



POWER IS NOTHING WITHOUT CONTROL



TORQ MASTER 3000 MANUAL

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Latest up-date October 2013

1.0 SAFETY

1.1 In-built safety systems

The TORQ-MASTER 3000 soft starter is fitted as standard with the following safety and protection circuits;

- ◆ Motor overload protection.
- ◆ Motor underload protection.
- ◆ Load monitor.
- ◆ Over temperature.
- ◆ Instantaneous over current trip.
- ◆ Phase loss.
- ◆ Thyristor fault
- ◆ Thermistor trip circuit.
- ◆ Limitation on starts per hour.
- ◆ Stalled motor protection.
- ◆ Motor fault.
- ◆ Earth leakage protection (optional extra)

All chassis mounting soft starters are fitted with an earth connection which must be wired to the control panel star point earth.

The chassis units are to IP2X protection, that is, touchproof by direct contact, although some live parts may be accessible by angled contact.

1.2 Safety considerations

This instruction manual is an essential part of the soft start device and must be:

- ◆ Available to competent personnel at all times.
- ◆ Read prior to installation or commissioning.
- ◆ Observed with regard to safety and risk management.

The safety instructions in this manual are described so they can be understood by persons trained in Electrical Engineering. Such personnel should have at their disposal the appropriate tools and testing equipment to enable a safe installation.

Such personnel must obtain any particular or general permits relating to local regulations and meet any requirements regarding:

- ◆ Safety of personnel.
- ◆ Product disposal.
- ◆ Environmental protection.
- ◆ Packaging disposal

NOTE The safety measures outlined must remain in force at all times. Should questions or uncertainties arise, please contact your supplier.

1.3 User responsibilities

DANGEROUS VOLTAGES EXIST ON THE SOFT STARTER. ALWAYS REMOVE POWER BEFORE SERVICING

DO NOT MEGGER ANY PART OF THE UNIT

- ◆ It is a legal requirement that soft starters are protected by means of an isolating switch. It is recommended that a lockable isolator or MCCB is installed so that maintenance can be carried out safely.
- ◆ By definition a contactor is not an isolating switch since the coil of the contactor may be inadvertently energised. Do not depend on the circuit being safe if the only isolation is a mains contactor.
- ◆ Never place power factor correction capacitors on the output side of the soft starter, only on the input side and should be 'switched' using a programmable relay set for POWER FACTOR. (see page 17 for details)
- ◆ Every soft starter carries a unique serial number which gives information on the power rating of the unit. It is the users responsibility to ensure that the rating is correct for the application.
- ◆ The user must ensure that whenever a **STOP** is called for that the soft starter assumes a **SAFE** operating condition at the end of the stop sequence.
- ◆ The user must ensure no unauthorised person works on the unit.
- ◆ The operator must avoid using any working practises that reduce the safety of the soft starter.

1.4 How to use this manual

This instruction manual will in most cases exceed the requirements of the user but it is advisable to read the notes on safety and installation before proceeding further. Each soft starter is set-up and tested at the factory prior to despatch and in the majority of applications the settings need never be altered. Where menu alterations need to be made the user must consult the manual or your supplier before attempting any changes.

1.5 Standards

The unit is manufactured in accordance with the following EC standards:-

- ◆ IEC/EN 60947-4-2
- ◆ Safety — IEC/EN 60204-1 (as is relevant)
- ◆ EMC — IEC/EN 61000-6-2 & 61000-6-4

Also see page 29 for declaration of conformity

2.0 INSTALLATION

2.1 Unit type

Firstly, after unpacking the soft starter the user should check the following:

- ◆ That there is no obvious damage to the unit.
- ◆ Check the serial number label, this will give you information about the kW size and type of soft starter you have purchased. For example, TQM3KB-250 would be a 250kw with a built-in bypass contactor. Whilst a TQM3K-250/B would be a 250kw unit designed for use with a bypass contactor supplied and fitted by the user.
- ◆ It is the users responsibility to make sure the correct unit has been supplied and that it is fit for the use it was intended.

2.2 Location (chassis units)

The standard chassis mounting soft starter is supplied as an IP2X unit designed for installation in industrial switchgear cabinets. The chassis will be supplied with either a built-in bypass contactor or for use with a bypass contactor. In both cases there is minimal heat loss from the starter. It is still good practise, however, to allow 50mm around the unit to allow for some air flow. There is no forced cooling of the heatsink and the only heat generated will be from cables, contactor coils etc. Therefore when mounting the unit in a switchgear cabinet it may be considered the same as a D.O.L. starter. It should be noted that on large power units or in high ambient conditions due to the high running temperature of modern cables and contactor coils forced ventilation of the cubicle is recommended.

2.3 Location (complete starter)

The soft starter may also be supplied as a complete unit built into a floor or wall mounting IP54 sheet steel or polyester cabinet. The user will only need to wire in the mains and motor cables, all the rest of the controls will have been pre-wired. The system wiring schematic will describe any special functions or conditions but in general the standard unit will be supplied as a stand alone motor starter.

2.4 Cabling

It is not necessary to use shielded control cables but it may be needed if the installation is electrically 'noisy'. Mains and motor cables need not be shielded. When wiring to the soft starter please follow these guidelines:

- ◆ Terminals 1 to 16 are control inputs. Keep the cables short and avoid, where possible, mixing power and control cables.
- ◆ Use tri-rated cable for mains and motor.
- ◆ Terminals 26 to 35 are volt free relay outputs so standard wiring is permissible.
- ◆ Other than the normal restrictions of volt drop on long motor leads there is no limit to the length of cable used between the soft starter and the motor.
- ◆ Due to the switching frequencies and distorted wave shape during ramp up (or down) the user must pay particular attention to the tightness of all connections.
- ◆ On larger kilowatt units cable ducting is provided to enable segregation of power and control cables.

2.5 Bypass contactors

It is highly recommended that all soft starters are fitted with bypass contactors. Section 2.1 details the two chassis types available. In the case of the TQM3KB version the contactor has been fitted by the **Factory**, so the user need only connect mains, motor and control wiring to have a fully operational system. However, in the case of the type TQM3K___/B chassis the user will have to fit the bypass contactor. The connection details are covered in section 12.0 but the rating should follow this formula:

****FULL LOAD CURRENT OF THE MOTOR + 15%**

And then choose an AC1 rating closest to, but above that figure.

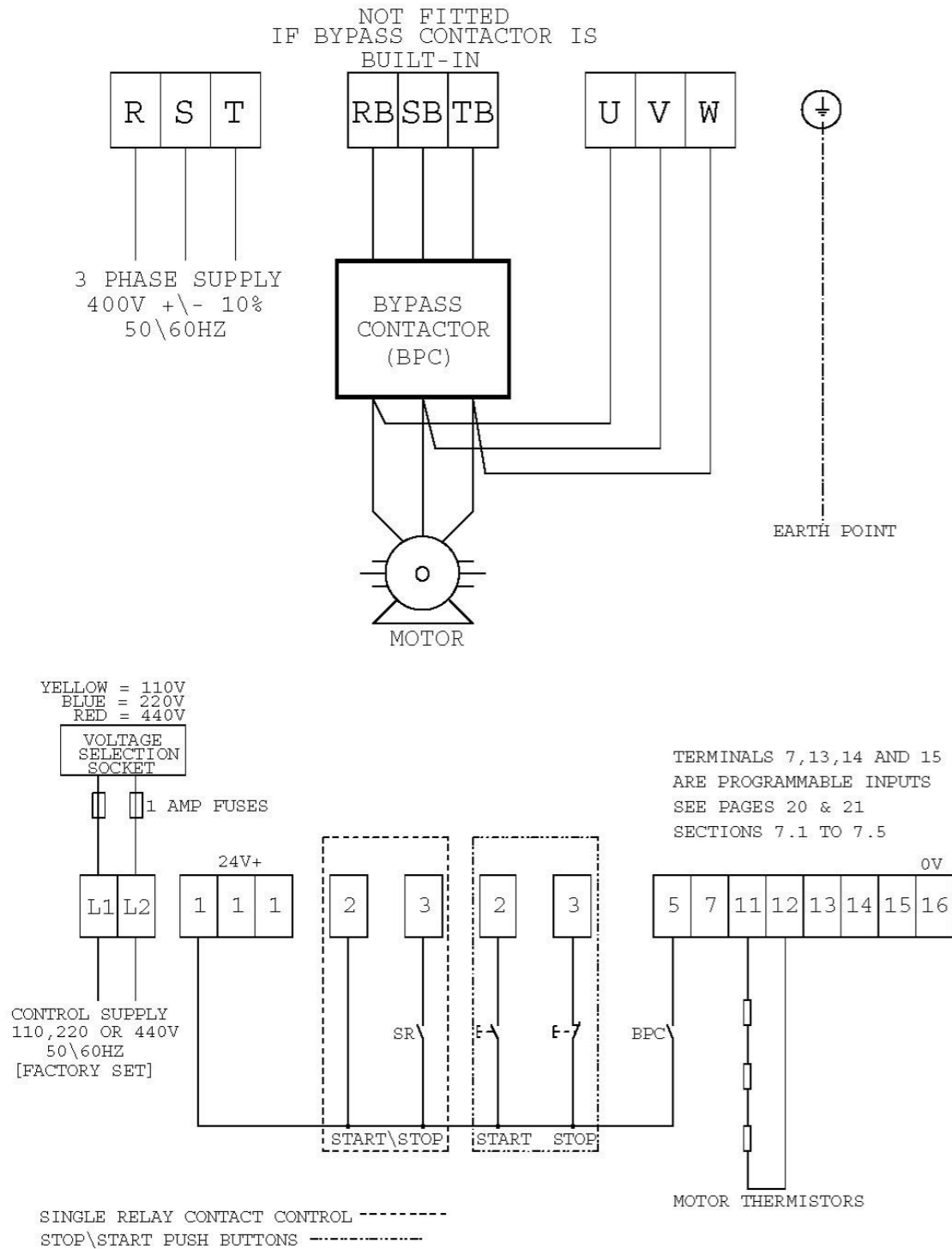
E.g. $FLC = 100A + 15\% = 115A$ nearest contactor rating is 125A at AC1 so this should be the choice.

The reason for the AC1 rating is because of the unique software sequence within the Torq-master unit. When set up correctly the bypass contactor will not energise until the current has dropped to full load current or less. When a stop command is given and the chosen stop mode is freewheel the software de-energises the BPC and briefly turns the thyristors on so that the contactor does not 'break' any current. Although the bypass contactor is energised and effectively 'shorting out' the thyristors all the protective features such as overload, shearpin, etc. are still fully functional.

IMPORTANT

THE BYPASS CONTACTOR MUST HAVE A COIL SUPPRESSOR FITTED

CIRCUIT DIAGRAMS



2.0 INSTALLATION - continued

2.6 Power terminals

R S T

RB SB TB

U V W

MAINS SUPPLY 3 PHASE 400V ± 10% 50/60HZ
(690v available as an option)

OUTPUT 3 PHASE TO THE LINE SIDE OF THE BYPASS CONTACTOR (THESE TERMINALS ARE NOT FITTED IF THE BYPASS CONTACTOR IS BUILT-IN)

OUTPUT 3 PHASE TO THE MOTOR

These terminals are the input for the electronics power supply input. This input can be 110v, 220v or 440v 50/60hz. This is a factory set input based on customer requirements and is always marked and colour coded. On 'board' fusing and voltage selection are under the metal PCB cover. On units with a built-in bypass contactors L2 and L2 are provided as a separate connection or may be pre-wired for 415v.

There are 3 number '1' terminals in order to avoid doubling up cables. The No 1 terminal is a 24v+ source and is used for all control applications.
TOTAL POWER DRAWN SHOULD NOT EXCEED 250mA
DO NOT TAKE THIS VOLTAGE OUTSIDE THE PANEL
WITHOUT CONSULTING YOUR SUPPLIER

This is the input start command and should be used with a normally open momentary push button.

THIS IS A LATCHED INPUT

Terminal 3 is the input stop command and should be used with a normally closed momentary push button.
FOR RELAY CONTROL OF START/STOP — SEE OPPOSITE

Terminal 5 is not used on the TQM3K unit. However in a retrofit situation the user may still connect as per the TQM2K version or leave it disconnected.

This terminal is the first of the programmable inputs. Depending on the program selected either a N/O or N/C contact will be needed to execute the program function.

These terminals are dedicated for the use of PTC motor thermistors. Circuit will accept 3 x PTC probes in series of approx 250Ω each. The circuit trips at 2.6KΩ. The circuit voltage is 5v+

These terminals are the three remaining programmable inputs and are the same as program 1

This is the zero volt connection and can be used to provide a 'common' for relays or external voltage inputs. The user must limit the 'drain' to 250mA

2.7 Control terminals

Terminals L1 & L2
colour code
110v --- yellow
240v --- blue
400v --- red

Terminal 1,1,1, (+ 24v)

Terminal 2 (Start)

Terminal 3 (Stop)

Terminal 5 (Bypass)

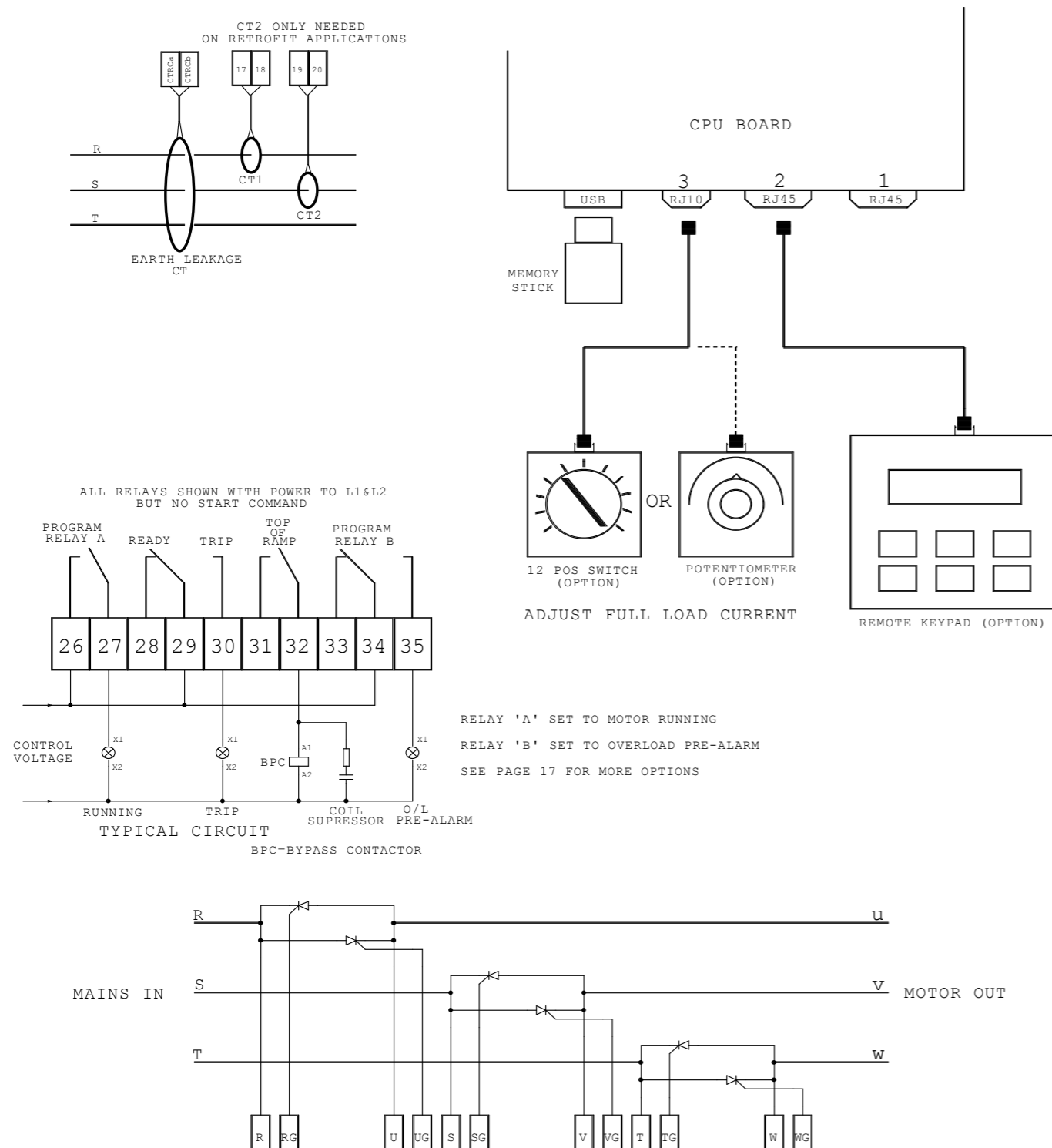
Terminal 7 (Program 1)
[see page section 7.4, 7.5]

Terminal 11 & 12 (Thermistor I/P)

Terminal 13,14 & 15 (Prog' I/Ps)
[see page section 7.4, 7.5]

Terminal 16 (zero volts)

CIRCUIT DIAGRAMS



2.0 INSTALLATION - continued

2.8 C.T. terminals

Terminals 17,18,19 & 20

Terminals CT3a, CT3b

Terminals CTRCa & CTRCb

Terminals 17 & 18 are the current transformer input for the overload system on the TQM3K version and only needs the one CT. On the previous TQM2K unit two CT inputs were needed and when retrofitting the second CT can still be connected to 19 & 20. CT3a & 3b—for future use. CTRCa & b are the connections for the commoning CT for the earth leakage protection (optional extra)

2.9 RJ45 & RJ10 connectors

2.10 USB port

On the edge of the CPU or display PCB are two connectors one RJ45 & one RJ10 and a USB port No-1 is for a future expansion board No-2 is for the remote door mounted display. No-3 is for connection to an external 12 position switch or potentiometer and is used to adjust the full load current setting without having to enter the menu structure. The USB port is designed so that the event log can be downloaded to a memory stick and then analysed later. This port is also used with the computer configuration software to enable the user to change settings and upload back into the soft starter. This facility also enables the user to easily change settings and email to site. Full details are on page 19 of this manual.

2.11 Relay terminals

Terminals 26 & 27 (Relay A)

Terminals 28,29 & 30 (Ready/Trip)

Terminals 31 & 32 (Top of Ramp)

Terminals 33,34 & 35 (Relay B)

Relay A on terminals 26 & 27 is a single pole single throw programmable relay. The contacts are rated at **10A @ 400v**.

ONLY ONE FUNCTION CAN BE ASSIGNED AT ONE TIME

This is a dedicated relay and is not programmable. Its function is to provide a 'READY' signal with power to L1 & L2 and a 'TRIP' signal if the soft starter detects a fault.

The TOP OF RAMP relay is used to energise a bypass contactor and is rated at **10A 400v**.

This is the second programmable relay and is a single pole changeover type again rated at **10A 400v**.

2.12 Gate/Cathode terminals

Terminals R, RG U, UG

Terminals S, SG V, VG

Terminals T, TG W, WG

These terminal blocks are situated at the top of the firing card and represent the gate and cathode connections of the six thyristors. Irrespective of the KW size of the thyristor stack these connections remain the same.

R = cathode red phase input RG = gate, brown phase. U = cathode red phase output UG = gate, brown phase.

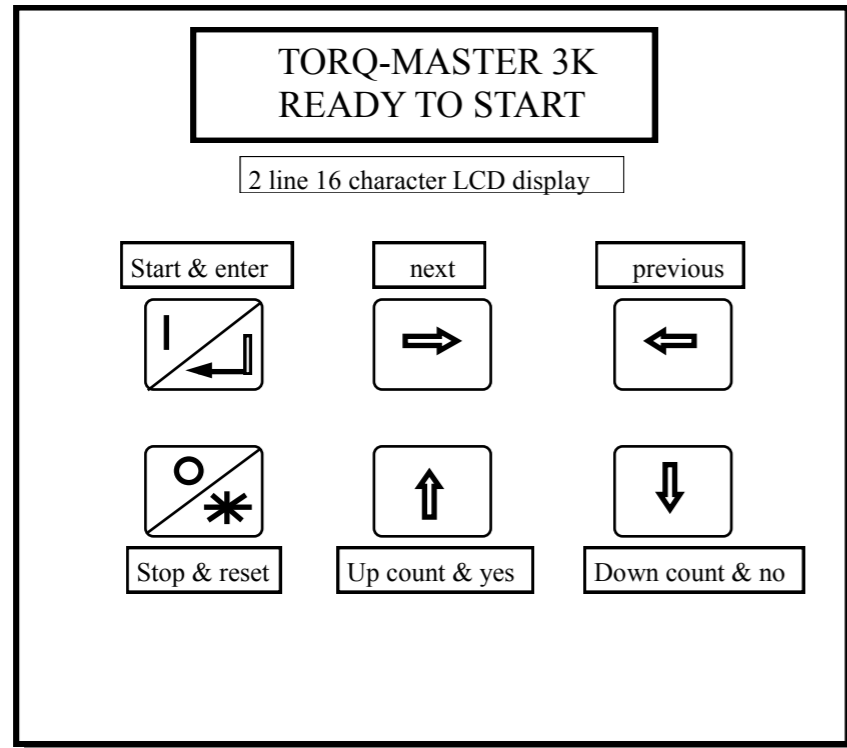
S = cathode yellow phase input. SG = gate, black phase. V = cathode yellow phase output SG = gate, black phase.

T = cathode blue phase input TG = gate, grey phase. W = cathode blue phase output WG = gate, grey phase.

NOTE
ALL CATHODE LEADS ARE RED
ALL GATE LEADS ARE EITHER YELLOW OR WHITE

3.0 KEYPAD AND DISPLAY

3.1 Layout



3.2 How to use the keypad

With the **READY TO START** screen as above the user has access to basic information. Press the next key and a 'rolling' screen will start that will give the following details **TIME & DATE, RMS VOLTS, FULL LOAD AMPS SETTING & AMBIENT TEMPERATURE**. Pressing the **NEXT** key will stop this process and allow the user to access more information screens every time the next key is pressed. These other screens will show phase to phase voltages, any service hours that have been set along with the accumulated running hours. The last information screen shows; **TO OPEN EVENT LOG, PRESS ENTER**. The event log is a unique system where the last 1000 events are recorded along with the time and date for each event. Also please note more information screens become available once the motor is started. (see opposite page for details)

3.3 How access the menu settings

To enter the menu settings hold down the **RED 0*** button for 4 seconds. The display will ask the user to enter a PIN No. This has been set at the Factory to **17**, use the 'up count' button until 17 appears in the display. Press the **NEXT** key and the display will show the **USER MENU** as the first option. Use the down key to move the cursor to the next heading which is **OPTIONS MENU**, using the down key will show the user to the next screens which are **PROG INPUTS & PROG RELAYS** (programmable inputs and relays) again using the down key will show the next screen which is **ENGINEERS MENU & USB MENU**. The Engineers menu is separately Pin locked to **19**

4.0 SCREENS

4.1 Start-up screens

TORQ-MASTER 3K
READY TO START

NO 3 PHASE

TORQ-MASTER 3K
MOTOR/SCR FLT

TORQ-MASTER 3K
EMERGENCY STOP

Explanation

With power to **L1** and **L2** the first screen will show that the soft starter is ready to start and is waiting for a start command.

When the ready to start screen is shown and a start command is given the unit will check to see if the three phase mains is available, if not, the screen shown opposite will appear and the screen will flash

If a start command is given and the three phase is present but the motor has two or more connections missing the screen will show **MOTOR/SCR FLT**. A damaged thyristor will also give this message

When emergency stop is chosen in the programmable inputs menu, and is actuated, even when a start is called for and mains and motor are connected the unit will not respond until the EM stop circuit is restored to normal.

4.2 Information screens

AMBIENT TEMP 30C
min ██████████ max

MOT CURRENT 000%
min ██████████ max

TIME 18 : 10 : 54
DATE 14/05/2013

R→S S→T T→R
415 413 416

SERVICE : EXPIRED
8,500h 15h

OPEN EVENT LOG
PRESS ENTER

VIEW EVENT LOG Y
STORE TO USB N

026 NO 3 PHASE
10 : 45 : 21 14/05

VOLTAGE RAMP
I=55.0A PEAK=275.5A

MOTOR RUNNING
MOTOR I = 55.0A

This screen shows the user the ambient temperature in the area around the soft starter unit. This should not be beyond 45\50C. Temperatures above this figure can result in the soft starter malfunctioning.

The motor current bar graph gives the user a view of the motor amps and its percentage value in comparison with the full load setting. KW, KVA & COSØ is displayed when the motor is running

The user can display the current time and date by accessing this screen. Any changes can be made in the **Engineers menu**.

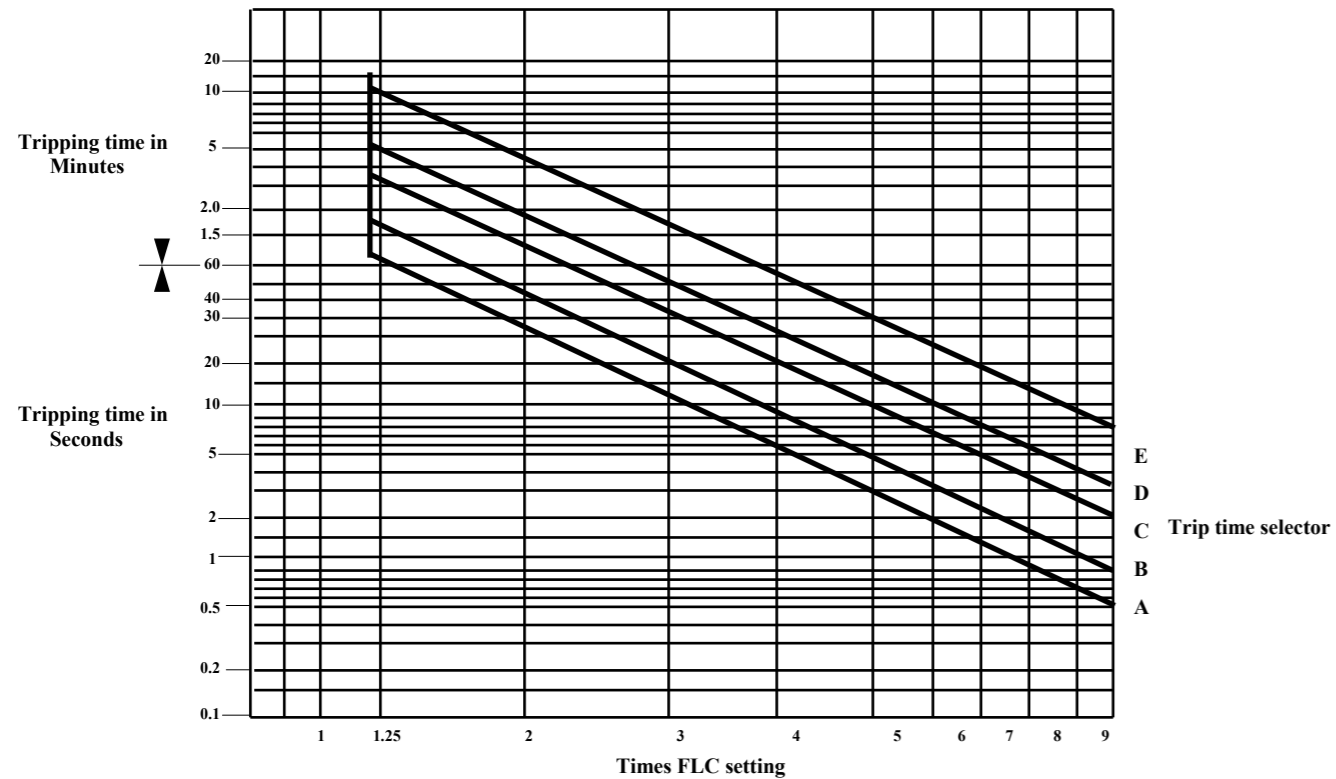
The phase to phase voltages are displayed in this screen and are given as RMS values

Service time for some machines is very important and this screen shows the user the time period between services and the elapsed time. A programmable relay can be configured to give an output signal when the service time is reached.

The unique software package within the soft starter has the ability to log the last 1000 events. This is a rolling log with battery back-up so that the unit can be interrogated at any time. The log will show the time and date of the event and also the event itself. The user can choose to view the event using the display or it can be downloaded to a memory stick and viewed on a PC or lap top. With the cursor under Y for view log pressing the **NEXT** key will change the screen to show the last recorded event. In this case no 3 phase supply was detected and the unit tripped at 10:45 and 21 seconds on the 14th of May. When a start command is given the display shows the type of ramp (voltage or current) and also shows the peak current during the ramp to full speed. The peak current is recorded in the log. Once the motor is at full speed the display shows **MOTOR RUNNING** on the top line and gives the running current on the bottom line. The peak starting value of current remains on the screen for several seconds along with the running current and then disappears. There is more detailed information about the data log on page 19 of this manual

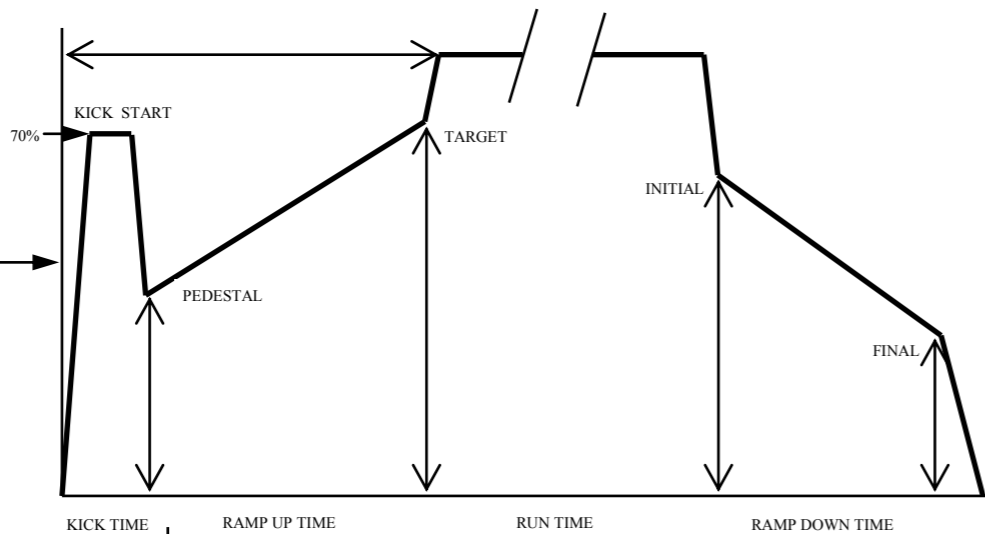
O/L AND STARTING GRAPHS

TYPICAL OPERATING TIME CHARACTERISTICS FROM COLD START

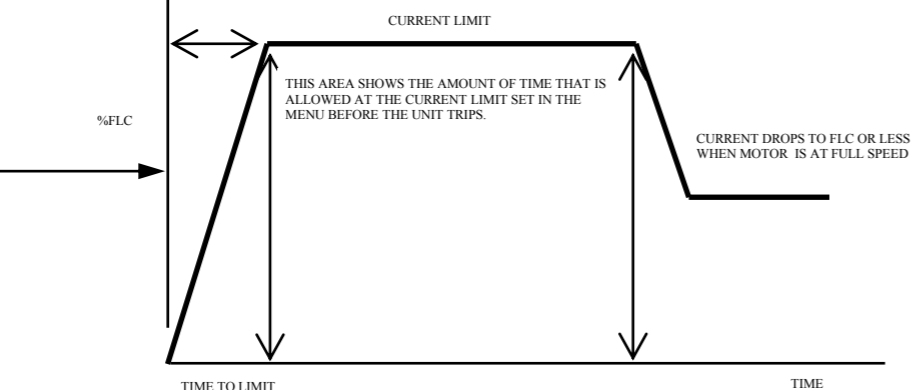


Maximums & Minimums

Kick start	0.2 to 2secs
Level	70% voltage
Ramp-up	1 to 240secs
Pedestal	10 to 70%V
Target	40 to 100%V
Ramp down	1 to 240secs
Initial	100 to 40%V
Final	20 to 50%V



Time to limit	1 to 10 secs
Current limit	100 to 600%
Time at limit	1 to 60 secs



5.0 SCREENS - USER MENU

TO ENTER THE USER MENU; HOLD DOWN THE STOP/RESET BUTTON FOR 4 SECONDS AND ENTER THE PIN NO (17) & PRESS NEXT. WITH THE CURSOR UNDER 'Y' PRESS NEXT TO ENTER THE USER MENU

5.1 Motor protection

SET MOTOR FLC
105 AMPS

next

CHOOSE O/L CURVE
A B C D E

5.2 Motor start up

next

RAMP TYPE
VOLTAGE Y

next

RAMP UP 10S
KICK TIME 0000ms

next

PEDESTAL 40%
TARGET 100%

OR

RAMP TYPE
CURRENT Y

next

RAMP TO LIMIT
SET TO 10S

next

CURRENT LIMIT
SET TO 350%

next

TIME OUT FOR
I LIMIT 30S

Explanation

The user should enter the full load or nameplate current of the motor to be controlled. It is important to enter the correct figure or the overload and other protective devices will not operate correctly. The full load current can be set from three different sources, keypad, 12position switch or potentiometer. The last 2 are optional extras.

There is a choice of five different overload curves. This enables the user to match the overload trip point to the load application. Please note these are *cold* start curves and every 'start' will reduce the tripping times.

SEE OVERLOAD CURVES OPPOSITE

After setting the overload curve, pressing the next button will ask the user to choose either a voltage, or a current control ramp-up. The default screen is VOLTAGE RAMP, to change to CURRENT RAMP press the UP count key

SEE VOLTAGE RAMP CURVE OPPOSITE

If the voltage control ramp is chosen the user will be asked to set the ramp-up time. This is normally Factory set to 10 seconds (max = 240s). The second item in this screen is the kick start facility which gives the motor an instantaneous 70% voltage boost for up to 2 seconds in 100mS steps.

Note - at the end of the set ramp time the bypass contactor will energise even though the motor may not be at full speed.

The settings in this screen enable the user to adjust the starting torque and set the final 'run out' voltage. The pedestal is set on final test and depends on the application. Generally for pumps and fans it can be set lower than constant torque applications. The target voltage setting is used to give linear acceleration for some applications, although it is normally set to 100%

SEE CURRENT CONTROL CURVE OPPOSITE

The first question in this screen is RAMP TO LIMIT and the user must input a value between 1 and 10 seconds which determines how long it will take for the current to rise to the limit. A typical value would be 5s and would suit most applications.

CURRENT LIMIT asks the user to set the multiple of full load current that will be the maximum during the ramp to full speed. For pumps and fans the value can be between 250-350%, for constant torque applications such as conveyors the value may need to be higher

Note - the bypass contactor will not energise until the current has fallen to the full load current setting or less

TIME OUT FOR I LIMIT. In this screen the user must set the length of time allowed at the current limit setting before the unit trips. The user should try to set this value in order to co-ordinate with existing fuses or breakers

5.0 SCREENS - USER MENU - continued

Screen

Explanation

5.3 Control

START/STOP
LOCAL or REMOTE

Within the user menu the stop/start control can be configured to be either via the terminals or the keypad. Use the UP key to change from local to remote. In LOCAL the user can start, stop and reset from either the keypad on the base unit or from a door mounted keypad if one is fitted. In REMOTE the control for stop/starting is via the terminals. A programmable input can be configured so that an external switch can change from one to the other.

5.4 Stop modes

STOP MODE F S

The user has a choice of two independent stop modes:

- ◆ Freewheel stop (F)
- ◆ Soft stop (S)

If freewheel stop is chosen then every time a stop command is given the mains supply will be disconnected, the bypass contactor will be de-energised, and the motor will freewheel to a stop.

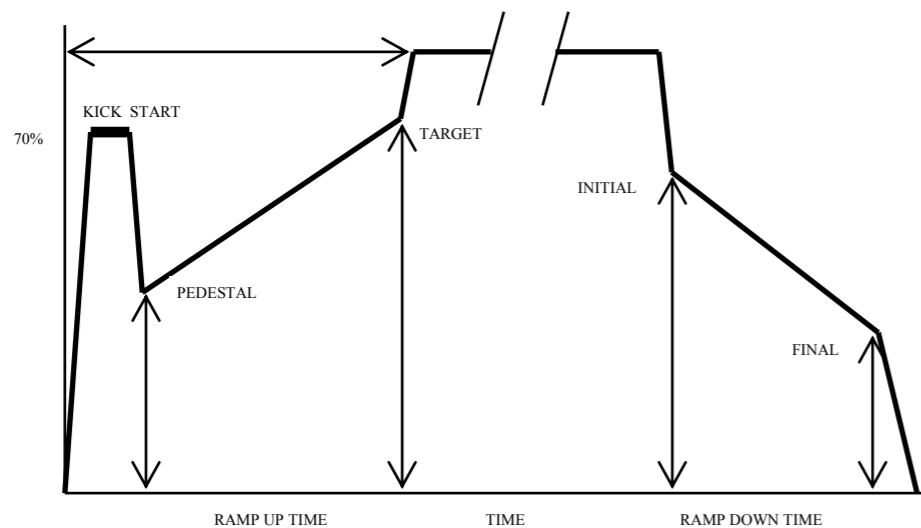
Use the UP key to change

STOP MODE F S
RAMP DOWN 18S

If soft stop is chosen the screen changes and the user sets a RAMP DOWN time. The soft stop is used mainly in pumping systems to avoid 'water hammer' and damage to piping. The INITIAL value is a percentage of full volts and should be set so that the speed of the motor is affected immediately. The FINAL value is also a percentage of full volts and is the natural 'stall' point of the motor/load. The above settings are not able to be pre-set at the Factory as the site conditions, type of pump, length of pipe work etc, affects the values. Please note that the FINAL value needs to be set carefully so that the motor does not stall through lack of volts and trips the soft starter.

next

INITIAL 90%
FINAL 10%



6.0 SCREENS - OPTIONS MENU

Screen

Explanation

USER MENU N
OPTIONS MENU Y

To enter the options menu move the cursor from USER to OPTIONS and press the NEXT key

6.1 next

THERMISTOR Y/N

Terminals 11 and 12 are the thermistor trip input but the user has to 'enable' the function in this menu heading. Please note that once the thermistors are set to Y there must be motor thermistors connected into terminals 11&12. The user can also use thermal trips instead of the thermistors but they must be of the normally closed contact type (see page 5 for details)

6.2 next

U/LOAD 00% FLC
TRIP IN 00 MIN

The underload trip option allows the user to set a lower than full load current value as an 'underload' trip point at which the soft starter will stop after the time set. Use the FLC % bar graph to determine underload values

UNDERLOAD RESET
IN 000 MIN

The underload reset is used mainly as a substitute for float switches or other forms of level control in the Water industry. For example if the underload is set to a level of current that equates to a pump running dry then the starter will switch off after the trip time setting. After the underload reset time has elapsed the unit will start up automatically and check the current, if it is above the trip value it will continue to run until the current value drops below the trip setting at which time the unit will be stopped and the whole cycle repeats.

6.3 next

SHEARPIN Y/N
LEVEL 000%

The shearpin trip is again a percentage of full load current. When the software detects a rise in current to the level set, the starter trips immediately.

6.4 next

AUTO RESET 0123
RESET IN 000S

Automatic reset is an option choice for the user to enable up to 3 automatic resets after a fault. The reset time is for the user to allow a time scale between resets. After a fault and with the auto reset enabled the unit will only restart if the start command is left on. The data log will only register and the ready trip relay actuate after the final reset

6.5 next

O/L PRE ALARM Y/N
SET LEVEL 00%FLC

The overload pre-alarm acts similar to a load monitor and allows the user to set a value of current (more or less than full load current) at which the unit will give an alarm output if a programmable relay is assigned to it. The pre-alarm circuit is not designed to trip the starter unless the programmable relay is used but the screen will flash when the pre-alarm condition is detected.

6.6 next

EARTH LEAKAGE Y
CT AMPS 135

The earth leakage detection system is a standard option and if requested by the end user is switched on via enabling software at the Factory before dispatch otherwise the screens opposite do not appear. If earth leakage is used then the ex-works settings would be 30mA and 5s delay. These values can be altered to suit applications and types of motor. There are 4 levels of leakage, 10,30,100&200mA. The delay can be set from 0.1 to 60s The CT value is set at the Factory and depends on the KW size of the motor.

6.7 next

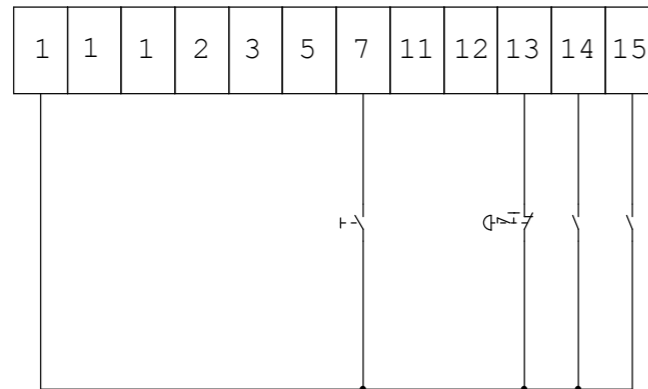
ENTER TIME-CLOCK
MENU Y/N

The automatic timed start/stop system is again a optional extra and as above needs to be switched on via software at the Factory. There are 3 separate start stop times that the user can set. The user must firstly set the current time and then set the start time and stop time, once this is set start/stop-2 will appear and then start/stop-3. Once these times have been set the soft starter will automatically start and stop according to these times. The user must take care that no damage or harm can result from the motor suddenly starting.

SET THE CURRENT
TIME 11:51:07

START-1(2) (3) 00:00
STOP 00:00

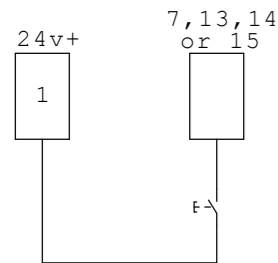
CIRCUIT DIAGRAMS



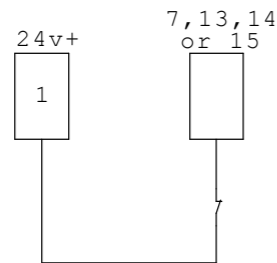
TYPICAL SYSTEM

TER-7 INCH
 TER-13 EMERGENCY STOP
 TER-14 START DELAY
 TER-15 EXT TRIP 1

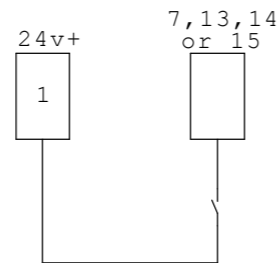
CIRCUIT EXAMPLES



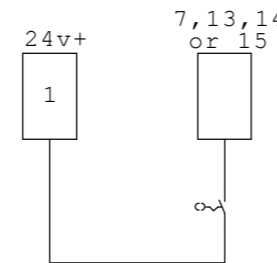
SOFT INCH
 user sets
 voltage level



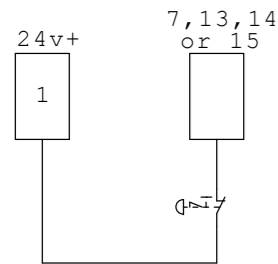
EXT TRIP 1
 user sets
 trip delay



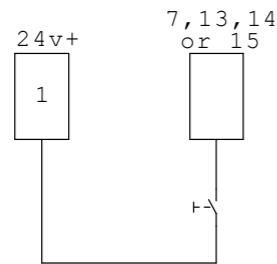
EXT TRIP 2
 user sets
 trip delay



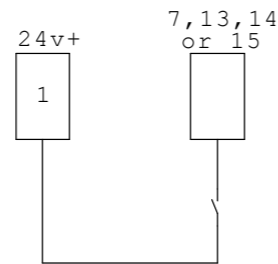
LOCAL/REMOTE
 changes between
 keypad & terminals



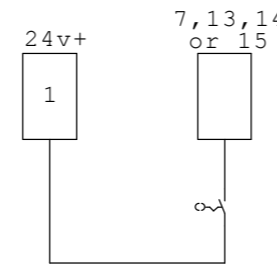
EMERGENCY STOP



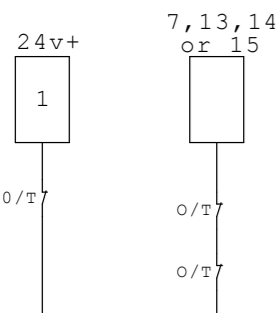
RESET
 N/O pushbutton



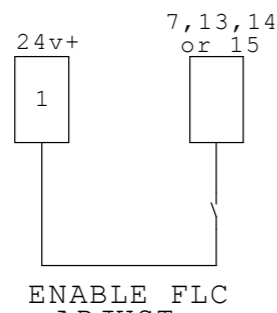
OVERRIDE START
 user sets
 ramp values



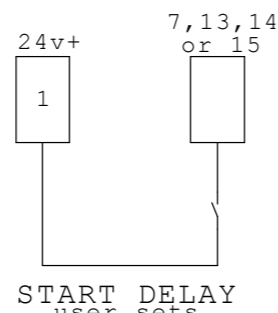
DOL START



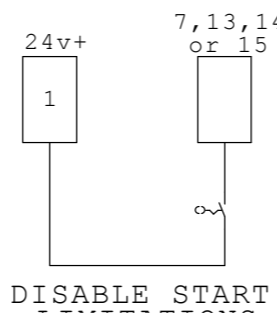
HEATSINK OVER
 TEMPERATURE TRIPS



ENABLE FLC
 ADJUST



START DELAY
 user sets
 delay times



DISABLE START
 LIMITATIONS

7.0 PROGRAMMABLE INPUTS MENU

7.1

Screen

PROG INPUT 1
 TERMINAL 7

PROG INPUT 2
 TERMINAL 13

PROG INPUT 3
 TERMINAL 14

PROG INPUT 4
 TERMINAL 15

Explanation

When the user first enters this menu the programmable input and terminal numbers are shown.

There are four programmable inputs on terminals 7,13,14 and 15. The user can choose an input and then assign *one* program to that terminal. The program inputs are listed below and it enables the user to tailor the soft starter to a particular application.

For example, if the user needed a 'soft' inch facility for say, positioning purposes, an input would be chosen and inch would be assigned to that input. Therefore whenever the inch button was pressed the voltage would rise to the inch level setting.

ONLY ONE INPUT PER PROGRAM

7.2 Program inputs

INCH	Y/N
LEVEL (min=10%, max=85%)	
EXT TRIP 1	Y/N
TRIP DELAY	00S
EXT TRIP 2	Y/N
TRIP DELAY	00S
START DELAY	Y/N
DELAY TIME	00S
LOCAL/REMOTE	Y/N
EM STOP	Y/N
RESET	Y/N
H/S OVER TEMP	Y/N
OVERRIDE START	Y/N
RAMP TIME	10S
KICK TIME	000mS
PEDESTAL	00%
TARGET	00%
DIS AUTO RESET	Y/N
TIME CLOCK	Y/N
DIS START LIMS	Y/N
DOL START	Y/N
ENABLE FLC ADJ	Y/N

INCH Soft inch can be used for positioning the user needs to set the voltage level.

EXT TRIP 1 This is a delay on de-energisation timer. The user will have to set the time required.

EXT TRIP 2 this is a delay on energisation timer the user will have to set the time required.

START DELAY This allows the user to set a delay, after receiving a start command the screen will show a countdown message and at zero the soft starter will begin to ramp.

LOCAL/REMOTE This program input switches the stop/start control from keypad to terminals.

EM STOP For use with an emergency stop button or relay. Requires a N\C contact to prevent tripping.

RESET Once set, this program input will reset any fault within the soft-starter. Needs a momentary N\O contact.

H/S OVER TEMP If over temperature trips are fitted to the thyristor stack this input can be set to monitor the trips.

OVERRIDE START If this option is chosen the user can set other values for starting the motor so that when the programmable input is chosen the starting values alter to the override settings.

DISABLE AUTO RST This option allows the user to disable the auto reset for certain conditions.

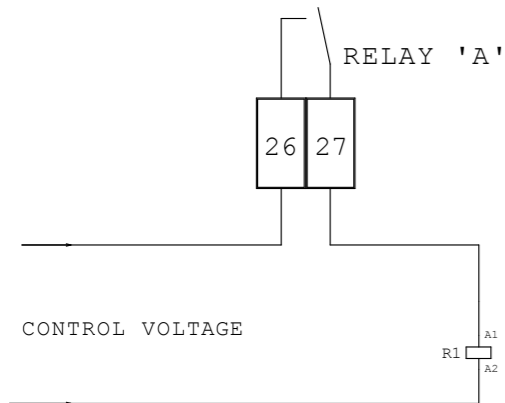
TIME CLOCK if the user has set the optional 24 hour time clock menu it can be disabled by using this prog input

DISABLE START LIMITATIONS this input allows the user disable the starts per hour limitations.

DOL START In an emergency and providing other switchgear and protection fuses/breakers will stand it the user can perform a direct on line start using the bypass contactor. The overload protection within the soft starter will still be active but the shearpin setting may have to be increased in value or disabled

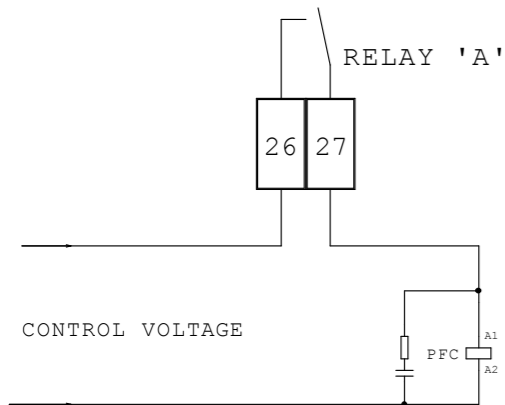
ENABLE FLC ADJUST The user can adjust the full load current settings without entering the Menu Structure. This can be done via a 12 position switch or a potentiometer.

CIRCUIT DIAGRAMS

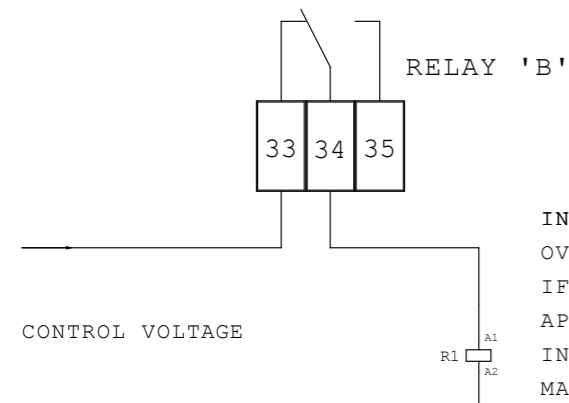


NOTES

IN THIS CIRCUIT RELAY 'A' WILL BE SET IN THE MENU FOR TOP OF RAMP. WHEN THE BYPASS CONTACTOR ENERGISES RELAY 'A' WILL ALSO ENERGISE. THIS CIRCUIT IS USED TYPICALLY TO SEND A FULL SPEED SIGNAL TO OTHER CIRCUITS OR PLCs



IN THIS CIRCUIT RELAY 'A' WILL BE SET IN THE MENU FOR POWER FACTOR. THE RELAY WILL THEN ENERGISE 500ms AFTER THE BYPASS CONTACTOR HAS ENERGISED AND WILL DE-ENERGISE 500ms BEFORE THE BYPASS DROPS OUT THIS ALLOWS THE USER TO ADD POWER FACTOR CAPACITORS AND ENERGISE THEM FROM THE PFC CONTACTOR AS SHOWN



IN THIS CIRCUIT RELAY 'B' WILL BE SET IN THE MENU FOR OVERLOAD PRE-ALARM. THIS ENABLES THE USER TO SEND A SIGNAL IF THE MOTOR DRAWS MORE CURRENT THAN IS NORMAL FOR THE APPLICATION. FOR EXAMPLE, DETECTING EXCESS CURRENT IN A MIXING MACHINE BECAUSE IT HAS BEEN OVERLOADED WITH MATERIAL OR PRODUCT

8.0 PROGRAMMABLE RELAYS MENU

PROG INPUTS N
PROG RELAY Y

From the initial menu choose **PROG RELAYS** and press **NEXT** this will take the user into the programmable relays menu

8.1 Programmable relay A

RELAY A
T26 & T27

Relay **A** is on terminals 26 & 27 and is a single pole single throw programmable relay. The contacts are rated at 10A@400v and is the first of two programmable relays. The user may choose to assign any **one** of the functions listed below to this relay.

8.2 Programmable relay B

RELAY B
T 33 T34 T35

Relay **B** is on terminals 33,34 & 35. This is the second of two programmable relays and the user may choose to assign any **one** of the functions listed below to this relay.

8.3 Programmable functions

OVERLOAD
UNDERLOAD
THERMISTOR
SERVICE TIME
PHASE FAULT
FIRING FAULT
EXTERNAL TRIP 1
EXTERNAL TRIP 2
O/L PRE-ALARM
MOTOR RUNNING
SHEARPIN
TOO MANY STARTS
TOP OF RAMP
POWER FACTOR
READY TRIP (only on B)
PHASE ROTATION
UNDER VOLTS
OVER VOLTS
MOTOR/SCR FLT

The user has to choose the programmable relay to be used and assign a function to it. Once a relay has had a function assigned the menu structure does not allow any more functions to be accessed. The user must cancel the action assigned before the menu will show the other options available.

The relays are all rated at **10amps AC1** with a voltage withstand of 400v, 50\60hz. The relays can switch DC voltages but the switching current is reduced to 3amps. If large currents need to be switched it is recommended that a slave relay is used.

POWER FACTOR is a unique and special setting that enables the user to energise a contactor from a programmable relay so that the power factor capacitors are only charged or discharged whilst the bypass contactor is energised. Relay 'B' can also be used as a second **READY/TRIP** relay

REMEMBER

ONCE A FUNCTION HAS BEEN ASSIGNED TO A RELAY NO OTHER FUNCTIONS ARE AVAILABLE

9.0 ENGINEERS MENU

Screen

Explanation

9.1 Entering pin number

ENGINEERS MENU Y
USB MENU N

Although all the previous menus have been designed for full user access the ENGINEERS MENU can only be opened by entering a second PIN number.

ENTER PIN No 19
THEN PRESS NEXT

THE OPTIONS LISTED IN THIS MENU SHOULD ONLY BE ALTERED BY AUTHORISED PERSONNEL

PLEASE NOTE NOT ALL OF THE SETTINGS AVAILABLE IN THE ENGINEERS MENU ARE LISTED BELOW 'IF IN ANY DOUBT CONSULT RALSPEED'

9.2 Menu settings

SET PIN MAIN 17
SET PIN ENGR 19

The PIN numbers are set at the factory and should only be altered with the permission of **RALSPEED**.

CT TRANS —A
O/L IN RAMP Y\N

The current transformer ratio is set at the Factory. There are some applications where the overload, even with the slowest trip setting, will still trip during ramp up. Using this facility the overload can be disabled during the ramp up.

DUTY CYCLE
STARTS PER HR 00

The maximum duty cycle is 20 starts per hour. This is for units up to 75kw. Above that 10 per hour is normal. If the menu is set to zero there will be no restrictions to the number of starts per hour.

LOW I IN START
CHECKING Y

There is an option with this setting to turn off the low current detect during starting. This is useful when testing a large soft starter on a small motor.

HOURS RUN
000000 HRS

This screen shows how many hours the starter has been running. This counter can be reset by holding down the up/down keys

TIME HH:MM:SS
DATE DD/MM/YYYY

The time and date can be altered in this screen

SERVICE 8750HRS
BPC CHECK DLY 0S

The first part of this screen asks the user if there is to be a service interval, and if so how many hours between services.

The second part of this screen is to allow the user the to delay the bypass contactor from de-energising when soft stop is used.

ENERGISE BYPASS
CONTACTOR 0S

The setting in this screen enables the user to energise the bypass contactor either earlier or later than is normal. The user should not alter the setting from zero unless the implications are fully understood.

PHASE SETTING Y\N
PHASE CHECKING Y\N

If the user requires the soft starter to be phase rotation sensitive then both questions should be set to **YES**. After the next **START** the unit will have logged the phase sequence and the user will have to enter and exit the menu to set the change. Thereafter the phase sequence will be checked on every start up.

ENTER FAULT MENU
Y\N

The Fault Menu is normally set on final test so the User should avoid entering this section unless the Factory has been consulted. For information purposes the following settings are contained within this menu; **MOTOR VOLTAGE, LATCH DETECT, MISSING PULSE,** (these two choices are concerning the latching and zero crossover detection circuits for the thyristors) **HIGH & LOW VOLTAGE DETECT, & TRIP AND LOG (DATA) OR LOG ONLY.** These last two settings refer to the 1000 event data log.

10.0 USB MENU AND DATA LOG

10.1 Entering USB menu

ENGINEERS MENU N
USB MENU Y

Using the **next** key with the cursor under 'Y' for will take the user to the next menu settings.

SAVE TO USB Y
LOAD FROM USB N

The first setting is asking the user to save the configuration menu settings to a memory stick. these settings can then be viewed on a computer, altered and then re-installed using the second part of this screen. Also if the user needs to alter any settings then this can be done via the computer and uploaded to the soft starter.

10.2 Entering and viewing the Data log

TORQ-MASTER 3K
READY TO START

With the **READY TO START** screen showing use the **NEXT** key to scroll down until the **OPEN EVENT LOG** screen appears, press the **ENTER** key and choose with the cursor under 'Y' will take the user to the next menu settings.

OPEN EVENT LOG
PRESS ENTER

VIEW EVENT LOG Y
STORE TO USB N

The first choice is to view the event log through the LCD display and the user will have to use the **NEXT** and **PREV** keys to see the events. Typical screens are shown opposite.

064 STARTED
14 : 22 : 10 25/05

065 BYPASSED
14 : 22 : 22 25/05

Event	Time	Date	Action	Current information
009	16:11:03	23/04/2013	STOPPED	
010	16:29:15	23/04/2013	STARTED	FLC = 77 AMPS
011	16:29:26	23/04/2013	BYPASSED	PEAK I=238.2A
012	16:51:19	23/04/2013	STOPPED	
013	16:59:49	23/04/2013	STARTED	FLC = 77 AMPS
014	17:00:00	23/04/2013	BYPASSED	PEAK I=231.1A
015	17:32:31	23/04/2013	STOPPED	
016	17:42:03	23/04/2013	STARTED	FLC = 77 AMPS
017	17:42:13	23/04/2013	BYPASSED	PEAK I=231.9A
018	18:20:41	23/04/2013	STOPPED	
019	18:30:53	23/04/2013	STARTED	FLC = 77 AMPS
020	18:31:03	23/04/2013	BYPASSED	PEAK I=228.4A
021	19:10:04	23/04/2013	STOPPED	
022	19:18:05	23/04/2013	STARTED	FLC = 77 AMPS
023	19:18:16	23/04/2013	BYPASSED	PEAK I=229.3A
024	19:49:26	23/04/2013	STOPPED	
025	20:00:01	23/04/2013	STARTED	FLC = 77 AMPS
026	20:00:12	23/04/2013	BYPASSED	PEAK I=228.4

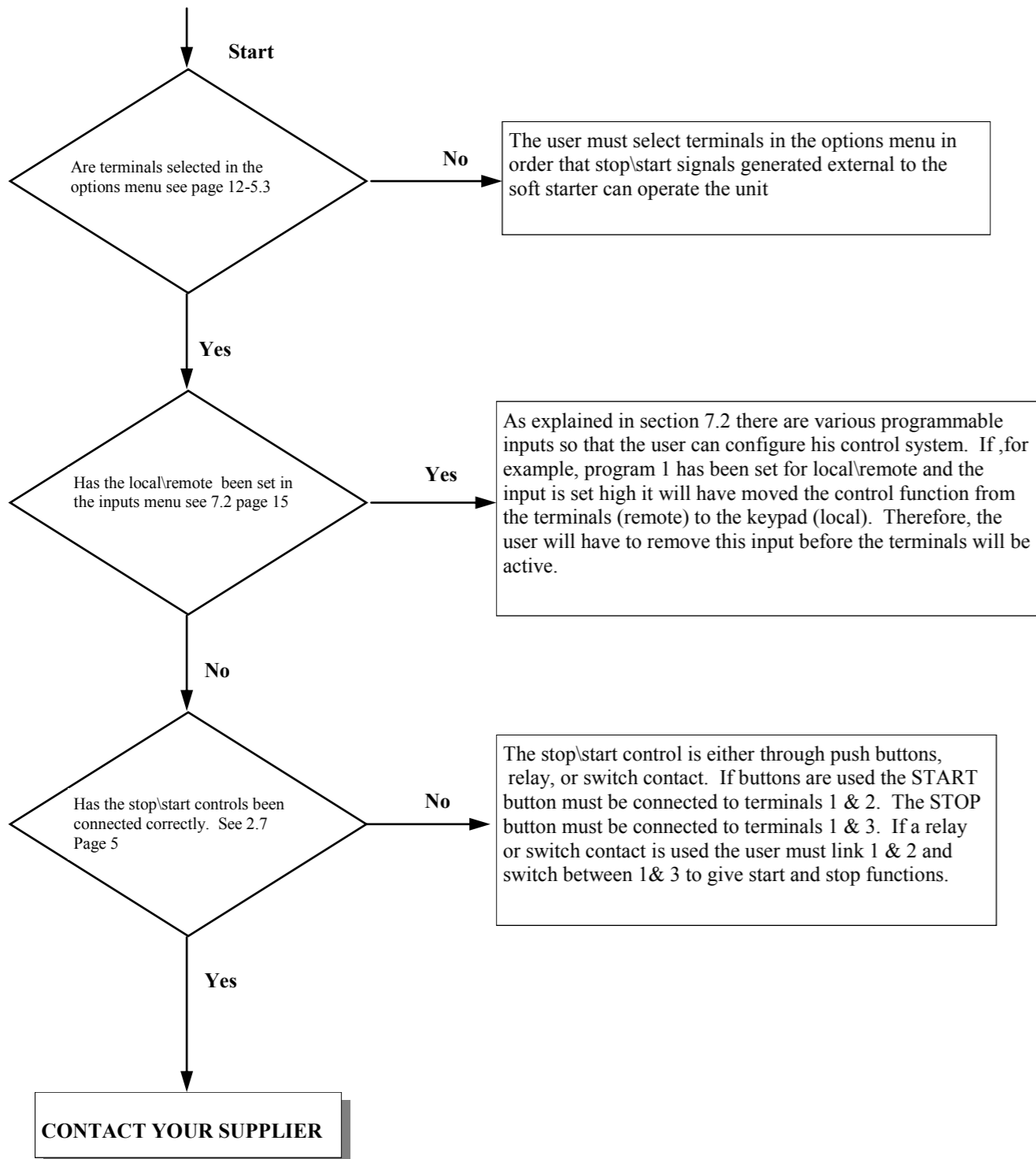
The **STORE TO USB** screen is asking the user to insert a memory stick into the USB port in order to download the log so it can be viewed on a PC. There is much more information when viewed in this way as can be seen from a log extract shown opposite. Not only does it tell the user the FLC setting (77A in this case) but also the peak amps drawn during start up.

The user can also use the memory stick to upload changes to the configuration menu. This allows a standard program to be uploaded to several soft starters.

11.0 TROUBLE SHOOTING FLOW CHART

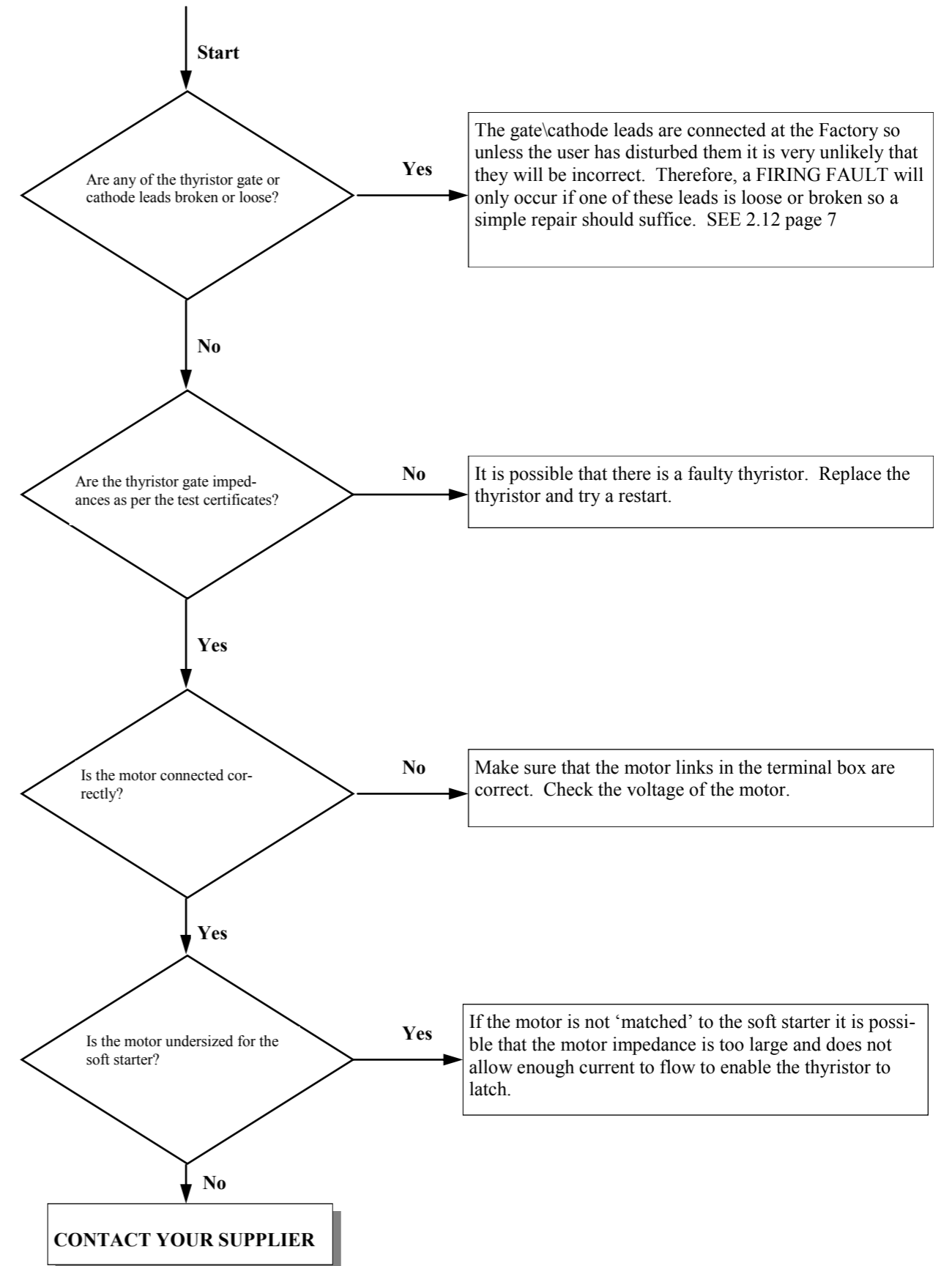
The TORQ-MASTER 3000 has been designed so that the two line sixteen character display gives the user information on the running and fault status of the unit. The following flow charts will allow the user to rectify problems when the display does not give any indication of the problem or is waiting for start command or other inputs from the external control system. This flow chart also helps the user to interpret some of the specialised messages.

11.1 The soft starter does not run



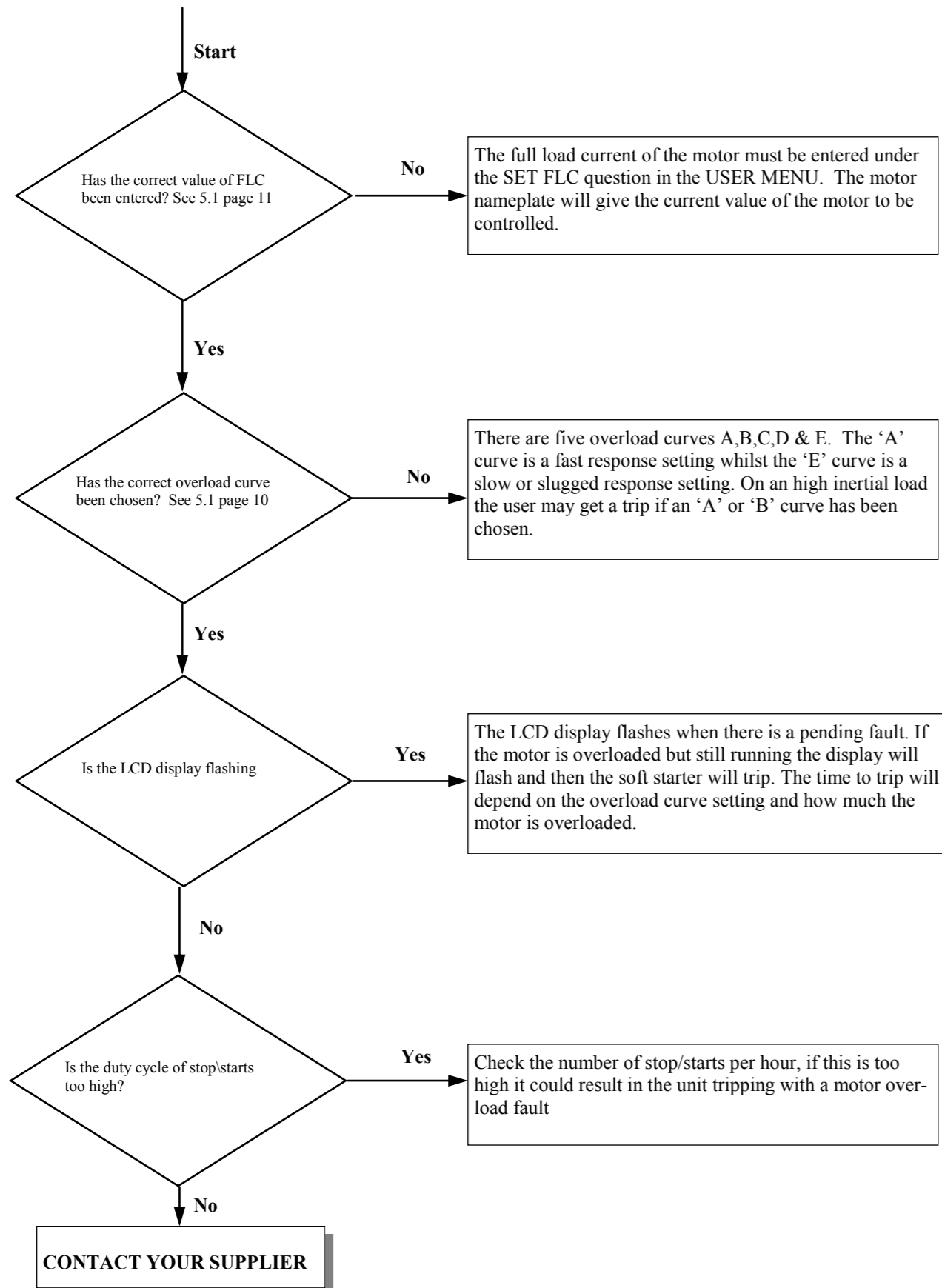
11.0 TROUBLE SHOOTING - CONTINUED

11.2 The soft starter trips on firing fault.



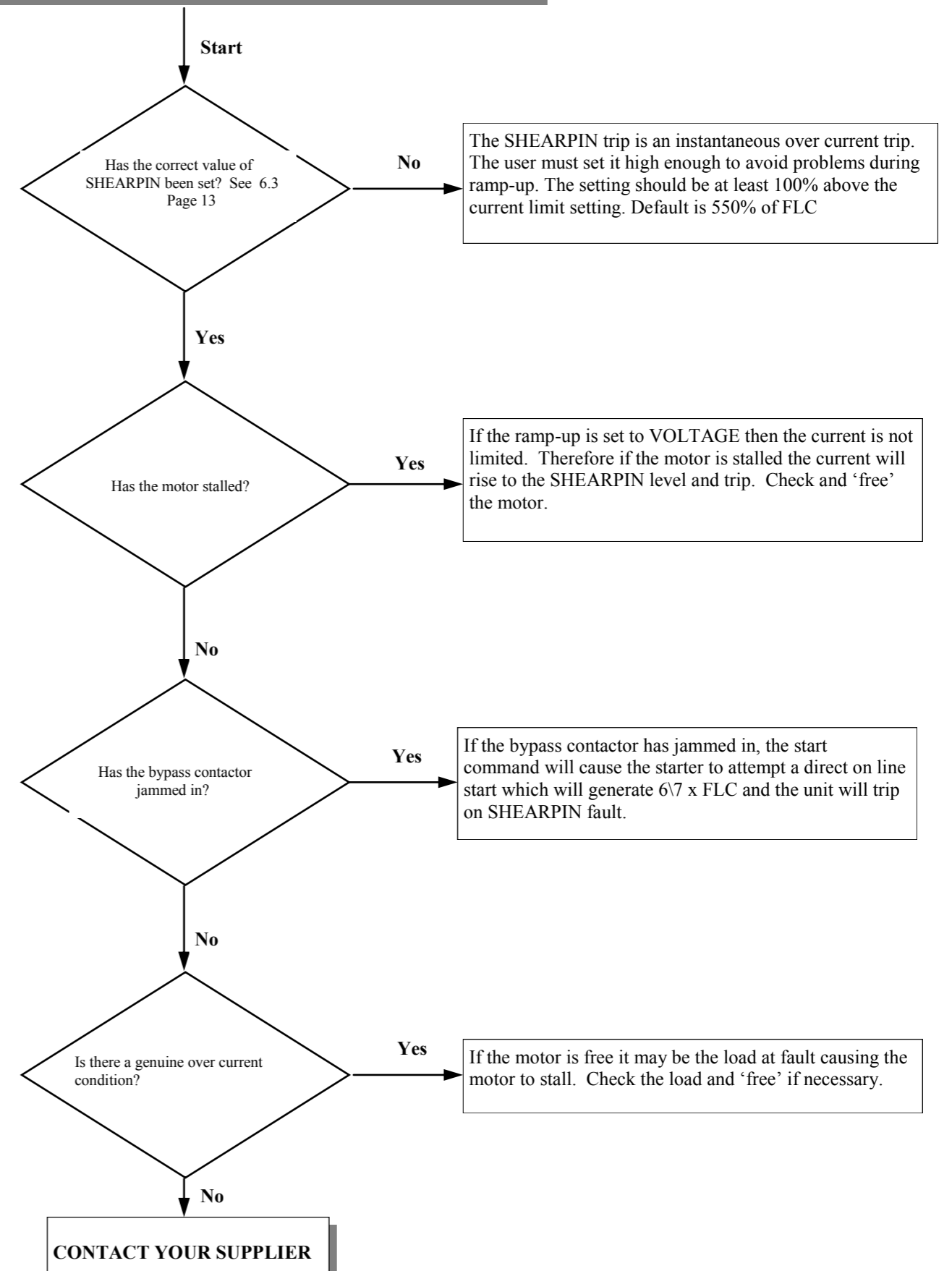
11.0 TROUBLE SHOOTING - CONTINUED

11.3 The soft starter trips on overload fault.



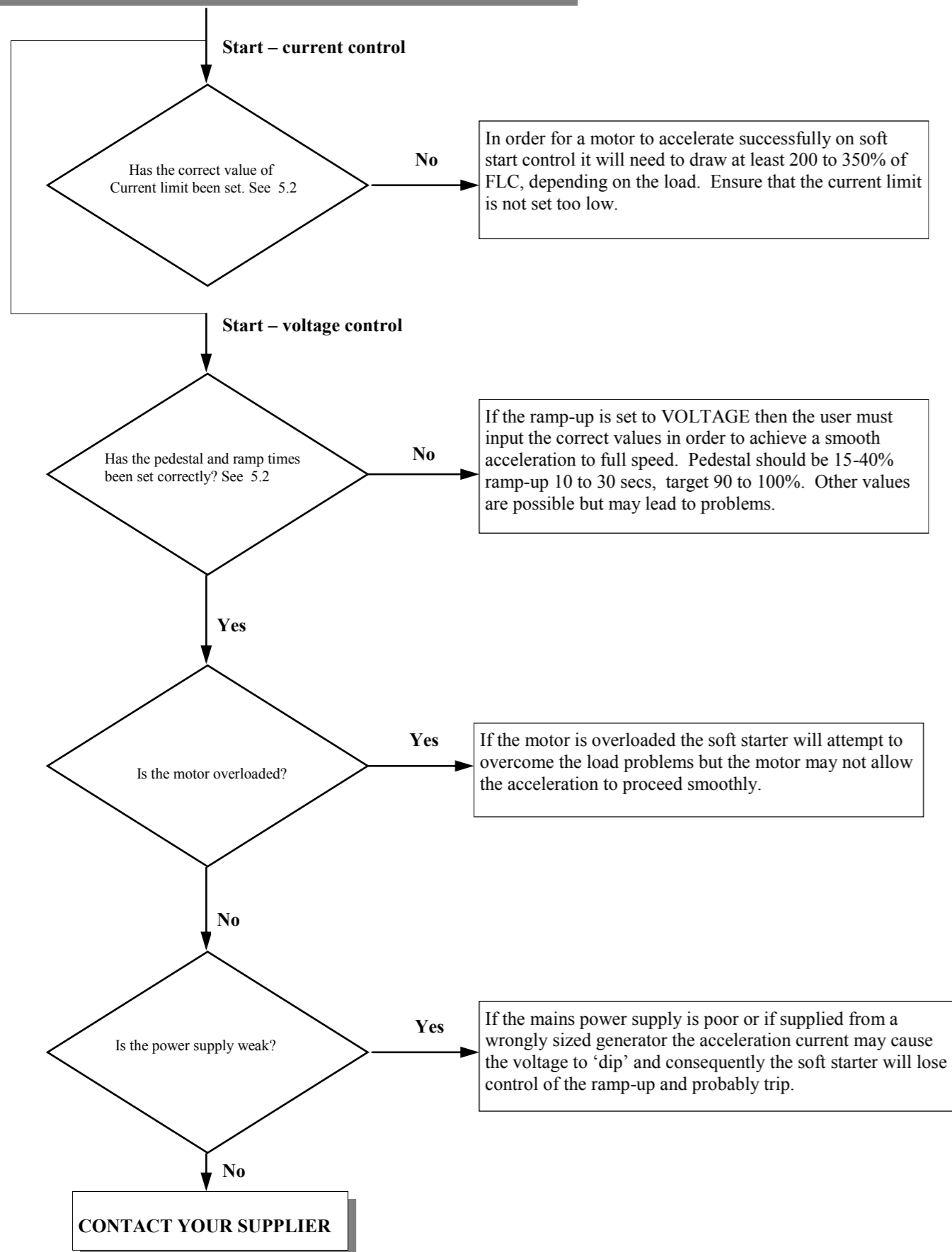
11.0 TROUBLE SHOOTING - CONTINUED

11.4 The soft starter trips on Shearpin fault.



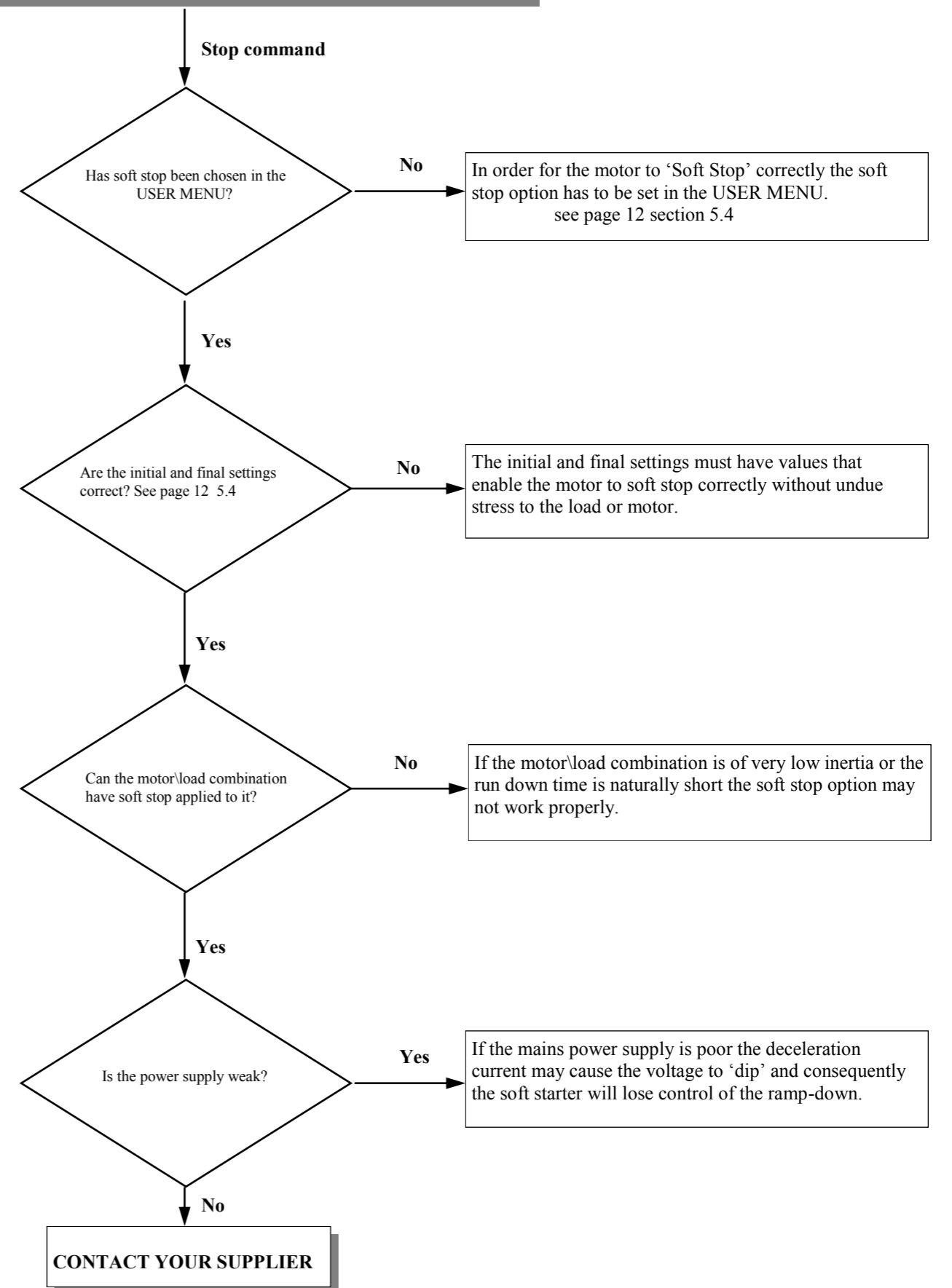
11.0 TROUBLE SHOOTING - CONTINUED

11.5 The motor does not accelerate properly.



11.0 TROUBLE SHOOTING - CONTINUED

11.6 The motor does not soft stop properly.



12.0 SYSTEM DRAWINGS - INDEX

DESCRIPTION	PAGE
BASIC SYSTEM. ISOLATOR, EXTERNAL BYPASS CONTACTOR AND STOP/START PUSHBUTTONS	27
BASIC SYSTEM. ISOLATOR, EXTERNAL BYPASS CONTACTOR AND STOP/START RELAY	27
INTEGRATED BYPASS CONTACTOR AND STOP/START BUTTONS	28
EMERGENCY STOP SYSTEM. INTEGRATED BYPASS CONTACTOR AND STOP/START RELAY	28

Please note that the following drawings are typical and therefore only represent a small part of the overall number of schemes that are possible.

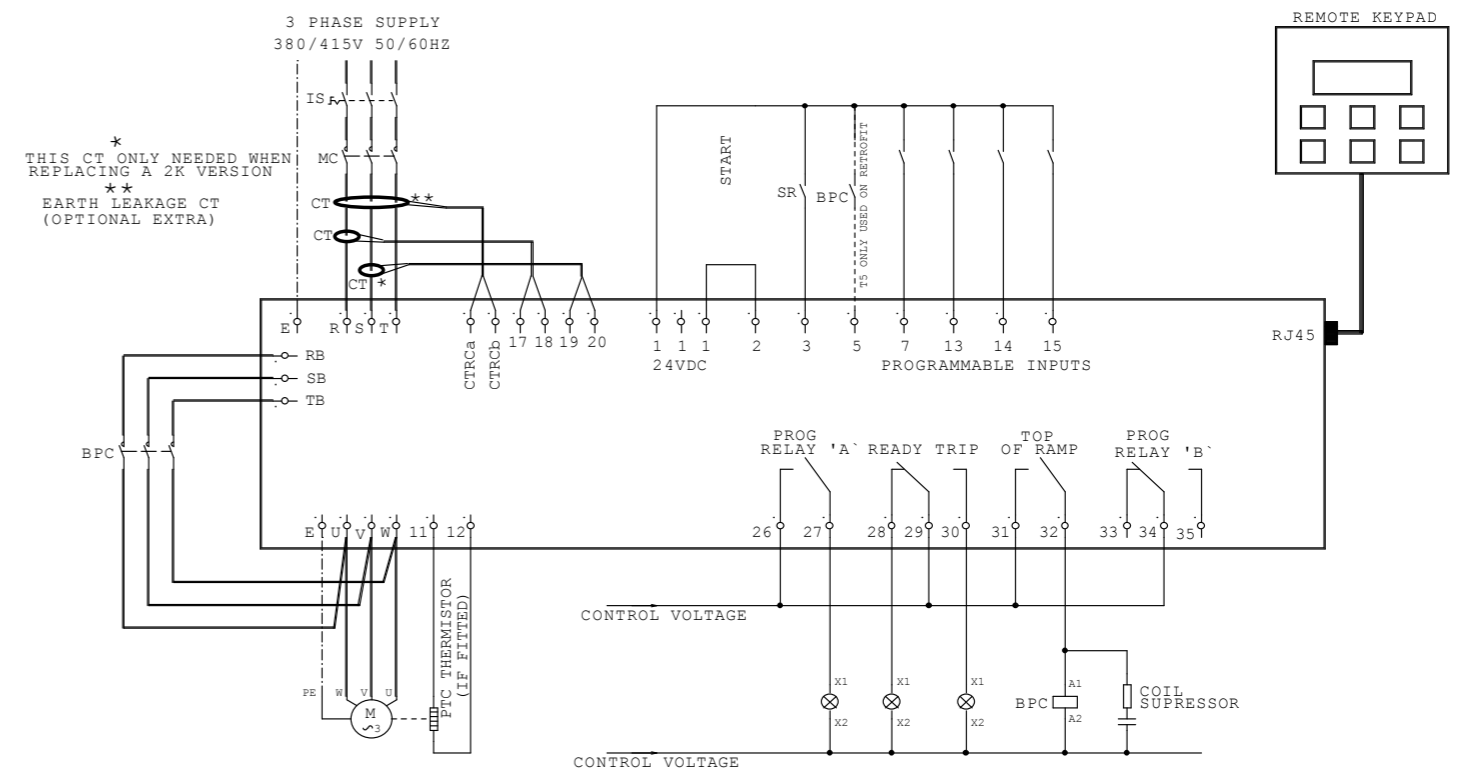
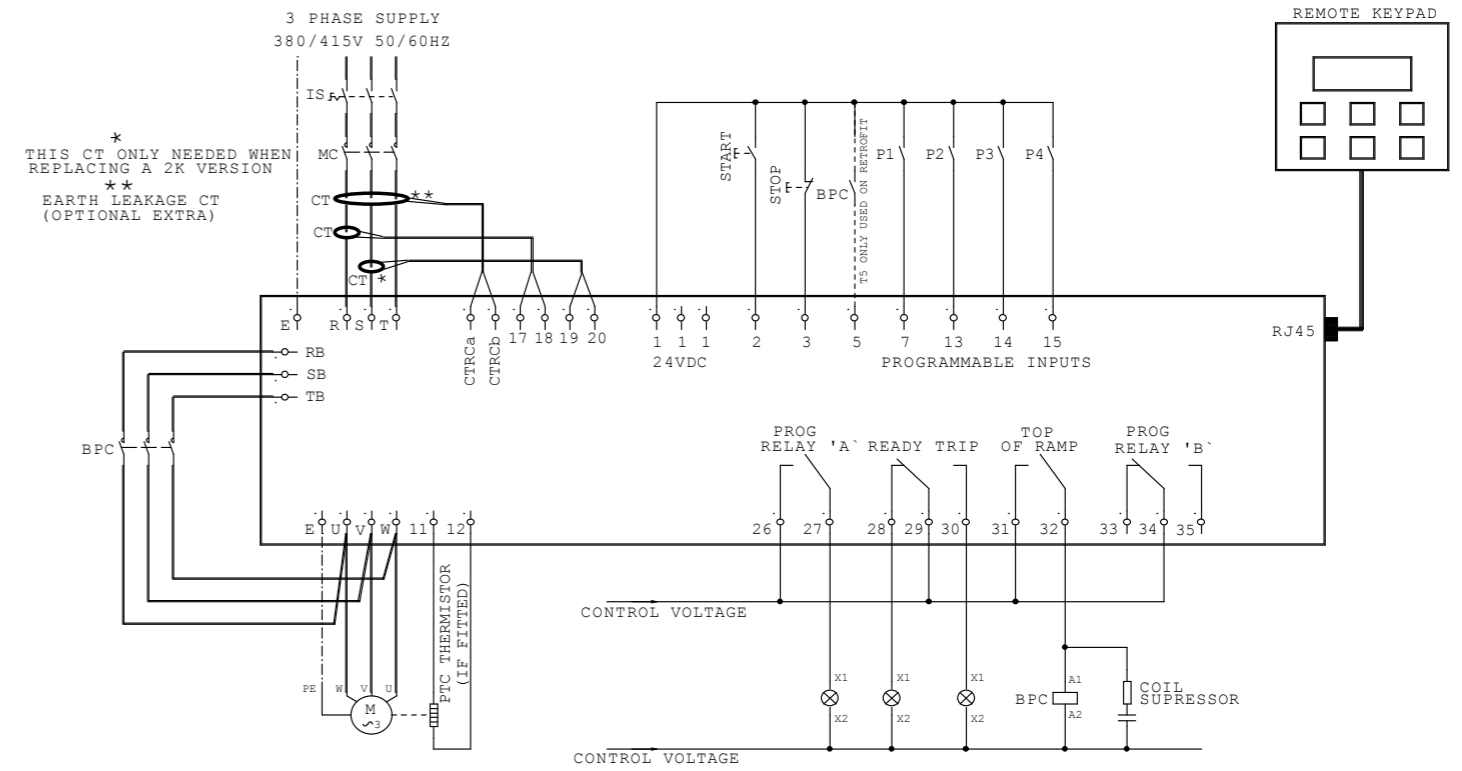
If the user is in any doubt regarding any of the control functions of the TORQ-MASTER soft starter please contact

RALSPED'S TECHNICAL SALES DESK @

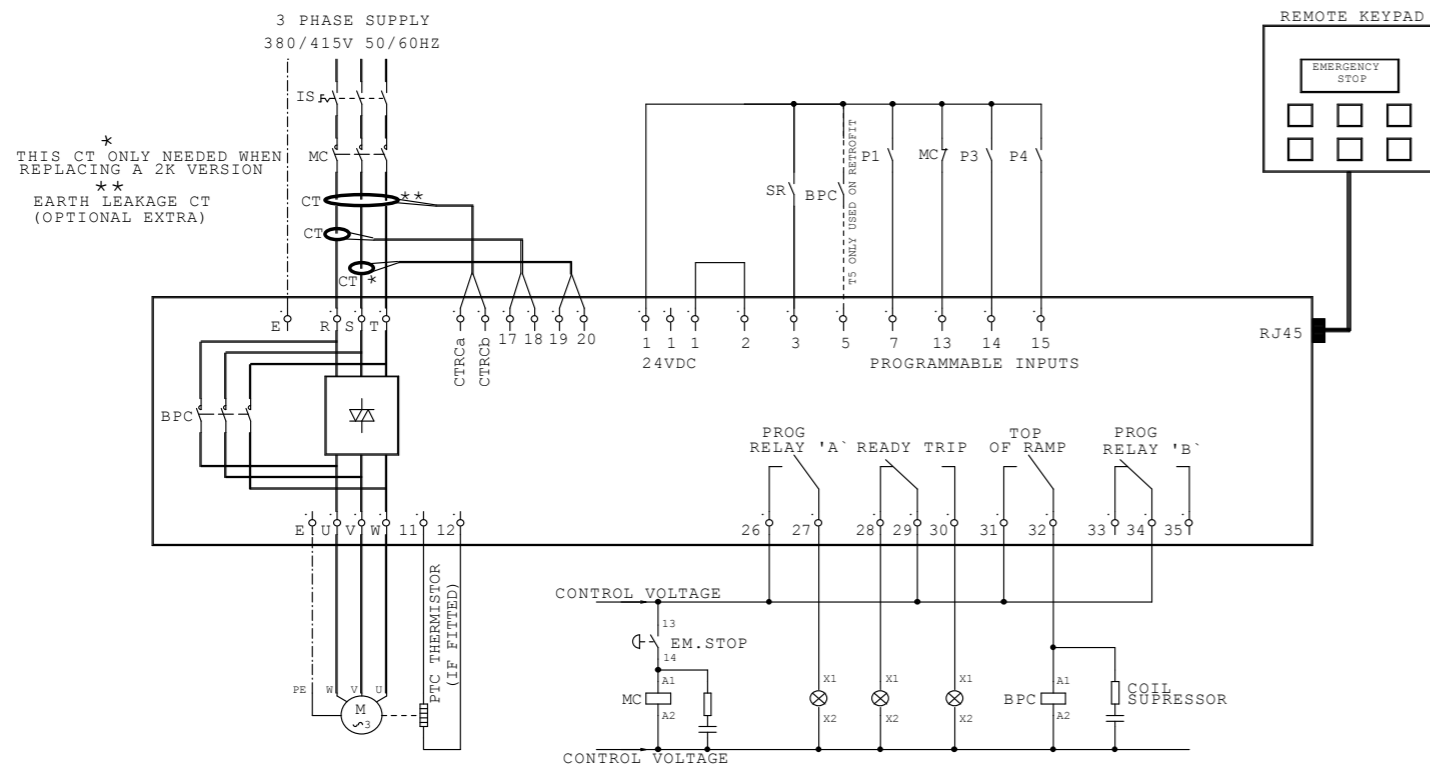
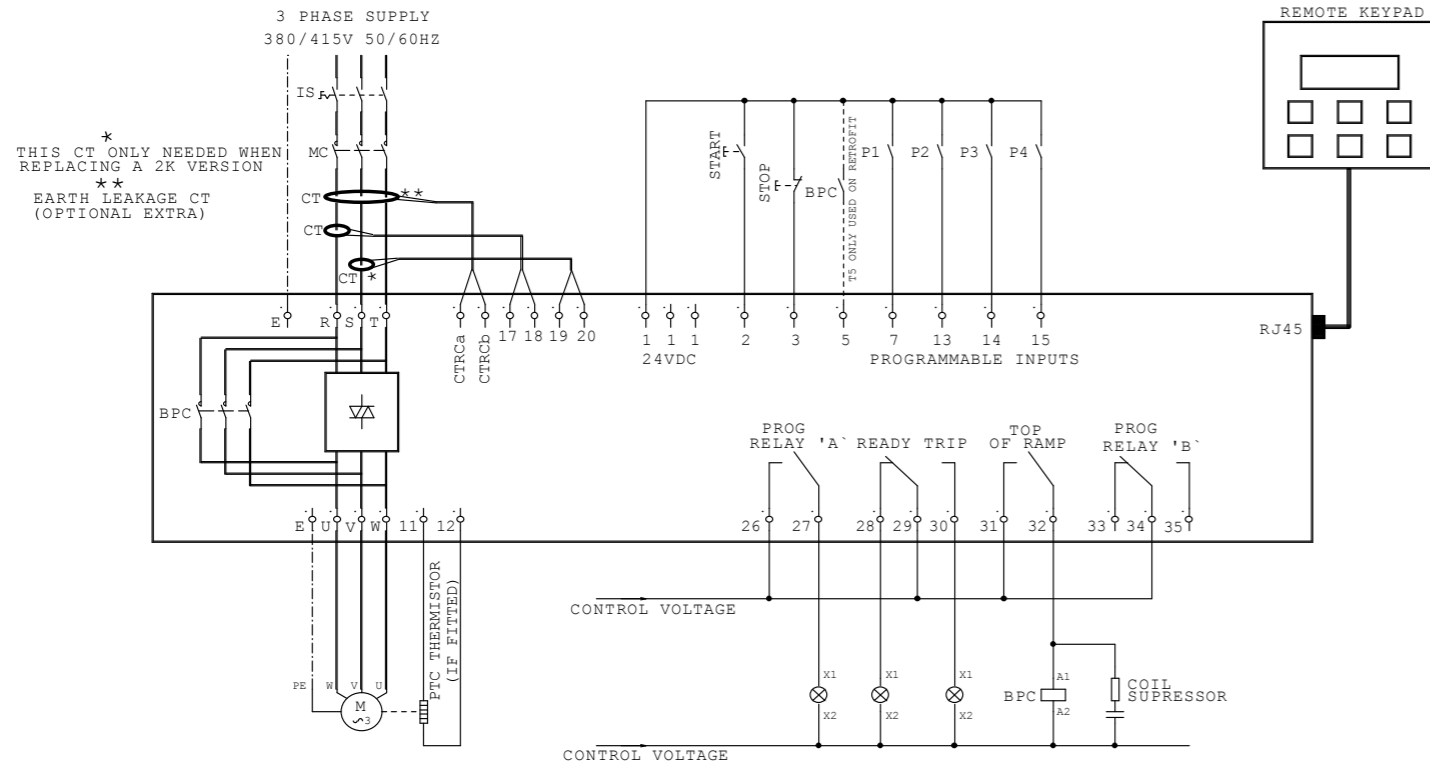
TEL 01254 582345 (4 LINES)
 FAX 01254 668414/504799
 e.mail technical@ralspeed.com

Help is also available at our website:
www.ralspeed.com

CIRCUIT DIAGRAMS



CIRCUIT DIAGRAMS



DECLARATION OF CONFORMITY



Declaration Of Conformity

We;

Manufacturer: Ralspeed Ltd
 A1 Hurstwood Court
 Mercer Way
 Shadsworth Business Park
 Blackburn
 Lancashire
 BB1 2QU

Hereby declare that the products detailed below;

Product/Model: Torq-Master 3000 Soft Starter

- TQM3K-11 500 /B
- TQM3KB-11 500
- TQM3KD-11 90
- TQM3KC-11 500

Have been designed and manufactured to the standards outlined below were applicable;

- Standards:** IEC/EN 60947-4-2
- Safety:** IEC/EN 60204-1 (As is relevant)
- EMC:** IEC/EN 61000-6-2 Generic Immunity, Industrial
 IEC/EN 61000-6-4 Generic Emissions, Industrial

And conforms to the relevant safety provisions of the Low Voltage Directive 2006/95/EC and EMC directive 2004/108/EC

Mr Simon Finlay
 Technical Director



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MERCER WAY • SHADSWORTH BUSINESS PARK
BLACKBURN • LANCASHIRE • BB1 2QU

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