EUROTHERM DRIVES

AC DRIVES
584/585/586
0.75kW - 37kW

PRODUCT MANUAL

HA385329 Issue 3

SAFETY INFORMATION

The equipment described in this manual contains hazardous voltages capable of inflicting severe or lethal electric shock. It is the responsibility of the owner or user to ensure that the equipment described herein is installed and operated in compliance with the requirements of the Health & Safety At Work Act in the UK and applicable legislation, regulations and codes of practice in the UK and elsewhere.

This equipment should be installed and operated by qualified personnel only after reading and understanding the instructions in this manual. Always refer to the supplier if in doubt.

Eurotherm Drives Ltd. accepts no liability for any consequences resulting from innappropriate, negligent or incorrect installation or adjustment of operating parameters of the equipment.

Eurotherm Drives Ltd. has a policy of continual product improvement and reserves the right to change the specification of the equipment and the contents of this manual without notice.

WARNING

The DC link capacitors inside this equipment remain charged to high voltage for some time after the mains supply is removed.
Always check the DC link voltage before starting work.
Never work on the drive, motor or ancillary equipment without first removing all supplies to the system.

TABLE OF CONTENTS

1. ABOUT THIS MANUAL

This manual describes the installation, operation and maintenance of the 584/585/586 series of AC drives. These products have many features which make them easy to apply and use. However it is essential that the contents of this manual are fully understood before commencing work on the drive or system.
The following is a brief description of the contents of each section of this manual. If you are new to AC drives then we would advise you to carefully read sections 3, 4 and 5 in particular.

1. ABOUT THIS MANUAL	This section describes the content of each part of the manual.
2. INTRODUCTION	A brief description of the range of products and features.
3. INSTALLATION INFORMATION	All the basic installation information required to mount the drive in a cubicle and connect it to the power supply, motor and control equipment.
4. BASIC SETUP PROCEDURE	This section describes the procedure for checking out the installation, applying power and getting the motor to turn.
5. TERMINAL DESCRIPTIONS	A detailed description of the function and scaling of each of the control terminals and power connections.
6. USING THE KEYPAD AND DISPLAY	How to use the keypad and display to alter drive parameters and obtain diagnostic information.
7. PARAMETERS AND DIAGNOSTICS	This section contains a detailed description of the function of each parameter.
8. DYNAMIC BRAKING OPTION	How to use the dynamic braking option to obtain faster stopping with large inertias.
9. SERIAL COMMUNICATIONS OPTION	A full explanation of the operation of EIBISYNC serial comms.
10. APPLICATION NOTES	Answers to some of the most common queries concerning drives applications.
11. PRODUCT SPECIFICATIONS	Details of the product code, electrical and mechanical specifications. Drawings of control and power wiring and mechanical outline drawings.

A note on Parameters and Diagnostics.

Throughout this manual, the names of parameters and diagnostics appear in a different font to the rest of the text.
So, for example, wherever the **CURRENT LIMIT** parameter appears the parameter name will be highlighted as shown.

2. INTRODUCTION

Eurotherm Drives **584** series AC drives are intended for speed control of standard 3 phase induction motors. The range covers motor power ratings from 0.75kW (1hp) to 37kW (50hp) with 3 phase mains supply voltages of 380V to 460V.

Using advanced microprocessor technology the motor is sinusoidally excited over the full speed range with maximum frequencies of 120Hz, 240Hz and 480Hz being selectable. Voltage/frequency characteristics are widely adjustable giving optimum control of constant torque loads or efficient operation of fans and pumps.

Selectable switching frequencies and a unique "Quiet Pattern" PWM modulation strategy are employed to minimise the audible noise from the motor. The Quiet Pattern feature reduces motor noise to a background hiss which is generally more acceptable than conventional PWM.

Drive commissioning and operation is greatly simplified by the digital control system which allows rapid and accurate adjustment of the drive configuration. Parameters and diagnostic messages are displayed in plain text on the menu-driven display. Four simple push buttons provide quick access to any drive parameter with just a few keystrokes.

There are several levels of protection built into the drive which ensure that the drive will protect itself under abnormal conditions but will not trip unnecessarily.

Option cards can be fitted inside the drive giving serial communications, closed loop speed control and dynamic braking functions.

3. INSTALLATION INFORMATION

This section contains basic installation information concerning the physical location of the drive, the motor installation and the system wiring.

PLEASE READ THIS SECTION CAREFULLY BEFORE CONNECTING THE MAINS SUPPLY TO THE EQUIPMENT

3.1. DRIVE ENVIRONMENT

1) A clearance of 80mm (3.0") above and below the drive is required to ensure good cooling airflow over the unit.
2) The operating temperature range of the drive is 0 to 50 ^{o}C. If the drive is fitted inside a cubicle, ensure that adequate cubicle ventilation is provided to keep the internal ambient temperature within this range.
3) The drive installation should be protected from airborne dust and excessive vibration.

3.2. MOTOR

1) Inspect the motor for transit damage to windings or connections. Disconnect the motor from the drive before carrying out electrical measurements e.g. insulation resistance.
2) Ensure that the motor is mechanically secure and mounted according to the manufacturers specifications and practice.
3) Ensure that the motor is connected for 380V/460V 3 phase operation as appropriate.
4) Check that there are no obstructions in the motor vents to maintain the cooling air path.
5) Auxiliary cooling must be provided for the motor if constant torque and low speed operation is required. Consult the motor manufacturer's derating specification.
6) Ensure that the motor is free to rotate and that pulleys and couplings are correctly aligned.

3.3. WIRING

1) For information on the wiring of the drive refer to the drawings of the power and control terminals in section 5 TERMINAL DESCRIPTIONS.
2) Control cabling should use 0.75mm^2 (18awg) minimum.
3) Power cable should be rated at 600 VAC minimum and 1.25 x drive rated input/output current as appropriate.
4) Fuses or circuit breakers of the correct rating are required for incoming supply protection.For fuse sizes refer to the tables in section 11.2 ELECTRICAL SPECIFICATION.
5) It is recommended that control wiring should use screened cable with the screen connected to earth at the drive end only. Control wiring should be segregated from power wiring.
6) The 585 and 586 are supplied with an external DC link choke to reduce the RMS input current. **These chokes are not optional and must be fitted.**

3.4. SPECIAL CONSIDERATIONS

For installations requiring compliance with UL standards:

Motor Overload Protection

An external motor overload protective device must be provided by the installer.

Overcurrent Protection Requirements

Fuses must be installed upstream of the drive. For fuse rating and type see section 11.2 ELECTRICAL SPECIFICATION.

Short Circuit Rating

Suitable for use on a circuit capable of delivering not more than 5000 RMS Symmetrical Amperes, 460V maximum.

Field Wiring Temperature Rating

Use (60°C) copper conductors only.

External Surge Suppressor

A UL recognised surge suppressor with a clamping voltage less than 6000V shall be installed upstream of this equipment.

4. BASIC SETTING UP PROCEDURE

WARNING
WAIT 3 MINUTES AFTER POWER IS DISCONNECTED BEFORE WORKING ON ANY PART OF THE SYSTEM OR REMOVING THE TERMINAL COVER FROM THE DRIVE

4.1. CHECKING THE INSTALLATION

Before power is applied to the system the following items should be checked:

1) Mains power supply voltage is correct.
2) Motor is of correct voltage rating and is connected in either star or delta as appropriate.
3) All external wiring circuits; Power connections, Control connections, Motor connections, Earth connections.
   NOTE:- Completely disconnect the drive before point to point checking with a buzzer or when checking insulation with a meggar.
4) Check for damage to equipment.
5) Check for loose ends, clippings, drilling swarf, etc., lodged in the drive or ancillary equipment.
6) If possible check that the motor can be turned freely and that the cooling fan is intact and free of obstructions.

Next ensure the safety of the complete system when the drive is energised. In particular ensure:

1) That rotation of the motor in either direction will not cause damage.
2) That nobody else is working on another part of the equipment which will be affected by powering up.
3) That other equipment will not be adversely affected by powering up.

Prepare to energise the drive and system as follows:

1) Prevent application of the main power supply by removal of the supply fuses or isolate via supply circuit breaker.
2) Disconnect the load from the motor shaft, if possible.
3) If any of the drive control terminals are not being used then read section 5.2 CONTROL TERMINALS to check whether these unused terminals need to be tied high or low.
4) Check external run contacts are open.
5) Check external speed setpoints are all zero.
6) The drive setup parameters such as min/max speed, ramp times etc. all have factory default values. These values should be adequate for many applications, however it may be necessary to change some of the parameters to suit individual applications. Full details of each of the parameters and how to use the keypad and display are given in section 6 USING THE KEYPAD AND DISPLAY.

The most important parameters and their default values are listed below. Check that these are appropriate for your application before proceeding. If any changes are required to these parameters then this should be done when the drive has been powered up but before the drive is enabled.

PARAMETER	DEFAULT	BRIEF DESCRIPTION	PAGE
LIMIT FRQ SELECT	120Hz	Highest drive output frequency	27
BASE FREQUENCY	50Hz	Frequency at which drive gives max output volts	18
MIN SPEED	0Hz	Min motor speed	18
MAX SPEED	50Hz	Max motor speed	18
MOTOR I LIMIT	100%	Output current limit as % of drive rated current	19
OP CURRENT CAL	100%	Calibrates motor rated current to drive rated current	20
RAMP UP TIME	5.0s	Acceleration time from 0Hz to limit frequency	18
RAMP DOWN TIME	5.0s	Deceleration time from limit frequency to 0Hz	18
VOLTAGE BOOST	0.0%	Boosts the starting torque by adding volts at low speed	20
STOPPING MODE	RAMP	Ramp to standstill when RUN signal removed	20

4.2. APPLYING POWER

Once all the preceeding steps are completed and understood, the supply fuses or circuit breaker may be replaced and power applied to the drive. Although fairly general, the following assumes a single drive and motor configuration.

1) At switch on the diagnostic "HEALTH" LED should illuminate. The remaining 3 LEDs should be off and the power-up message should appear on the LCD as follows:

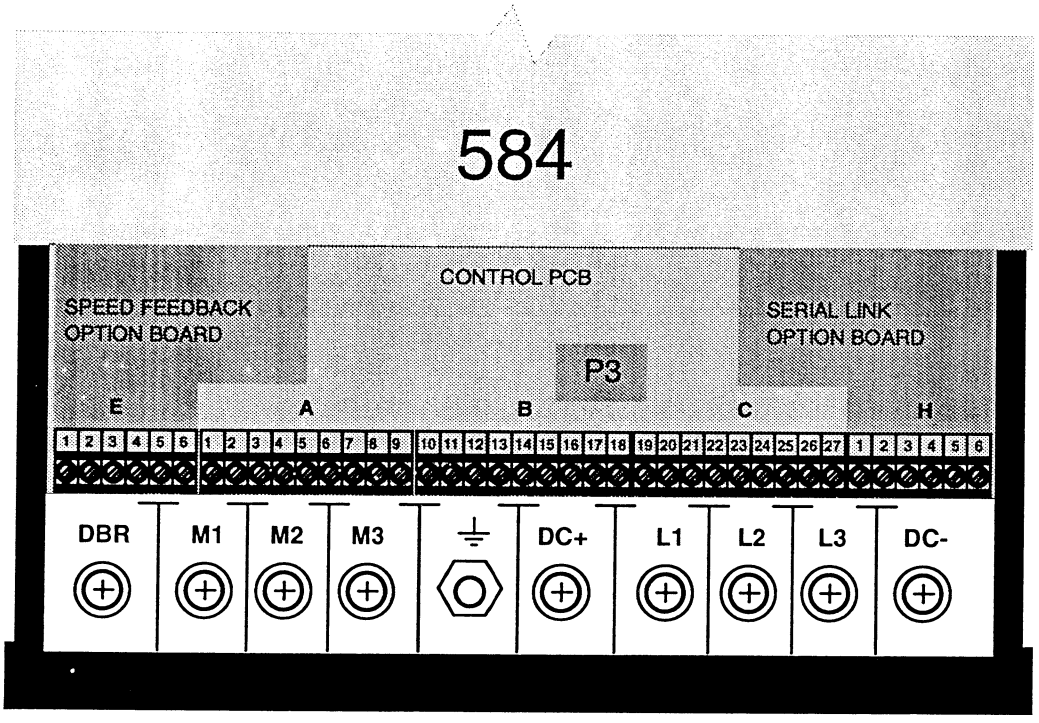
```
MICRO AC DRIVE
ISSUE X.YZ
```

2) If any of the basic drive parameters need to be changed then this should be done now. See section 6 USING THE KEYPAD AND DISPLAY for a full explanation of how to use the keypad and display.
3) Close the RUN contact and give the drive a small speed demand. The motor should rotate slowly.
4) If the motor rotates in the wrong direction either (a) swap two of the output phases M1, M2, M3 or (b) operate the DIRECTION digital input terminal 22.
5) In applications where a high starting torque is required an increase in the **VOLTAGE BOOST** parameter may be necessary.This parameter is described in section 7.2. Excessive boost may cause the drive to trip on OVERCURRENT. Always use the minimum level of boost that allows the motor to start reliably.
6) If the motor current rating is smaller than the drive current rating then the **OP CURRENT CAL** parameter should be reduced to match the motor rating.
7) If several motors are connected to a single inverter then each motor should be protected with an appropriate overload device.

5. TERMINAL DESCRIPTIONS

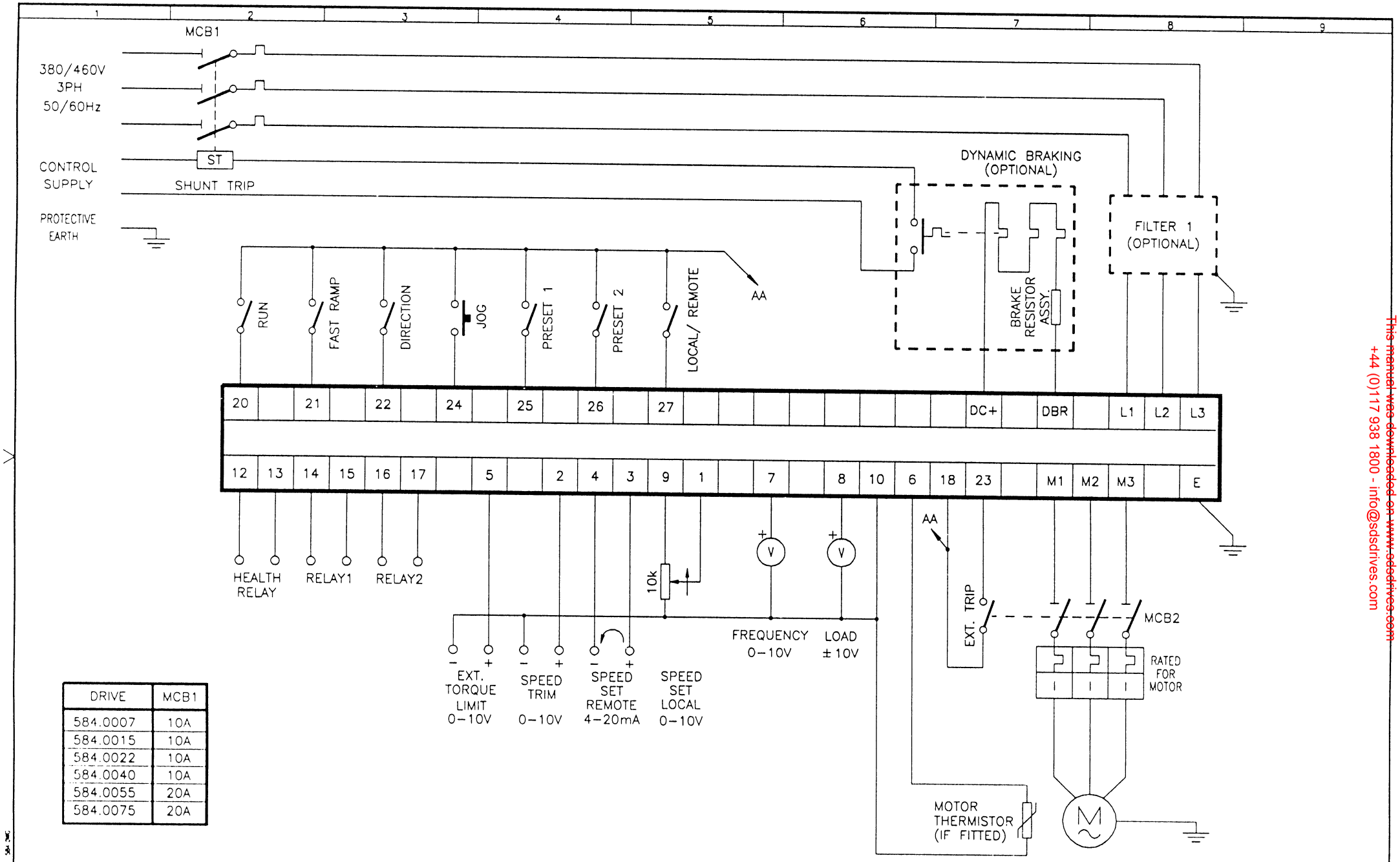
The drawings below show the general arrangement of the power and control terminals. Note that the control terminal layout and functionality is identical on all ratings of drive.

5.1. *584* POWER TERMINALS



DBR	Connection for dynamic braking resistor. Resistor is connected between DBR and DC+. Protect the resistor and cabling with a thermal trip.
M1, M2, M3	Three phase motor connections
GROUND	Protective ground connection usually marked with the IEC grounding symbol ⏚
DC+	DC link +ve for use with DB resistor.
L1, L2, L3	Three phase mains connection 380V to 460V.
DC-	DC link -ve.

Refer to example wiring diagram overleaf for more information.



DRIVE	MCB1
584.0007	10A
584.0015	10A
584.0022	10A
584.0040	10A
584.0055	20A
584.0075	20A

DRAWN	CHECKED	DATE	ISS
MDN	AWS	14 10 92	A
TRACED	DESIGN APP.	12 05 93	B
	JFM	19/11/93	C

ELECTRICAL SYMBOLS GENERALLY TO BS 3939

EUROTHERM DRIVES Ltd.

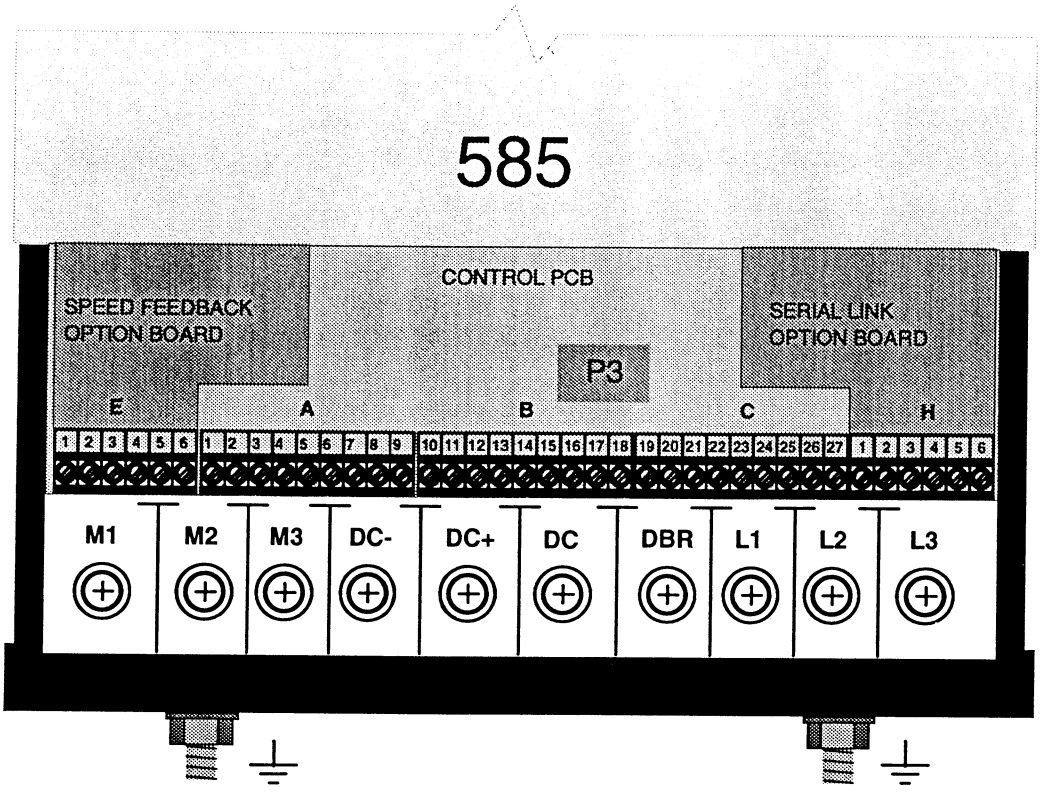
TITLE
584 CONTROL AND
POWER WIRING

USED ON
584 INVERTER

DRAWING NUMBER
HB 358566 D

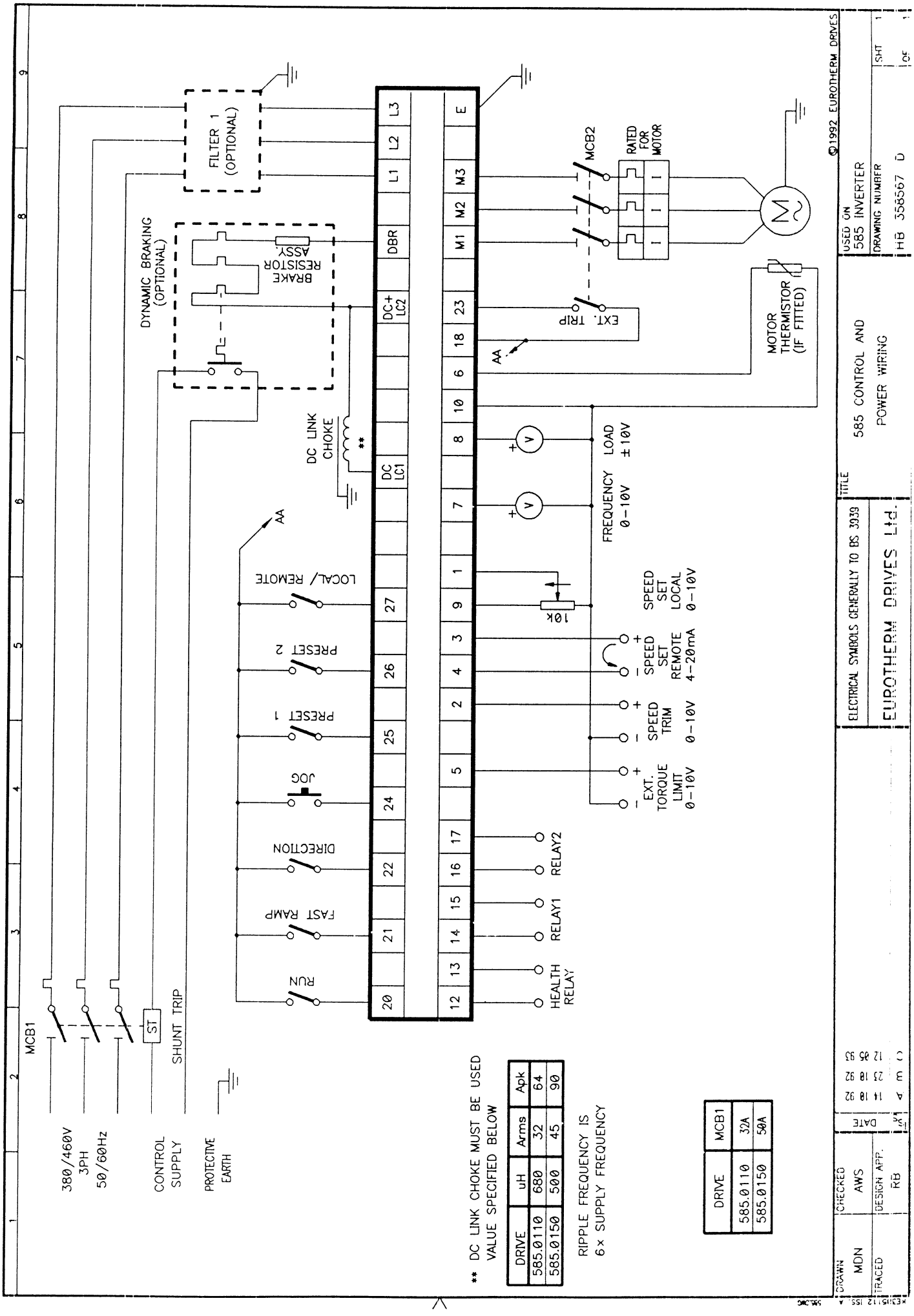
SHT. 1
OF 1

5.2. *585* POWER TERMINALS



M1, M2, M3	Three phase motor connections
DC-	DC link -ve.
DC+	DC link +ve for use with DB resistor.
DC	DC link choke connection between here and DC+
DBR	Connection for dynamic braking resistor. Resistor is connected between DBR and DC+. Protect the resistor and cabling with a thermal trip.
L1, L2, L3	Three phase mains connection 380V to 460V.
GROUND	Protective ground connection usually marked with the IEC grounding symbol

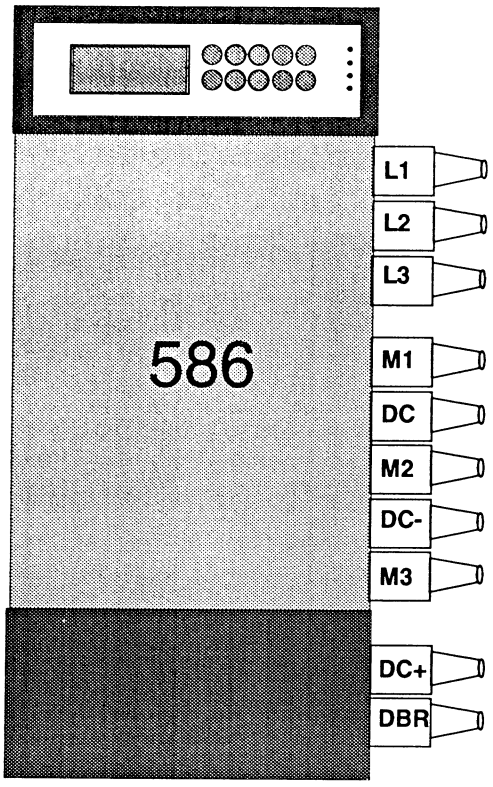
Refer to example wiring diagram overleaf for more information. Note in particular the DC link choke connections in the +ve side of the DC link.



DRIVE	uH	Arms	Apk
585.0110	680	32	64
585.0150	500	45	90

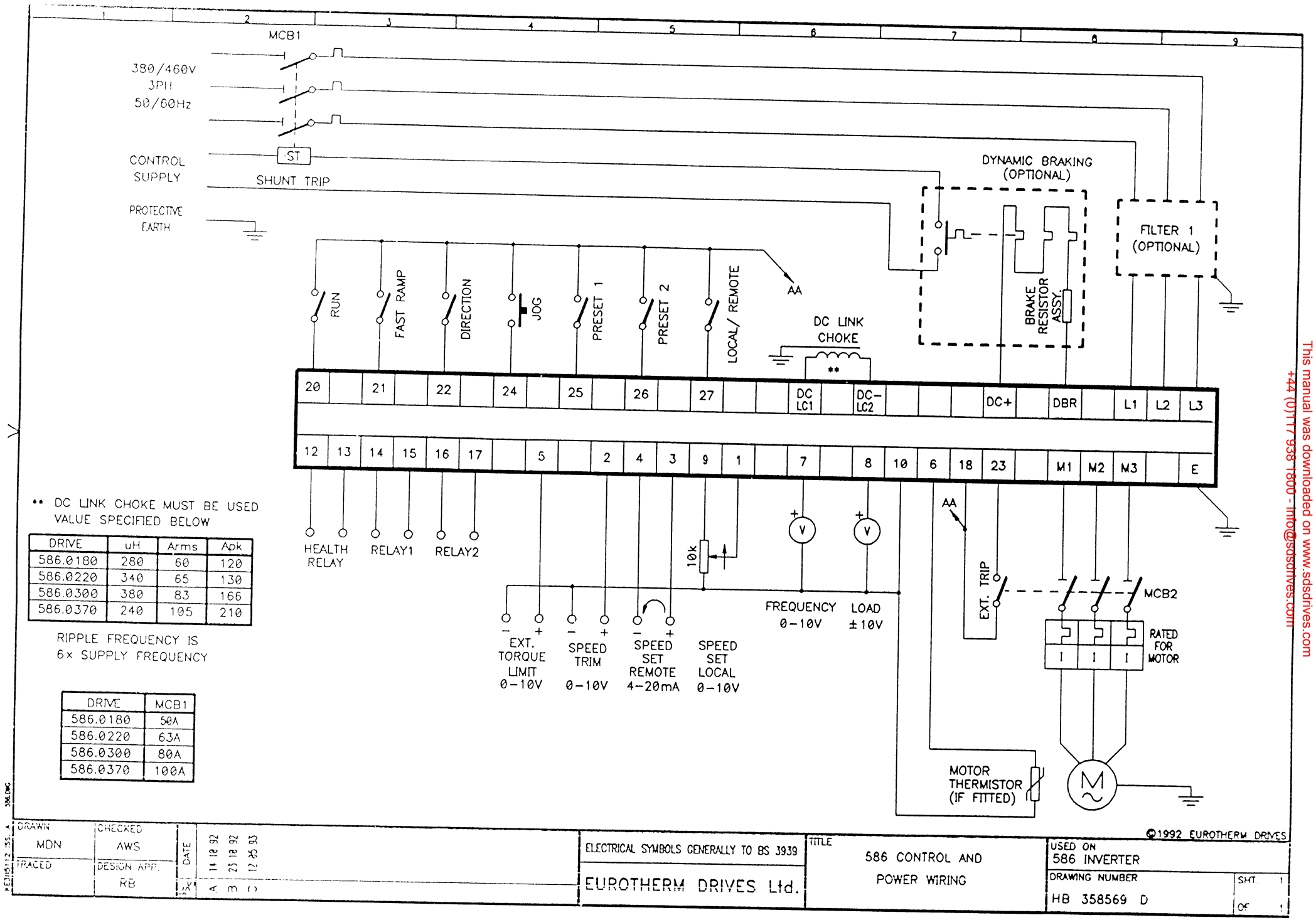
DRIVE	MCB1
585.0110	32A
585.0150	50A

5.3. *586* POWER TERMINALS



M1, M2, M3	Three phase motor connections
DC-	DC link -ve.
DC+	DC link +ve for use with DB resistor.
DC	DC link choke connection between here and DC-. **Note that the DC link choke is in the -ve side on the 586.**
DBR	Connection for dynamic braking resistor. Resistor is connected between DBR and DC+. Protect the resistor and cabling with a thermal trip.
L1, L2, L3	Three phase mains connection 380V to 460V.
GROUND	Protective ground connection usually marked with the IEC grounding symbol

Refer to example wiring diagram overleaf for more information. Note in particular the DC link choke connections in the -ve side of the DC link.



** DC LINK CHOKE MUST BE USED
VALUE SPECIFIED BELOW

DRIVE	uH	Arms	Apk
586.0180	280	60	120
586.0220	340	65	130
586.0300	380	83	166
586.0370	240	105	210

RIPPLE FREQUENCY IS
6× SUPPLY FREQUENCY

DRIVE	MCB1
586.0180	50A
586.0220	63A
586.0300	80A
586.0370	100A

DRAWN	CHECKED	DATE	ISSUE
MDN	AWS	14 10 92	A
TRACED	DESIGN APP.	23 10 92	B
	RB	12 05 93	C

ELECTRICAL SYMBOLS GENERALLY TO BS 3939

EUROTHERM DRIVES Ltd.

TITLE
586 CONTROL AND
POWER WIRING

USED ON
586 INVERTER

DRAWING NUMBER
HB 358569 D

SHT 1 OF 1

5.2. CONTROL TERMINALS

ANALOGUE INPUTS

Resolution 10 bits (1 in 1024)
Sample Rate 20ms

TERM. NO.	TERMINAL NAME	DESCRIPTION	SCALING
A1	LOCAL SETPOINT	Analogue speed setpoint. Input range 0 to 10V or +/- 10V selectable from the keypad Input impedance 94kΩ.	+10V= **MAX SPEED** forward 0V = **MIN SPEED** -10V= **MAX SPEED** reverse
A2	TRIM	Analogue speed trim. Input range +/- 10V. Input impedance 94kΩ.	+10V= **MAX SPEED** forward 0V = **MIN SPEED** -10V= **MAX SPEED** reverse
A3 A4	REMOTE SETPOINT + REMOTE SETPOINT -	20mA current loop speed setpoint. Input range 0 to 20mA, 20 to 0mA, 4 to 20mA or 20mA to 4mA as selected from the keypad. Input impedance 100Ω	eg. 4/20mA selected 4mA = **MIN SPEED** 20mA= **MAX SPEED**
A5	TORQUE LIMIT	Analogue torque limit input. Input range 0 to 10V. When enabled from the keypad, this terminal sets the maximum output torque.	10V= 150% drive torque 0V= 0% drive torque
A6	MOTOR THERMISTOR	Analogue input for motor thermistor.	Trip at 3kΩ, reset at 1.8kΩ

ANALOGUE OUTPUTS

Resolution 8 bits (1 in 256)
Update Rate 20ms

TERM. NO.	TERMINAL NAME	DESCRIPTION	SCALING
A7	RAMP OUTPUT	Analogue voltage output representing drive output frequency. Output range 0V to 10V, 5mA max.	Scaling set by **RAMP OUTPUT** parameter. See section 7.2 10V= **MAX SPEED** 0V= **MIN SPEED** or 10V= **LIMIT FREQUENCY** 0V= 0Hz
A8	LOAD OUTPUT	Analogue voltage output representing load (torque). Output range +/-10V, 5mA max.	10V= 150% load motoring 0V= 0% load -10V= 150% load regenerating
A9	+10VREF	+10V supply for analogue inputs. Max load 5mA.	
B10	0V	0V for analogue I/O.	
B11	-10VREF	-10V supply for analogue inputs.	

CONFIGURABLE RELAY OUTPUTS

Max. load 240VAC 3A
Update Rate 20ms

TERM. NO.	TERMINAL NAME	DESCRIPTION
B12 B13	HEALTH RELAY A HEALTH RELAY B	Contacts close to indicate drive powered up and no alarms present.
B14 B15	RELAY 1 A RELAY 1 B	Function configurable from the keypad. See section 7.8: System Parameters.
B16 B17	RELAY 2 A RELAY 2 B	Function configurable from the keypad. See section 7.8: System Parameters.

DIGITAL INPUTS

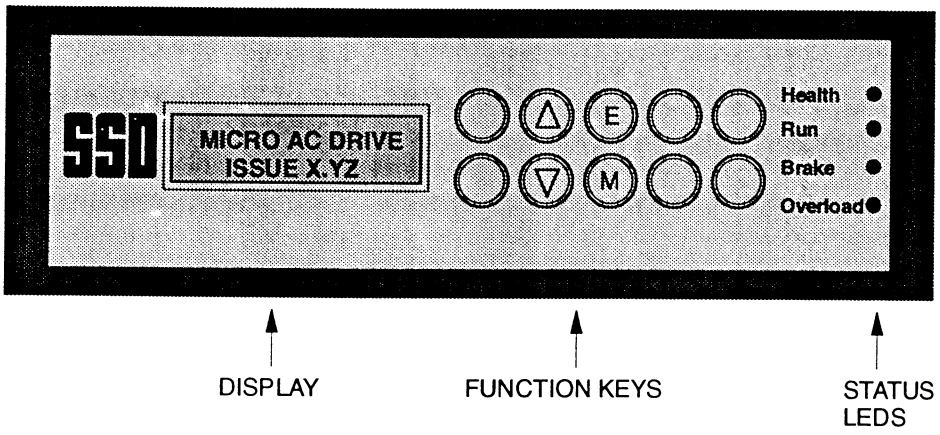
Nominal input voltage	24VDC
Max. input voltage	30VDC
Input impedance	4k7Ω
Sample rate	20ms
Threshold	12V typical
Vin low	<6V
Vin high	>18V

Note that all digital inputs are pulled down to 0V if left open-circuit.

TERM. NO.	TERMINAL NAME	DESCRIPTION	SCALING
B18	+24V	24V supply for use with digital inputs. Max. load 200mA.	
C19	0V	0V for digital inputs.	
C20	RUN	Digital input to run and stop the drive	24V= run 0V= stop
C21	FRAMP	Digital input to select alternative ramp down rate. See section 7.2 for ramp parameters.	24V= framp selected 0V= normal ramp selected
C22	DIRECTION	Digital input to control the direction of the motor.	24V= forward 0V= reverse
C23	EXTERNAL TRIP	Digital input to trip the drive. The motor will coast to standstill.	24V= no trip 0V= trip
C24	JOG	This function is not yet implemented.	
C25 C26	PRESET 1 PRESET 2	Digital inputs to select 1 of 4 preset speeds as shown below: PRESET 2 state / PRESET 1 state / Preset selection 0V / 0V / Preset speed 1 selected 0V / 24V / Preset speed 2 selected 24V / 0V / Preset speed 3 selected 24V / 24V / Preset speed 4 selected	
C27	LOCAL/REMOTE		24V= remote setpoint control 0V= local setpoint control

6. USING THE KEYPAD AND DISPLAY

The Eurotherm Drives **584** range of AC drives feature a 2x16 character liquid crystal display (lcd). Together with the four function keys these provide a simple method of reading diagnostic information or tailoring the drive to individual application requirements. The display is in plain text for clarity and ease of use. In addition there are 4 status LEDs which show the condition of the drive.



6.1. DISPLAY

For simplicity in handling a large number of parameters, the drive information is organised as a menu tree structure. The central core of the tree, menu level 1, will display several sub-menus each associated with one aspect of the product. Any of these sub-menus may be explored as branches from the central core until the desired function or parameter is displayed. When a function or parameter is displayed, it's value may be modified.
Parameters relating to a particular drive function are stored together under one menu heading. For example, all the parameters relating to the serial link are stored under the SERIAL LINKS menu.
The upper line of the display generally describes the current function or menu level. The lower line describes the next function or menu level available, or the value or status of the function selected on the upper line.

6.2. FUNCTION KEYS

The four function keys allow the user to move around the menu structure on the display and to alter parameters. Each key is identified by the legend on its top surface as follows:

M MENU

The MENU select key allows the user to access the menu level or function indicated on the bottom line of the display. This key does not alter any of the stored drive parameters.

E ESCAPE

The ESCAPE key allows the user to select the preceding menu level. It does not alter any of the stored drive parameters. The ESCAPE key always takes you back to the last point at which you were working.

△ UP

The UP key provides forward movement to explore the options available under any selected menu level. The selected menu is always given on the top line of the display. When a modifiable parameter is shown on the top line of the display the UP key will increment it's value.

DOWN

The DOWN key provides backward movement to explore the options available under any selected menu level. The selected menu is always given on the top line of the display. When a modifiable parameter is shown on the top line of the display the DOWN key will decrement it's value.

6.3. STATUS LEDS

The status LEDs give instant diagnostic information on the condition of the drive. When the LEDs are illuminated they indicate:

HEALTH	The drive is powered up and there are no alarms present.
RUN	The run digital input is active and there are no alarms present. When flashing indicates that the output current has exceeded the selected I*T threshold. The drive will trip if this condition persists. Section 7.2 describes the I*T function in more detail.
BRAKE	This LED comes on when the DC link voltage inside the drive rises above the dynamic braking threshold. Section 8 describes dynamic braking in more detail.
OVERLOAD	Current limit is active.

7. DIAGNOSTICS AND PARAMETERS

Drive information is organised as a set of menus with parameters relating to the same function stored under a common menu heading. The following paragraphs explain in detail each of the menu headings and the parameter values or diagnostics contained therein.

7.1. DIAGNOSTICS

The diagnostics menu allows the user to monitor operation of the drive. This includes items such as the motor current, speed setpoint, digital input states, and many others.
Diagnostic values are read-only. Refer to the Functional Block Diagram at the back of this manual.

```
DIAGNOSTICS
SPEED SETPOINT
```

The total **SPEED SETPOINT** is displayed in Hz.

```
DIAGNOSTICS
DRIVE FREQUENCY
```

The output **DRIVE FREQUENCY** is displayed in Hz.

```
DIAGNOSTICS
MOTOR CURRENT
```

MOTOR CURRENT is displayed as a % of the drive output current. This can be scaled to read as a % of the motor rated current using the **OP CURRENT CAL** parameter described in section 7.2. Note that the **MOTOR CURRENT** diagnostic may show a different value from the **MOTOR LOAD** diagnostic, especially on light loads.This is because even on no-load the motor draws typically 30% magnetising current.

```
DIAGNOSTICS
MOTOR LOAD
```

The estimated **MOTOR LOAD** (torque) is displayed as a % of the drive output current. It is assumed that 100% load corresponds to 100% output current. This can be scaled to read as a % of the motor rated current using the **OP CURRENT CAL** parameter described in section 7.2

```
DIAGNOSTICS
EXT TORQUE LIM
```

The setting of the **EXTERNAL TORQUE LIMIT** analogue input (terminal A5) is displayed as a % of the drive output current. This can be scaled to read as a % of the motor rated current using the **OP CURRENT CAL** parameter described in section 7.2

```
DIAGNOSTICS
DRIVE STATUS
```

DRIVE STATUS is a 16 bit hexadecimal number representing the condition of the drive. as follows.

Bit No.	Function	Hex. Value
0	Drive stopped	0x0001
1	Drive running	0x0002
2	Drive at zero speed	0x0004
3	Drive at speed setpoint	0x0008
4	Drive running with I*t warning	0x0010
5	Not used	0x0020
6	Not used	0x0040
7	External trip	0x0080
8	DC link overvoltage trip	0x0100
9	DC link undervoltage trip	0x0200
10	Overcurrent trip	0x0400
11	I*t trip	0x0800
12	Stall trip	0x1000
13	4-20mA control trip	0x2000
14	Heatsink overtemperature trip	0x4000
15	Motor overtemperature trip	0x8000

Example 1

```
DRIVE STATUS
    0x000A
```

This indicates that the drive is running at the speed setpoint since 0x0008 + 0x0002 = 0x000A.

Example 2

```
DRIVE STATUS
    0x8001
```

This indicates that the drive has stopped with a motor overtemperature trip since 0x8000 + 0x0001 = 0x8001.

Note that it is not necessary to look at DRIVE STATUS if a trip occurs since the drive will always display an alarm message in plain text. Further information on alarm messages can be found in section 7.6: ALARMS.

```
DIAGNOSTICS
DIGITAL INPUTS
```

The status of the digital inputs is represented as an 8 bit hexadecimal number as follows:

Bit No.	Digital Input	Hex. Value
0	Run	0x01
1	FRamp	0x02
2	Direction	0x04
3	External trip	0x08
4	Jog	0x10
5	Preset 1	0x20
6	Preset 2	0x40
7	Local/remote	0x80

7.2. SETUP PARAMETERS

WARNING

If your application requires operation above 120Hz with a special high speed motor then the **LIMIT FREQUENCY** parameter should be adjusted before any other parameters are changed. This is because **LIMIT FREQUENCY** affects the scaling of all frequency related parameters (**MIN SPEED, MAX SPEED, BASE FREQUENCY** etc). The default value for **LIMIT FREQUENCY** is 120Hz which covers the majority of applications for standard induction motors.
The **LIMIT FREQUENCY** parameter is described on page 22.

SETUP PARAMETERS BASE FREQUENCY	Range: Default:	**LIMIT FREQUENCY**/16 to **LIMIT FREQUENCY** 50Hz

BASE FREQUENCY is the frequency at which the inverter produces maximum output voltage. This would be set at 50Hz or 60Hz for a standard motor.

SETUP PARAMETERS MAX SPEED	Range: Default:	**MIN SPEED** to **LIMIT FREQUENCY** 50Hz

MAX SPEED is the motor speed corresponding to maximum setpoint input. Note that the **MAX SPEED** and **MIN SPEED** parameters can affect the scaling of the analogue speed setpoint inputs. See section 5.2 Control Terminals

SETUP PARAMETERS MIN SPEED	Range: Default:	0Hz to **MAX SPEED** 0Hz

MIN SPEED is the motor speed corresponding to zero setpoint input.

SETUP PARAMETERS
RAMPS

RAMPS RAMP UP TIME	Range: Default:	0.1s to 3000s 5.0s

RAMP UP TIME is the time taken for the drive to ramp the frequency from 0Hz to **LIMIT FREQUENCY**.

RAMPS RAMP DOWN TIME	Range: Default:	0.1s to 3000s 5.0s

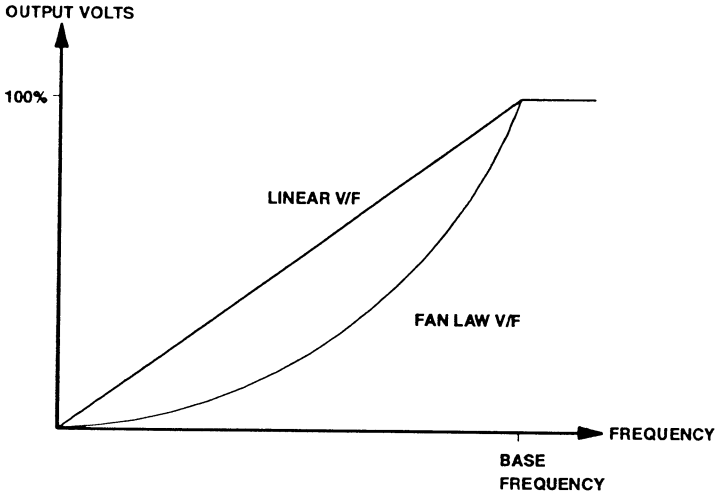
RAMP DOWN TIME is the time taken for the drive to ramp the frequency from **LIMIT FREQUENCY** to 0Hz.

RAMPS RAMP HOLD	Range: Default:	ENABLE or DISABLE DISABLE

RAMP HOLD can prevent the drive from tripping on overvolts when decelerating large inertia loads without a dynamic braking unit. The deceleration ramp is stopped when the DC link volts rises above 750VDC and started when the link voltage falls below 750VDC. The effect is to increase the overall deceleration time.

SETUP PARAMETERS
V/F SHAPE

Range: LINEAR or FAN LAW
Default: LINEAR



LINEAR V/F shape gives a constant torque characteristic up to the **BASE FREQUENCY**.

FAN LAW V/F shape gives a quadratic torque characteristic up to the **BASE FREQUENCY**. This matches the load requirements of fan and pump applications.

SETUP PARAMETERS
CURRENT LIMITS

CURRENT LIMITS
MOTOR I LIMIT

Range: 50 to 150%
Default: 100%

MOTOR I LIMIT sets the maximium motoring current for the drive. If the drive output current exceeds this value then the drive will attempt to reduce the load by reducing the motor frequency.

CURRENT LIMITS
REGEN I LIMIT

Range: -50 to -150%
Default: -100%

REGEN I LIMIT sets the maximium regenerating current for the drive. If the drive output current exceeds this value then the drive will attempt to reduce the load by increasing the motor frequency.

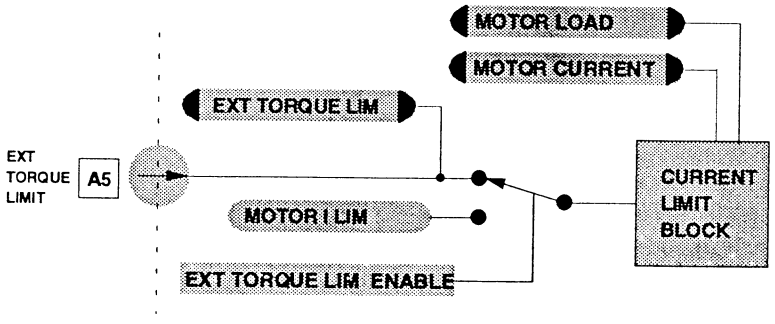
CURRENT LIMITS
REGEN LIM SELECT

Range: ENABLE or DISABLE
Default: ENABLE

REGEN LIM SELECT enables or disables the **REGEN I LIMIT** function.

CURRENT LIMITS
EXT TORQUE LIM

Range: ENABLE or DISABLE
Default: DISABLE



This parameter enables or disables the EXTERNAL TORQUE LIMIT analogue input on terminal A5.

When enabled, the drive takes it's current limit setting from terminal A5 rather than from the **MOTOR I LIM** parameter. In this mode, the drive will adust the motor frequency to control the motor load rather than motor current.

CURRENT LIMITS
OP CURRENT CAL

Range: 10 to 100 %
Default: 100%

This parameter can be used to scale the drive output current to match the actual motor current as follows:

$$\text{OP CURRENT CAL} = \frac{\text{MOTOR FLC}}{\text{DRIVE FLC}} \times 100\%$$

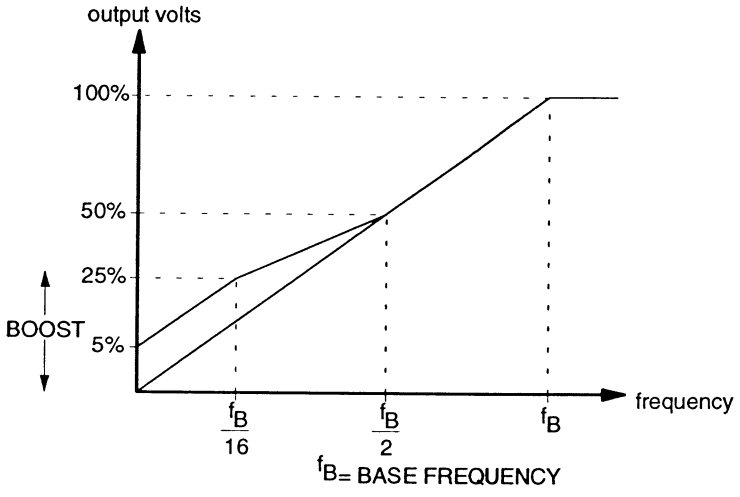
For example, if the drive full load current is 16A and the motor full load current is 14.8A then:

$$\text{OP CURRENT CAL} = \frac{14.8}{16} \times 100\% = 92.5\%$$

All current related diagnostics and parameters can now be read as a % of the motor rated current.

SETUP PARAMETERS
VOLTAGE BOOST

Range: 0 to 25% rated output volts
Default: 0%



VOLTAGE BOOST is used to compensate for the motor losses at low speed. This allows the drive to produce greater starting torque for friction loads. The **VOLTAGE BOOST** parameter increases the motor volts above the selected V/f characteristic at the lower end of the speed range.

SETUP PARAMETERS
STOPPING MODE

STOPPING MODE selects one of the 4 stopping modes available:

STOPPING MODE
COAST

The motor is allowed to freewheel to a standstill

STOPPING MODE
RAMP

The motor speed is controlled down to zero at a rate set by the **RAMP DOWN TIME** parameter

STOPPING MODE
RAMP + INJECTION

The motor speed is controlled down to zero at a rate set by the **RAMP DOWN TIME** parameter.

A timed DC pulse is then applied to hold the shaft. The DC pulse amplitude is set by the **VOLTAGE BOOST** parameter.

STOPPING MODE
INJECTION

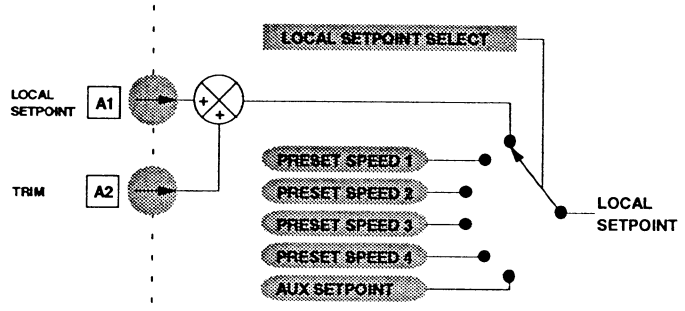
On a stop command the motor volts are rapidly reduced at constant frequency to deflux the motor.

A low frequency braking current is then applied until the motor speed is almost zero.
A timed DC pulse is then applied to hold the motor shaft.
Braking current during the injection stopping sequence is controlled by the CURRENT LIMIT parameter.

SETUP PARAMETERS
SETPOINT SELECT

This menu allows the user to configure the local and remote setpoints. The LOCAL/REMOTE digital input (terminal 27) can be used to switch between local and remote setpoints.

SETPOINT SELECT
LOCAL SETPOINT



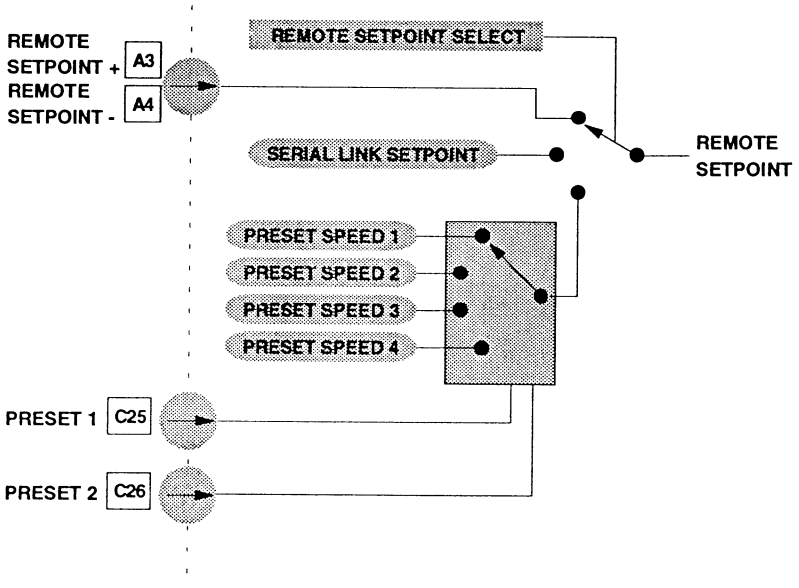
There are 7 possible sources for the **LOCAL SETPOINT:**

1. analogue input terminal A1, 0V to 10V
2. analogue input terminal A1, -10V to 10V
3. **AUX SETPOINT** parameter
4. **PRESET SPEED 1** parameter
5. **PRESET SPEED 2** parameter
6. **PRESET SPEED 3** parameter
7. **PRESET SPEED 4** parameter

SETPOINT SELECT
REMOTE SETPOINT

There are 3 possible sources for the **REMOTE SETPOINT:**

1. analogue input terminals A3/A4, 4/20mA etc
2. serial link setpoint
3. one of 4 preset speeds selected by the digital inputs.



SETUP PARAMETERS
FRAMP TIME

Range: 0 to 3000s
Default: 1.0s

FRAMP TIME is the time taken for the drive to ramp the frequency from **LIMIT FREQUENCY** to 0Hz, when the FRAMP digital input (terminal C21) is active, and the RUN signal is removed.
Note that the FRAMP digital input is used only to select the **FRAMP TIME**. The RUN signal must always be removed to initiate the stop sequence.

SETUP PARAMETERS
PRESET SPEEDS

There are 4 preset speeds available. Once the values have been programmed, each preset can be selected remotely via the two digital inputs C25 and C26, or locally using the **SETPOINT SELECT** parameter.

SETUP PARAMETERS
PRESET SPEED 1

Range: **-LIMIT FREQUENCY** to **+LIMIT FREQUENCY**
Default: 0Hz

SETUP PARAMETERS
PRESET SPEED 2

Range: **-LIMIT FREQUENCY** to **+LIMIT FREQUENCY**
Default: 0Hz

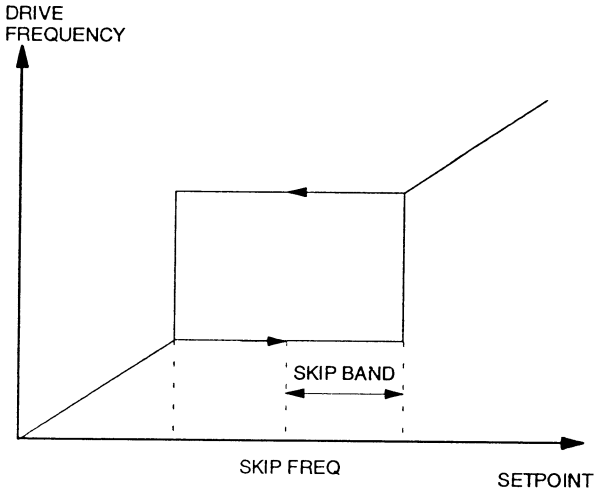
SETUP PARAMETERS
PRESET SPEED 3

Range: **-LIMIT FREQUENCY** to **+LIMIT FREQUENCY**
Default: 0Hz

SETUP PARAMETERS
PRESET SPEED 4

Range: **-LIMIT FREQUENCY** to **+LIMIT FREQUENCY**
Default: 0Hz

SETUP PARAMETERS
SKIP FREQUENCIES



Four programmable skip frequencies are available to avoid resonances within the mechanical system. Enter the value of drive frequency that causes the resonance using the **SKP FRQ** parameter and then programme the width of the skip band using the **SKIP BAND** parameter. The drive will then avoid sustained operation within the forbidden band as shown in the diagram.

SKIP FREQUENCIES
SKP FQ SELECTION

This menu is used to enable or disable each of the 4 skip frequencies.

SKP FQ SELECTION
SKP FRQ 1

Range: ENABLE or DISABLE
Default: DISABLE

SKP FQ SELECTION
SKP FRQ 2

Range: ENABLE or DISABLE
Default: DISABLE

SKP FQ SELECTION
SKP FRQ 3

Range: ENABLE or DISABLE
Default: DISABLE

SKP FQ SELECTION
SKP FRQ 4

Range: ENABLE or DISABLE
Default: DISABLE

SKIP FREQUENCIES
SKIP FRQ 1

Range: 0Hz to **LIMIT FREQUENCY**
Default: 0Hz

This parameter contains the centre frequency of the skip band.

SKIP FREQUENCIES
SKIP BAND 1

Range: 0Hz to **LIMIT FREQUENCY**/24
Default: 0Hz

This parameter contains the width of the skip band.

SKIP FREQUENCIES
SKIP FRQ 2

Range: 0Hz to **LIMIT FREQUENCY**
Default: 0Hz

SKIP FREQUENCIES
SKIP BAND 2

Range: 0Hz to **LIMIT FREQUENCY**/24
Default: 0Hz

SKIP FREQUENCIES
SKIP FRQ 3

Range: 0Hz to **LIMIT FREQUENCY**
Default: 0Hz

SKIP FREQUENCIES
SKIP BAND 3

Range: 0Hz to **LIMIT FREQUENCY**/24
Default: 0Hz

SKIP FREQUENCIES
SKIP FRQ 4

Range: 0Hz to **LIMIT FREQUENCY**
Default: 0Hz

SKIP FREQUENCIES
SKIP BAND 4

Range: 0Hz to **LIMIT FREQUENCY**/24
Default: 0Hz

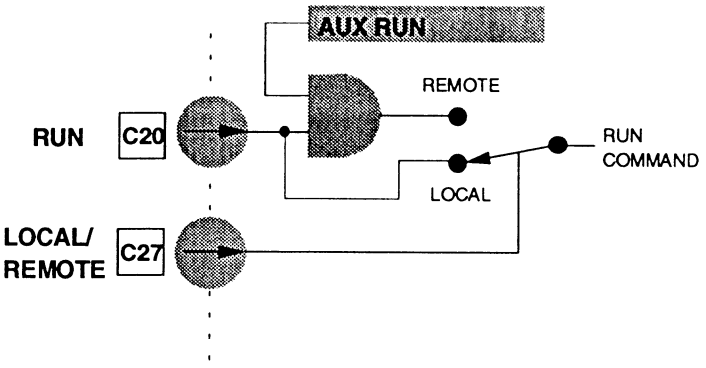
SETUP PARAMETERS
AUX SETPOINT

Range: 0Hz to **LIMIT FREQUENCY**
Default: 0Hz

This parameter allows a setpoint value to be entered directly via the keypad. The **SETPOINT SELECT** menu must first be used to enable the **AUX SETPOINT** to allow the motor speed to be controlled from the drive keypad.

SETUP PARAMETERS
AUX DIG INPUTS

AUX DIG INPUTS are used by the serial link to control RUN, FRAMP and DIRECTION. The functionality of the these inputs is as shown in the example on the right:



AUX DIG INPUTS
AUX RUN

Range: ENABLE or DISABLE
Default: ENABLE

AUX DIG INPUTS
AUX FRAMP

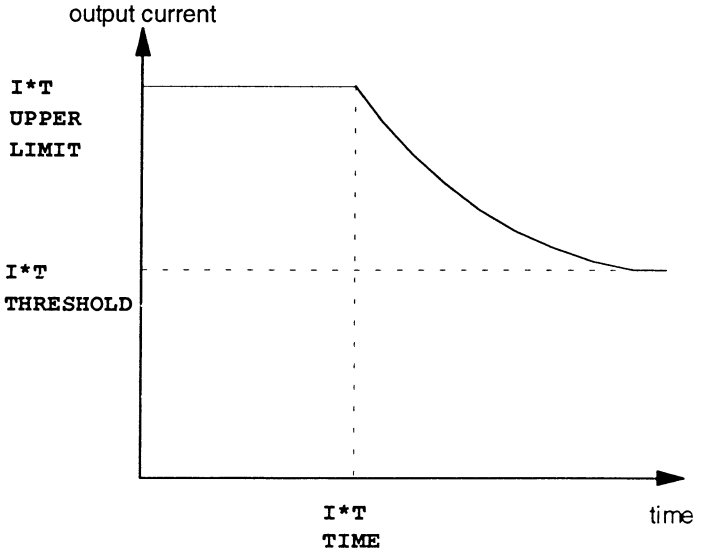
Range: ENABLE or DISABLE
Default: ENABLE

AUX DIG INPUTS
AUX DIRECTION

Range: ENABLE or DISABLE
Default: ENABLE

SETUP PARAMETERS
I*T ALARM

The **I*T ALARM** parameters allow the overload characterstics of the drive to be programmed to match the application.



If the drive output current exceeds the **I*T THRESHOLD** then the drive will trip after a certain time given by:

$$\text{I*T TRIP TIME} = \frac{(\text{I*T UPPER LIMIT} - \text{I*T THRESHOLD}) \times \text{I*T TIME}}{\text{OUTPUT CURRENT} - \text{I*T THRESHOLD}}$$

I*T ALARM I*T THRESHOLD	Range: Default:	50% to 105% drive output current 105%

I*T ALARM I*T UPPER LIMIT	Range: Default:	50% to 150% drive output current 150%

I*T ALARM I*T TIME	Range: Default:	5s to 60s 60s

SETUP PARAMETERS SLIP COMP	Range: Default:	0Hz to **LIMIT FREQUENCY** /24 0Hz

Slip compensation increases the inverter output frequency as a function of load. This is an open loop compensation for the slip characteristic of the induction motor. **SLIP COMP** gives the frequency value which will be added to the output frequency at 100% drive load. The procedure for adjusting **SLIP COMP** is as follows:

1. Run the drive at the desired speed on no load.
2. Measure the actual motor speed using a hand tacho or other suitable device.
3. Run the drive at the desired speed on full load
4. Measure the actual motor speed and increase the SLIP COMP parameter until the no-load speed (synchronous speed) is attained.

SETUP PARAMETERS SWITCHING FREQ	Range: Default:	3kHz, 6kHz or 9kHz 3kHz

This controls the drive switching frequency. Higher switching frequencies produce lower audible noise from the motor, but increase overall inverter losses. Lower switching frequencies improve motor operation at low speed and result in lower overall inverter losses.
Note that 9kHz can not be selected on the 585 or 586.

SETUP PARAMETERS STABILISATION	Range: Default:	0Hz to **LIMIT FREQUENCY**/24 **LIMIT FREQUENCY**/200

Larger motors can sometimes exhibit instability at certain speeds under light load. If oscillations are apparent in the motor speed or current, increase the **STABILISATION** parameter until stable operation is achieved. A typical setting for this parameter would be between 0.5Hz and 1.0Hz. Note that too high a value will tend to make the motor more unstable.

SETUP PARAMETERS MENU POSITION	Range:	MICRO AC DRIVE SPEED SETPOINT DRIVE FREQUENCY MOTOR CURRENT MOTOR LOAD EXT TORQUE LIMIT DRIVE STATUS DIGITAL INPUTS
	Default:	MICRO AC DRIVE

This parameter selects a diagnostic menu to be displayed on power-up.

SETUP PARAMETERS STALL TRIP TIME	Range: Default:	0.1s to 3000s 600s

If the drive operates continuously in current limit for longer than the **STALL TRIP TIME** then a MOTOR STALLED alarm will occur.

SETUP PARAMETERS
INHIBIT ALARMS

This menu allows certain alarm conditions to be disabled.

INHIBIT ALARMS
STALL ALARM

Range: ENABLE or DISABLE
Default: ENABLE

The stall alarm must be disabled in applications where the drive operates continuously in current limit.

SETUP PARAMETERS
BRAKE CONTROL

This menu is used in conjunction with the configurable relay outputs described in section 7.8. The brake control function is intended for use with electro-mechanical brakes in lift or hoist applications.

BRAKE CONTROL
ON LOAD LEVEL

Range: 0% to 150%
Default: 50%

BRAKE CONTROL
ON FREQ LEVEL

Range: 0Hz to **LIMIT FREQUENCY**
Default: **LIMIT FREQUENCY**/24

BRAKE CONTROL
OFF FREQ LEVEL

Range: 0Hz to **LIMIT FREQUENCY**
Default: **LIMIT FREQUENCY**/40

SETUP PARAMETERS
RAMP OUTPUT

Range: MIN TO MAX
0 TO LIMIT FREQ

Default: MIN TO MAX

This parameter sets the scaling of the RAMP OUTPUT analogue output terminal A7.

MIN TO MAX gives 0V at **MIN SPEED** and 10V at **MAX SPEED**.

0 TO LIMIT FREQ gives 0V at 0Hz and 10V at the **LIMIT FREQUENCY**.

SETUP PARAMETERS TORQUE MODE	Range:	CONST TORQUE FAN/PUMP TORQUE
	Default:	CONST TORQUE

This feature is only available on the 584.

TORQUE MODE should be set to match the load characteristic for your application. Constant Torque mode is the default setting which gives a linear V/F shape and 150% overload for 60s. FAN/PUMP TORQUE gives a fan law V/F shape, a higher continuous output current rating and an overload of 110% for 30s. Refer to section 11.2 ELECTRICAL SPECIFICATIONS for a comparison of output current ratings for the 2 different modes.

Altering the **TORQUE MODE** parameter causes preset values and limits to be loaded into various other parameters as follows:

	TORQUE MODE	
Parameter	**Constant Torque**	**Fan/Pump Torque**
CURRENT LIMITS MOTOR I LIMIT	Range: 50.0% to 150.0% Default: 100.0%	50% to 110% 100%
I*T ALARM I*T UPPER LIMIT	Range: 50.0% to 150.0% Default: 150%	50.0% to 110% 110%
SETUP PARAMETERS V/F SHAPE	Range: LINEAR or FAN LAW Default: LINEAR	LINEAR OR FAN LAW FAN LAW
CURRENT LIMITS OP CURRENT CAL	In FAN/PUMP mode this parameter is assigned a value > 100% which allows a higher continuous output current. The actual value assigned depends on the kW rating of the drive. e.g. The 5.5kW 584 has a constant torque output current rating of 13A. In fan/pump mode, the drive output current rating is increased to 16A by setting a value of: $\textbf{OP CURRENT CAL} = \frac{16A}{13A} \times 100\% = 123\%$	

SETUP PARAMETERS BASE VOLTS	Range:	0% to 100%
	Default:	100%

BASE VOLTS is the output voltage produced at the **BASE FREQUENCY**, as a % of the input voltage. This is the maximum output voltage the drive will produce.

SETUP PARAMETERS LIMIT FRQ SELECT	Range:	120Hz, 240Hz, 480Hz
	Default:	120Hz

The **LIMIT FREQUENCY** is the highest value of drive output frequency. There are 3 choices of **LIMIT FREQUENCY**: 120Hz, 240Hz and 480Hz. The setpoint frequency resolution of the drive is:

$$\text{RESOLUTION} = \frac{\textbf{LIMIT FREQUENCY}}{10{,}000}$$

7.3. SERIAL LINK

This section gives a brief description of each of the serial link setup parameters. A full explanation of how to use serial communications is given in section 9.
The ***584*** series drives support 2 serial links. Fitted as standard is an RS232 port, called the AUX PORT, P3. This is intended for connection to a personal computer to allow drive configuration and storing of parameters. The second serial port, called MAIN PORT P1, is fitted as an option. It is an opto-isolated RS422/485 port allowing full remote control of the drive from a host supervisory computer. Both serial ports use the industry standard EI BISYNC protocol. Each port has a number of setup parameters which are described below. Since the two sets of parameters are identical only those for the MAIN PORT P1 are described.

MAIN PORT P1 SRL LINK ENABLE	Range: ENABLE or DISABLE Default: ENABLE

Enable serial port operation. Note that this parameter must be enabled before serial communications can take place.

MAIN PORT P1 GROUP ID (GID)	Range: 0 to 7 Default: 0

Eurotherm protocol group identity address.

MAIN PORT P1 UNIT ID (UID)	Range: 0 to 15 Default: 0

Eurotherm protocol unit identity address.

MAIN PORT P1 ASCII/BINARY	Range: ASCII or BINARY Default: ASCII

There are two types of message format (protocol), ASCII or BINARY. This parameter selects which format is to be used.

MAIN PORT P1 BAUD RATE	Range: 300 to 9600 Default: 9600

Baud rate is the serial communications bit rate.

MAIN PORT P1 ESP SUP(ASCII)	Range: ENABLE or DISABLE Default: DISABLE

See section 9.7 for description of ESP support.

MAIN PORT P1 CHANGEBAND(BIN)	Range: 0.0% to 327.6% Default: 0.0%

Enquiry poll changeband. See section 9.6 Block0, PNO.4 for description.

```
MAIN PORT P1
ERROR REPORT
```

This is a read only diagnostic showing communication errors as follows:

ERROR REPORT	MEANING
00C0	No errors
01C7	Unknown mnemonic
02C2	Block check character fail
03C1	Parity error on received data
03C2	Framing or overrun error
05C8	Attempt to write to a read-only mnemonic
07C7	Invalid message format
08C8	Value in selection message out of range

```
MAIN PORT P1
PNO.7
```

Range: 0x0000 to 0xFFFF
Default: 0x0000

Control word for multi-parameter polling. See section 9.6, Block0, PNO.7 for description.

```
MAIN PORT P1
PARITY
```

Range: ODD or EVEN
Default: EVEN

Select odd or even parity (Main Port P1 only). Eurotherm BISYNC protocol requires even parity, however odd parity may be selected for other applications.

7.4. MENUS

```
MENUS
MENU DELAY
```

Range: 10 to 200
Default: 20

The menu delay parameter controls the speed of response of the display to key presses. Increasing the MENU DELAY slows down the display.

7.5. PARAMETER SAVE

```
PARAMETER SAVE
UP TO ACTION
```

This menu is used to save all of the drive parameters in the non-volatile memory.
Press the up arrow key to save the parameters.

7.6. ALARMS

If the drive trips then the display immediately shows a message indicating the reason for the trip. Alarm conditions are reset by removing and re-applying the RUN signal on terminal A20. The alarm message can be cleared from the display by pressing the "E" key. However the message will be stored in the drive's non-volatile memory. The message can be retrieved by using the LAST ALARM menu. The last alarm parameter can be cleared from the display and non-volatile memory by pressing the "m" key while in the last menu.

```
ALARMS
LAST ALARM
```

The possible alarm messages are:

```
*** ALARM ***
LINK UNDERVOLTS
```

The DC link voltage is too low. Possible reasons for this alarm message are:

(a) The mains voltage is too low
(b) The mains supply has been lost

```
*** ALARM ***
LINK OVERVOLTS
```

The DC link voltage is too high. Possible reasons for this alarm message are:

(a) The mains voltage is too high
(b) Trying to decelerate a large inertia load too quickly.

```
*** ALARM ***
LINK OVERCURRENT
```

The DC link current is too high. Possible reasons for this alarm message are:

(a) Trying to accelerate a large inertia load too quickly.
(b) Trying to decelerate a large inertia load too quickly.
(c) Application of shock load
(d) Short between motor phases
(e) Short between motor phase and earth

```
*** ALARM ***
HEATSINK TEMP
```

The drive heatsink temperature is too high. Possible reasons for this alarm message are:

(a) The ambient air temperature is too high
(b) One of the drive cooling fans (if fitted) is blocked or has failed

```
*** ALARM ***
MOTOR TEMP
```

The motor temperature is too high. Possible reasons for this alarm message are:

(a) Prolonged operation of the motor at low speed without forced cooling
(b) Excessive load
(c) Motor voltage rating incorrect

```
*** ALARM ***
MOTOR STALLED
```

The motor has stalled. Possible reasons for this alarm message are:

(a) `MOTOR I LIMIT` parameter set too low
(b) `STALL TRIP TIME` parameter tool low.

```
*** ALARM ***
SETPOINT LOSS
```

The current loop setpoint signal has been lost. This alarm only works if the remote setpoint has been configured as 4/20mA or 20/4mA.

7.7. PASSWORD

The 584 series drives have a password system which can be used to prevent unauthorised access to the setup parameters. Once the user has programmed in a password then the setup parameters become read-only. In order to change the parameter values the correct password must first be entered.
All drives shipped from the factory have a default password value of 0000.
The **PASSWORD** sub-menu has 3 entries as shown below.

```
PASSWORD
ENTER PASSWORD
```

This menu is used to enter the password to regain access to the setup parameters. The password value entered must match the value previously set up in the **CHANGE PASSWORD** menu to gain access to the setup parameters.

```
PASSWORD
CHANGE PASSWORD
```

This menu is used to change the password or to initially programme a user password. When a password has been set up, the **PARAMETER SAVE** menu should be used to save the password in non-volatile memory.

```
PASSWORD
CLEAR PASSWORD
```

The **CLEAR PASSWORD** menu is used to clear the password value displayed under the **ENTER PASSWORD** menu. When this menu is accessed the **ENTER PASSWORD** value is cleared to "0000". If the **CHANGE PASSWORD** value is non-zero then the setup parameters will be locked.

Example 1: Initial programming of password

(1) Access the **CHANGE PASSWORD** menu. The display will show:

```
CHANGE PASSWORD
0x0000
```

(2) Using the up and down arrow keys, set the password value required as a 4 digit hexadecimal number. The display will show, for example:

```
CHANGE PASSWORD
0x1234
```

When you are happy with the password make a note of the value and keep it in a safe place!

(3) Press the 'E' key to take you out of the CHANGE PASSWORD menu. The display will show:

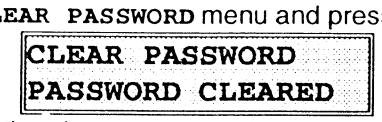
```
PLEASE REMEMBER
0x1234
```

Press the 'E' key again and the display will show:

```
NOW SAVE PARAMS
0x1234
```

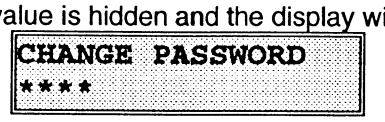
This is to remind you to save the password along with the other parameters before you remove power from the drive. Press the 'E' key again to exit the **CHANGE PASSWORD** menu.

(4) Access the **CLEAR PASSWORD** menu and press the 'M' key. The display will show:



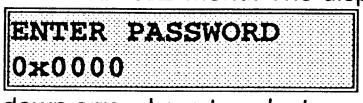
This indicates that the password value entered above has been locked into the system. Using **CLEAR PASSWORD** sets the value in the **ENTER PASSWORD** menu to **0x0000**, otherwise the password would still be displayed.

(5) The setup parameters are now locked. Remember to to use **PARAMETER SAVE** to put the password value in non-volatile memory. If you now go back to the **CHANGE PASSWORD** menu the password value is hidden and the display will show:



Example 2: Accessing setup parameters when the password is set.

(1) Access the **ENTER PASSWORD** menu. The display will show:



(2) Use the up and down arrow keys to select your password.
(3) Press the 'E' key to exit the **ENTER PASSWORD** menu.
(4) Access the **SETUP PARAMETERS** menu to make any necessary changes.
(5) When all parameter changes have been made come back to the **CLEAR PASSWORD** menu to hide the password value and lock the setup parameters again.

Example 3: Changing a previously set password

(1) Access the ENTER PASSWORD menu.
(2) Use the up and down arrow keys to enter the existing password value.
(3) Leave the ENTER PASSWORD menu and access the CHANGE PASSWORD menu.
(4) Use the up and down arrow keys to select a new password value.
(5) Leave the CHANGE PASSWORD menu and access the CLEAR PASSWORD menu.
(6) Press the 'M' key to clear the password value and lock the setup parameters.
(7) Remember to use SAVE PARAMETERS to save the new password value in non-voltaile memory.

7.8. SYSTEM

```
SYSTEM
PEEK
```

The PEEK function is used to examine data held in the drive's memory.

```
SYSTEM
RECONFIG O/PS
```

This menu controls the function of the two user-configurable relay outputs, RELAY 1, and RELAY 2.

```
CONFIG O/PS
RELAY 1
```

Range: ZERO SPEED
AT SPEED
RUN CONFIRM
BRAKE CONTROL

Default: ZERO SPEED

```
CONFIG O/PS
RELAY 2
```

Range: ZERO SPEED
AT SPEED
RUN CONFIRM
BRAKE CONTROL

Default: AT SPEED

Each relay can be configured to 1 of 4 functions as described below:

ZERO SPEED
The relay contacts close when the drive output frequency is at 0Hz ± 0.2% of **LIMIT FREQUENCY**.
The relay contacts subsequently open when the drive output frequency rises above 0.4% of **LIMIT FREQUENCY**.

AT SPEED
The relay contacts close when the drive output frequency reaches the speed setpoint ± 0.2% of **LIMIT FREQUENCY**.
The relay contacts subsequently open when the drive output frequency differs from the speed setpoint by more than 0.4% of **LIMIT FREQUENCY**.

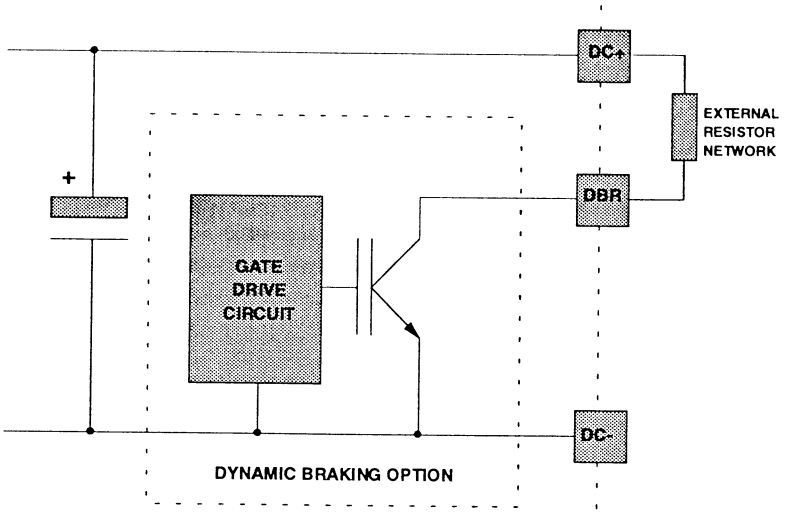
RUN CONFIRM
Relay contacts are closed when the drive is running.
Relay contacts are open when the drive is not running.

BRAKE CONTROL
This mode is intended to control electro-mechanical brakes in lift and hoist applications.
There are 3 parameters associated with this mode. These are under the **BRAKE CONTROL** parameter described in section 7.2..
Relay contacts close when drive frequency > **ON FREQ LEVEL** AND motor load > **ON LOAD LEVEL**
Relay contacts open when drive frequency < **OFF FREQ LEVEL.**

8. DYNAMIC BRAKING OPTION

8.1. WHAT IS DYNAMIC BRAKING?

During deceleration, or with an overhauling load, the motor acts as a generator. Energy flows back from the motor into the DC link capacitors within the drive. This causes the DC link voltage to rise. If the DC link voltage exceeds 800V then the drive will trip to protect the capacitors and the inverter power devices. The amount of energy that can be absorbed in the capacitors is relatively small; typically more than 20% braking torque will cause the drive to trip on overvolts. Dynamic braking is a means of increasing the braking capability of the drive by dissipating the excess energy in a high power resistor connected across the DC link.



The dynamic braking option is a pcb with an extra IGBT power device. This is fitted inside the drive package connected to the -ve side of the DC link as shown.

When the DC link voltage rises above 750V, the brake unit switches the external resistor network across the DC link. The brake unit switches off again when the DC link voltage falls below 750V. The amount of energy produced by the motor during regeneration depends on the **RAMP DOWN TIME** parameter and the inertia of the load. Low inertia and slow ramp times do not produce sufficient energy to require a dynamic braking unit.

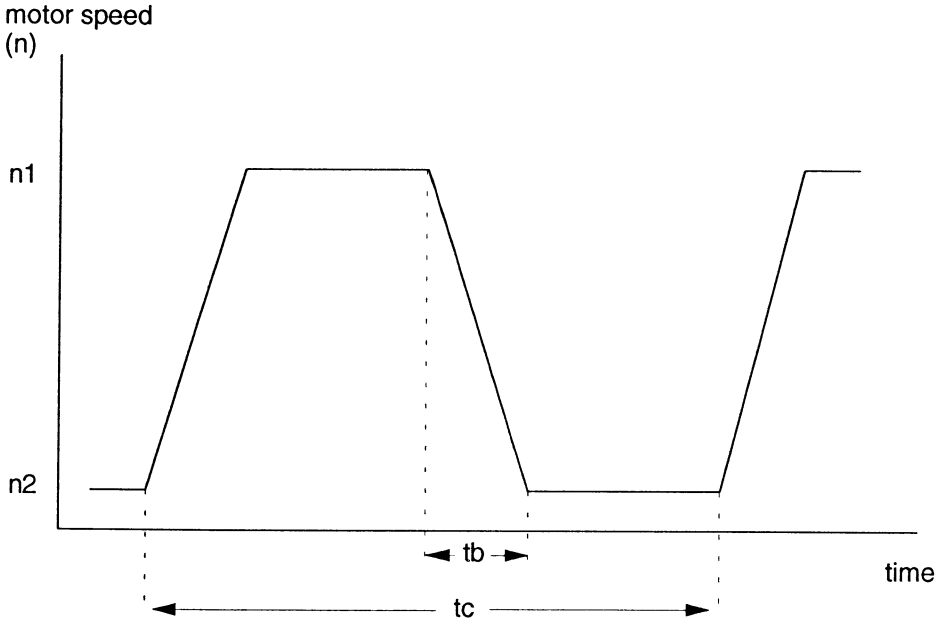
Note that the dynamic braking option is designed to cope with short term stopping or braking only. It is not rated for a continuously overhauling load.

8.2. DO I NEED THE DYNAMIC BRAKING OPTION?

If the application requires rapid speed changes or the load inertia is large then it is likely that the dynamic braking option will be required. This is particularly true for operation above base speed in the constant power region. Small motors tend to have higher losses which means less energy is returned to the DC link during regeneration. Conversely larger motors are more efficient and therefore more likely to need dynamic braking during regeneration. In general it will be necessary to perform tests assess the requirement.

Alternatively a calculation can be performed for which the following information is required:

J	Total moment of inertia calculated at the motor shaft	(kgm^2)
T_l	Load torque at motor shaft	(Nm)
P_m	Motor rated power	(kW)
n_m	Motor rated speed	(rpm)
n_1	Motor speed before braking	(rpm)
n_2	Motor speed after braking	(rpm)
t_b	Braking time	(s)
t_c	Cycle time	(s)



The ratio between braking torque and motor rated torque determines whether the brake option is required.

$$\text{Motor rated torque } T_m = \frac{P_m \times 9550}{n_m}$$

$$\text{Braking torque } T_b = \frac{J(n_1 - n_2)}{9.55 \times t_b} - T_l \quad \text{(ignoring all mechanical losses)}$$

(a)	$\frac{Tb}{Tm} \leq 0.2$	Brake option not required
(b)	$0.2 \leq \frac{Tb}{Tm} < 1.5$	Brake option required
(c)	$\frac{Tb}{Tm} > 1.5$	Braking torque too high. Use larger motor and inverter.

8.3. BRAKE RESISTOR SELECTION

Brake resistor assemblies must be rated to absorb both the peak braking power during deceleration and the average power over the complete cycle.

$$\text{Peak braking power } P_{pk} = \frac{0.0055J \times (n_1^2 - n_2^2)}{t_b} \text{ (kW)}$$

$$\text{Average braking power } P_{av} = \frac{P_{pk}}{t_c}$$

Information on the peak power rating and the average power rating of the resistors must be obtained from the resistor manufacturer. Alternatively if this information is not available then a large safety margin must be incorporated to ensure that the resistors are not overloaded.
Eurotherm Drives can supply suitable brake resistor assemblies as detailed below:

Part number	CZ057146
Resistance value	56Ω
Max. average power rating	220W @ 20°C ambient; derate 4% per 10°C above 20°C ambient
Peak power rating	0.1s 2.2kW 1s 1.0kW 2s 700W 5s 300W 10s 220W
Mounting centres	285mm
Overall length	300mm
Overall width	32mm
Fixing	M4
Electrical connection	M4

By connecting these resistors in series and in parallel the braking capacity can be selected for the application.
It is recommended that a thermal overload device is connected in series with the brake resistor. The overload trip should be set to prevent the average power in the resistor bank exceeding the resistor rating.

8.4. SPECIFICATION OF DYNAMIC BRAKING SWITCH

In choosing the rating of the brake resistor assembly, it is important to remember that the brake switch itself has the following rating limits:

	584
Typical Motor Rating	0.75kW to 7.5kW
Current rating (20s max)	15A
Max duty cycle	30%
Min resistor value	50Ω

	585		586			
Typical Motor Rating	11kW	15kW	18.5kW	22kW	30kW	37kW
Current rating (20s max)	30A		45A		60A	75A
Max duty cycle	30%					
Min resistor value	25Ω		17Ω		12.5Ω	10Ω

9. SERIAL COMMUNICATIONS OPTION

This option provides an opto-isolated RS422/485 serial data port to allow an intelligent device to monitor or update the parameters of a network of drives. The option takes the form of a pcb which is plugged into the drive control board at the bottom right-hand side. The option board carries 6 screw terminals for the serial link connections.
The 584 series drives support both ASCII and Binary communications modes. ASCII is more commonly used so this section concentrates mainly on ASCII communications. Section 9.5 explains how to use Binary communications.

9.1. SPECIFICATION

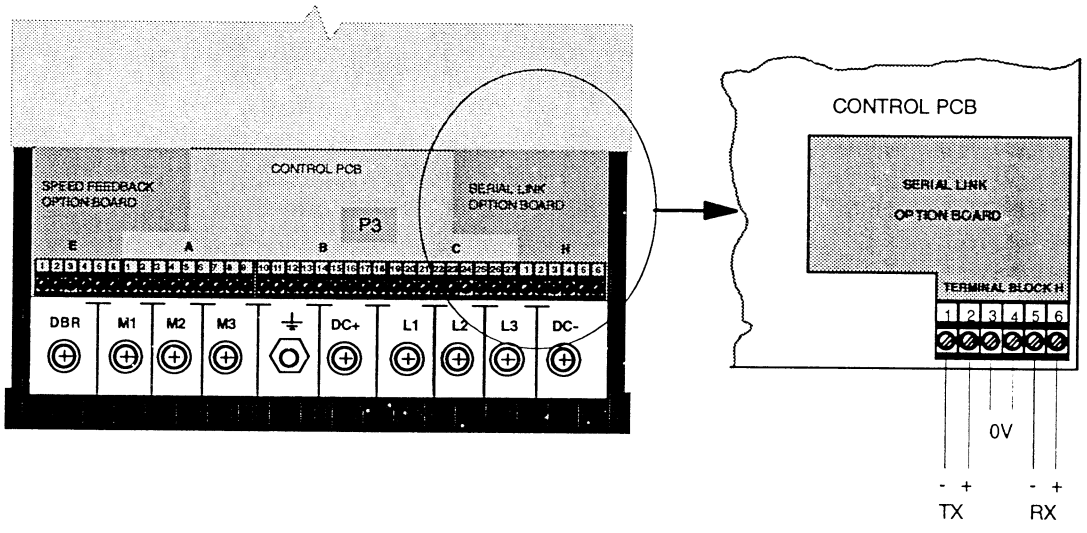
Transmission Standard	:	RS485(RS422)(bi-directional)
Protocol	:	ANSI-X3.28-2.5-B1
Data Rates	:	300,600,1200,2400,4800 or 9600 baud
Character Format (300 to 9600 baud)	:	ASCII + 1 start, 1 parity and 1 stop bit. [10 BIT]
Parity	:	Defaults to Even

START	D0	D1	D2	D3	D4	D5	D6	PARITY	STOP

	RS422	RS485
Electrical Connections	4-wire differential	4-wire differential
No. of drivers and receivers allowed per line	1 driver 16 receivers	32 drivers 32 receivers
Maximum cable length	4000ft/1200 metres	

Note that RS485 supports multiple drivers however EI protocol supports only 1 driver.

9.2. TERMINAL CONNECTIONS



9.3. ASCII COMMUNICATIONS

9.3.1. Reading Data

Control Characters

Control Characters are ASCII binary codes which define actions rather than information. Six ASCII codes are used:-

ASCII-HEX		
02	(STX)	Start of Text
03	(ETX)	End of Text
04	(EOT)	End of Transmission
05	(ENQ)	Enquiry
06	(ACK)	Positive Acknowledge
15	(NAK)	Negative Acknowledge

Enquiry

The computer initially has master status, with the ***584*** in slave status and begins by transmitting a message, known as the "establish connection" message, which is represented by the following format:-

(EOT) (GID) (GID) (UID) (UID) (C1) (C2) (ENQ)

These symbols are defined as follows:-

(EOT) This control character resets all instruments on the link and causes them to examine the next four transmitted characters to see if they correspond with their group/unit address identifiers.

(GID) These characters represent the required group address identifier, repeated for security

(UID) These characters represent the required unit address identifier, repeated for security. (Together these units define the address of a particular instrument). If, for example, GID = 3 and UID = 4, then the instrument to be addressed is number 34.

(C1)(C2) These characters specify the parameter by mnemonic.

(ENQ) This character indicates the end of the message, and that it is an enquiry.

The transmission of this message initiates a response procedure from the 584.

Valid Response of the 584 to this Message

After the message has been sent, the computer adopts slave status and expects to receive a reply from the 584. In so doing, the 584 assumes Master status and providing the 584 has successfully received the message in full, it responds in the following form:-

(STX) (C1) (C2) (D1) (D2) (D3) (DN) (ETX) (BCC)

which constitutes a message defined as:-

(STX) start of text.

(C1)(C2) parameter specified by mnemonic

(D1 to DN) value of the requested parameter (string may be of any length as determined by the data). The 584 responds with the shortest message which represents the data value. If the data value is an integer (decimal part is 0), then it does not send a decimal point. Trailing zeros in the decimal part are not sent.

(ETX) end of text

(BCC) verification digit which is the character generated by taking the exclusive OR of the ASCII values of all the characters transmitted after and excluding (STX) up to and including (ETX).
e.g. in a message with (D1 - DN) is 5 characters (BCC) = (C1) EOR (C2) EOR (D1) EOR (D2) EOR (D3) EOR (D4) EOR (D5) EOR (ETX)
where EOR = Exclusive OR

The computer must check this (BCC) before accepting this reply as valid. Also the software must be able to extract the number from the data string taking into account the protocol of the data transmission.

NOTE: If the 584 receives the message but does not recognize the mnemonic it will respond with (EOT). The (EOT) hands back control to the computer.

Further Enquiry and Termination

The computer then assumes master status again and three options are available:-

1. Repeat Parameter Facility (NAK). If the computer transmits a (NAK) after the valid reply, it causes the 584 to repeat the parameter that was just received. This allows continuous monitoring of the same parameter without having to re-establish the connection.
2. Scroll Mode Facility (ACK). If the computer transmits an (ACK) after a 'valid reply', it causes the 584 to fetch the next parameter from the parameter list. This facility enables the computer to continuously sequence through all the parameters of the 584.
3. Terminate Communication (EOT). The termination procedure is entered when the selection of a particular instrument is no longer required or when a 584 does not respond to a message or replies with an (EOT) character. The computer assumes Master status and transmits an (EOT) character to enable all the instruments on the data link to be responsive to the next GID-UID address parameter.

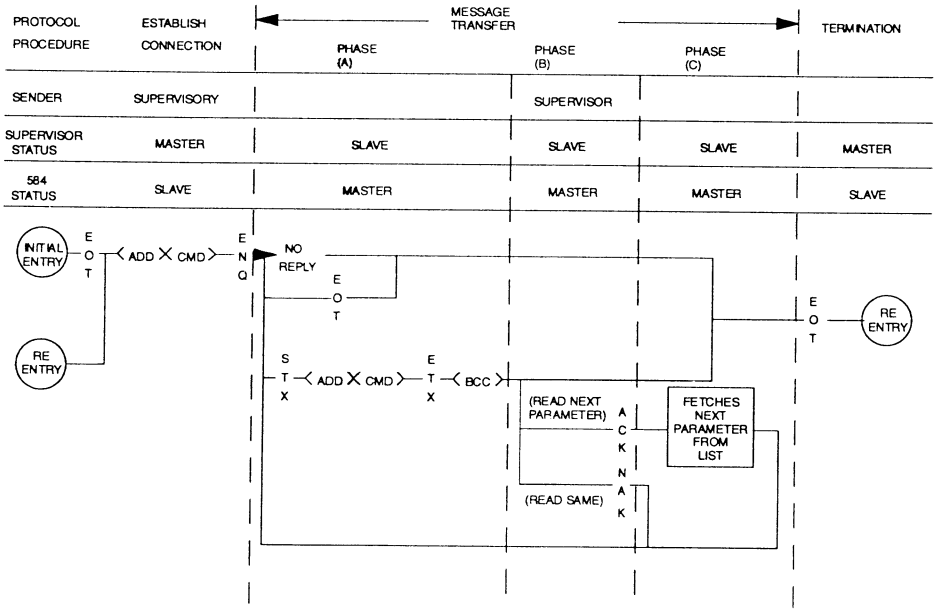
No Response

Under certain circumstances the computer may not receive a response from the 584. This could be due to any of the following reasons:-

1. Group/Unit address identifiers not recognized.
2. An error (e.g. parity) is found in one or more of the characters up to and including ENQ.
3. Communications loop failure perhaps due to noise or wrong baud rate being selected.
4. Hardware failure.

In these cases the computer should be programmed to "time-out", i.e. wait for a response for a short time (160ms minimum) before trying again.

READING DATA FROM THE 584



9.3.2. Sending Data

Establish Connection

Connection is established with a particular 584 by sending

(EOT) (GID) (GID) (UID) (UID)

followed immediately by the data transfer

(STX) (C1) (C2) (D1) (D2) (D3) (DN) (ETX) (BCC)

(Note that the data transfer message is identical to that transmitted by a 584 when giving a "valid reply").

The symbols of this message are defined as follows:-

(STX)	start of text character
(C1)(C2)	parameter specified by mnemonic
(D1 to DN)	parameter value
(ETX)	end of text character
(BCC)	Block Check Character (verification check digit which is again the exclusive OR of (C1) to (ETX) inclusive and must be calculated by the computer before transmission).

Responses

After transmission of the whole message, the 584 responds to it by sending (ACK), (NAK) or by giving no reply.

1. Positive acknowledgement (ACK)
   When the 584 has received the message, it performs the following tasks:-
   - Checks for any parity errors in the message. If none then it...
   - Verifies that the (BCC) character corresponds to the data pattern received. If no error then it...
   - Verifies that the (C1), (C2) command characters are a valid mnemonic that may be written to. If so then it...
   - Verifies that the data (D1 to DN) is valid and not out-of-range*. If so then it...
   - Updates the selected parameter with the new value contained in the message.

   Only when all these tasks have been successfully completed does the 584 send the (ACK) response to the computer.
   This signifies that the message was correctly received and implemented.

2. Negative acknowledgement (NAK)
   If the message fails any of the above checks, the 584 sends (NAK) response to the computer. This signifies that the message received by the 584 contained an error and accordingly it has not updated the selected parameter. One possible reason is the incorrect calculation of (BCC). At this point, the selected command may be repeated by sending the data transfer string without re-establishing connection, until the (ACK) response is received by the computer.
   * Data out-of-range returns NAK and is discarded.

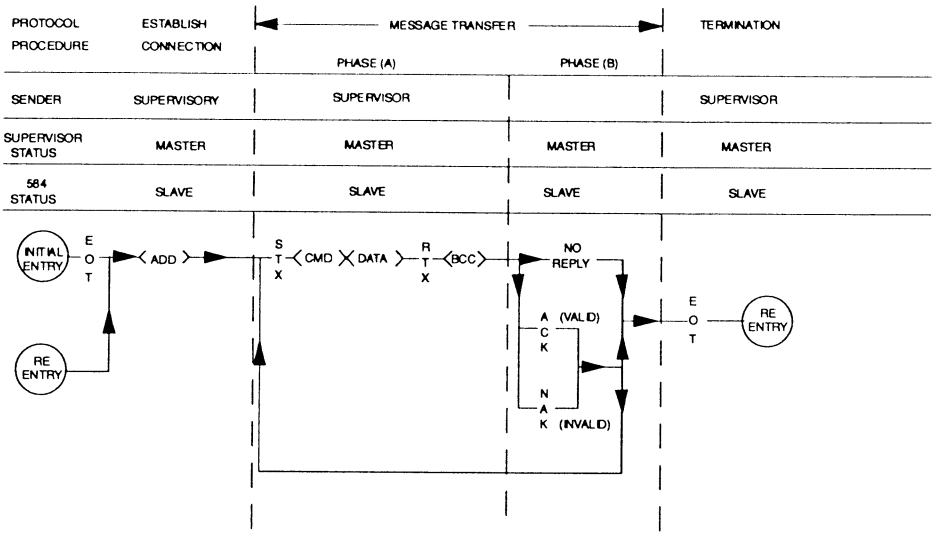
3. No Reply
   Under certain circumstances, the computer may not receive a response from the 584. This could be due to any of the following reasons:-
   1. Unit address identifiers not recognized.
   2. An error (e.g. parity) is found in one or more of the characters up to and including (BCC).
   3. Communications loop failure perhaps due to noise or wrong baud rate selected.
   4. Hardware failure.

   In these cases the computer should be programmed to 'time-out', i.e. wait for a response for a short time (160ms minimum) before trying again.

Termination

The termination procedure is used if the computer wishes to stop selecting a particular 584 and establish connection with another. This is achieved by sending the 'establish connection' sequence. The computer retains Master status and transmits an (EOT) character to reset all instruments on the data link to be responsive to the next GID-UID address parameter.

SENDING DATA TO THE 584



9.4. BINARY COMMUNICATIONS

This mode has many similarities with the ASCII mode. This document mainly concentrates on presenting those parts which are different from the ASCII mode.

9.4.1. Specifications

Character Format

Each byte is transmitted as 11 bits rather than adapting the 10-bit format used by the ASCII mode. This is because of using a control bit which is cleared in control characters, and set in data characters. The format is represented by the following:-

1	Start bit (lo)
7	Data bits (LSB first)
1	Control bit *
1	Even parity bit
1	Stop bit (hi)

* 0 = Control character
1 = Data character

9.4.2. The Message

The message received from the supervisor can be in any of several modes. They can be divided into two categories, the first is the "main messages", and the second is the "continuation messages". Before presenting the format of these messages, the following gives the symbols they use. These symbols are divided into two parts, they are "control characters" and "data characters".

9.4.3. Control Characters

(EOT) : Indicates the end of transmission. It therefore clears the line and is sent by the master at the start of a new message.

(STX) : This is the start of text character.

(ENQ) : This is the enquiry character. It is sent by the master as the last character of any type of a polling message.

(ETX) : This is the end of text character. It is followed by another character containing the checksum.

(ETB) : This is the end of block character. It is sent by the 584 drive instead of the (ETX) when it wishes to reply to a multi parameter enquiry. The (ETB) indicates the end of a block, but not the end of a message. Each block contains information on up to eight parameters. The (ETB) is used in replies to enquiry polling and multi-parameter polling (these are explained below).

(ACK) : This is the positive acknowledgement character.

(NAK) : This is the negative acknowledgement character.

9.4.4. Data Characters

(INO) : This is the instrument number. It contains the address of the slave drive and is equivalent to the combination of the GID, UID characters of the ASCII mode.

(PNO) : This is the parameter number. It is equivalent to the combination of the C1 and C2 characters of the ASCII mode and is sent as a hexadecimal number rather than two ASCII characters.

(D1), (D2) and (D3) : These three characters contain both the value and the mode number. The format is explained in section (c) below.

(CCC) : This is the connection check control character. It contains the checksum of all the characters following the (EOT) character in the message.

(BCC) : Verification digit which is the character generated by taking the exclusive OR of the ASCII values of all character transmitted after and excluding (STX) up to and including (ETX)

9.4.5. Types of Messages

As described above there are two types of message:

Main Messages

The main messages are in four types:

1. Selection

The supervisor writes to one parameter.

(EOT) (INO) (CCC) (STX) (PNO) (D1) (D2) (D3) (ETX) (BCC)

where the (BCC) character contains the checksum of all characters following the (STX).

2. Polling

The supervisor requests to read the value of one parameter.

(EOT) (INO) (PNO) (CCC) (ENQ)

3. Enquiry Polling

The supervisor requests to read all those parameters in block 1 that have changed since the last read by an amount greater than or equal to changeband (PNO 4).

(EOT) (INO) (CCC) (ENQ)

4. Multi-parameter polling

The supervisor requests to read a given number of parameters. That number is referred to as the count number ("CNO"), it is included in the request message and the reply will be sent by the drive, in blocks of up to 8 parameters.

(EOT) (INO) (PNO) (CNO) (CCC) (ENQ)

Note that the CCC is the checksum of the characters following an (EOT) and is therefore equal to (INO) in selection and enquiry-polling messages.

If PNO is the first in a block (i.e. 0, 8, 16, etc.) and CNO = 8, then a pseudo - enquiry poll is performed on the block, controlled by PNO 7. Section 7.3 gives details.

Continuation messages:

In addition to the above, there are two types of continuation messages (sent by the supervisor).

1. Next : (send next item from a list)
   Only valid if sent following a multi-parameter poll.
   (ACK)
2. Repeat : (repeat last reply)
   Only valid if sent following any type of poll. It requests a repetition of the previous reply.
   (NAK)

Data Format

Data values are presented in three consecutive characters, D1, D2 and D3. These characters include the mode name as well as the value read from or to be written to one of the parameters. A data character is represented by setting its MSB (bit 7). The contents of these characters are as follows:-

D1 :	bits 2 to 6	: mode number Number format is: 0 = XXXX 1 = XXX.X 2 = XX.XX 3 = X.XXX 4 = .XXXX
	bits 0 and 1	: bits 14 and 15 of the value.
D2 :	bits 0 to 6	: bits 7 to 13 of the value.
D3 :	bits 0 to 6	: bits 0 to 6 of the value.

Baud Rate:

This can be any one of 6 values: 300, 600, 1200, 2400, 4800 or 9600 baud

9.4.6. Serial Transmission

During serial communications, the 584 drive acts as a slave and replies to messages sent from a supervisor. It responds by transmitting a reply which can be one of two types:

a. one character

It can be one of the following:-

1. (ACK) : sent after the correct reception of a selection message.
2. (NAK) or (EOT) : in case of detecting a fault.

b. more than one character

This is the case when sending a reply to any type of a polling message.The reply is in the form:

(STX) (PNO) (D1) (D2) (D3) (ETX) (BCC)

In case of multi-parameter polling, the reply can consist of more than one message. Such a reply is divided into a group of messages (blocks). The (ETX) character is only sent at the end of the last message. In other messages, the (ETX) is replaced by an (ETB) to indicate an end of a block rather than the end of reply, as explained earlier.

9.5. SERIAL LINK MNEMONICS AND PARAMETER NUMBER ALLOCATION

9.5.1. Eurotherm Group Standard Parameters

Each of the Eurotherm Group instruments which support ASCII protocol contains a minimum set of parameters. These are known as the Prime Set and allow access to the following:-

Mnemonic	Description	Access	Function
BL	Buffer length	R/O	Returns 4646_{16} indicating that both transmit and receive buffers are 46_{16} bytes long.
CI	Configuration Information	R/O	Returns $4CCC_{16}$ indicating that the drive supports both fixed and variable length data formats, and that the drive is a single-function device.
EE	Error report	R/W	Returns one of the following to indicate the status of serial link transmissions : 00C0 No errors 01C7 Unknown mnemonic 02C2 Block check character fail 03C1 Parity error on received data 03C2 Framing or overrun error 05C8 Attempt to write to a read-only mnemonic 07C7 Invalid message format 08C8 Value in selection message out of range Writing any value to mnemonic EE resets it to 00C0.
	Instrument	R/W	Returns the value of a parameter, the default value of which is 5840_{16}.
MN	Mode Number	R/O	Returns a fixed value 08C1 (the full Eurotherm standard is not supported).
VO	Version Number	R/O	Returns the issue number in the upper two characters, and the release number in the lower two characters. For example issue 2.1 returns 0201.

In addition to the Prime Set, each drive or instrument supports an application set of parameters to allow fast access to commonly required variables such as:-

a. Process variables.
b. Setpoints.
c. PI gains.

All parameters can be found by polling the instrument identifier parameter and then sequentially polling until the instrument identifier parameter is repeated. This will result in a circular list that contains all supported by the instrument.

9.5.2. PNO Allocation

Block 0: (Binary Protocol Only)

<table>
<tr><th>PNO</th><th>Access</th><th>Description</th></tr>
<tr><td>0</td><td>R/O</td><td>Instrument Identifier. Same as ASCII mnemonic II.</td></tr>
<tr><td>1</td><td>R/W</td><td>Error report. Same as ASCII mnemonic EE</td></tr>
<tr><td>2</td><td></td><td>Reserved</td></tr>
<tr><td>3</td><td></td><td>Reserved</td></tr>
<tr><td>4</td><td>R/W</td><td>Changeband. In an enquiry poll or pseudo-enquiry poll R/W (see PNO 7), a value must have changed by an amount equal to or greater than the hysteresis before it will be reported. Hysteresis is measured in the smallest units applicable to each parameter. For example, if hysteresis = 10, then a parameter with one decimal point must change by 1.0, and a parameter with two decimal points must change by 0.10 before they will be reported</td></tr>
<tr><td>5</td><td>R/O</td><td>Serial link configuration.
<table>
<tr><th>Bit nos.</th><th colspan="2">Description</th></tr>
<tr><td>0 - 3</td><td>Baud rate</td><td>0 = 300
1 = 600
2 = 1200
3 = 2400
4 = 4800
5 = 9600 (default)
6 = 19200</td></tr>
<tr><td>4 - 15</td><td colspan="2">Reserved</td></tr>
</table></td></tr>
<tr><td>6</td><td></td><td>Reserved.</td></tr>
<tr><td>7</td><td>R/W</td><td>Control word for multi-parameter polling. For the purpose of multi-parameter polling, the PNOs are arranged in 16 blocks of 8. Bit 0 of this parameter controls block 0 (PNO 0 to 7), bit 1 controls block 1 (PNO 8 to 15) bit 15 controls block 15 (PNO 120 to 127).
When a bit is 1 (default), a multi-parameter poll on this block operates normally.
When a bit is 0, a multi-parameter poll on this block with PNO = multiple of 8, and CNO = 8 performs an enquiry poll instead (a pseudo-enquiry poll).</td></tr>
</table>

Block 1 :

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
8	08	38	R/O	-	21	xxx.xx	-	MOTOR CURRENT (%)
9	09	60	R/O	-	21	xxx.xx	-	MOTOR LOAD (%)
10	0A	62	R/O	-	21	xxx.xx	-	EXT TORQUE LIM (%)
11	0B	39	R/O	-	21	xxx.xx	-	DRIVE FREQUENCY (%)
12	0C	61	R/O	-	21	xxx.xx	-	SPEED SETPOINT (%)
13	0D	85	R/O	-	21	xxx.x	-	DRIVE FREQUENCY (Hz)
14	0E	84	R/O	-	21	xxx.x	-	SPEED SETPOINT (Hz)
15	0F	58	R/O	-	23	xxxxx	-	DRIVE STATUS
	-	-	0				-	Drive stopped
	-	-	1				-	Drive running
	-	-	2				-	Drive at zero speed
	-	-	3				-	Drive at speed setpoint
	-	-	4				-	Drive running with i*t warning
	-	-	5				-	Jog active
	-	-	6				-	Reserved
	-	-	7				-	External trip
	-	-	8				-	D.C. link overvoltage trip
	-	-	9				-	D.C. link undervoltage trip
	-	-	10				-	Overcurrent trip
	-	-	11				-	I*t trip
	-	-	12				-	Stall trip
	-	-	13				-	4-20mA control trip
	-	-	14				-	Heatsink overtemp trip
	-	-	15				-	Motor overtemp trip

Block 2 :

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
16	10	14	R/W	-	21	xxx.x	0.1 3000.0	RAMP UP TIME (sec)
17	11	13	R/W	-	21	xxx.x	0.1 3000.0	RAMP DOWN TIME (sec)
18	12	6	R/W[2]	-	21	xxx.xx	0 100.00	MAX SPEED (%)
19	13	7	R/W[2]	-	21	xxx.xx	0 100.00	MIN SPEED (%)
20	14	17	R/W	-	21	xxx.xx	50.00 150.00	MOTOR I LIMIT (%)
21	15	12	R/W[2]	-	21	xxx.xx	6.25 100.00	BASE FREQUENCY (%)
22	16	18	R/W	-	21	xxx.xx	0.00 25.00	VOLTAGE BOOST (%)
23	17	59	R/O	-	23	xxxxx	-	DIGITAL INPUTS
-	-	-	0					Run
-	-	-	1					Framp
-	-	-	2					Direction
-	-	-	3					External trip
-	-	-	4					Jog
-	-	-	5					Preset 1
-	-	-	6					Preset 2
-	-	-	7					Local/remote
-	-	-	8 - 15					Reserved

Block 3 :

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
24	18	8	R/W	-	21	xxx.xx	-100.00 100.00	PRESET SPEED 1 (%)
25	19	9	R/W	-	21	xxx.xx	-100.00 100.00	PRESET SPEED 2 (%)
26	1A	10	R/W	-	21	xxx.xx	-100.00 100.00	PRESET SPEED 3 (%)
27	1B	11	R/W	-	21	xxx.xx	-100.00 100.00	PRESET SPEED 4 (%)
28	1C	31	R/W	-	21	xxx.xx	50.00 105.00	I*T THRESHOLD (%)
29	1D	5	R/W	-	21	xxx.xx	0.00 100.00	AUX SETPOINT (%)
30	1E							Reserved
31	1F		-	-	23	xxxxx	(Note 1)	
-		44	R/W	0		0 → 1		EXT TORQUE LIM SELECT
-		55	R/W	1		0 → 1		AUX RUN
-		56	R/W	2		0 → 1		AUX FRAMP
-		57	R/W	3		0 → 1		AUX DIRECTION
-				4 - 15				Reserved

Block 4 :

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
32	20	19	R/W	-	21	xxx.xx	0.00 100.00	SKIP FRQ 1 (%)
33	21	23	R/W	-	21	x.xx	0.00 2.09	SKIP BAND 1 (%)
34	22	20	R/W	-	21	xxx.xx	0.00 100.00	SKIP FRQ 2 (%)
35	23	24	R/W	-	21	x.x	0.00 2.09	SKIP BAND 2 (%)
36	24	43	R/W	-	21	xxx.x	0.1 3000.0	FRAMP TME (sec)
37	25	53	R/W	-	21	x.xx	0.00 4.17	SLIP COMP (%)
38	26	86	R/W	-	21	xxx.xx	-100.00 100.00	SERIAL LINK SETPOINT (%)
39	27		-	-	23	xxxxx	(Note 1)	
	-	27	R/W	0			0 → 1	SKIP FRQ 1 SELECT
	-	28	R/W	1			0 → 1	SKIP FRQ 2 SELECT
	-	-		2 - 15			-	Reserved

Block 5 :

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
40	28	21	R/W	-	21	xxx.xx	0.00 100.00	SKIP FRQ 3 (%)
41	29	25	R/W	-	21	x.xx	0.00 2.09	SKIP BAND 3 (%)
42	2A	22	R/W	-	21	xxx.xx	0.00 100.00	SKIP FRQ 4 (%)
43	2B	26	R/W	-	21	x.xx	0.00 2.09	SKIP BAND 4 (%)
44	2C							Reserved
45	2D							Reserved
46	2E							Reserved
47	2F		-	-	23	xxxxx	(Note 1)	
	-	29	R/W	0				SKIP FRQ 3 SELECT
	-	30	R/W	1			0 → 1	SKIP FRQ 4 SELECT
	-	-	-	2 - 15			0 → 1	Reserved

Block 6 :

PNO	ASCII mnemonic	Tag No.	Access	ASCII data format	Binary data format	Values		Description
48	30	2	R/W	21	xxxxx	0	0V TO 10V	LOCAL SETPOINT
						1	AUX SETPOINT	
						2	PRESET SPEED1	
						3	PRESET SPEED 2	
						4	PRESET SPEED 3	
						5	PRESET SPEED 4	
						6	-10V TO +10V	
49	31	3	R/W		xxxxx	0	0mA TO 20mA	REMOTE SETPOINT
						1	20mA TO 0mA	
						2	4mA TO 20mA	
						3	20mA TO 4mA	
						4	SERIAL LINK	
						5	DIGITAL PRESET	
50	32	4	R/W[2]	21	xxxxx	0	120 Hz	LIMIT FRQ SELECT
						1	240Hz	
						2	480 Hz	
51	33	15	R/W[2]		xxxxx	0	RAMP	STOPPING MODE
						1	COAST	
						2	DC INJECTION	
						3	RAMP + INJECTION	
52	34	16	R/W[2]		xxxxx	0	LINEAR	V/F SHAPE
						1	FAN LAW	
53	35	32	R/W[2]		xxxxx	0	3kHz	SWITCHING FREQUENCY
						1	6kHz	
						2	9kHz	
54	36	36	R/W[2]		xxxxx	0	ZERO SPEED	RELAY 1 CONFIG
						1	AT SPEED	
						2	RUN CONFIRM	
						3	BRAKE CONTROL	
55	37	37	R/W[2]		xxxxx	0	ZERO SPEED	RELAY 2 CONFIG
						1	AT SPEED	
						2	RUN CONFIRM	
						3	BRAKE CONTROL	

Block 7

PNO	ASCII mnemonic	Tag No.	Access	Bit No.	ASCII data format	Binary data format	Limits and values	Description
56	38	115	R/W		21	xxx.xx	-150 to 150	REGEN I LIMIT (%)
57	39					xxx.xx		Reserved
58	3A	131	R/W[2]		21		0.00 to 100.00	BASE VOLTS (%)
59	3B	132	R/W	-	21	xxxxx	0 MICRO AC DRIVE 1 SPEED SETPOINT 2 DRIVE FREQUENCY 3 MOTOR CURRENT 4 MOTOR LOAD 5 EXT TORQUE LIM 6 DRIVE STATUS 7 DIGITAL INPUTS	Menu position
60	3C	54	R/W	-	21	x.xx	0.00 to 4.17	STABILISATION (%)
61	3D	134	R/W	-	21	xxxx.x	0.1 to 3000.0	STALL TRIP TIME (sec)
62	3E	136	R/W	-	21	xxx.xx	10.00 to 100.00	OP CURRENT CAL (%)
63	3F		-	-	23	xxxxx	(Note 1)	
	-	116	R/W	0			0 → 1	REGEN LIM SELECT
	-	128	R/W	1			0 → 1	RAMP HOLD SELECT
	-	133	R/W	2			0 → 1	STALL TRIP ENABLE
	-	144	R/W	3			0 → 1	RAMP OUTPUT
	-			4-15			-	Reserved

Block 8

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
64	40	137	R/W	-	21	XXX.XX	50.00 150.00	I*T UPPER LIMIT (%)
65	41	138	R/W	-	21	XX.XX	5.0 60.0	I*T TIME (sec)
66	42	140	R/W	-	21	XXX.XX	0.00 150.00	ON LOAD LEVEL (%)
67	43	141	R/W	-	21	XXX.XX	0.00 100.00	ON FREQ LEVEL (%)
68	44	142	R/W	-	21	XXX.XX	0.00 100.00	OFF FREQ LEVEL (%)
69	45							Reserved
70	46							Reserved
71	47							Reserved

Block 15:

PNO	ASCII mnemonic	Tag No.	Access	Bit number	ASCII data format	Binary data format	Limits	Description
96	60	91	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 112 (mnemonic 70)
97	61	92	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 113 (mnemonic 71)
98	62	93	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 114 (mnemonic 72)
99	63	94	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 115 (mnemonic 73)
100	64	95	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 116 (mnemonic 74)
101	65	96	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 117 (mnemonic 75)
102	66	97	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 118 (mnemonic 76)
103	67	98	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 119 (mnemonic 77)
104	68	99	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 120 (mnemonic 78)
105	69	100	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 121 (mnemonic 79)
106	6A	101	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 122 (mnemonic 7A)
107	6B	102	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 123 (mnemonic 7B)
108	6C	103	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 124 (mnemonic 7C)
109	6D	104	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 125 (mnemonic 7D)
110	6E	105	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 126 (mnemonic 7E)
111	6F	106	R/W	-	21	xxxxx	0 → 255	Pointer for PNO 127 (mnemonic 7F)

Block 16:

This block on PNOs and mnemonics are configurable. The tags to which they point are defined by PNOs 60 to 6F in block 15.

PNO	ASCII mnemonic	Tag No.	Access	Bit No.	ASCII data format	Binary data format	Limits	Description
112	70	(PNO 96)	*	-	*	*	*	Configurable mnemonic 1
113	71	(PNO 97)	*	-	*	*	*	Configurable mnemonic 2
114	72	(PNO 98)	*	-	*	*	*	Configurable mnemonic 3
115	73	(PNO 99)	*	-	*	*	*	Configurable mnemonic 4
116	74	(PNO 100)	*	-	*	*	*	Configurable mnemonic 5
117	75	(PNO 101)	*	-	*	*	*	Configurable mnemonic 6
118	76	(PNO 102)	*	-	*	*	*	Configurable mnemonic 7
119	77	(PNO 103)	*	-	*	*	*	Configurable mnemonic 8
120	78	(PNO 104)	*	-	*	*	*	Configurable mnemonic 9
121	79	(PNO 105)	*	-	*	*	*	Configurable mnemonic 10
122	7A	(PNO 106)	*	-	*	*	*	Configurable mnemonic 11
123	7B	(PNO 107)	*	-	*	*	*	Configurable mnemonic 12
124	7C	(PNO 108)	*	-	*	*	*	Configurable mnemonic 13
125	7D	(PNO 109)	*	-	*	*	*	Configurable mnemonic 14
126	7E	(PNO 110)	*	-	*	*	*	Configurable mnemonic 15
127	7F	(PNO 111)	*	-	*	*	*	Configurable mnemonic 16

* = The access, data format and limits depend on the tag to which the corresponding pointer points.

9.6. ADDITIONAL FEATURES

1. There is a option on the way in which the 2 state (binary) parameters return values when polled. These are accessible only via the configurable PNOs. If ESP SUPPORT is disabled the data part of the message consists of

   >x

   where x = 0 or 1. Thus the message length is minimised.
   If ESP SUPPORT is enabled the data part of the message consists of

   >0 0 0 x

   where x = 0 or 1. This option is intended for use with Eurotherm ESP devices. When sending a selection message to these parameters any leading zeros are ignored.

2. On the main RS485 serial port (P1) the parity is EVEN by default, but may be switched to ODD using the keypad.

9.7. REFERENCES

1. Eurotherm International Bisynch Communications Handbook Part No. HP022047C

9.8. NOTES

1. The reserved bits in these parameters return zero for a poll. The state for a selection is immaterial.
2. Access to these parameters is read/write if the drive is not running or read-only if the drive is running.
3. The range of tis parameter is restricted as a function of the drive power rating. For 585 and 586 power ratings the switching frequency is limited to 6kHz.

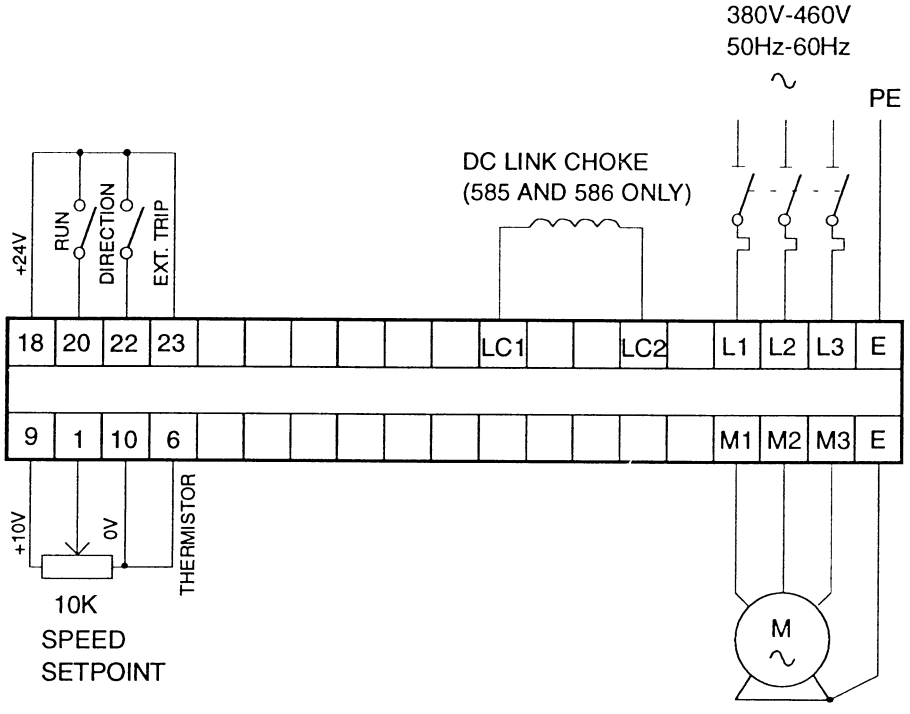
10. APPLICATION NOTES

10.1. GENERAL

Always use gold flash relays, or others designed for low current operation (5mA) on all control wiring.
All power factor correction equipment must be removed from the motor before an inverter can be used.
Motors with low efficiency and small cos ø (power factor) should be avoided since they require a larger KVA rated inverter to produce the correct shaft kW.

10.2. MINIMUM CONNECTION REQUIREMENTS.

The diagram below shows the minimum connection requirements in order to operate the drive.



10.3. SYNCHRONOUS MOTORS

Although intended primarily for use with induction (asynchronous) motors, inverters can also be used for speed control of synchronous AC machines. Synchronous motors can offer economic solutions in applications where tight control of speed is required together with the low maintenance characteristics of an AC motor.
The two most common types of synchronous AC motor are permanent magnet and wound rotor. In contrast to induction motors, synchronous motors run at synchronous speed whether on no load or full load. Synchronous speed is set by the frequency of the supply applied to the stator. The stator flux can be maintained constant by keeping the stator volts/frequency ratio constant as with an induction motor.
Torque is produced in the motor by a increase in load angle between the stator and rotor fluxes. Maximum torque occurs when the load angle approaches 90°. If the load angle exceeds this value then torque drops and the motor will stall. Systems involving synchronous motors need careful design to ensure that the motor can accelerate the load and handle transient load changes without stalling.

10.4. BRAKE MOTORS

Brake motors are used in applications requiring a mechanical brake for safety or other operational reasons. The motor can be a standard induction motor fitted with an electromechanical brake or it could be a special conical rotor machine. In the case of a conical rotor machine the spring-loaded brake is controlled by the motor terminal voltage as follows:

At rest the motor is braked.

When the motor is energised an axial component of the magnetic field, due to the conical air-gap, overcomes the force of the brake spring and draws the rotor into the stator. This axial displacement releases the brake and allows the motor to accelerate like a normal induction motor.

When the motor is de-energised the magnetic field collapses and the brake spring displaces the rotor, pushing the brake disc against the braking surface.

Inverters can be used to control the speed of conical rotor brake motors since the linear V/f characteristic maintains the motor magnetic field constant over the speed range. It will be necessary to set the VOLTAGE BOOST parameter to overcome motor losses at low speed.

10.5. USING LINE CHOKES

Line chokes are not required to limit input current to Eurotherm Drives inverters. 585 and 586 series drives are supplied with externally mounted DC Link chokes. The purpose of these chokes is to reduce the ripple current in the DC Link capacitors. 584 series drives up to 4kW do not require a choke. From 5.5kW to 7.5kW the choke is fitted inside the drive package.
Line chokes may be used to reduce the harmonic content of the supply current where this a particular requirement of the application.

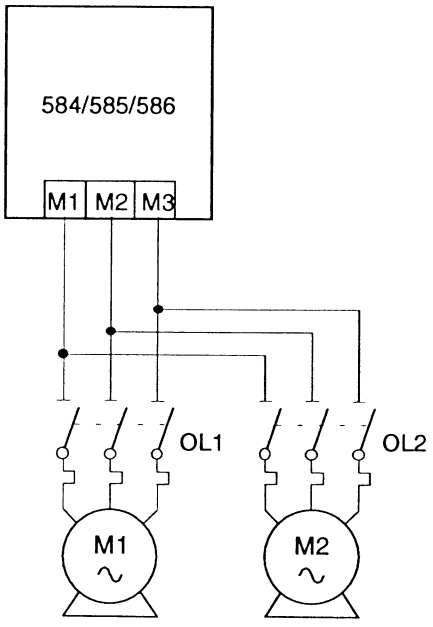
10.6. USING MOTOR CHOKES

Installations with motor cable runs >50m may suffer from nuisance overcurrent trips. This is due to the capacitance of the cable causing current spikes to be drawn from the inverter output. A choke may be fitted in the inverter output which limits the capacitive current. Screened cable has a higher capacitance and may cause problems in shorter runs. The recommended choke values are shown below:

Drive kW	Choke Inductance	RMS Current Rating	Eurotherm Part No.
0.75	2mH	7.5A	CO055931
1.1			
1.5			
2.2			
4.0	0.9mH	22A	CO057283
5.5			
7.5			
11	0.45mH	33A	CO057284
15			
18	0.3mH	44A	CO057285
22	50uH	70A	CO055193
30			
37	50uH	99A	CO055253

10.7. USING MULTIPLE MOTORS ON A SINGLE DRIVE

It is possible to use a single large inverter to supply several smaller motors provided that each individual motor has overload protection.



The drive must be rated to supply the **total motor current**. It is not sufficient to simply sum the power ratings of the motors, since the drive has also to supply the magnetising current for each motor.

Note that the overload device will not prevent the motor overheating due to inadequate cooling at low speed. Force vented motors may be required; consult your motor supplier.

11. PRODUCT SPECIFICATIONS

11.1. PRODUCT CODE

All members of the 584 family can be fully specified using a numerical product code. This code identifies such things as the motor power rating and whether various options are fitted, etc.
The product code consists of 8 blocks of digits seperated by "/". The meaning of each of the blocks is given below:

Block 1 — 3 digits identifying the basic product (584, 585, 586, 587).

Block 2 — 4 digits identifying the output power.

584	0007	-	0.75kW
	0015	-	1.5kW
	0022	-	2.2kW
	0040	-	4.0kW
	0055	-	5.5kW
	0075	-	7.5kW
585	0110	-	11kW
	0150	-	15kW
	0185	-	18.5kW
	0220	-	22kW
586	0300	-	30kW
	0370	-	37kW
	0450	-	45kW
587	0550	-	55kW
	0750	-	75kW

Not yet available

Block 3 — 1 digit identifying overload rating.
0 - Constant torque rating, 150% overload 60secs
1 - Fan/Pump Torque Rating,110% overload 30secs not available
2 - Dual rating,Constant torque/Fan-Pump Rating software selectable

Block 4 — 1 digit identifying AC power input

8 - 380 to 460V

Block 5 — 1 digit identifying speed feedback option

0 - open loop (no speed feedback)
1 - analogue tach
2 - microtach
3 - encoder

Not yet available

Block 6 — 1 digit identifying serial comms option

0 - standard, option not fitted
1 - opto isolated RS422/485 option fitted — Not yet available

Block 7 — 1 digit identifying dynamic brake option

0 - standard, option not fitted
1 - dynamic brake

Block 8	(584 only) 3 digits identifying special options 000 - standard 001 to 999 - special options	(585/586/587 only) 1 Digit Identifying requirement for DC Choke 0 - No DC Choke 1 - DC choke supplied
Block 9	(584 only) 2 Digits identifying the build standard. (Factory Use Only)	(585/586/587 only) 3 digits identifying special options 000 - standard 001 to 999 - special options
Block 10	(584 only) Not applicable	(585/586/587 only) 2 digits identifying the build standard. (Factory Use Only)

Example 1: 584/0075/0/8/0/1/1/000/02
is a 584 drive rated at 7.5kW standard industrial rating for 380V-460V mains supply, no speed feedback option, serial link option fitted, dynamic brake option fitted, build standard 02 with no special options.

Example 2: 585/0150/0/8/0/1/1/1/000/02
is a 585 drive rated at 15kW standard industrial rating for 380V-460V mains supply, no speed feedback option, serial link option fitted, dynamic brake option fitted, dc choke provided , build standard 02 with no special options.

11.2. ELECTRICAL SPECIFICATION

		584						
Motor Power (kW)	Constant Torque	0.75	1.1	1.5	2.2	4.0	5.5	7.5
	Fan/Pump Torque	1.1	1.5	2.2	4.0	5.5	7.5	N/A
Input voltage		380V to 460V ±10%, 50/60Hz						
Input Current (A)	Constant Torque	3.0	4.5	6.0	8.0	11	15	18.0
	Fan/Pump Torque	4.0	5.5	7.0	10	14	18	N/A
Input p.f.		0.95					0.86	
Input Fuse ①		10A				20A		
Output Voltage		Dependent on Input Voltage						
Output Current (A)	Constant Torque	2.3	3.3	4.5	6.3	9.4	13	16
	Fan/Pump Torque	3.0	4.0	5.5	8.5	12	16	N/A
Output Overload	Constant Torque	150% for 60s						
	Fan/Pump Torque	110% for 30s						
Output Frequency		0 to 120Hz/240Hz/480Hz						
Switching Frequency		3kHz/6kHz/9kHz						
Approx. loss @ 6kHz (W)		60	70	85	110	150	200	250
Temp. Range	Constant Torque	0 to 50°C						
	Fan/Pump Torque	0 to 40°C						
Humidity		85% RH at 40°C non-condensing						
Altitude		above 1000m, derate 1%/100m						
Atmosphere		non-flammable, non-corrosive and dust-free						

	585		586			
Motor Power (kW)	11	15	18	22	30	37
Input voltage	380V TO 460V ±10%, 50/60Hz					
Input Current (A)	25	31	40	46	61	72
Input p.f.	0.86					
Input Fuse ②	30	40	50	63	100	
Output Voltage	Dependent on Input Voltage					
Output Current (A)	24	30	39	46	61	72
Output Overload	150% for 60s					
Output Frequency	0 TO 120Hz/240Hz/480Hz					
Switching Frequency	3kHz/6kHz					
Approx. loss @ 6kHz (W)	350	400	550	630	820	1050
Temperature Range	0 to 50°C					
Humidity	85% RH at 40°C non-condensing					
Altitude	above 1000m, derate 1%/100m					
Atmosphere	non-flammable, non-corrosive and dust-free					

Notes :-

① Class "T" Fuses.

② To provide short circuit protection Semiconductor Fuses should be installed in the 3-phase supply to the 585/586 products. These fuses are not, however, suitable for branch protection and type "T" fuses must be used for this purpose

11.3. MECHANICAL SPECIFICATION

584

Refer to 584 Outline Drawing HG385656F

ENCLOSURE	:	Chassis mounted IP20.
MOUNTING ORIENTATION	:	Vertical
WEIGHT	:	7.5kg max.
AIR FLOW CLEARANCE	:	80mm top and bottom, 10mm side to side.
POWER TERMINATIONS	:	M5 tapped bushes with slotted screws. Tightening torque 2.5Nm (1.8lb-ft). Earth terminal is M4 stud with nut. Tightening torque 1.3Nm (0.9lb-ft)
CONTROL TERMINATIONS	:	Removable screw connectors for 0.75mm^2 (18awg) wire. Terminals will accept up to 1.5mm^2 (16 awg) wire. Tightening torque 0.6Nm (0.4lb-ft)

585

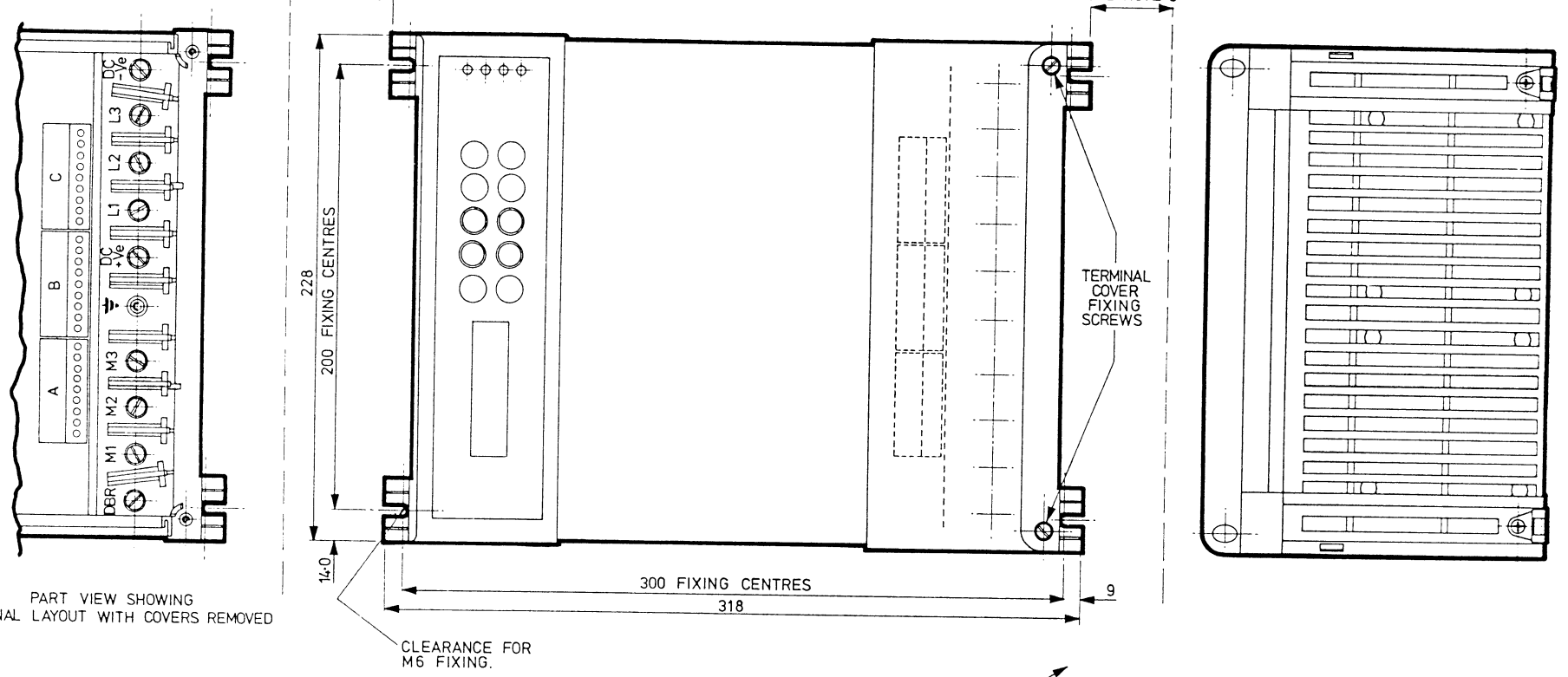
Refer to 585 Outline Drawing HG386871F

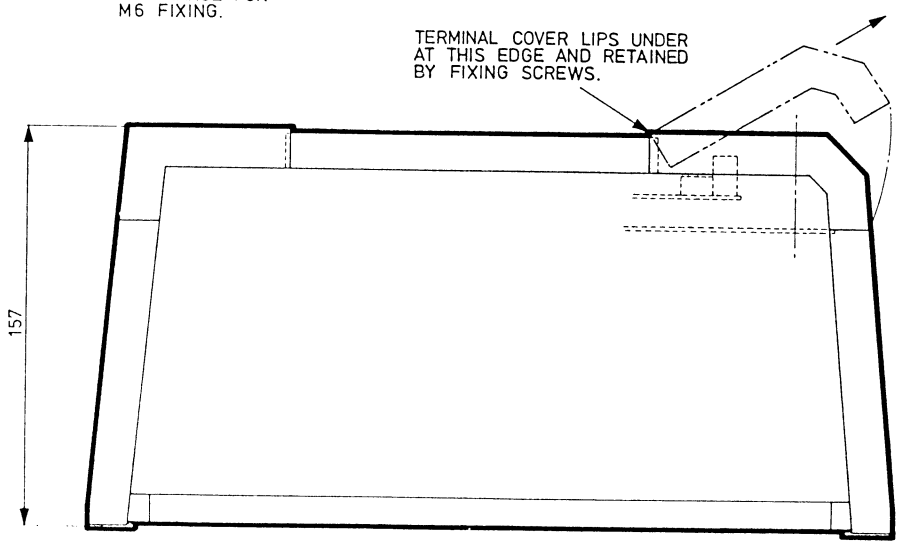
ENCLOSURE	:	Chassis mounted IP20.
MOUNTING ORIENTATION	:	Vertical
WEIGHT	:	11kg max. 4kg choke
AIR FLOW CLEARANCE	:	80mm top and bottom, 10mm side to side.
POWER TERMINATIONS	:	M5 tapped bushes with slotted screws. Tightening torque 2.5Nm (1.8lb-ft).
CONTROL TERMINATIONS	:	Removable screw connectors for 0.75mm^2 (18awg) wire. Terminals will accept up to 1.5mm^2 (16 awg) wire. Tightening torque 0.6Nm (0.4lb-ft)

586

Refer to 586 Outline Drawing HG386744F

ENCLOSURE	:	Chassis mounted IP20.
MOUNTING ORIENTATION	:	Vertical
WEIGHT	:	24kg max. Choke 4kg
AIR FLOW CLEARANCE	:	80mm top and bottom, 10mm side to side.
POWER TERMINATIONS	:	M8 captive nuts with slotted screws. Tightening torque 11Nm (7.6lb-ft)
CONTROL TERMINATIONS	:	Removable screw connectors for 0.75mm^2 (18awg) wire. Terminals will accept up to 1.5mm^2 (16 awg) wire. Tightening torque 0.6Nm (0.4lb-ft)





NOTES

1. CONNECTIONS A, B & C ARE PLUG IN STYLE TERMINALS, CAPABLE OF ACCEPTING 1·5 mm² CABLE INTO CLAMP STYLE LOOPS.
2. EARTH CONNECTION IS M4, ALL OTHER CONNECTIONS ARE M5. ALL NECESSARY FIXINGS FOR ELECTRICAL CONNECTIONS ARE SUPPLIED.
   MECHANICAL FIXINGS ARE NOT SUPPLIED.
3. AT LEAST 80mm CLEARANCE ABOVE AND BELOW CONVERTER MUST BE PROVIDED FOR COOLING AIR.
4. TERMINAL COVER CAN BE REMOVED BY RELEASING RETAINING SCREWS.

DO NOT SCALE | THIRD ANGLE PROJECTION | GENERAL DRAWING PRACTICE TO BS 308 / BS 3638

DRAWN PLB | CHECKED | MATERIAL | FINISH

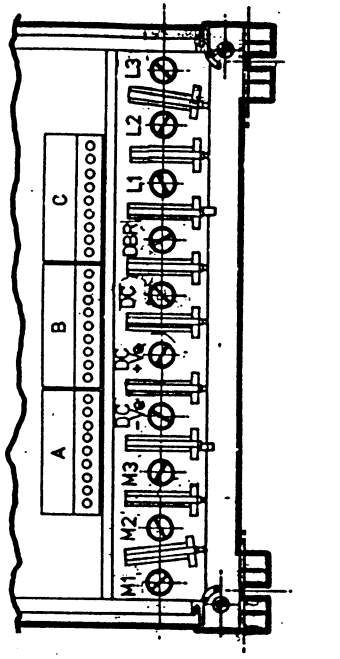
DIMS. IN M.M. APPLY OVER FINISH (EXCEPT FOR PAINT AND LACQUER)

SCALE 1:1

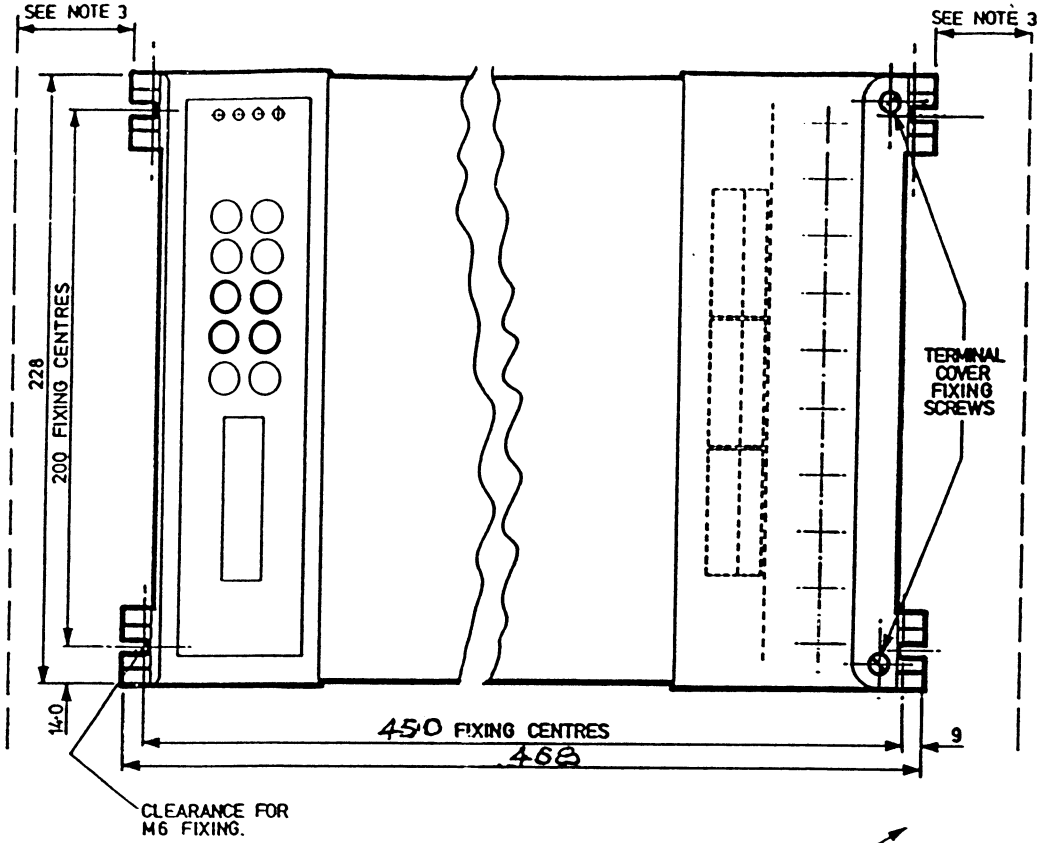
TITLE 534 OUTLINE DRAWING

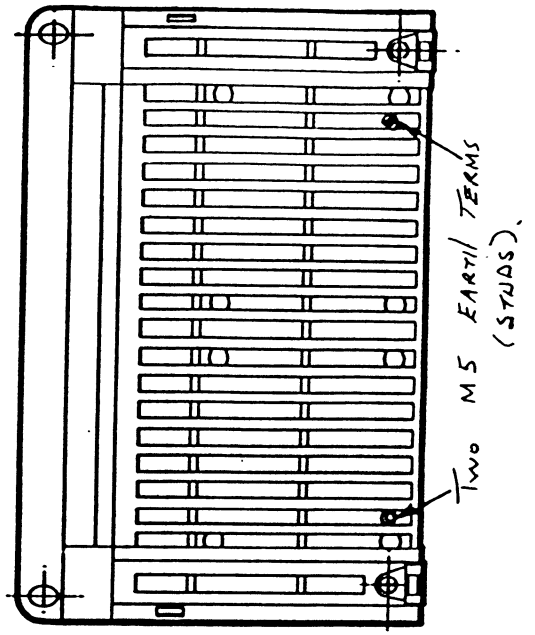
SSD LITTLEHAMPTON ENGLAND TELEX 87142

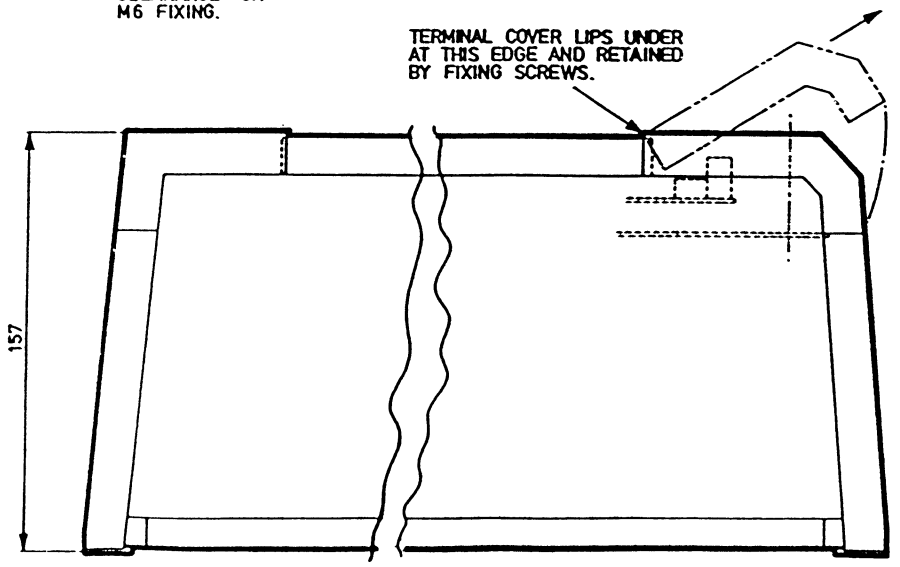
HD 395555 F



PART VIEW SHOWING
TERMINAL LAYOUT WITH COVERS REMOVED

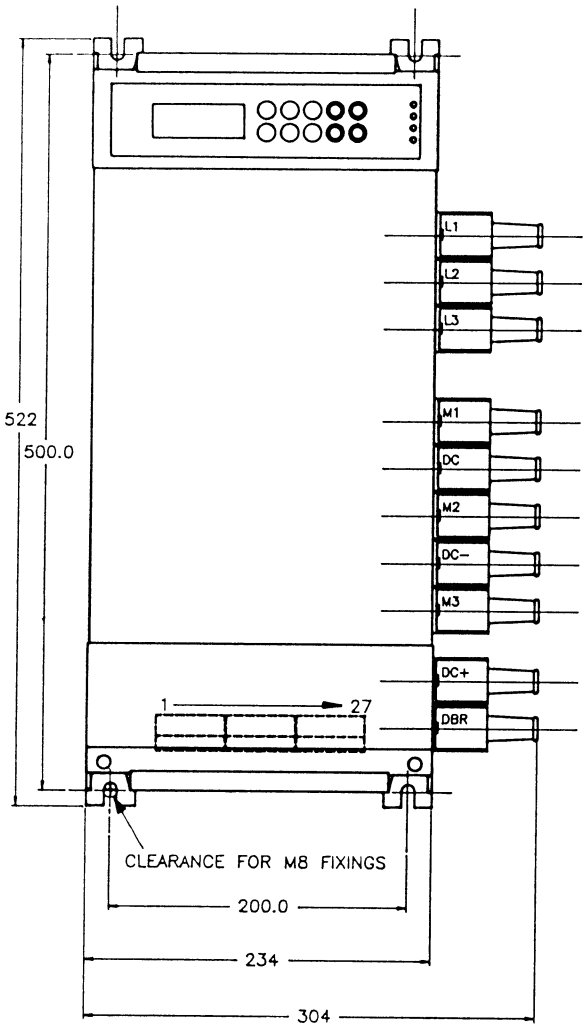


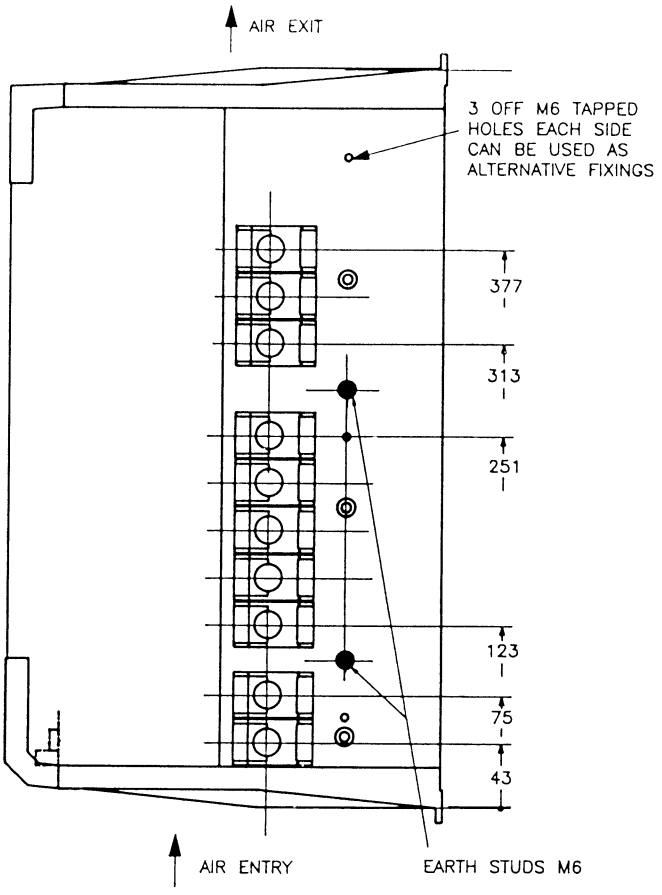




NOTES

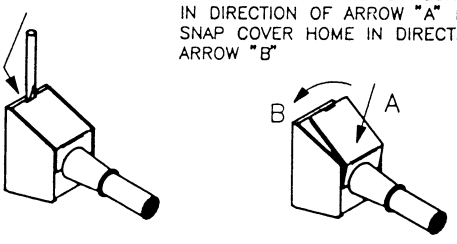
1. CONNECTIONS A, B & C ARE PLUG IN STYLE TERMINALS, CAPABLE OF ACCEPTING 1·5 mm² CABLE INTO CLAMP STYLE LOOPS.
2. EARTH CONNECTION IS M5 ALL OTHER CONNECTIONS ARE M5. ALL NECESSARY FIXINGS FOR ELECTRICAL CONNECTIONS ARE SUPPLIED.
   MECHANICAL FIXINGS ARE NOT SUPPLIED.
3. AT LEAST 80mm CLEARANCE ABOVE AND BELOW CONVERTER MUST BE PROVIDED FOR COOLING AIR.
4. TERMINAL COVER CAN BE REMOVED BY RELEASING RETAINING SCREWS.



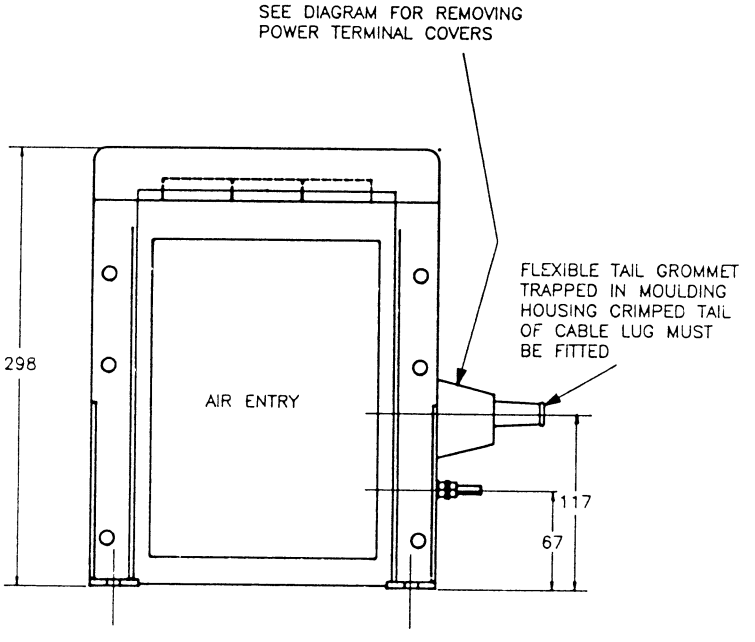


TO REMOVE POWER TERMINAL COVERS INSERT SCREWDRIVER HERE AND TWIST OR PULL AWAY FROM TERMINAL HOUSING

TO ASSEMBLE POWER TERMINAL COVERS HOOK COVER LUGS BETWEEN GROMMET AND TERMINAL HOUSING PUSHING DOWN IN DIRECTION OF ARROW "A" ROTATE AND SNAP COVER HOME IN DIRECTION OF ARROW "B"



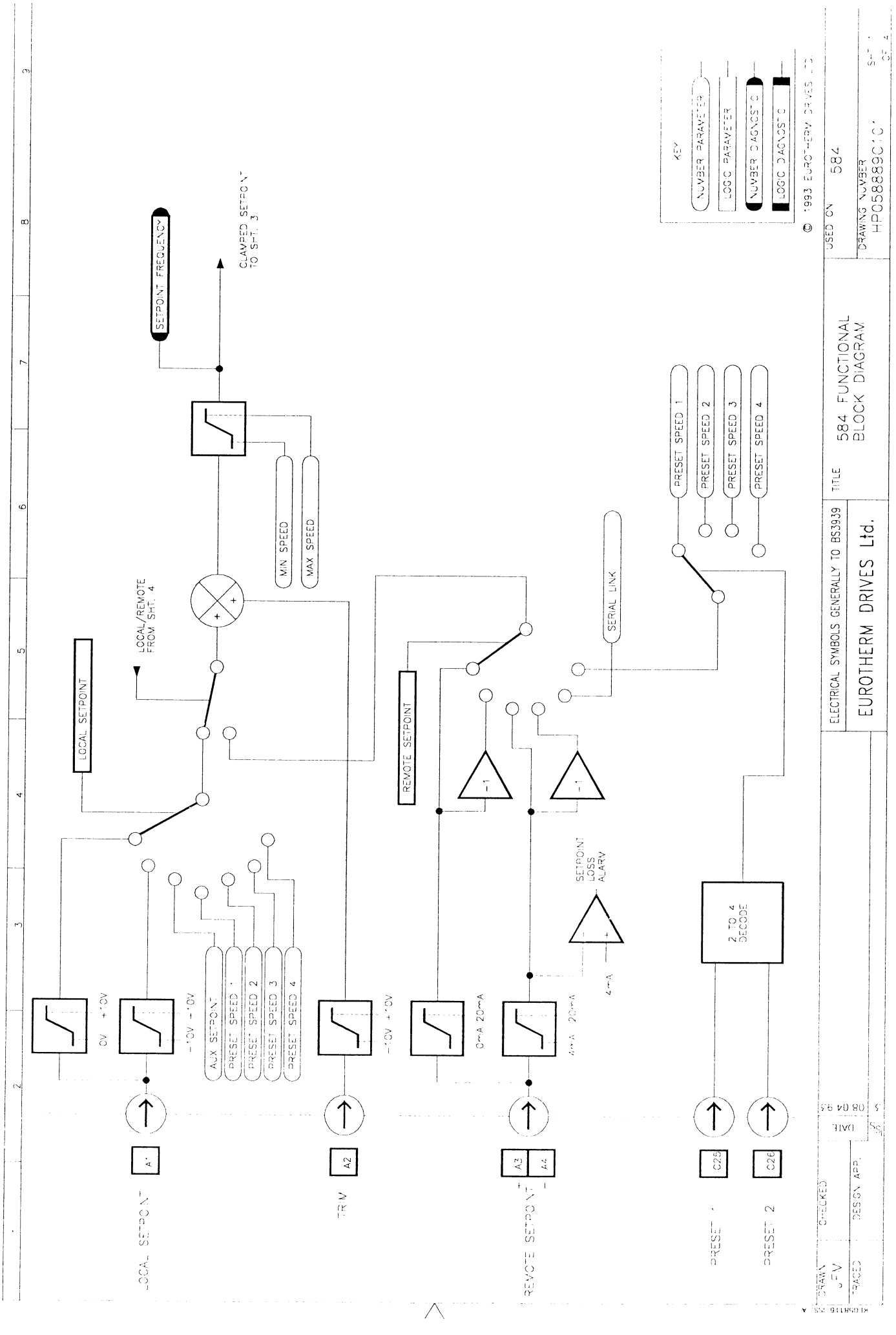
586 TERMINAL COVER

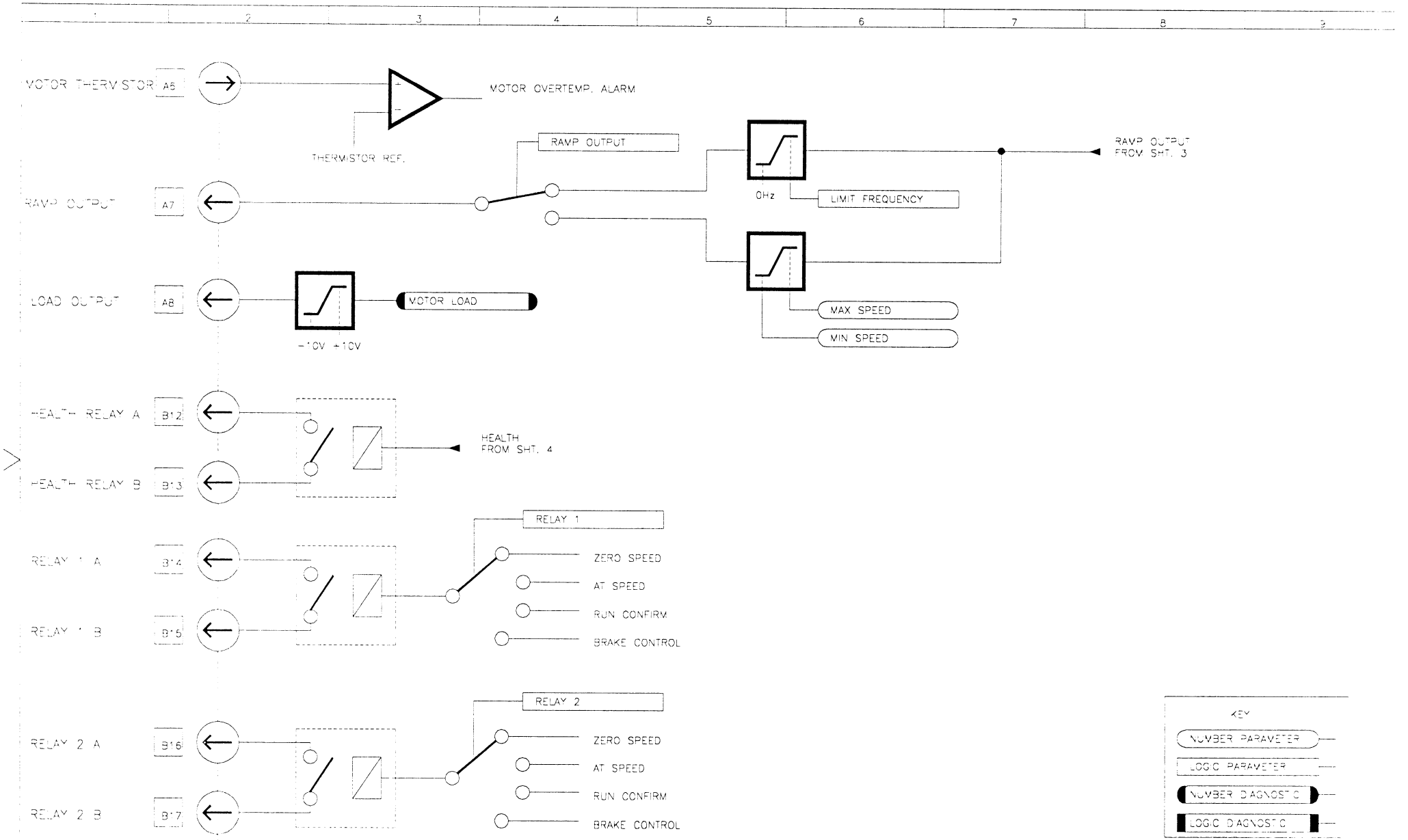


NOTE 1 CONNECTIONS TO CONTROLS TERMINALS 1 TO 27 ARE PLUG IN STYLE TERMINALS CAPABLE OF ACCEPTING 1.5mm (16 AWG) CABLE INTO CLAMP STYLE LOOPS.
2 EARTH CONNECTIONS ARE M6 ALL OTHER CONNECTIONS ARE M8. ALL NECESSARY FIXINGS FOR ELECTRICAL CONNECTIONS ARE SUPPLIED. MECHANICAL FIXINGS ARE NOT SUPPLIED.
3 AT LEAST 100mm CLEARANCE ABOVE AND BELOW CONTROLLER MUST BE PROVIDED FOR COOLING AIR
4 TERIMINAL COVER CAN BE REMOVED BY RELEASING RETAINING SCREWS TO GIVE ACCESS TO CONTROL TERMINALS

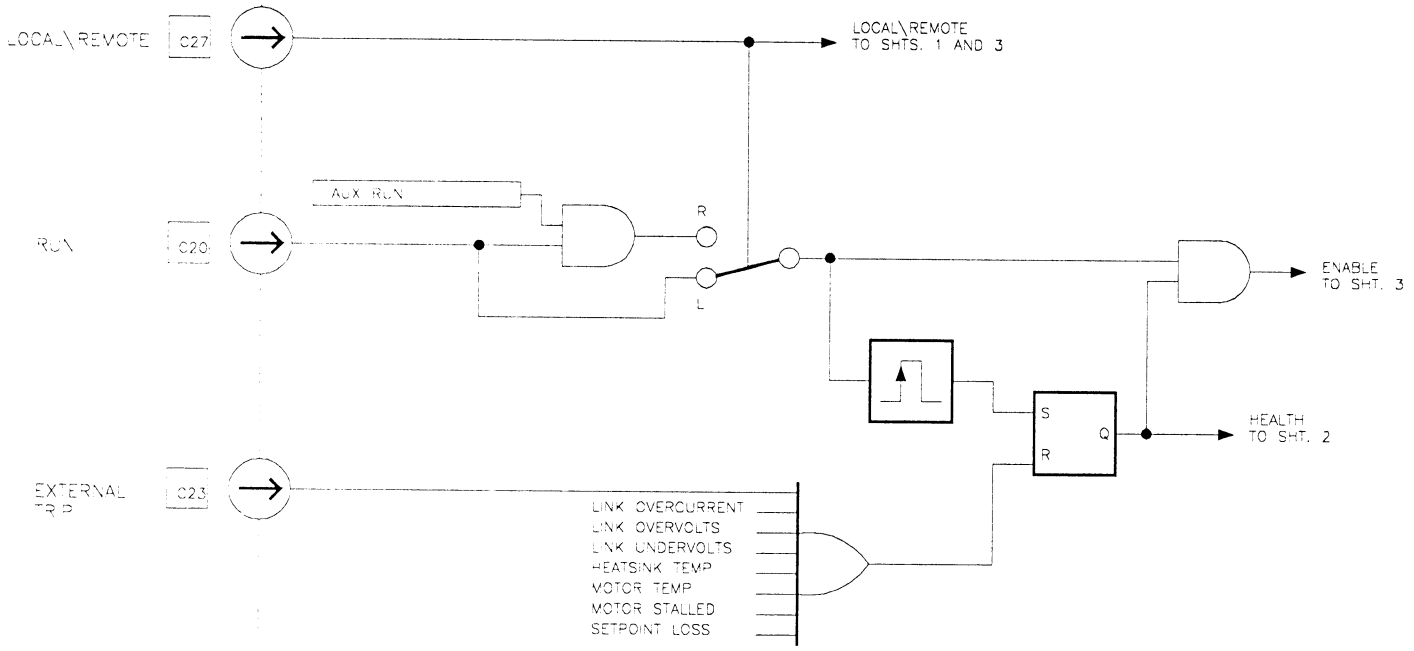
586 OUTLINE DRAWING

HG386744 ISSUE 1 DATE 8/3/93





DRAWN JFM	CHECKED	DATE 07.04.95	ELECTRICAL SYMBOLS GENERALLY TO BS3939	TITLE 584 FUNCTIONAL BLOCK DIAGRAM	USED ON 584
TRACED	DESIGN APP.	ISS 3	EUROTHERM DRIVES Ltd.		DRAWING NUMBER HP0588890104 SHT 2 OF 4



KEY

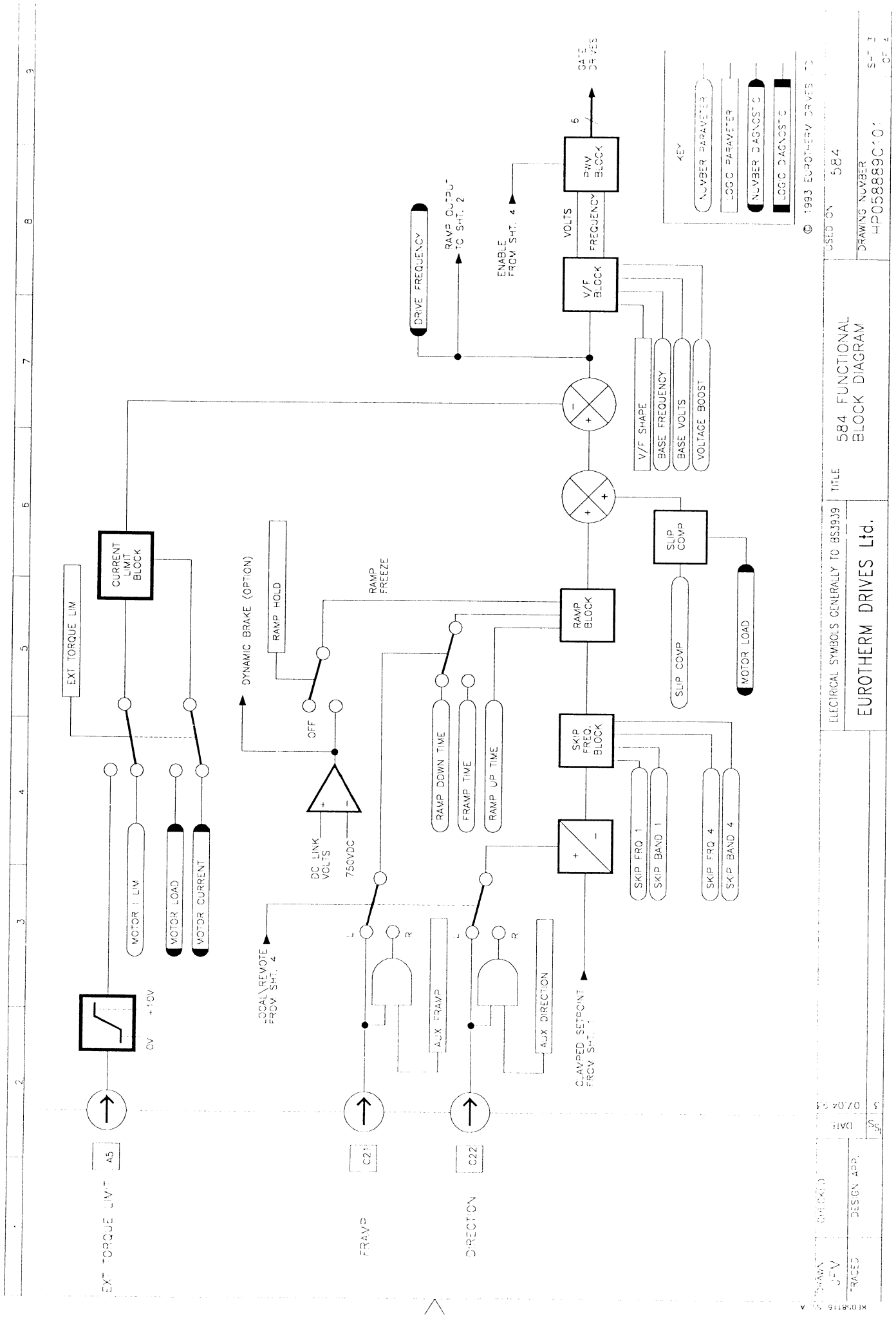
NUMBER PARAMETER

LOGIC PARAMETER

NUMBER DIAGNOSTIC

LOGIC DIAGNOSTIC

DRAWN JFW	CHECKED	ELECTRICAL SYMBOLS GENERALLY TO BS3939	TITLE 584 FUNCTIONAL BLOCK DIAGRAM
TRACED	DESIGN APP.	EUROTHERM DRIVES Ltd.	USED ON 584
ISS 3	DATE 07.04.94		DRAWING NUMBER HP0588890101 SHT 4 OF 4



ISSUE	MODIFICATION	CP. No.	DATE	APPROVAL
A	Initial Issue			GDR
1	General amendments and corrections	6713	14/12/92	GDR
2	Issue 2.2 s/w features added	8147	09/06/93	GDR
3	Amend manual to explain IEC grounding symbol to clarify for UL requirements.	8794	10/02/94	GDR

FIRST USED ON 584	MODIFICATION RECORD 584/585/586 PRODUCT MANUAL
EUROTHERM DRIVES	DRAWING NUMBER ZZ385329C SHT. 1 OF 1