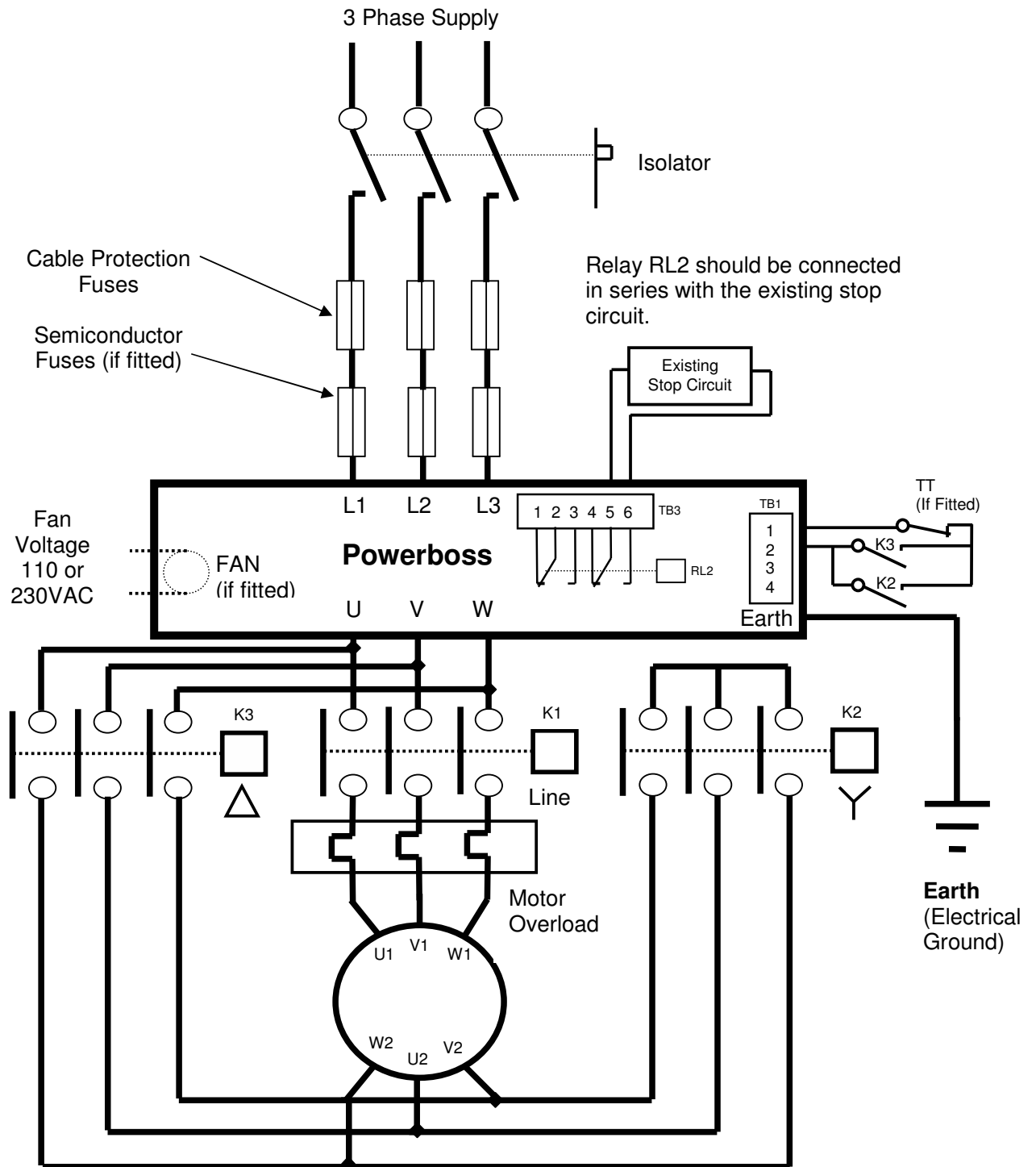
The Current Limit Time is adjustable in increments of 1 second, between 0 and 255 seconds. If high starting currents are expected for longer periods of time a larger Powerboss may need to be fitted. See Powerboss manual for starting current ratings.

DELTA WINDING - RAMP UP - (SEMI-CONTROLLED Y Δ)

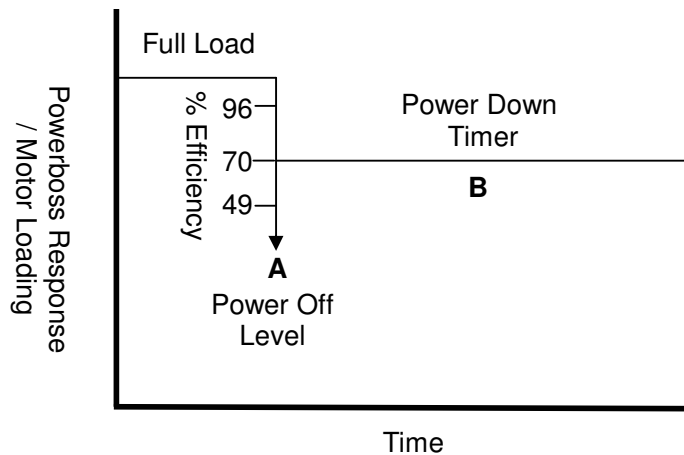
The **Ramp Up** time (**D**) is the time taken to reach full voltage from the initial Pedestal Voltage setting. The Ramp Up time dictates the acceleration torque, and therefore, the acceleration time of the driven load. Setting a particular Ramp Up time will not guarantee that the motor will accelerate in the set time. The acceleration time is governed by a combination of the moment of inertia, for both the load and the motor, and the speed/torque curves of both the load and the motor.

The Ramp Up time is adjustable in increments of 1 second between 0 and 255 seconds.

SEMI-CONTROLLED STAR DELTA (SEMI-CONTROLLED Y Δ) SCHEMATIC



TIMED POWER OFF



The Timed Power Off feature is useful for applications that run at no load for prolonged periods of time, such as a Mechanical Press. Powerboss can be programmed to recognise the no load period and switch the motor off. Powerboss will still provide Optimisation until the motor is switched off.

Other uses can include Dry Well Protection for Pumps, where Powerboss can detect if the Pump runs dry and switch the motor off accordingly, thus preventing damage to the Pump.

POWER OFF LEVEL - TIMED POWER OFF

The Power Off Level (**A**) measures the efficiency level of the motor at the working load and initiates the Power Down Timer when the motor efficiency drops below the set value, indicating that the motor is running in the no load cycle.

The Power Off Level is adjustable between 49 and 96% motor efficiency in 1% increments, the default level is 70% and is adequate for most applications.

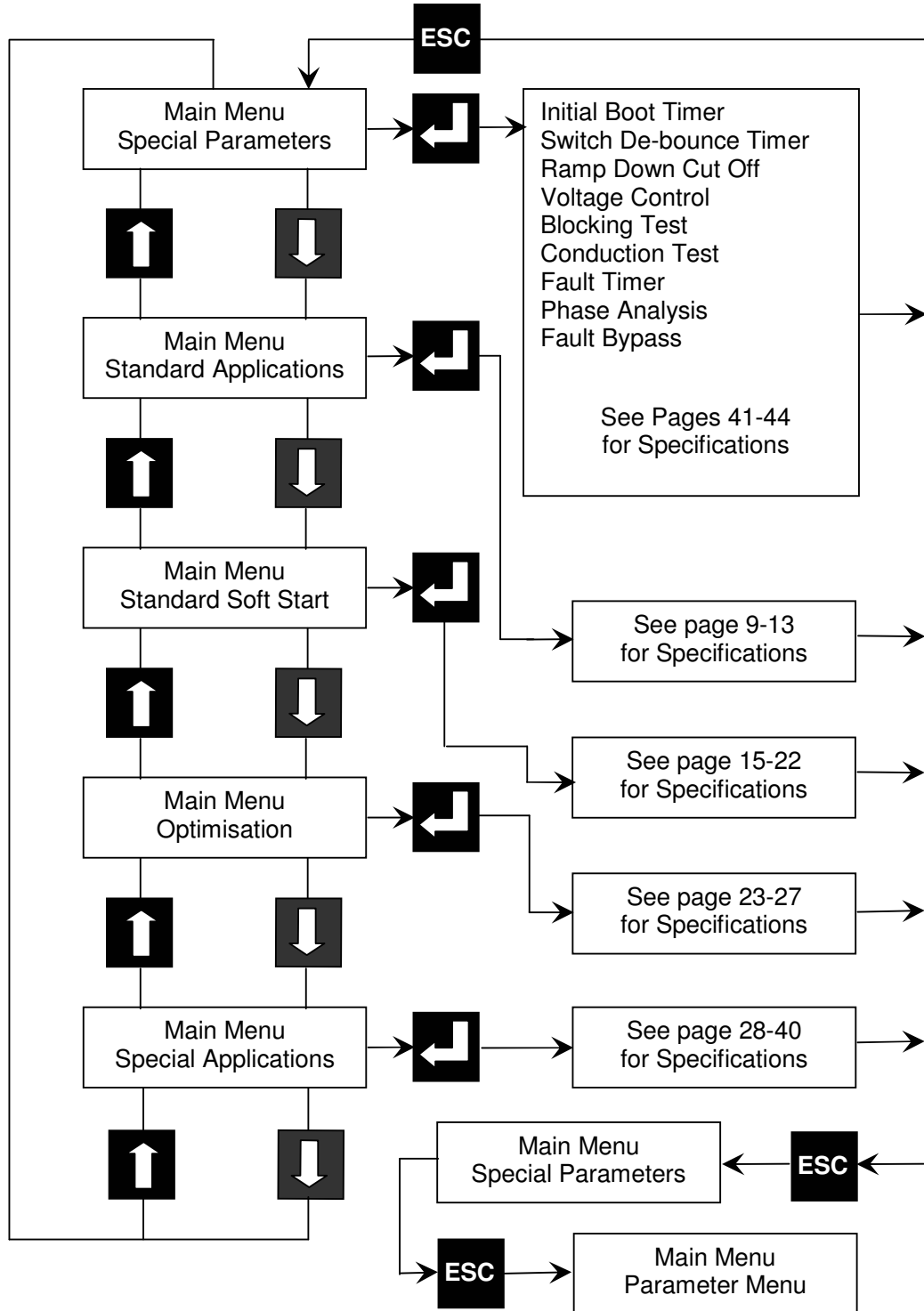
POWER DOWN TIMER - TIMED POWER OFF

The Power Down Timer (**B**) is the set time before Powerboss shuts the motor down, the timer is reset if the load reappears before the Power Down Timer ends.

The Power Down Timer is adjustable as follows.

0-60 minutes in 1 minute increments, 0-60 seconds in 1 second increments, the default level is 25 seconds and is suitable for most applications.

MAIN MENU - SPECIAL PARAMETERS



MAIN MENU SPECIAL PARAMETERS

SPECIAL PARAMETERS ARE ONLY ACCESSABLE BY ENTERING A 4 DIGIT LOCK CODE SUPPLIED BY THE MANUFACTURER OR THE DISTRIBUTOR. THE PARAMETERS BELOW SHOULD ONLY BE CHANGED IN CONSULTATION WITH EITHER THE MANUFACTURER OR THE DISTRIBUTOR.

INITIAL BOOT TIMER

The Initial Boot Timer delays the start routine by the programmed time after Terminals 1 and 2 on Terminal Block TB1 have been bridged. This adjustable feature allows Powerboss to finish reading any downloaded information from a connected source.

The Initial Boot Timer is disabled as default.

The Initial Boot Timer is Programmable between 0.1 and 25 seconds in 0.1 second increments.

SWITCH DE - BOUNCE TIMER

The Switch De-bounce Timer delays the start routine by the programmed time after Terminals 1 and 2 on Terminal Block TB1 have been bridged. This ensures Powerboss will not start until Terminals 1 and 2 on Terminal Block TB1 have been bridged for the programmed period of time.

The Switch De-bounce Timer is enabled as default.

The Switch De-bounce Timer is Programmable between 0.1 and 25 seconds in 0.1 second increments, the default level is 0.1.

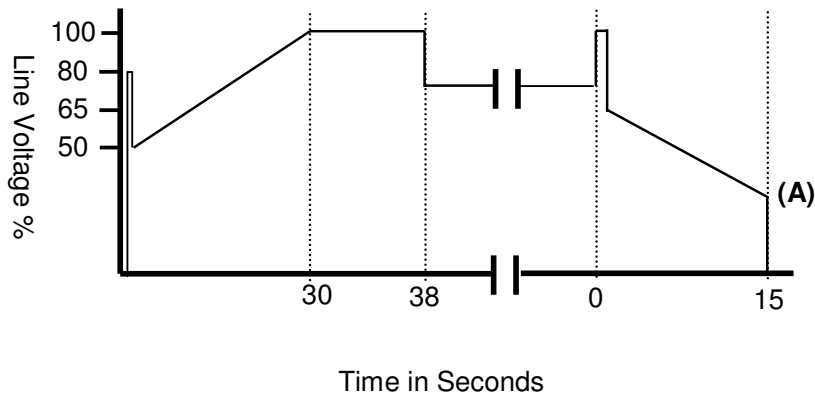
VOLTAGE CONTROL

This parameter enables Powerboss to attain smaller conduction angles and remains in circuit for the first 16 cycles of the mains supply, thus fluxing the motor before the Pedestal Voltage is applied. This prevents any current peaks at the initial switch on.

Voltage Control is enabled as default.

RAMP DOWN CUT OFF

This parameter sets the voltage level **(A)** at which Powerboss will Ramp Down to after the Soft Stop command.



The Ramp Down Cut Off is adjustable between 30 and 50% of the line voltage in 1% increments, the default level is 30%.

BLOCKING TEST

The Blocking Test monitors the thyristor blocking cycle as part of the overall fault routine.

The default is ON.

CONDUCTION TEST

The Conduction Test monitors the thyristor conduction cycle as part of the overall fault routine.

The default is ON.

FAULT TIMER

The Fault Timer monitors general fault conditions and provides a fixed time buffer to allow system recovery before a fault condition is registered.

The default is ON.

PHASE ANALYSIS

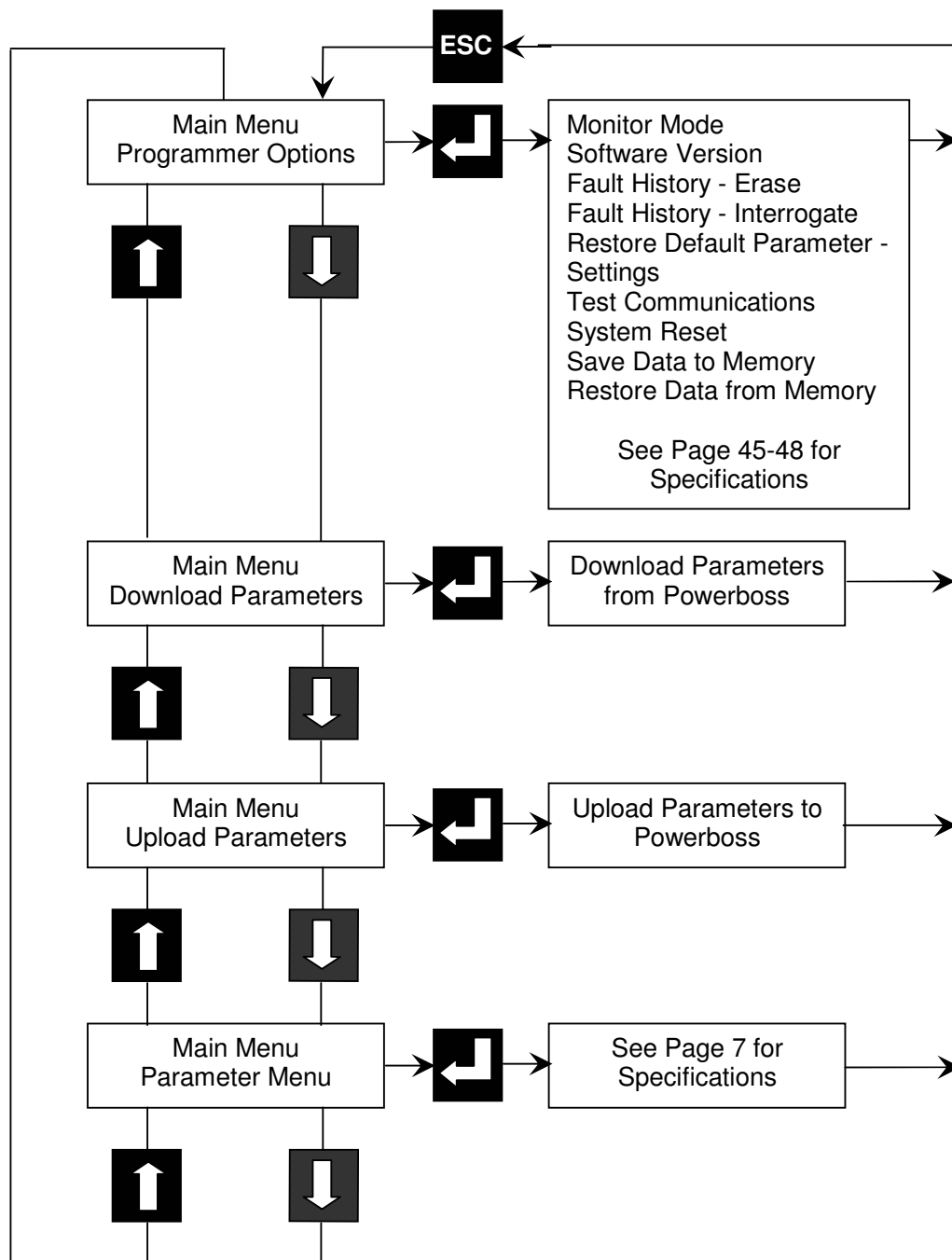
The Phase Analysis software module conducts the initial monitoring of the Line rotation, and Motor Windings, ensuring all three phases are present.

The default is ON.

FAULT BYPASS

The Fault Bypass feature when enabled will disable the fault routine after Powerboss has reached Top of Ramp. The default setting is disabled.

PROGRAMMER OPTIONS MENU



PROGRAMMER OPTIONS MENU

MONITOR MODE

Enables the programmer to monitor certain parameters live. See section on Monitor Mode on page 45 for details.

SOFTWARE VERSION

This parameter displays both the loaded programmer and Powerboss software versions.

FAULT HISTORY - ERASE

This parameter will clear all the saved fault history from the Powerboss Memory.

FAULT HISTORY - INTEROGATE

This parameter will list the last 6 faults related to the Powerboss in order. The type of faults that can be listed are as follows.

1. Line Faults for L1, L2 and L3
2. Motor Winding Fault
3. Thyristor Fault for L1, L2 and L3

RESTORE DEFAULT PARAMETER SETTINGS

Enabling this feature will restore all the parameters within the Powerboss to their default levels.

TEST COMUNICATIONS WITH POWERBOSS

This parameter will ensure all the data lines between the Programmer and Powerboss are functioning correctly.

SYSTEM RESET

If enabled this parameter will perform a complete re-boot of the system enabling the Programmer to synchronise with the Powerboss when in Monitor Mode.

SAVE DATA TO MEMORY

Enabling this feature will save all set Parameter data to the Programmer memory. This feature is useful if more than one Powerboss needs to be programmed with the same data.

RESTORE DATA FROM MEMORY

Enables the programmer to restore the saved data from memory in order to be changed or re-used.

MONITOR MODE

WARNING

WHEN MONITOR MODE IS ENABLED POWERBOSS WILL BE AUTOMATICALLY RESET TO ENABLE COMMUNICATION BETWEEN THE PROGRAMMER AND POWERBOSS.

Monitor Mode will automatically inform the user of the current status of Powerboss, the following is a list of parameters that are displayed.

Soft Start	i) Kick Start ii) Current Limit iii) Ramp Up iv) Ramp Down
Optimisation	i) Normal Optimisation ii) Motor Efficiency % - above or below pre-set Motor Efficiency threshold. iii) Conduction Angle iv) Stored Energy Routine v) Timed Power Off - Countdown to Power Cut off
Controlled Star-Delta	i) Ramp Up - Star ii) Current Limit - Star iii) Star Dwell Time iv) Ramp Up - Delta v) Current Limit - Delta
Semi - Controlled Star-Delta	i) Ramp Up - Star ii) Current Limit - Star iii) Awaiting Delta Contactor iv) Ramp Up - Delta v) Current Limit - Delta
Fixed Voltage	i) Monitors Fixed Voltage Level and enables the user to change the set value. See Fixed Voltage in Special Applications.